ANNUAL REPORT
2020-21

आज़ादी का अमृत महोत्सव

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

Annual Report 2020-21

1 April 2020 to 31 March 2021

National Council for Cement and Building Materials

(Under the Administrative Control of Ministry of Commerce & Industry, Govt of India)

34 Km Stone, Delhi-Mathura Road (NH-2), Ballabgarh-121004, Haryana

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Message from the Chairman

NCB - The apex body for research, development, technology development & transfer, continuing education in the areas of Cement and Building Materials, under its mission based approach has always strived for developing technical know-how through its programmed projects and rendering technical services with efficiency to the cement and construction industries. It is a matter of contentment to be associated with NCB. As I have observed, NCB always keeps pace with latest developments in the interest of the industry and nation such as conservation of mineral wealth, conservation of energy, environmental aspects, productivity, quality control and quality assurance and growth as a whole.

With its modern testing and evaluation infrastructure, NCB has been providing valuable support to the Indian cement and building materials industry through its targeted research programs to achieve greater sustainability, performance enhancement and cost reduction. NCB has contributed significantly to the development of newer technologies and materials such as composite cements, high volume fly ash cements, geo-polymeric cements and so on.

The institute is also rendering services to the cement and building materials industry by executing projects on sponsored basis, testing materials in its NABL accredited and BIS recognized laboratories, providing calibration services, training and solving problems wherever required. I'm glad to learn that with its strength, NCB has completed 02 research projects and 129 sponsored projects during this period apart from carrying out approximately 100 training programs, disseminating knowledge to more than 1200 professionals working in cement and concrete sector.

Keeping the needs of the industry and stake holders in mind, NCB has taken up programmed projects in the areas of waste utilization like investigations on Ladle Furnace Slag, Cement Backfills Pastes, coarse and ultra-fine fly-ash, high MgO bearing low grade limestone for the manufacturing of Portland clinker.

Recently, NCB has provided valuable support to the cement industry by conducting studies on capacity assessment, energy audits, pre-feasibility, techno-economic feasibility, DPRs and marketing reports. It is heartening to know that NCB is providing PMC services to cement plants abroad, thus carving a niche for itself as a reliable consultancy service provider to the cement industry in this part of the world.

NCB has been carrying out pioneering work for the concrete and construction industries. Investigations on alkali aggregate reaction, corrosion inhibition, PLC cement, durability studies on hardened concrete, utilization of coarser fly ash, properties of Very High and Ultra High Strength Concrete, mechanical & durability properties of High Strength Geo-polymer Concrete, Cathodic Protection (CP) enhancing service life of reinforced concrete structures are areas where NCB is contributing significantly. NCB has also developed number of special concretes for different uses. I'm hopeful that outcomes of such research projects shall tremendously

benefit the building materials sector. Through its Third Party Quality Assurance program, NCB has been a part of prestigious projects of national importance like Convention Centers at ITPO, Pragati Maidan and IICC, Dwarka in Delhi. Apart from these high valued projects, NCB is providing quality assurance services to the building construction industry, having a long and prestigious list of clientele across the length and breadth of the country, thus contributing significantly towards national building.

In the area of Quality Management, apart from providing excellent calibration services to the industry, NCB has conducted Inter Laboratory Proficiency Testing Schemes and continued the supply Bhartiya Nirdeshak Dravyas (BNDs), four of which were launched by Hon'ble Prime Minister of India, this year in January.

NCB has been organizing its flagship event, the International Seminars on Cement and Building Materials since 1987, considered as one of the biggest event for cement and construction industry in this part of the world. I've been apprised that NCB is putting all its efforts to ensure that the 17th International Conference is carried out successfully and in a safe manner, which like its predecessor, is likely to bring all stakeholders of the industry to a single platform for mutual benefit and for benefit of the nation as a whole.

At this point, I would like to extend my deepest appreciation for the scientists and engineers including other technical and non-technical staff at NCB for their contribution during these times when the pandemic fears have gripped the entire globe. I would also like to thank my fellow members in the Board of Governors and its Committees for their valuable advice and guidance in decision making on various issues from time to time. The achievements and progress made by NCB to a great extent are due to the active support and cooperation from the Government, industry and other organizations. I also extend my sincere thanks to the Department for Promotion of Industry and Internal Trade, Government of India for providing their support and direction. I wish that in this new normal, NCB will continue to pursue global standards of excellence in all its endeavors covering: Research, Technology Transfer, Continuing Education, Calibration and Testing Services in the areas of Cement, Construction and Building Materials, thus, satisfying all its stakeholders.

K C Jhanwar
Chairman

02 December 2021

Message from desk of Director General

We've just gone through one of the most eventful and unprecedented years in living history. COVID-19 pandemic, one of the global health crises of our times not only led to loss of valuable lives but also dented economies of the world in an untold manner. The pandemic has given a rude jolt but also taught us lesson for lifetime. Today, our country, like the whole world is confronting twin crisis of COVID-19 and Climate Change which questions the very existence of us and our businesses. The industry must end its reliance on polluting, financially volatile and costly fossil fuels and instead invest in technologies providing economic resilience. Investment in renewable energy and energy efficient technologies will not only help in reducing carbon footprint but also pave the way for increase in jobs.

On the bright side, green shoots of growth in cement industry are now visible as slew of measures have been announced during the union budget presentation on infrastructure-led economic revival. The cement industry is set to hit a decadal high-volume growth of approximately 13% in the next fiscal, helped by an expected revival in demand from the infrastructure and urban housing sectors. For turning challenges into opportunities, we must embrace new and innovative technologies. New innovations, if created and supported in time, might turn out to be a game changer in reducing the much talked about CO_2 footprint of the industry.

I'm pleased to present to the cement and concrete fraternity, government, academia, scientific institutions, civil society and all our stakeholders, the Annual Report for the year 2020-2021. NCB is built on the pillars of knowledge, infrastructure, energy and drive of its people. This year's Annual Report is a story of resilience, resolve and solidarity showcased by NCB employees, working in its units, in all four corners of the country.

In the year gone by, we at NCB have provided reliable technical solutions to our clients, fresh and old alike. With pro-active customer centric approach and constantly updating infrastructure facilities, NCB satisfactorily completed 129 sponsored projects for the industry and is in pursuit of a number of programmed projects. The projects covered all important research areas like utilization of industrial wastes, process optimization studies, energy conservation, environment improvement, feasibility studies, diagnostic studies on distressed structures, quality audit and human resource development.

CRT completed LCF studies, carried out development of cements using low grade limestone and industrial waste. Emphasis was particularly laid down on investigations carried out to utilize wastes in making clinker and cement. State-of-the-art, Independent Testing Laboratories undertook testing as per National and International standards of more than 7000 samples during the period.

CME carried out projects of Project Management Consultancy services, Capacity assessment, Energy audit, pre & techno-economic feasibility and detailed project

reports for setting up cement plants, grinding units and Bulk Cement Terminal as well as marketing report for utilization of FGD Gypsum.

CDR is conducting studies on corrosion inhibitors, mechanical & thermal properties of mass & hardened concrete, carbonation induced reinforcement corrosion, utilization of coarser fly ash, processed LD Slag, properties of VHSC & UHSC, Cathodic Protection (CP), properties of High Strength Geopolymer Concrete and PLC for designing concrete mixes. The Centre is providing durable repair strategy for distressed RCC structures and specialized services in quality assurance/control thereby contributing towards building durable infrastructure in India for prestigious projects of national importance.

CQC developed BNDs, envisioned to boost "***Make in India***" program and fulfill the mission of "***Atmanirbhar Bharat***". 04 such BNDs were dedicated to the Nation by Hon'ble Prime Minister on National Metrology Conclave earlier this year. Supply of CRMs was continued to the laboratories in India and abroad. Calibration services were also provided to clients with excellent feedback. PT schemes, re-certification audit of QMS based on ISO 9001:2015 of all the three units of NCB was successfully carried out.

In the prevailing COVID-19 scenario, CCE imparted online training on cement, concrete and construction technologies through its various special, short-term and refresher courses. 17 students were also admitted in course of PG Diploma in Cement Technology. CIS also organized webinars & workshops on pressing issues of cement and concrete sector with impressive participation from India and abroad. Information on technologies and services along with activities was also disseminated through various modes.

With great satisfaction, I'd like to mention that NCB's current Research and Innovations projects are well aligned to national and global priorities, besides addressing current Research & Innovation requirements of cement, building materials and construction industry. I'm extremely thankful to the unwavering commitment exhibited by my colleagues to uphold high standards of professionalism and whole hearted cooperation extended by their families during the pandemic. I am grateful to the Board and its Committees, DPIIT, MoCI, GoI, for their support, guidance and encouragement. I also thank industry for restoring their faith in NCB's services and their continued patronage thereby invigorating our long-standing relationships and allowing us to continuously foster our common vision to further work for the good of society.

In times to come, we look forward for support and to live up to the expectations of our stakeholders by delivering key sustainable ideas to help businesses and society grow. I hope that this report, like the previous one, will introduce you to the engines that keep us running strong. Our people!

Dr. B N Mohapatra
Director General

03 December 2021

National Council for Cement and Building Materials
(A Premier R&D Organisation under the Administrative Control of Ministry of Commerce & Industry, Govt. of India)

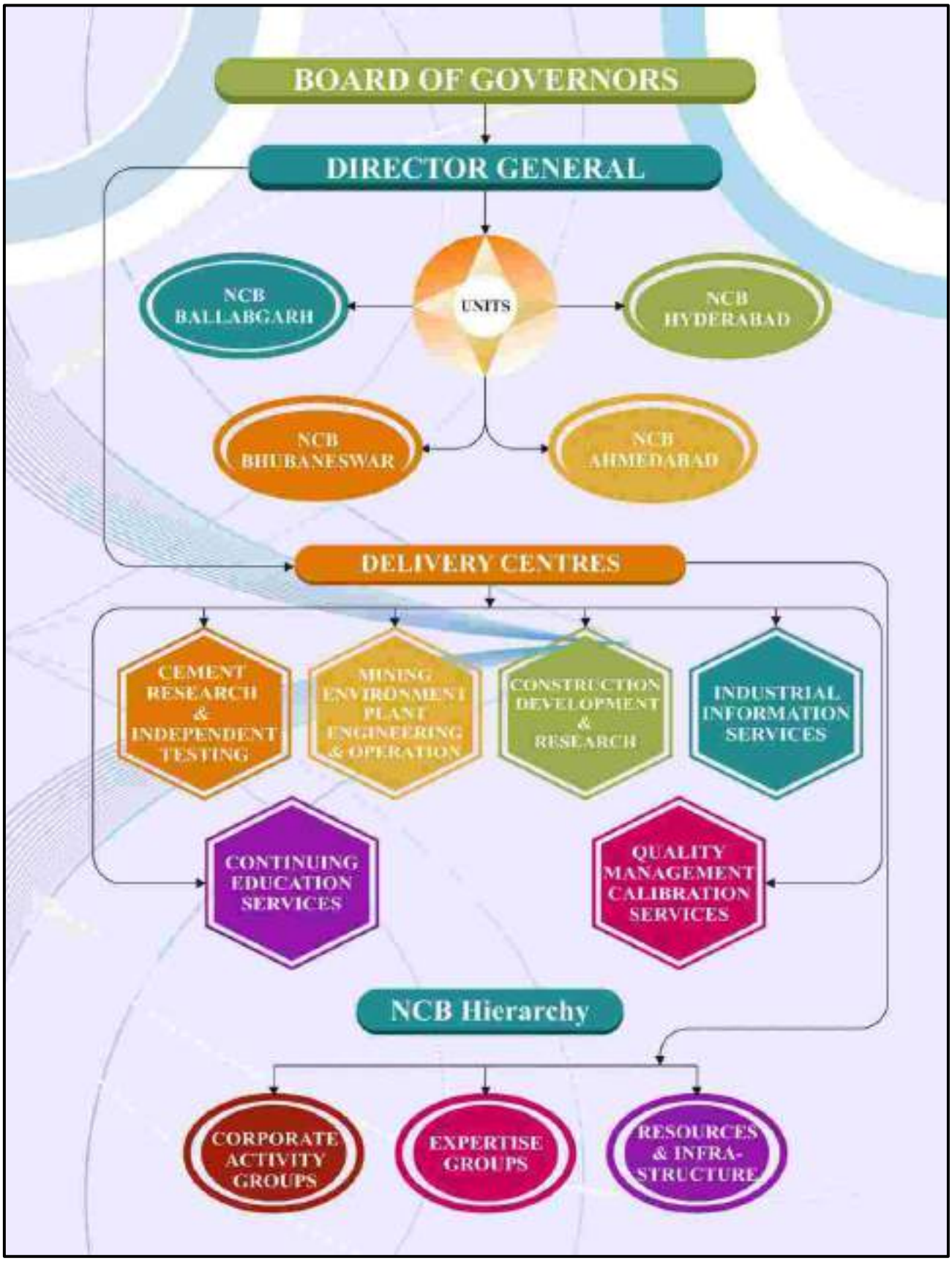
OUR VISION

Be a preferred technology partner to cement and construction sectors in the sustainable development of a better infrastructure and housing.

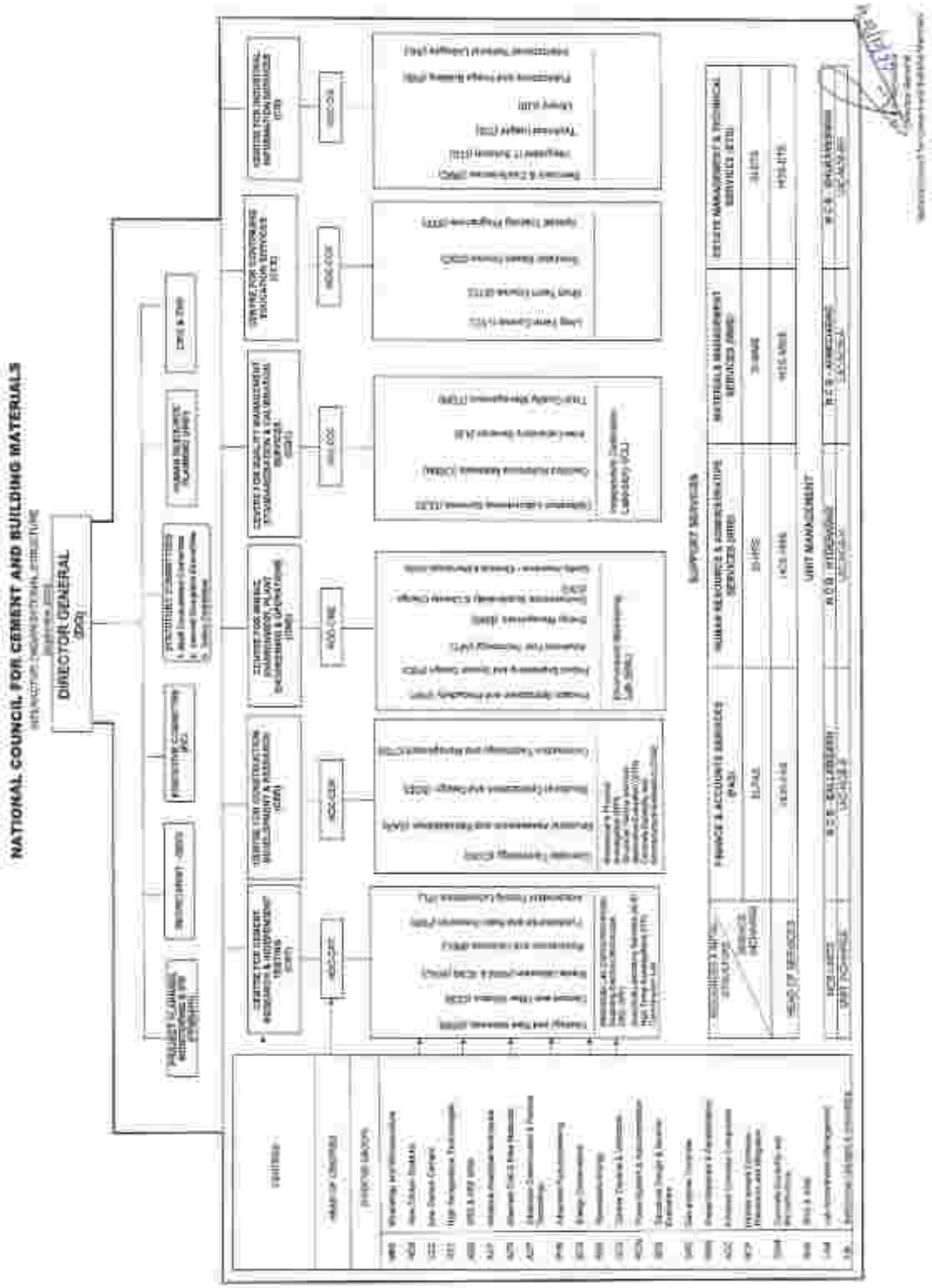
OUR MISSION

Research and Development of innovative technologies, their transfer and implementation in partnership with cement and construction industries.

- To enhance quality, productivity and cost-effectiveness
- To improve the management of materials, energy and environmental resources
- To develop competency and productivity in human resources
- To develop technologies for durable infrastructure and affordable housing


BOARD OF GOVERNORS
DIRECTOR GENERAL
UNITS
NCB BALLABGARH
NCB HYDERABAD
NCB BHUBANESWAR
NCB AHMEDABAD
DELIVERY CENTRES
CEMENT RESEARCH & INDEPENDENT TESTING
MINING ENVIRONMENT PLANT ENGINEERING & OPERATION
CONSTRUCTION DEVELOPMENT & RESEARCH
INDUSTRIAL INFORMATION SERVICES
CONTINUING EDUCATION SERVICES
QUALITY MANAGEMENT CALIBRATION SERVICES
NCB Hierarchy
CORPORATE ACTIVITY GROUPS
EXPERTISE GROUPS
RESOURCES & INFRA-STRUCTURE

NCB Organization Structure



INTRODUCTION OF NCB

National Council for Cement and Building Materials (NCB), the then Cement Research Institute of India (CRI) was founded on 24th December 1962 with the objective to promote research and scientific work, connected with cement and building materials trade and industry.

NCB is the premier R&D Organisation, registered under the Society Act 1860, under the administrative control of Ministry of Commerce and Industry, Govt. of India, for technology development, transfer, continuing education and industrial services for cement and construction industries. NCB serves as the nodal agency for providing the Government the necessary support for formulation of its policy and planning activities related to growth and development of cement industry.

It is devoted to protect the interests of consumers of cement and concrete in the country. NCB's stakeholders are Government, Industry and Society, who perceive NCB's role as discharging national responsibility, providing adequate technology support and improving the quality of life respectively.

Geographically, NCB has its corporate unit and main laboratories located at Ballabgarh (near New Delhi) & regional units at Hyderabad, Ahmedabad (Gujarat) and at Bhubaneshwar (Odisha). The units of NCB-Ballabgarh, Hyderabad and Ahmedabad are ISO 9001:2015 certified.

NCB's areas of work span over the entire spectrum of cement manufacturing and usage starting with geological exploration of raw materials through the processes, the machinery, the manufacturing aspects, energy and environmental considerations to the final utilization of materials in actual construction, condition monitoring & rehabilitation of buildings and structures.

NCB provides ISO 17025 accredited testing and calibration services, ISO 17043 accredited proficiency testing (PT) services and ISO 17020 accredited inspection services. It also develops and supplies certified reference materials (CRMs) to cement and construction sector. For human resource development, NCB imparts training to professionals of cement, concrete and building materials sectors through short term and long term courses. NCB's Post Graduate diploma in cement technology of year duration is approved by AICTE.

In the area of industrial information services, NCB organizes international seminars on cement, concrete and building materials. It has organised 16 editions of this seminar, so far.

All these activities are channelized through six corporate centres:

- **Centre for Cement Research & Independent Testing (CRT):** Centre is responsible for research activity in the areas of cement and other binder, waste utilization, refractory and ceramics, fundamental and basic research. it also

look after testing activities of cement and cementitious materials and other building materials.

- **Centre for Mining, Environment, Plant Engineering & Operation (CME):** Centre carries out its activity in the area of geology, mining and raw materials, environmental management, process utilization and productivity, energy management, plant maintenance and project engineering and system designing.

- **Centre for Construction Development & Research (CDR):** Centre is responsible for research activities in the area of structural assessment and rehabilitation, concrete technology, construction technology and management and structural optimization and design.

- **Centre for Quality Management, Standards & Calibration Services (CQC):** Centre provides services to the industry in the area of proficiency testing, standards reference materials, calibration services and total quality management.

- **Centre for Industrial Information Services (CIS):** Centre provides the IT infrastructure. Centre also looks after the publications, seminar and conferences, international and national linkage and image building of NCB.

- **Centre for Continuing Education Services (CCE):** Centre organizes need based, industry oriented training programmes in the area of cement, concrete and constructions.

NCB has following four service groups to support the technical activities of above six corporate centres.

- **Finance and Account Services (FAS):** FAS is responsible for managing all day-to-day financial activities

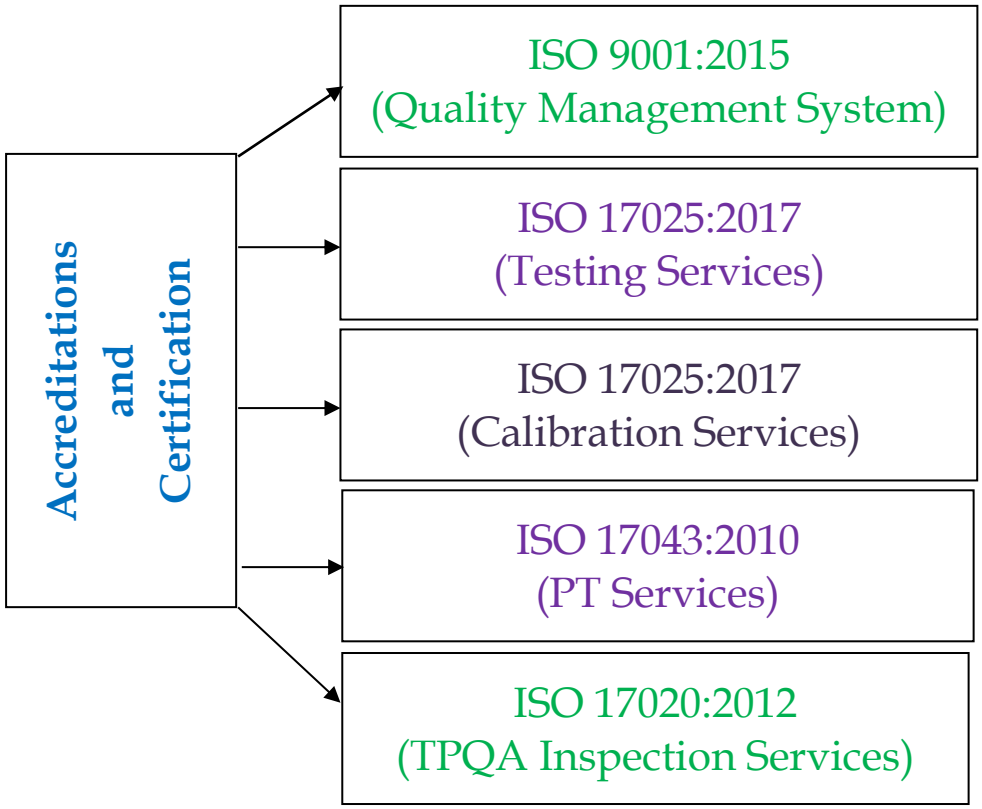
- **Human Resource and Administrative Services (HRS):** HRS-GEN provides the transportation infrastructure and HRS-PER human resources activity such as recruitment, promotion, appraisal etc.

- **Estate Management and Technical Services (ETS):** The infrastructure including resources such as workspace, utilities, equipment and communication technology infrastructure are maintained by ETS.

- **Materials Management Services (MMS):** MMS is responsible for purchase of materials including raw material as well as equipment as per the requirements of different departments of organization.

NCB's Commitment to International Quality Standards

NCB in its commitment to achieve excellence has adopted world class practices and implemented international standards for Quality Management System. NCB's quality management system is certified as per ISO 9001:2015. NCB provides world class Testing, Calibration, Proficiency Testing and Third Party Inspection Activities which are accredited as per International Standards.



Quality Management System Certification as per ISO 9001:2015

ISO 9001 is international standard published by International Organization for Standardization which specifies requirements for quality management system with the aim to enhance customer satisfaction, ability to provide reliable products and services meeting customer's requirements and expectations. NCB implemented ISO 9001 since 2002. NCB-Ballabgarh, NCB-Hyderabad and NCB-Ahmedabad units are ISO 9001:2015 certified.

QUALITY POLICY

We commit ourselves to:

- **Pursue global standards of excellence in all our endeavors, covering: Research, Design and Development, Technology Transfer, Continuing Education, Calibration and Testing Services in the areas of Cement, Construction and Building Materials.**
- **Satisfy all our stakeholders- Government, Industry and Society.**
- **Continually improve the Quality Management System.**
- **Comply with the requirements of ISO 9001:2015 [E] Quality Management System and other applicable requirements.**

BMS CERT

CERTIFICATE OF REGISTRATION

National Council for Cement and Building Materials

ISO 9001:2015

ISO 17025:2017- Testing Services

ISO/IEC 17025:2017 is international standard published by International Organization for Standardization and International Electro Technical Commission. ISO/IEC 17025:2017 specifies the general requirements for the competence, impartiality and consistent operation of laboratories involved in testing, calibration and sampling. NCB implemented ISO/IEC 17025 for its testing services since 1998. NCB provides complete physical, chemical, mineralogical and micro-structural analysis of various types of raw materials, cement, clinker, pozzolana, aggregate, concrete, admixtures, water, refractory, bricks, coal, lignite, Environment parameters etc. & Non-Destructive Testing as per National and International standards.

QUALITY POLICY

Testing laboratories of National Council for Cement and Building Materials, Ballabgarh are committed to provide reliable and accurate test results to the total satisfaction of customers in accordance with the stated methods and customer's requirement.

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS (TESTING LABORATORIES)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

[illegible]

in the field of

TESTING

Certificate Number [illegible]

Issue Date [illegible] Valid Until [illegible]

[illegible]

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

ISO 17025:2017- Calibration Services

ISO/IEC 17025:2005 is international standard published by International Organization for Standardization and International Electro Technical Commission. This standard specifies the general requirements for the competence to carry out tests and/or calibrations, including sampling. NCB implemented ISO/IEC 17025 for its calibration services since 1998. NCB provides quality calibration services in the field of force, mass, pressure, volume, rpm and dimension fields.

QUALITY POLICY

Independent Calibration Laboratories of National Council for Cement and Building Materials, Ballabgarh are committed to provide reliable and accurate calibration results to the total satisfaction of customers in accordance with the stated methods and customer's requirements, and set quality objectives.

QUALITY OBJECTIVES

1. **Providing reliable calibration services, accurately and timely, to the satisfaction and requirements of customers.**
2. **Continual improvement and upgradation of services and facilities in accordance with changing customer requirements.**
3. **Improving customer satisfaction feedback.**
4. **Increasing resource generation.**

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

INDEPENDENT CALIBRATION LABORATORIES, NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

in the field of

CALIBRATION

Signed for and on behalf of NABL

N. Venkateswarlu
Chief Executive Officer

ISO 17043:2010 - Proficiency Testing Services

ISO/IEC 17043:2010 is international standard published by International Organization for Standardization and International Electro Technical Commission. This standard specifies general requirements for the competence of providers of proficiency testing schemes and for the development and operation of proficiency testing schemes. NCB implemented ISO/IEC 17043:2010 since 2013. NCB provided proficiency testing services in testing of various building materials like cement, clinker, fly ash, limestone, coal/coke, granulated slag, water, steel, aggregate etc.

QUALITY POLICY

Interlaboratory Services of National Council for Cement and Building Materials, Ballabgarh, are committed to provide highest quality of proficiency testing services to participants and other customers.

QUALITY OBJECTIVES

1. **To provide efficient and reliable proficiency testing services, to the satisfaction and requirements of proficiency testing participants and other customers.**
2. **To continually improve and upgrade proficiency testing services.**
3. **To improve feedback of participants and customers.**
4. **To analyze and improve the management system, proficiency testing schemes. and customer service.**

National Accreditation Board for Testing and Calibration Laboratories
(A Constituent Board of Quality Council of India)

CERTIFICATE OF ACCREDITATION
INTERLABORATORY SERVICES, NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
has been assessed and accredited in accordance with the standard
ISO/IEC 17043:2010
"Conformity Assessment - General Requirements for Proficiency Testing"
for its facilities at
34, KM Stone, NH-2, Delhi-Mathura Road, Ballabgarh, Haryana
in the field of
Proficiency Testing Provider

Certificate Number
Issue Date
Valid Until

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

ISO 17020:2012-Third Party Quality Assessment

ISO/IEC 17020:2012 is international standard published by International Organization for Standardization and International Electro Technical Commission. This standard specifies requirements for the competence of bodies performing inspection and for the impartiality and consistency of their inspection activities. NCB implemented ISO 17020:2012 for Third Party Quality Assurance Inspection Services since 2017. NCB provides Technical Audit (TA), Quality Assurance & Quality Control (QA/QC) and Third Party Quality Audit (TPQA) of new constructions- residential, commercial & institutional Buildings; Flyovers, Concrete roads, Bridges etc.

QUALITY POLICY

National Council for Cement and Building Materials is committed to provide reliable and impartial inspection services in a confidential manner and without any discrimination to the total satisfaction of customers in accordance with the stated methods and customer requirements.

National Accreditation Board for Certification Bodies

NABCB

INSPECTION BODY

Accreditation Certificate

NABCB hereby confirms that

National Council for Cement and Building Materials

34 Km Stone, Delhi – Mathura Road (NH-2),
Ballabgarh -121004, Haryana, India

Complies with NABCB Accreditation Criteria for Inspection Bodies
and is accredited in accordance with

International Standard ISO/IEC 17020:2012
as Type 'A' Inspection Body

to provide Inspection Services as per
Approved Scope of Accreditation described in Schedule I
and from its Office(s) described in Schedule II

Accreditation Certificate Number	:	**IB 043**
Date of Initial Accreditation	:	12 January 2018
Validity of Accreditation	:	11 January 2021

(ANIL JAUHRI)
CEO

Page 1 of 1

12 January 2018
Issue Date

BOARD OF GOVERNORS (BOG) 2020

Management of NCB is entrusted to a Board of Governors, which consists of representatives of cement manufacturers, government of India and consumers of cement. The composition of BOG is given below:

Composition of BOG (Till 31.12.2020)

Chairman

Shri Mahendra Singhi
President-CMA,
Managing Director & Chief Executive Officer
Dalmia Cement (Bharat) Limited

Members

Shri Shashank Priya
Additional Secretary & Financial Advisor
Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry, Govt. of India

Shri S P Singh Parihar#
Chairman
Central Pollution Control Board

Shri Shiv Das Meena##
Chairman
Central Pollution Control Board

Shri Rajendra Chamaria
Vice Chairman & MD
Star Cement Ltd.

Shri K K Maheshwari*
Managing Director
UltraTech Cement Ltd.

Shri Getamber Anand
Chairman, Confederation of Real Estate Developers' Associations of India (CREDAI), ATS Infrastructure Ltd.

Dr. B N Mohapatra
Director General NCB

Shri Anil Agrawal
Joint Secretary (Cement)
Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry, Govt. of India

Shri Abhay Bakre
Director General
Bureau of Energy Efficiency

Shri V S Narang
Director (Technical)
My Home Industries Pvt. Ltd.

Shri Prashant Bangur
Director
Shree Cement Ltd.

Shri B V N Prasad
Chairman & Managing Director
Cement Corp. of India (CCI)

Shri Ajay Kapur**
Managing Director & CEO
Ambuja Cements Ltd.

Shri Sumeer Malgoora
Managing Partner
Shivalik Cement Industries

Note: The above BOG was formed for the year 2018 & 2019, however, the same continued till 31.12.2020.
#Till 17th May 2020; ## From 18th May 2020
* Retired from M/s UltraTech Cement Ltd. on 31st December 2019
** Resigned as per communication received from M/s Ambuja Cements Ltd. dated 09th March 2019

BOARD OF GOVERNORS (BOG) 2021 & 2022

Composition of BOG (From 01.01.2021)

Chairman

Shri K C Jhanwar
President - CMA
Managing Director & Chief Executive Officer
UltraTech Cement Limited

Members

Shri Neeraj Akhoury
Vice Chairman
Managing Director & CEO
Ambuja Cements Limited

Shri Anil Agarwal
Additional Secretary (Cement)
Department for Promotion of Industry & Internal Trade, Ministry of Commerce & Industry, Govt. of India

Shri Shashank Priya
Additional Secretary and Financial Advisor
Department for Promotion of Industry & Internal Trade, Ministry of Commerce & Industry, Govt. of India

Shri Abhay Bakre
Director General
Bureau of Energy Efficiency

Shri Giridhar Aramane, IAS
Chairman
National Highways Authority of India

Shri Jamshed N Cooper
CEO & Managing Director
Heidelberg Cement India Limited

Shri Jayakumar Krishnaswamy
Managing Director
Nuvoco Vistas Corp Ltd

Shri Deepak Khetrapal
Managing Director & CEO
Orient Cement Limited

Shri Rajendra Chamaria
Vice Chairman & Managing Director
Star Cement Limited

Shri P N Chhangani
Wholetime Director
Shree Cements Limited

Shri Rakesh Singh
Executive President
The India Cements Ltd

Shri Satish Magar
Chairman
Confederation of Real Estate Developers' Associations of India

Shri Anil Meshram
Manging Director
Tamilnadu Cements Corporation Ltd

Dr B N Mohapatra
Director General NCB

Note: The above BOG is formed for the year 2021 & 2022 w.e.f. 01.01.2021.

MEETINGS OF BOARD OF GOVERNORS (BOG)

The 119th & 120th Board of Governors (BOG) meetings were held on 29th September 2020 & 23rd December 2020 respectively under the Chairmanship of Sh. Mahendra Singhi, Chairman-NCB & Managing Director & CEO, Dalmia Cement (Bharat) Ltd.

BOG is the highest decision making body of NCB and is aided by various Committees like Administrative and Finance Committee (AFC), Infrastructural Development Committee (IDC), Research Advisory Committee (RAC) and Advisory Committee for Hyderabad & Bhubaneswar (ACH) of NCB to make informed decisions on multiple issues relating to finance, manpower, service matters and rules. Many important discussions were held during the meetings which led to key decisions made in both the BOG meetings.

Meeting of Board of Governors (BOG)

CORPORATE ADVISORY COMMITTEES

Research Advisory Committee (RAC)

RAC advises on all aspects pertaining to Programmed R&D and industrial support services in NCB, with particular reference to technology forecasting, technology planning, programmes, strategies and methodologies and the overall project programme of NCB. RAC comprises of eminent and learned technocrats representing Indian cement and concrete industry, technology suppliers, officials from Ministry of Commerce and Industry, Government of India, Elite academia and Bureau of Indian Standards *(BIS)*, Director General-NCB etc. The RAC members meet twice in a year.

The composition of RAC has officials from

- Govt. of India: 01
- Other Govt organizations: 09
- CSIR Labs: 05
- Academic institutions: 02
- Cement & Construction Industry: 19
- Consultants / Others: 01
- NCB: 07

The detailed composition is given below:

Chairman

Shri Ashwani Pahuja
Executive Director & Chief Sustainability Officer
Dalmia Cement (Bharat) Limited

Members

Shri V H Choudary
Plant Head
My Home Industries Ltd.

Dr Awadhesh Singh
VP and Head (Product Assurance and Services)
UltraTech Cement Ltd.

Dr V Ramachandra
Head (Technical Services)
UltraTech Cement Ltd.

Dr G V K Prasad
Executive President (CPU-I, II & CCP)
The KCP Ltd.

Shri Raju Goyal
Chief Technology Officer
Ultratech Cement Ltd.

Shri Pankaj Kejriwal
Executive Director
Cement Manufacturing Co Ltd.

Dr Manish V Karandikar
Vice President- Raw Mix & Product Optimisation
ACC Ltd.

Shri Narendrasinh N Gohil
Dy General Manager (Q&A)
Shree Digvijay Cement Co Ltd.

Shri A Subose Chandra Bose
Joint President (Manufacturing)
The India Cements Ltd.

Shri Dinesh G Randad
Director (Works)
Gujarat Sidhee Cement Ltd.

Shri Sushil Kumar Rathore
Unit Head
J K Cement Works

Dr S K Saxena
Vice President (Jhajjar Unit and QA)
J K Lakshmi Cement Ltd.

Shri B C Pandey
Manufacturing Cluster Head (N)
Ambuja Cements Ltd.

Shri S K Tiwari
Technical Director
Heidelberg Cement India Ltd.

Director (IA)
Ministry of Environment, Forests & Climate Change

The Controller General
Indian Bureau of Mines

The Executive Director
Building Materials and Technology Promotion Council

The Director General
National Productivity Council

Shri Sanjay Pant
Director (Civil Engg.) & Head
Bureau of Indian Standards

The Member Secretary
Central Pollution Control Board

Shri M Srinivasan
President-Manufacturing
The Ramco Cements Ltd.

Shri S D Arya
Vice President (Production & QA)
Mangalam Cement Ltd.

Director (Cement)
Dept. for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry

Shri Sunil Khandare
Director
Bureau of Energy Efficiency

Dr Nahar Singh
Principal Scientist
National Physical Laboratory

The Director
Central Soil & Materials Research Station

The Deputy Director General
Geological Survey of India

The Director
Central Building Research Institute
Roorkee

Prof. B Bhattacharjee
Prof. of Civil Engineering
Indian Institute of Technology

Prof. G C Mishra
Director (Cement Technology)
AKS University

Ms Aparna Dutt Sharma
Secretary General
Cement Manufacturers' Association

Shri R K Khandekar
Addl. General Manager
Ash Utilization Group
NTPC Ltd.

Dr K Ramanjaneyulu
Chief Scientist Structural Engineering Research Centre

The Chairman and Managing Director
National Research Development Corporation

Dr Lakshmy Parameswaran
Chief Scientist
Bridges and Structures Division
Central Road Research Institute

Dr K Mohan
Ex Director General NCB

Dr S K Handoo
Advisor (Tech)
My Home Industries Pvt. Ltd

ADVISORY COMMITTEE FOR NCB–HYDERABAD

In an endeavor to reach out to the cement and construction sectors in South India and share NCB's Research and Innovative initiatives, Advisory Committee for NCB-Hyderabad (ACH) has been constituted. The committee deliberates on various aspects of development of NCB–Hyderabad and its activities. It focusses in particular on the development & utilization of infrastructural facilities of the Unit and industrial & training services rendered by it.

The Composition of ACH has officials from Central/State Government Departments: Cement & Construction Industry, Research Institutes (IIT/NIT/BITS). The detailed composition of ACH is given below:

Chairman

Shri V S Narang
Director (Technical)
My Home Industries Pvt. Ltd.

Members

Shri D Muruganandam
President (Manufacturing)
M/s The India Cements Ltd.

Shri Sushil Kumar
Unit Head
M/s Ambuja Cements Limited

Shri V Ganesan
Chief Operating officer
Chettinad Cement Corpn. Pvt. Ltd

Shri RBM Tripathi
Plant Head
M/s J K Cement Ltd

Shri Amit Mehta
Vice President – Mgf.
M/s Kalburgi Cement Private Limited

Shri RVR Murthy
Plant Head
M/s. Orient Cement Limited

Shri Madhusudhan Rao
Vice President
M/s The K C P Limited

Shri K R Reddy
Director
M/s ACC Limited

Shri B. M. Mahana
HOD - Prod
Cement Corporation of India Ltd

Shri AVNVS Murthy
Plant Head
M/s Dalmia Cement (Bharat) Ltd

Shri Arpan Parekh
Plant Head
M/s JSW Cement Limited

Shri K Ravi
Managing Director
M/s NCL Industries Ltd.

Shri D Lakshmikantham
Director (Technical)
M/s. Penna Cement Ind. Ltd.

Shri SVRK Murthy Rao
Plant Head
M/s The Ramco Cements Limited

Shri S Sreekanth Reddy
Joint Managing Director
M/s. Sagar Cements Limited

Shri Surya Valluri
Plant head
M/s Ultra Tech Cement Ltd

Shri G Srinivasa Reddy
Plant Head
M/s Kesoram Industries Limited

Dr. N V Ramana Rao
Director
National Institute of Technology-Warangal

Dr. Ratish Kumar
Professor – Civil Engg.
National Institute of Technology-Warangal

Dr. Ramancharla Pradeep Kumar
Professor & Head, Earthquake Engineering Research Centre
Indian Institute of Technology-Hyderabad

Shri N Srinivasa Rao
Superintendent Engineer – CMDA
Member Chennai Metro Politan Development authority

Shri P. Kanaka Raju
Chief Engineer
Central Public Works Department

Shri P K Laad
General Manager- Tech Services
NTPC Ltd.-Ramagundam

Shri. Ameer Uz Zaman
Scientist 'F' & Head
Bureau of Indian Standards

Dr. B N Mohapatra
Director General
National Council for Cement and Building Materials

Shri Arvind Kumar Patil
Unit Head
M/s Shree Cement Ltd

Shri S V Murali Prasad reddy
Plant Head
M/s Zuari Cement Limited

Sh. V M Moorthy
Vice President - Technical
M/s. Rain Cements Ltd.

Dr. Kumar Molugaram
Professor & Principal
University College of Engineering
Osmania University

Prof. KVL Subramanian
Indian Institute of Technology-Hyderabad

Prof. K V R Chary
Director
Indian Institute of Science Education and Research-Berhampur

Shri N N Samba Siva Rao
Chief Engineer
Central Public Works Department

Shri J Mohan Naik
Chief Engineer (R & B)
State Roads & Core Roads Network wing
Govt. of Telangana

Member Secretary
Telangana State Pollution Control Board
Paryavaran Bhawan

Shri D.B.N.RAO
Former Director General
NCB

Ms. K V Kalyani
Unit-in-Charge of NCB–Hyderabad :
Member Secretary

INFRASTRUCTURAL DEVELOPMENT COMMITTEE

(IDC)

Infrastructural Development Committee (IDC) advises the Board of Governors on various aspects of land, building services, equipment and facilities at the various NCB Units and to cause these infrastructural developments to be carried out at the various NCB Units and to assist in conducting the affairs of the unit in such a manner as to fulfill the set objectives with the programmes, policies and guidelines laid down by the board. The composition of the committee is given below:

Chairman

Shri V S Narang
Director (Technical)
My Home Industries Pvt. Ltd.

Members

The Director (Cement)
Department for Promotion of Industry and Internal Trade,
Ministry of Commerce & Industry

Dr Rakesh Kumar
Head of Deptt. (Rigid Pavements)
Central Road Research Institute

Dr Sujit Ghosh
Executive Director (New Building Solutions)
Dalmia Cement (Bharat) Ltd.

An NCB Official nominated by
DG NCB : Member-Secretary

Shri S K Deshpande
Scientist 'G & Advisor,
Dept. of Scientific & Indl. Research,
Ministry of Science & Technology

Shri Chander Shekhar
Addl. General Manager-PE-Civil
NTPC Ltd.

DG NCB
Joint Directors and Head of concerned Service Groups in NCB

ADMINISTRATION AND FINANCE COMMITTEE (AFC)

Administration and Finance Committee (AFC) advises the Board of Governors on issues relating to financial planning, budgets, accounts, manpower growth plan and service matters including various rules of NCB. To take decisions on behalf of the Board of Governors on individual personnel cases and on issues of administrative nature as may be referred to it by the Board or by the Director General-NCB. All such decisions are reported to the Board at its immediate next meeting through the relevant status report. The composition of the committee is given below:

Chairman

Shri Rajendra Chamaria
Vice Chairman & Managing Director
Star Cement Limited

Members

The Senior Development Officer (Cement)
Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry

The Director Integrated Finance Wing
Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry

Shri C K Bagga
Vice President (Fin. & A/Cs)
J K Lakshmi Cement Ltd.

Shri Dharmender Tuteja
Executive Director
F&A & Commercial
Dalmia Cement (Bharat) Ltd.

DG NCB
Joint Directors and Heads of concerned Service Groups

An NCB Official nominated by DG NCB: Member-Secretary

Executive Committee (EC)

With a view to achieve the objectives of collegiate management and to assist the Director General to deal with the various functions, the Executive Committee, comprising heads of various Divisions of activities with the Director General as its Chairman. The composition of the committee is given below:

Chairman

Dr. B N Mohapatra
Director General-NCB

Secretary

Dr. S K Chaturvedi
HOC-CRT & HOS-FAS

Members

Shri Ashutosh Saxena	HOC-CME & HOS-HRS
Mrs K V Kalyani	Unit In-charge, NCB-Hyderabad
Shri V V Arora*	HOC-CDR, Unit In- charge, NCB-Ahmedabad & Bhubaneswar
Dr. D K Panda	HOC-CCE
Shri P N Ojha**	HOC-CDR, Unit In-charge, NCB-Ahmedabad
Shri Amit Trivedi$	HOC-CQC & HOS-MMS
Dr. B P Ranga Rao$$	Unit In-charge, NCB-Bhubaneswar
Shri A V S Manian#	HOC-CIS-I
Shri Anupam##	HOC-CIS
Shri T V G Reddy@	HOS-ETS
Dr. D Yadav@@	Incharge-TPM

** Retired on 31st May 2020;*
*** Earlier as HOC-CQC till 7th June 2020 and then as HOC-CDR & UIC-A from 08th June 2020*
$ Earlier as HOS-MMS till 7th June 2020 and then as HOC-CQC & HOS-MMS from 08th June 2020
$$ from 8th June 2020; # Till 4th September 2020; ## from 11th June 2020;
@ from 8th June 2020; @@ Till 22nd July 2020

Corporate Advisory Committee Meeting

CORPORATE ADVISORY COMMITTEE MEETINGS

50th MEETING OF INFRASTRUCTURAL DEVELOPMENT COMMITTEE (IDC)

The 50th Meeting of Infrastructural Development Committee (IDC) was held on 07th August 2020 under Chairmanship of Sh. V S Narang, Director (Technical), My Home Industries (P) Ltd

A presentation, highlighting the details of infrastructure up-gradation activities undertaken at NCB-Ballabgarh and NCB-Hyderabad and status of work through visuals/photographs was made.

DG-NCB explained the requirement of funds for procurement of latest equipment as well as replacement of obsolete equipment. He also informed about the planning of setup of Alternate Fuels laboratory in a phased manner to cater the requirement of industry. Proposed list of equipment (based on the industry requirement in the recently conducted AFR workshop) to be procured in the first phase was also discussed. DG also informed about the planning of expansion of Bhubaneswar project office to cater the cement plants of eastern zone.

64th MEETING OF ADMINISTRATION & FINANCE COMMITTEE (AFC)

The 64th Administration & Finance Committee (AFC) meeting was held on 03rd September 2020 under the Chairmanship of Sh. Rajendra Chamaria, Vice Chairman & Managing Director, Star Cement Ltd. The Committee took vital decisions on behalf of the Board of Governors on individual personnel cases and on issues of administrative nature which were referred to it by the Board and by DG-NCB.

56th ANNUAL GENERAL MEETING (AGM)

The 56th Annual General Meeting of NCB was successfully held on 14th Dec 2020 virtually under the chairmanship of Sh. Mahendra Singhi, President-Cement Manufacturers' Association and MD & CEO, Dalmia Cement (B) Ltd. The AGM was attended by senior Cement Industry Experts from UltraTech Cement, Dalmia Cement, ACC Ltd, Ambuja Cement, JK Cement, JK Lakshmi Cement, Star Cement, Orient Cement, The KCP Ltd., Gujarat Sidhee Cement, My Home Ind., Prism Johnson, AKS University and senior NCB officials. DG-NCB gave a detailed presentation on the NCB activities during the last one year, highlighting the important projects undertaken, webinars/ workshops organised; new equipment facility added and increased interaction with Academia & Industry.

Chairman-NCB in his address thanked Sh. Anil Agrawal, Joint Secretary and other officials of DPIIT for their constant guidance and support to research activities of NCB. He emphasized that the achievements of NCB are due to the support of various stakeholders viz. Government, Cement Industry, Construction Industry etc. He highlighted that NCB has completed 11 R&D projects on waste reduction, improved sustainability & reduction in carbon footprint of cement industry and trained about 1065 cement & construction industry professionals through 64 training programmes. He thanked cement and construction industry professionals for supporting and banking on NCB services. He complimented DG-NCB and his team for efforts and commitment for providing quality services to cement and construction industry.

NCB'S PROGRAMMES AND THEIR FULFILMENT

THE CORPORATE PROGRAMMES

NCB continues to be a preferred research & consultancy partner for the cement and construction industry. With its state-of-art laboratories and addition of modern and latest scientific equipment, reinforced by the enthusiastic experienced scientists and engineers and pro-active leadership, NCB has been providing innovative technological solution to overcome the hurdles faced by industry and nation at large. Services were provided in the areas of development of newer products, optimal utilization of resources be it limestone or industrial waste, process optimization, energy studies, plant maintenance, structural assessment and rehabilitation, quality assurance in construction, concrete technology, materials evaluation, application of nanotechnology, dissemination of information through webinars & online training programmes and total quality management.

NCB's activities aligned with schemes and missions of Govt. of India

Skill India Mission	NCB's Centre for Continuing Education (CCE) and Centre for Industrial Information Services (CIS) has been organising various industry oriented training programmes and Seminars / Workshops / Online Training/Webinars for cement, concrete, construction and building material sectors. Beneficiaries: **Entire Cement Industry, IAF, RRI, SRO, Indian Post, Indian Railways, CPWD, PWD & Water Resources Department of various State Governments, BPCL, HPCL, IOCL, DMRC, NBCC India Ltd., NHPC Ltd., Power Grid Corp. of India Ltd., NTPC, GAIL India Ltd.**
Make in India	**To promote** "Atma Nirbhar Bharat" **and** "Make in India" **programme by reducing the import of foreign Standard Reference Materials, NCB's Centre for Quality Management, Standards & Calibration Services (CQC) developed 12** Bhartiya Nirdeshak Dravya (BNDs) **for cement and cementitious materials.** **CQC provides** Proficiency Testing **services as well as** Calibration services **traceable to National / International Standards in various fields of force, temperature, mass & volume, dimension, pressure and RPM.**
Reduction of CO_2 intensity by 33-35% by 33 to 35 per cent by 2030 below 2005 levels	**NCB's Centre for Cement Research and Independent Testing (CRT) has undertaken extensive research for Clinker Substitution to achieve specific CO_2 emissions to 0.35 tCO_2/t of cement by development of:** • Low Carbon Clinker • Portland Composite Cement based on fly ash and Limestone • Portland Limestone Cement and • Portland Dolomite Cement • Multi component blended cement
Swachh Bharat	**NCB's Centre for Construction Development and Research (CDR)** has done extensive research on utilisation of C&D waste as well as other industrial waste as an alternative to natural fine and coarse aggregates. Development of Geopolymer Cement and Concrete systems. **NCB's CRT & CME centres are actively working with cement industry for utilisation of various wastes as Alternative Fuels and Raw Materials to enhance %TSR from 4% to 25% by 2030.**
PAT Scheme of BEE	**NCB's Centre for Mining, Environment, Plant Engineering and Operations (CME)** has carried out over 300 Energy Audits of cement plants for improving Energy Efficiency under the Perform Achieve & Trade (PAT) scheme of Bureau of Energy Efficiency (BEE), Ministry of Power, Govt. of India. **CME is also carrying out research on ways to maximize Waste Heat Recovery and utilize Renewable Energy in cement related operations.**
Smart Cities Mission	**NCB's Centre for Construction Development and Research (CDR)** is providing reliable technical services to ensure durable and sustainable infrastructure by undertaking Third Party Quality Assurance and Audit of Construction Projects such as Convention Centres, Buildings, Bridges, Roads etc. for CPWD, PWD, IDCO Odisha, Telangana, Power Grid Corp. Ltd., ITPO (Pragati Maidan), International Convention Centre Dwarka, Ambedkar Memorial, NTPC, Bhakra Dam, AIIMS etc.

NCB has taken up studies for improving the Reactivity of Fly ash and their Effect on Cement and Concrete Performance. Limestone consumption factor was established for cement plants from all over the country and so far established the same for 229 cement plants. During the year, LCF studies were done for cement plant in Andhra Pradesh, Chhatisgarh, Madhya Pradesh, Telangana and Tamil Nadu. Comprehensive Investigations were carried out on utilization of ladle furnace slag as a raw mix component in manufacture of clinker & development of Portland composite cements based on fly ash and limestone. Investigations were undertaken on the development of Portland Composite Cements based on Fly Ash and Limestone.

NCB has taken up several projects with Hindustan Zinc Limited for the development of cement-based backfilling material/paste (CBP-Cement Backfills Paste) as a cost-

effective alternative to existing backfilling industrial solutions. NCB studies on investigation of performance of PPC and PSC cements prepared from high magnesia (MgO) clinker (to utilize high MgO bearing low grade limestone) will pave the way for preservation of natural resources and improved sustainability in cement manufacture. Further, studies were undertaken for the development of Belite Calcium Sulpho-Aluminate Cement Using Low Grade Limestone and Industrial Waste. A total of 22 sets of raw mixes were designed & studied at 1250 and 1280°C and mineralogical evaluation of raw mix was performed by XRD. Further, Investigations were carried out to study utilization of coarser fly ash in cement manufacture as per specified BIS limit (250 m^2/kg) and to establish its technical suitability. Assignments were carried out by Independent Testing Laboratories of NCB including newly commissioned optical microscopy lab & installation of X-Ray diffractogram, for samples from neighbouring countries also.

A large number of samples (more than 7367) tested as per national & international standards during the period. Periodic knowledge oriented webinars were also organised which were dedicated for cement industry professionals and attracted huge number of participation as well as appreciation.

NCB got first of its kind project for providing project management Consultancy services for installation of tyre chips to Oman Cement Company at Sultanate of Oman. Further, NCB successfully completed capacity assessment study of M/s Topcem Company & inspected the plant virtually to verify the current operational data and potential capacity of the installed equipment. The Energy Management division carried out more than 200 plant energy audit studies at various cement plants which includes assessment of energy management, monitoring & target setting, detailed heat & gas balance studies, identification of potential for thermal & electrical energy savings & recommendations for remedial measures, techno economic feasibility studies for waste heat recovery system (WHRS), etc. In the areas of Project Engineering and System Design, Preparation of Technical Economic Feasibility Report for setting up a 1.6 & 0.3 MTPA Cement Plant unit, Marketing Report for utilization of Flue Gas Desulphurization Gypsum (FGD) of power plants, TEFR for setting up a Cement Grinding Unit were conducted. Further, NCB provided Project Monitoring and Control (PMC) Consultancy Services to the Government of the Republic of Congo for monitoring and controlling the project implementation activities and providing the support for project supervision. NCB has taken a R&D project with the target outcome of a design of chute which may cater maximum types of Solid Alternative fuels without any jamming issue.

In addition, various business promotion activities were carried out & accordingly proposals were prepared for taking up the studies of various projects namely, using higher %TSR with the available alternative fuel without having any impact on the quality of cement/clinker & Process and utilization of alternate raw materials to substitute conventional/already-in-use material in the process of clinker/cement manufacture, Prepared State-of-the-Report on utilization of Red Mud in Cement Industry and was submitted to Ministry of Mines, etc.

Condition/health assessment services for old & new structures like Turbo Generator, Cooling Towers, Chimneys, Coal Handling Structures, Machine Foundations, Dam Structures, Bridges, Water Reservoir Basins, Commercial, distressed Industrial & Residential RCC buildings in different states of India as sponsored R&D assignments were provided by Programme namely Structural Optimization and Design.

In the area of Concrete Technology, NCB has conducted evaluation of wide range of concrete making materials such as natural coarse and fine aggregates, cement, flyash, GGBS, alternative aggregates like geo-polymer flyash sand etc. and has successfully carried out important projects for prestigious clients. Distress investigation, durability assessment & service life prediction for the existing RC structures are being carried out under Structural Assessment and Rehabilitation Programme. More than 50 numbers of coarse and fine aggregates were evaluated for accelerated mortar bar test, potential alkali reactivity of carbonate rocks (rock cylinder method) & length change of concrete due to alkali carbonate reaction for various prestigious clients. More than 26 sponsored projects of material characterization and about 70 mix designs were completed during the period of 2020-21. Concrete mix designs for special applications such as Self-Compacting Concrete (SCC), Roller Compacted Concrete (RCC), High performance concrete with and without steel fiber, dry shotcrete and control low strength material (CLSM) have been carried out successfully for various clients. Large number of projects for Testing & evaluation of corrosion inhibitors were taken up to help the construction industry. Studies were taken up to investigate possibilities of using high concentration (1-10%) Carbon Nanotubes (CNT) solutions for improving the performance and properties of cement concrete and concrete based precast building products. In yet another study, a milestone is achieved in preparing UHPC mix using NCB Planetary Mixer and Compressive strength achieved so far in the range of 185 to 190 MPa. Applications of SCMs (single and multi) mainly, fly ash and GGBS as a part replacement to Ordinary Portland Cement and impact of corrosion inhibitor on corrosion rate has been studied comprehensively. The expertise on Development of Geopolymer concrete for application in pavements and precast concrete construction is extended to study the properties of geopolymer concrete in reinforced concrete as well.

Prestigious projects of national importance were awarded to NCB by Indian Trade Promotion Organization (ITPO), India International Convention Centre (IICC), Central Public Works Dept. (CPWD), State PWDs, All India Institute of Medical Sciences (AIIMS), Delhi Development Authority (DDA), Odisha Industrial Infrastructure Development Corporation (IDCO), State Trade Promotion Organizations in Karnataka & Tamil Nadu, Sports Authority of Gujrat (SAG), etc. NCB provide specialized services in the area of quality assurance/control and thereby contributing to the durable infrastructure in India. The Third Party Quality Assurance/Audit of construction projects was taken up for a large number of satisfied customers.

In the area of Total Quality Management services, during the year, Interlaboratory Services completed 7 PT schemes. Sixteen Bhartiya Nirdeshak Dravyas (BNDs), the Indian Certified Reference Materials (CRMs) were developed by NCB. The availability

of SI traceable BNDs will give a boost to "Make in India" programme and harmonize the quality infrastructure of the country. Reference materials have been developed and provided to the end users. NCB has a wide range of CRMs for chemical and mechanical parameters of cement, fly ash and other materials. So far, 79 types of CRMs have been developed. Calibration services are continued. Different CRMs and standard lime were supplied customers from cement plants, testing laboratories, public sector undertakings, R&D institutions including Bangladesh, Bhutan, Nepal etc. More than 1500 equipment/instrument including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers, environmental chambers, ovens, furnaces, balances, rebound hammers etc. were calibrated at NCB laboratories and at customer's site.

NCB's Rolling Plan of Missions is given in Appendix-I. During the year, projects with time target, cost and assured end product were pursued under six Corporate Centres which are responsible for delivering the needed technological support services to the user industries. Close liaison was maintained with Cement Manufacturers Association (CMA), Ministry of Environment and Forests (MoEF), Central Pollution Control Board (CPCB), Indian Bureau of Mines (IBM), Bureau of Energy Efficiency (BEE), Bureau of Indian Standards (BIS) and concerned departments of the state governments on aspects related to the development of cement and construction industries including availability of raw materials, quality assurance, modernization, energy management, environment, consumer protection, human resources development etc.

Considering the training needs of the industry in the COVID-19 scenario NCB imparted online training on cement, concrete and construction technologies through its various short term online training programmes via. Cisco Webex platform to technical professionals of all levels of various organizations. During the year 2020-21, 100 training programmes (online/offline) were successfully organised with a total of 1242 participants attending the programmes.

NCB's CONTRIBUTIONS

BNDs LAUNCHED BY HON'BLE PRIME MINISTER OF INDIA ON NATIONAL METROLOGY CONCLAVE IN CSIR-NPL

Releasing of BNDs by Hon'ble Prime Minister of India

NCB is proud to announce that four Bhartiya Nirdeshak Dravya (BNDs) developed by NCB for Cement & Cementitious materials in association with CSIR-NPL, Delhi were launched by Hon'ble Prime Minister of India on 04th January 2021. Earlier, 10 BNDs for Indian Cement Industry were developed by NCB in 2018-19 and 2 BNDs were developed in 2019-2020.

NCB has developed 04 Bhartiya Nirdeshak Dravya (BNDs) for cement & cementitious materials in association with CSIR-NPL, Delhi. NCB's BNDs were dedicated to nation by Hon'ble PM of India Shri Narendra Modi Ji at a glittering function on National Metrology Conclave in CSIR-NPL on 04th January 2021 in the presence of Dr. Harsh Vardhan, Hon'ble Minister for Science & Technology, Dr. Shekhar C Mande (DG-CSIR), Dr. D K Aswal (Director-NPL), Dr. B N Mohapatra (DG-NCB), Sh. Amit Trivedi (Head, Centre for Quality Management, Standards & Calibration Services-NCB), NCB team and the scientific community of India.

NCB team with Hon'ble Minister Dr Harsh Vardhan on National Metrology day

Bhartiya Nirdeshak Dravya (BND) is Indian Certified Reference Materials which are being used for Quality Control & Quality Assurance as well as for evaluating proficiency of analysts, evaluating various test methods and calibration of equipment. These BNDs derive their traceability to SI units from CSIR-National Physical Laboratory (NPL), India, the custodian of National Standards in India.

These BNDs are equivalent to Standard Reference Materials (SRM) produced by NIST, USA and will substitute the import of International Standard products thus giving a boost to "Make in India" & "Atmanirbhar Bharat" programme to harmonize quality infrastructure within the country.

NCB'S CONTRIBUTION IN IMPORTANT COMMITTEES & SUB-COMMITTEES OF NITI AAYOG

Sub-committee on Circular Economy in Construction & Demolition Waste management: The world is increasingly becoming conscious to the pattern and efficiency of resource utilisation. The convergence of different disciplines- industrial ecology, environmental sustaining, sustainable production and consumption, end of life management of products – have evolved to an overarching vision of Circular Economy. NITI Aayog has taken a number of initiatives on sustainability aspect of growth.

NITI Aayog has constituted committees in 11 areas of concerns for the preparation of comprehensive action plan for transformational change. One such area is the Municipal Solid Waste and Liquid Waste which continues to pose considerable challenge and needs to be addressed in a holistic manner. Accordingly, a Committee under the Chairmanship of Sh. Kamran Rizvi, Additional Secretary (D), Housing and Urban Affairs has been constituted. Municipal Solid Waste includes plastic, biomedical, hazardous, construction and demolition waste, food waste, paper, faecal sludge and waste water, treatment plant sludge etc.

The Committee on Municipal Solid Waste and Liquid Waste is further divided and sub-committee on Circular Economy in Construction & Demolition Waste management under the chairmanship of DG-NCB is constituted to prepare a comprehensive action plan on C&D waste. The work of Sub-Committee is to examine the current situation and propose an action plan for Resource Efficiency practices in the management of C&D waste in the country and further to suggest a roadmap for introducing necessary principles for Circular Economy, Governance and Regulation for the Construction Industry (primarily in human settlements, roads and railways).

Committee on Circular Economy in Gypsum: NITI Aayog has taken the lead to expedite the transition of the country from a linear to a circular economy and identified 11 focus areas. Each of the focus areas is assigned to the concerned line Ministry. Department for Promotion of Industry and Internal Trade has been assigned Gypsum as the focus area. Consequently, a committee was formed under DPIIT comprising of domain experts, academics, representatives from industry, regulatory bodies, officials from MoEF & CC, NITI Aayog and others.

Two major by-product streams have been identified as challenge areas for detailed action plans – Phosphogypsum-a by-product from fertilizer plants and Flue Gas Desulphurization (FGD) gypsum-a by-product from Thermal Power Plants. Phosphogypsum generation is already posing threat to environment and ecosystem due to its generation and huge legacy stocks whereas FGD gypsum is expected to pose a grave threat in near future once all FGD systems get installed in thermal power plants. Recommendations have been prepared based on a comprehensive action plan for each of the by-product gypsum. The implementation of action plan will result in achieving Circular economy in Gypsum. DG-NCB volunteered to house the Secretariat of the Committee on Gypsum at NCB. Under his leadership, NCB has

worked for doing extensive research, organizing stakeholder consultations, compiling all recommendations, and preparing the final report.

NCB's CONTRIBUTION TO MORTH, GOI & INDIAN ROAD CONGRESS

Ministry of Road Transport and Highways through Indian Roads Congress constituted an Expert Committee for formulating guidelines for Use of Fiber Reinforced Polymer Bars in National Highway works during March 2021. The first meeting of this Expert Committee (01st May 2021) deliberated the International Practices regarding the use of FRP reinforcement in concrete structures as an alternate to carbon steel mainly due to its corrosion resistance in countries like Japan, USA, Canada and Australia.

FRP composites have been used for rehabilitation of bridges even in India. Though, it is not a new material and predominantly used in aerospace applications, the extent of the use of FRP rebars for structural applications needs to be studied. The mechanical properties and behaviour of FRP rebars is different from that of carbon steel rebars. Therefore, a change in the traditional design philosophy of concrete structures is needed for use of FRP reinforcement in highway infrastructure components after identifying the various suitable applications.

NCB team comprising of Sh. P N Ojha & Sh. Brijesh Singh is contributing currently along with CRRI, IIT Bombay and other eminent experts in preparation of State-of-the-Art Report (SOAR) on the use of Fibre Reinforced Polymer (FRP) bars in Highway Projects for developing "Guidelines for use of Fibre Reinforced Polymer in NH Works in Different RCC Structures". The State-of-the-Art Report (SOAR) contains number of chapters and covers materials, manufacturing, design methods, quality control and quality assurance, and site requirements. Thereafter, this State-of-the-Art Report will help in framing specification and test method for evaluation of GFRP bars for Bureau of Indian Standard and Indian Road Congress. NCB team is also contributing as member in working group on Bureau of Indian Standard (BIS) FRP Standard committee under sectional committee CED-54.

FORMATION OF "EXPERTISE GROUPS" AT NCB

DG constituted inter-departmental Expertise Groups with mandate to carry out research on issues significant to the industry & demanding further attention, paving a way for the sustainability of the industry. It is envisioned that scientists & engineers in these groups will apply their knowledge & experience to work specifically on conflicting tasks such as lowering clinker factor, increasing production efficiency, improving performance, enhancing renewable energy usage and cutting CO_2 emissions using low carbon technologies & carbon capture.

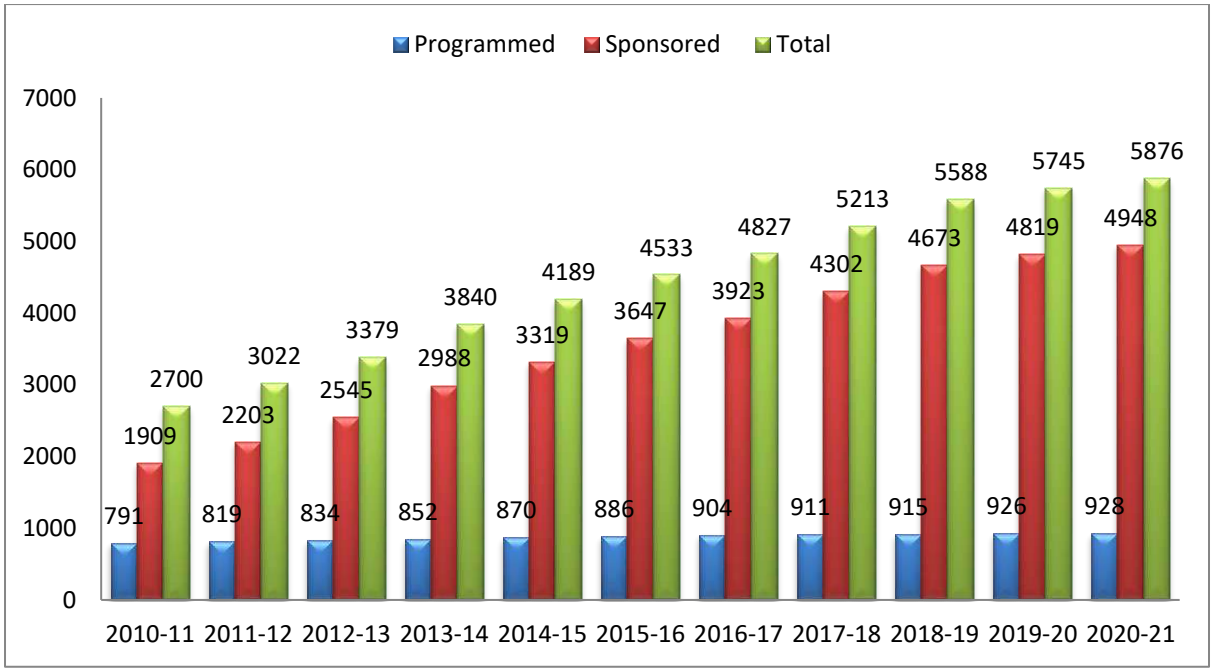
GROUP CODE	NAME OF EXPERTISE GROUP
MIM	Mineralogy and Microstructure
NCS	New Clinker Systems
LCC	Low Carbon Cement

HTT	High Temperature Technologies
XRS	XRD & XRF SRM
AAT	Advance Analytical Techniques
AFR	Alternate Fuel & Raw Materials
ACP	Advanced Comminution & Particle Technology
PYR	Advanced Pyro-processing
ECN	Energy Conservation
REN	Renewable Energy
CCU	Carbon Capture & Utilization
POW	Power Systems & Instrumentation
SDS	Structural Design & Seismic Evaluation
GPC	Geo-polymer Concrete
RMR	Repair Materials & Rehabilitation
ACC	Advance Concrete Composites
RCP	Reinforcement Corrosion - Prevention and Mitigation
CDM	Concrete Durability and Microstructure
BND	BND & SRM
LAM	Lab Accreditation Management
ILN	Institutional Linkages & Networking

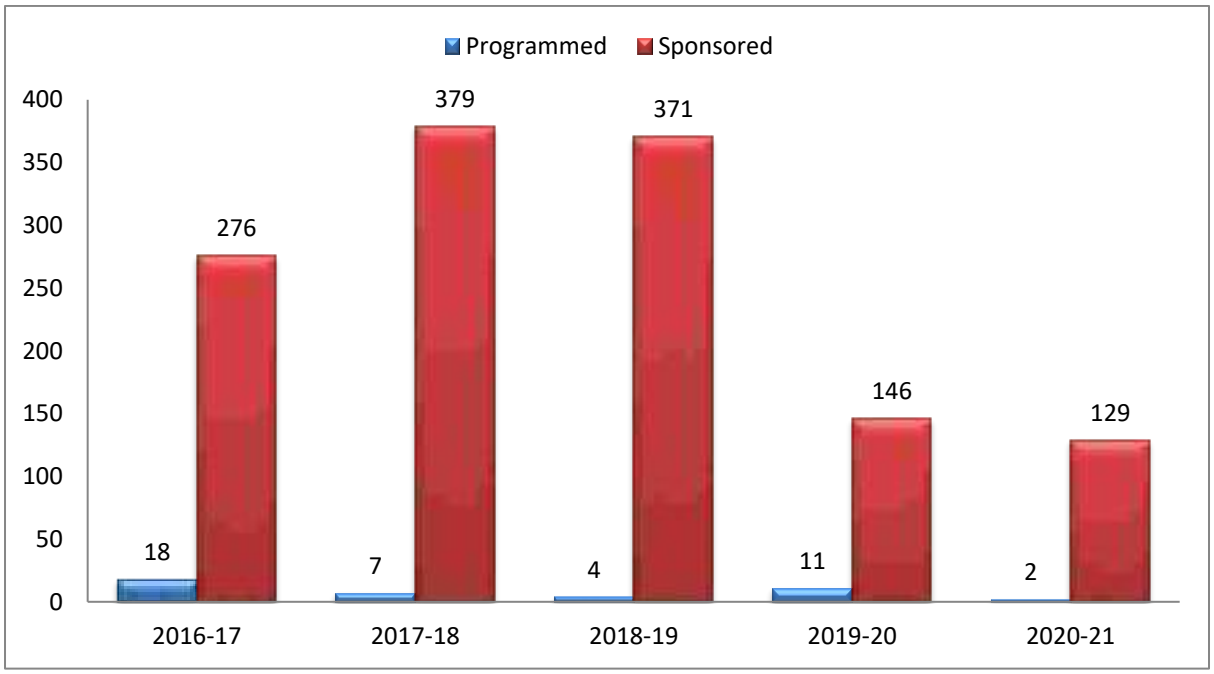
Framework of Institutional Efforts

The activities of the Council were carried out under the six Corporate Centres at NCB's Units, situated in Ahmedabad, Ballabgarh, Hyderabad and Bhubaneswar. While the infrastructure is physically distributed over these Units, all the Units are involved in the execution of projects or services as necessary following the matrix approach.

During the year, 129 Sponsored projects were completed as listed in Appendices III respectively. The programmed projects, carried forward along with the new ones taken-up, comprised the R&D Programme for 2020-21, as given in Appendix IV. The broad activities carried out by the six Corporate Centres are highlighted in the following sections.



Projects Completed by NCB (Cumulative)



Project Completed by NCB (Cumulative)

NCB BALLABGARH

CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING - CRT

The Centre executes its activities through five programmes viz. Cements and Other Binders, Wastes Utilization, Refractories and Ceramics, Fundamental and Basic Research and Independent Testing. During the year 25 Sponsored Projects and 1 Programmed Project were completed and 4 Programmed Projects were pursued.

Cements and Other Binders

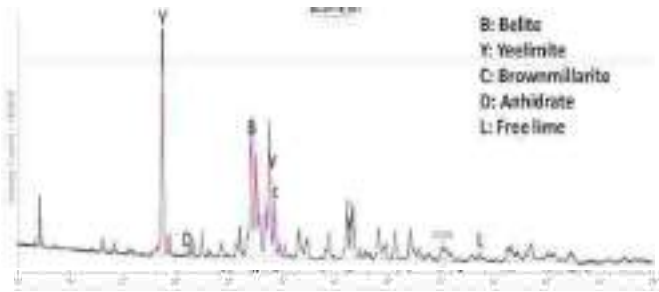
Establishing Limestone Consumption Factor (LCF)

LCF studies are very important from the point of view of rationalization of limestone consumption in production of cement, estimating royalty payable to state for the limestone mined from their respective captive mines besides internal material audit of the concerned cement plants. NCB has carried out Limestone Consumption Factor (LCF) studies for cement plants from all over the country and so far established the same for 229 cement plants. During the year, LCF studies were completed for 11 cement plants from Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Telangana, and Tamil Nadu.

Development of Belite Calcium Sulpho-Aluminate Cement Using Low Grade Limestone and Industrial Waste

In the study the raw materials and Industrial waste were characterized for their chemical and mineralogical compositions. A total of 22 sets of raw mixes were designed with lower LSF and using different types of industrial waste. The burnability study of designed raw mixes were studied at 1250 and 1280°C and mineralogical evaluation of raw mix were performed by XRD. Out of the total raw mixes studied four optimised raw mixes were selected for preparation of bulk clinker and evaluation of physical properties. Hydration studies were also carried out by Isothermal calorimeter, XRD and DTA/TGA.

Burnability studies conducted showed rapid formation of BCSA clinker mineral phases with low LSF (~70) of raw mix. The mineral phase developments such as dicalcium silicate (C_2S) and ye'elimite ($C_4A_3\$$) of laboratory clinkers fired at 1250°C. XRD, Scanning Electron Microscope and Optical Microscope confirmed the formation of ye'elimite ($C_4A_3\$$) and C_2S through microstructural and morphological characterization.

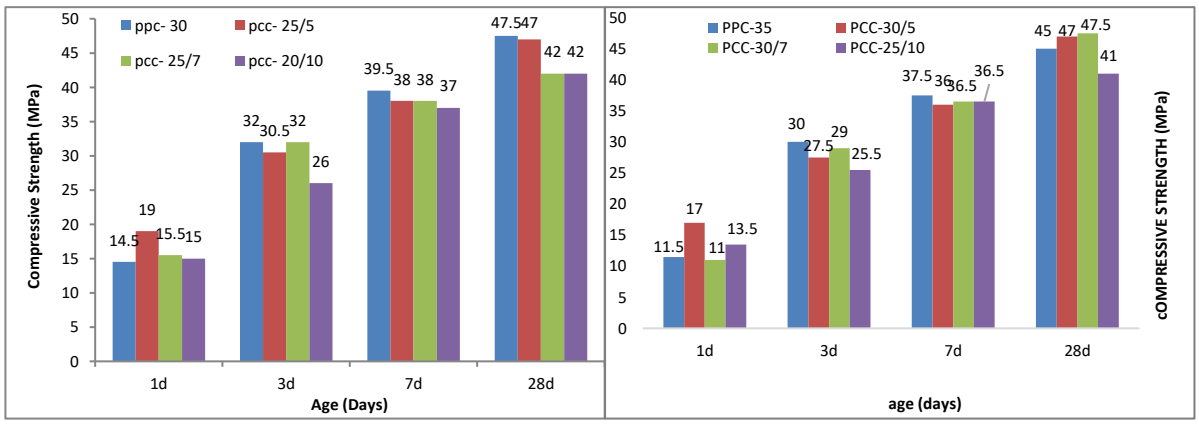


Mineralogical Analysis of Lab Fired Clinker, BCSA by XRD

Waste Utilization

Investigations on Development of Portland Composite Cements Based on Fly Ash and Limestone

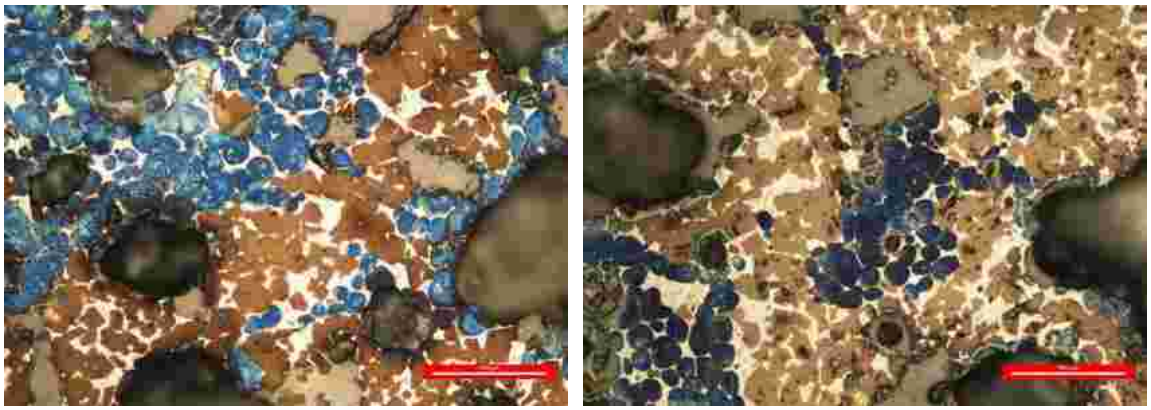
In this study, Portland composite cement blends were prepared (140 nos) with four types of clinker from different regions of India along with the regional available fly ash (15-35%) and limestone (5, 7 & 10%). The results depicted that the clinker quality plays an important role on performance of limestone and fly ash based composite cements. The mortar studies indicated Portland composite cements based on limestone and fly ash with 35% replacement of clinker by fly ash and limestone. (keeping limestone content upto7% in it). Hydration studies showed Monocarboaluminate ($Ca_4Al_2O_6 \cdot CO_3 \cdot 11H_2O$) was found in the samples containing FA and LS, and the intensity of these peaks tend to be stronger when the amount of limestone is increased. Durability evaluation of selected cement compositions against SO_4 attack, chloride ingress and CO_2 attack is under progress.



Graphs showing compressive strength of cement blends prepared from eastern region

Investigation on utilization of ladle furnace slag as a raw mix component in manufacture of clinker

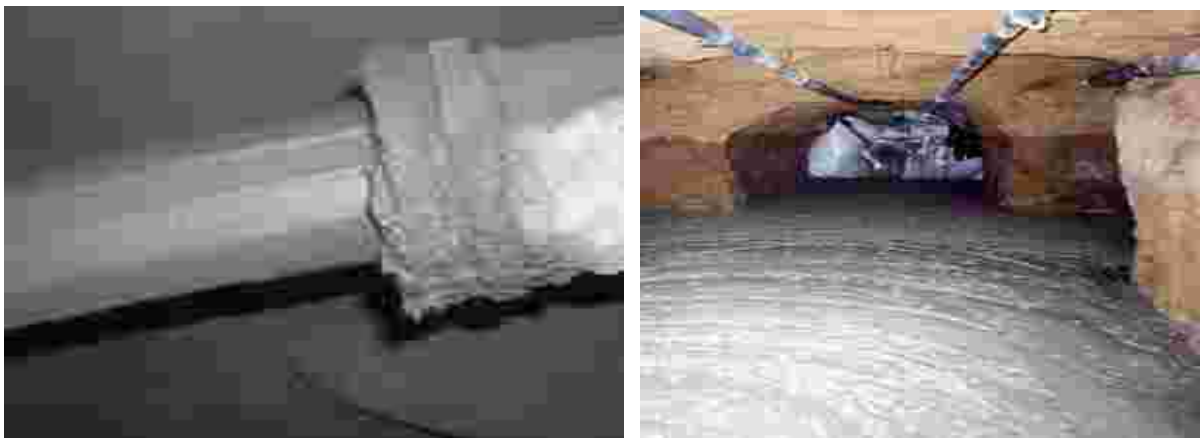
Exploration studies of Ladle Furnace Slag (LDF slag), which was a waste product from steel industry were carried out as a raw mix component in manufacture of clinker to replace the laterite/red mud. Chemical and mineralogical investigations of LDF slag showed the presence of Fe_2O_3 in the range of 3 to 34%, Al_2O_3 in the range of 14 to 33%, SiO_2 in the range of 3 to 21% and CaO in the range of 33-51% and calcium silicate, calcium aluminate, iron containing minerals etc. Computed mix designs were performed to optimize the raw materials with the similar potential minerals percentage, liquid content, AM, SM in the resultant clinker. LDF slag designed optimum compositions with the replacement level of 0.5 to 1.5 of laterite/red mud showed similar characteristics in terms of burnability as well as setting time, compressive strength and other physical characteristics.



Distribution of alite and belite grains in the lab fired clinker

Study of development cement backfills pastes (CBP) using ultra-fine fly-ash and its evaluation for application in zinc-lead mines.

NCB has taken up several projects with Hindustan Zinc Limited in cement-based backfilling material/paste development. The target is for an application of the CBP as a cost-effective alternative to existing backfilling industrial solutions. Assimilation of fly-ash-an industrial waste: generated from a thermal power station along with other wastes generated from mining industries to produce CBP having the desired requirement, as per standing regulation, not only yields financial benefits of reduced consumption of cement whereby reducing carbon footprint; also, it allows utilization of industrial waste whereby reducing the portion of material channeled to landfills. In the title project, the utilization of the ultra-fine fly ash for the preparation of CBP was studied at NCB, Ballabgarh. Based on the studies, NCB made a recommendation to HZL and is under consideration by the company. The studies' results have effectively achieved the target and are subject to application mine backfilling at SKE mines, Udaipur, Rajasthan, India.

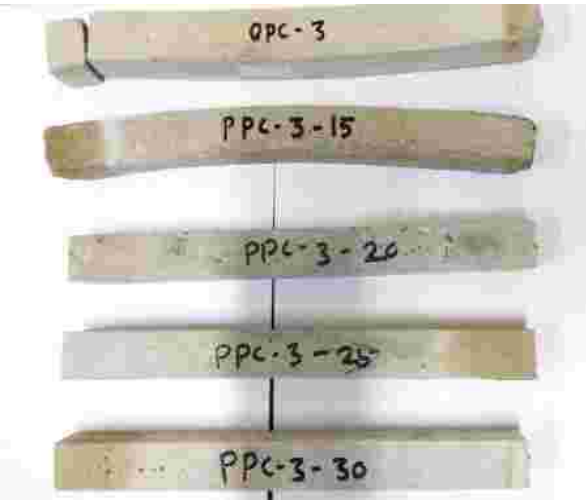


Pictures of back filling in the zinc lead mines

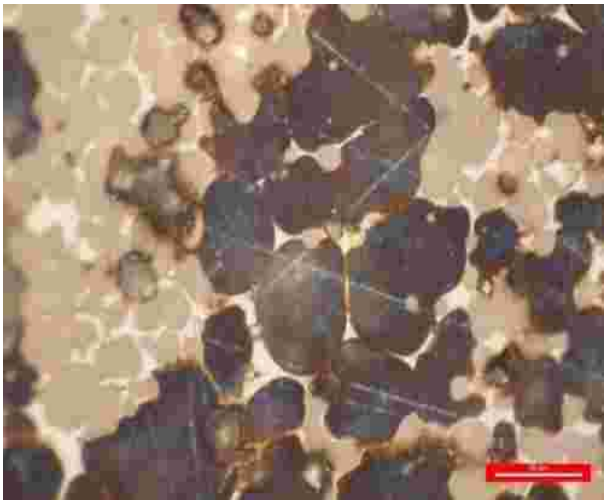
Investigation for Standardization of High Magnesia (MgO) Clinker for the Manufacture of PPC and PSC Blended Cement

The objective of this study was to investigate the performance of PPC and PSC cements prepared from high magnesia clinker to utilize high MgO bearing low grade limestone for the manufacturing of Portland clinker resulting in preservation of

natural resources and sustainable development. Four types of high MgO clinker samples containing MgO as high as upto 8.4% from different cement plants were procured along with other cementitious and additive samples such as fly ash, GBF slag and gypsum for the manufacture of OPC, PPC and PSC. These cement samples were prepared by intergrinding the constituents in a laboratory ball mill keeping the fineness level 350±10 m^2/kg. The results of investigation revealed that addition of fly ash and granulated blast furnace slag (GBFS) in the blended cements prepared from high MgO clinker samples were found to have potential effect on arresting the expansion caused by periclase (MgO). The minimum fly ash content was optimized to be 25% by weight in case of PPC and the minimum slag content was optimized to be 35% in case PSC while utilizing high MgO clinker for the manufacture of blended cement. The performance results obtained so far are quite encouraging. Use of high magnesia (MgO) clinker for the manufacturing of the PPC and PSC will pave the way for utilization of high MgO content low grade limestone containing high MgO resulting in increased mine life besides improved sustainability in cement manufacture.



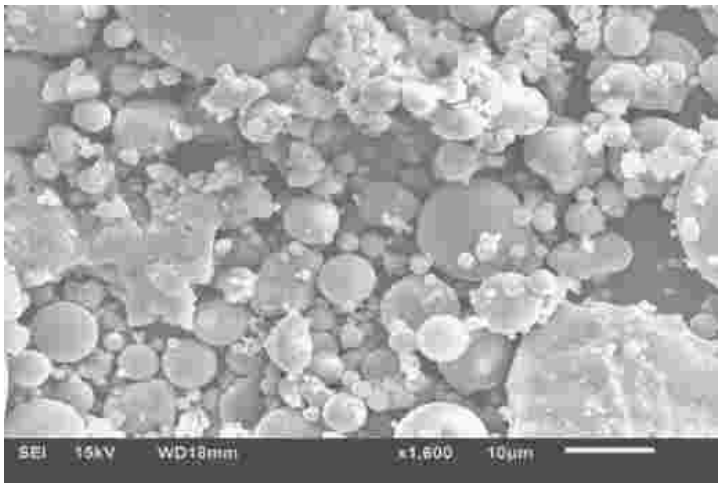
Autoclave tested bar of OPC, PPC and PSC



Optical Microscopy image of High MgO Clinker-Formation rounded periclase grains

Investigations on Utilization of Coarse Fly Ash (200-250 m^2/kg) in Cement Manufacturing

Generation of fly ash in India is about 226 mtpa, out which 26% is being utilized in cement industry. BIS allows fly ash of fineness above 250 m^2/kg to be utilized for cement manufacturing. This investigation was carried out to study utilization of coarser fly ash (200-250) in cement manufacture and to establish its technical suitability Investigations were carried out with fly ashes having the fineness below the specified BIS limit (250 m^2/kg). The studies depicted that the coarser fly ash samples are meeting the mandatory requirements of IS 3812:2013, after grinding to 320±10 m^2/kg. Studies on field wise samples indicated that the fineness is lower than 250 m^2/kg at initial fields. However, grinding of these samples to 320±10 m^2/kg resulted in improved characteristics conforming to IS 3812:2013.



SEM image of coarse fly ash sample

Independent Testing

Independent Testing Laboratories of NCB undertake complete physical, chemical, mineralogical and micro-structural analysis of various types of raw materials, cement, clinker, pozzolana, aggregate, concrete, admixtures, water, refractory, bricks, coal, lignite etc. as per National and International standards.

The INT laboratories established in 1977 on a Test House pattern, undertake testing jobs for cement, construction and allied industries. NCB testing laboratories achieved a landmark when NABL accredited them in the year 1997 as per ISO 17025 quality system. The laboratories are equipped with state-of-art instruments to carry out the tests as per National and International standards. During the year, assignments were carried out for samples from neighboring countries also. The number of samples tested during the period was more than 7,367.

Inauguration of Optical Microscopy Laboratory

An newly commissioned optical microscopy laboratory was inaugurated by Addl. Secretary, DPIIT, Sh. Anil Agarwal on 19 Feb 2021. He was accompanied by SDO, DPIIT, Dr. S S Gupta. The application of optical microscopy in the area of cement and concrete were elaborated by Dr. B N Mohapatra, D G NCB, HOC-CRT, Seniors and scientist of CRT department. The Addl. Secretary DPIIT, interacted with the

scientists and engineers of the department and motivated them for giving training of advanced instruments to the students.

Inauguration of X Ray Diffractogram (XRD)

The new X ray diffractogram of Rikagu Make, Japan was installed in the CRT department and inaugurated by Director CPPRI, Dr. Thaplial on 19 Aug 2020. He was accompanied by eminent scientist and officials from CPPRI. The application of XRD in the area of cement and concrete were elaborated by Dr. B N Mohapatra, D G NCB, HOC-CRT, Seniors and scientist of CRT department. The group of scientists from CPPRI interacted with the officials.

The Director, CPPRI interacted with the scientists and engineers of the department and motivated them for innovative research and development.

CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING & OPERATION – CME

Centre for Mining, Environment, Plant Engineering and Operation has completed 09 sponsored projects during the year & carried out its activities through Process Optimisation and Productivity, Project Engineering & System Design, Advanced Fuel Technology, Energy Management, Environmental Sustainability & Climate change, Quality Assurance-Electrical & Mechanical

Process Optimization and Productivity (PRP)

NCB got first of its kind project for providing Project Management Consultancy services for installation of Tyre chips at M/s Oman Cement company SAOG, Sultanate of Oman. The activities under this project in this financial year are given below

- Preparation of EPC Tender documents
- Evaluation of Technical Bids received
- Technical Clarifications from the Bidders
- Submission of Technical Bid Evaluation Report to Sponsor.
- Advising OCC to open the financial Bids based on the Technical Bid evaluation report
- Commercial Bid evaluation done and clarifications obtained from bidders.
- Support provided to OCC for negotiation meetings and finally getting OCC and BTIEC to an agreement for signing of the contract.

Successfully completed capacity assessment study of M/s Meghalaya Cement Limited. Plant approached NCB for assessment of plant production capacity in order to submit the report to state government for claiming transport subsidy applicable as per the North East policy. During this study, NCB collected the historical data of production, process, quality and Breakdown analysis of the equipment installed.

NCB inspected the plant virtually to verify the current operational data and potential capacity of the installed equipment.

Energy Management (EMG)

- NCB has been very closely associated with energy efficiency improvement of the Indian Cement Industry. NCB has an experienced team of Energy Engineers, Certified Energy auditors and Accredited Energy auditors certified by Bureau of Energy Efficiency (BEE) to conduct detailed energy audits. NCB has carried out more than 200 detailed energy audits till date in various cement plants. Energy audit studies in cement plants include assessment of energy management, monitoring and target setting, detailed heat balance and gas balance studies, identification of potential for thermal and electrical energy savings and recommendations for remedial measures, techno economic feasibility studies for waste heat recovery system (WHRS) etc.

Project Engineering and System Design (PSD)

- **Preparation of Pre-Feasibility Report for setting up a 1.6 MTPA Cement Plant for M/s Canis Mines & Minerals LLP, Meghalaya**

  The program successfully completed preparation of pre-feasibility study for setting up of 1.6 mtpa cement plant at East Jaintia Hills in Meghalaya. The study primarily covered aspects like availability & suitability of limestone deposits for making cement, correctives, additives and fuels along with their source and physical properties, availability of basic resources & infrastructure, technical concept for the plant, project implementation planning, study on potential market & optimal marketing strategies, estimated capital cost as well as manpower to install and operate the plant.

- **Preparation of Marketing Report for utilization of Flue Gas Desulphurization Gypsum (FGD) of power plants in VSR region for NTPC Ltd.**

  The program has successfully carried out visit in the Vindhyachal, Singrauli and Rihand region to estimate the potential of sale/utilization of Flue Gas Desulphurization (FGD) Gypsum from the units of NTPC at Vidhyanchal, Singrauli and Rihand (collectively known as VSR region). The present study analyses the scope for consumption of FGD gypsum generated through coal-based thermal power plant located in NTPC VSR region. The 500 kms area around VSR region was subject area of market research for the possible utilization of gypsum produced at NTPC plants. Specific purpose of this report is to provide an overview of the various gypsum specific consumer sectors that have been identified during the study.

- **TEFR for setting up a Cement Grinding Unit at Kannur, Kerala for M/s Malabar Cements Ltd, Kerala**

  The program successfully completed technical and economic feasibility study for setting up a 60 tph Cement Grinding Unit at KINFRA, Taliparamba covering major aspects like availability and logistics for the raw material input source, basic infrastructure, market potential, project technical concept and project financial analysis.

- **Preparation of Detailed Project Report for setting up a 0.3 mtpa Bulk Cement Terminal at Ernakulam wharf, Cochin Port Trust, Kerala for M/s Malabar Cements Ltd, Kerala.**

  The program has successfully completed a project for preparation of Detailed Project Report for setting up a 1000 tpd (0.3 mtpa) Bulk Cement Terminal and allied materials handling unit at Cochin Port Trust Complex. The report covers detailed study of various aspects like loading/ unloading, handling, storage, blending, packing and transportation of raw materials (like OPC, dry fly ash, laterite, coal, clinker, gypsum etc.) and finished product (PPC).

- **Project Monitoring and Control (PMC) Consultancy Services for setting up a 600 tpd Cement Plant in RoC for Government of RoC**

  The program team is working as a Project Management Consultant (PMC) to the Government of the Republic of Congo for monitoring and controlling the project implementation activities and providing the support for project supervision. Package-I (Mine development & Mining Equipment Supply) is nearing completion and activities for Package-II (Engineering, Construction and Supply of Machineries for setting up the Cement plant at Louvakou district, Department of NIARI, Republic of Congo have already begun.

Appreciation / recognition received from outside NCB:

- Sh Prateek Sharma received 2nd position among all research scholars for article writing competition entitled "Application of chemical engineering research in cement Industry" at BITS Pilani

- Appreciated by BEE for supporting in energy setting targets for PAT Cycle VI

CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH – CDR

Centre for Construction Development and Research (CDR) is contributing in developing durable and sustainable civil infrastructure for the nation. The Centre provides services to the cement, concrete and construction industries through four programs namely Concrete Technology, Structural Optimization and Design, Structural Assessment and Rehabilitation, Construction Technology and Management. The Centre conducted 93 sponsored projects during the year.

Concrete Technology (CON)

Material Evaluation and Concrete Mix Designs

Evaluation of concrete making materials, analysis of test results and establishing its relationship with fresh, hardened and durability properties of concrete is an important and crucial step before carrying out concrete mix designs. Centre has evaluated various concrete making materials such as cement, fly ash, silica fume, GGBS, water, fine and coarse aggregates, and chemical admixtures and carried out concrete mix designs for various grade. Various government/semi government/private organizations like DRDO, NTPC and its subsidiaries, NHPC and its subsidiaries, NPGC, THDCIL, PWD, CPWD, municipal corporations, PVUN, PHPA-BHUTAN, UJVNL, SJVNL, ACC, Balajee Infratech, Dalmia, L&T Limited, APCPL, Angelique International Limited, approached NCB to study the performance of different concrete making materials and to provide recommendations for the required grade of concrete ranging from M10 to as high as M90. More than 26 sponsored projects of material characterization and about 70 mix designs were completed during the period of 2020-21.

Concrete Mix Design for Special Applications

- ***Self-Compacting oncrete***

  Self-Compacting Concrete (SCC) of grade M40 to M70 were designed by NCB for clients likes of Delhi Jal Board, R.K Construction during the period of 2020- 21.

- ***Roller Compacted Concrete***

  NCB has taken up the sponsored project of designing high volume fly ash (using fly ash up to 65%) concrete mix with limestone dust as a filler material to be used in Roller Compacted Concrete for Dibang Multipurpose project in Arunachal Pradesh to be constructed by M/s NHPC Ltd. Hardened concrete prepared using with and without marble dust as a filler material will be evaluated for various properties like tensile strength, modulus of elasticity, Poisson's ratio, permeability and shear strength

Alkali Aggregate Reaction (AAR) studies on aggregates

Alkali – silica reaction (ASR) is the most common form of alkali–aggregate reaction (AAR). ASR is a chemical reaction between the alkalis in Portland cement and certain siliceous aggregates which form a silica gel. It is well known that alkaline components of Portland cement chemically react with silica in certain forms found in certain aggregates. Over the years, NCB has developed expertise and competencies to evaluate aggregates for potential alkali aggregate reaction which includes both alkali silica reaction and alkali carbonate reaction. Petrographic and Mineralogical Analysis and Alkali Aggregate Reaction (AAR) studies were carried out on different fine and coarse aggregates by conducting accelerated mortar bar testing and long term testing like mortar bar testing and concrete prism test as per national and international standards. About 50 number of coarse and fine aggregates were evaluated for accelerated mortar bar test, mortar bar test, potential alkali reactivity of carbonate rocks (rock cylinder method) & length change of concrete due to alkali carbonate reaction for various prestigious clients like NTPC, L&T, UJVNL, NHPC Ltd during the period of 2020-21.

Evaluation of Corrosion Inhibitors and water proofing compound

Centre has developed the facility for evaluation of corrosion inhibitors through modified accelerated corrosion test as per JIS Z 1535, rebar weight loss by immersion method as per ASTM G-1, polarization test as per ASTM G-3 and corrosion rate measurement as per ASTM G109 & AASTHO T259. Testing & evaluation project of corrosion inhibitors were taken up to help the construction industry.

Various crystalline/integral water proofing compounds were tested to evaluate their performance in terms of resistance against water penetration into concrete and mortar specimen as per IS: 516 (Part-II, section 1) and IS: 2645 respectively in comparison to reference mixes. Various parameter such as resistance against chloride penetration, porosity, coefficient of permeability using Valenta equation, presence of integral crystal into concrete specimen using SEM after subjected to hydrostatic pressure and other such properties of concrete specimens made with crystalline/integral water proofing compounds were tested and compared with reference mix. Testing & evaluation of crystalline/integral water proofing compounds from six different manufacturers were taken up to help the construction industry.

Some of the Important Completed R&D and sponsored Projects

Fresh hardened and durability performance evaluation of concrete made with Portland limestone cement (PLC)

Looking into the environmental concerns related to clinker production, scarcity of cement grade limestone in future and huge availability of low grade and dolomitic limestone NCB took up a comprehensive study on a new type of cement, often regarded as Portland limestone cement (PLC). PLC is prepared by adding substantial amount uncalcined limestone in clinker either by separate grinding and mixing or by

inter grinding. PLC has been one of the important fields of study in last two decades and different countries like USA, Canada, Australia and countries in Europe have introduced standards on PLC. The findings of the project are aimed at using low grade and dolomitic limestone for manufacturing of Portland Limestone Cement and its application in production of durable concrete. The benefits of project include reduction in clinker content, energy and natural resources conservation, waste utilization and reduction in emission of greenhouse gases.

In a previous study conducted on PLC mortar, it was concluded that 15% addition of low grade and dolomitic limestone could perform to the level of OPC 43. In order to validate the findings of the previous study and to study the performance of PLC concrete NCB, this project was stared in April 2019. In order the cover quality variation materials, five different OPC clinkers and eight samples of limestone (covering cement, dolomitic and low grade) samples were procured from five different cement plants located in different geographical locations of the country. A total of 53 blends (05 of which were control and 48 were PLC blends) were prepared in the NCB laboratory by inter grinding clinker, limestone and gypsum. Comprehensive study on these blends was carried using physical, chemical and mineralogical characterization. Apart from the study on PLC blends, fresh, hardened and durability properties of concrete were also studied on18 concrete mixes, 9 each at w/c of 0.4 and 0.6 (out of which 2 were control) were prepared using PLC produced by adding 15% of different grades of limestone. The study concluded that limestone addition mainly influences the compressive strength of mortar and concrete, however, limestone addition of appropriate quality and fineness up to 15% could be possible.

Durability studies on concrete prepared using coal based bottom ash as fine aggregate and preparation of mix design guidelines of PPC and PSC based cement concrete for M/s NETRA-NTPC Limited

Previously, NCB has carried out two studies sponsored by NTPC-NETRA on use of bottom ash as replacement of fine aggregate in cement concrete. In first project, studies were carried out to assess the feasibility of use of bottom ash as fine aggregate using bottom ash from two sources. In second study, bottom ash from ten different sources were collected and studies were conducted for preparation of specifications and guidelines for use of coal based bottom ash as replacement of fine aggregate in concrete made with OPC. Since out of total cement production in the country, more than 65% are blended cement. Therefore, it is imperative to extend the above mentioned study to blended cement.

Present R&D study is a follow up study of above mentioned studies. In this study, formulation of guidelines for designing concrete mixes with PPC and PSC using bottom ash as a fine aggregate, will be done on basis of characterization of bottom ash from 8 thermal power plants (NTPC Jhajhar, NTPC Solapur, NTPC Dadri, NTPC Kudgi, NTPC Sipat 1, NTPC Sipat 2, NTPC Unchahar and NTPC Ramagundam). Mix trials of concrete were carried out using two brands each of PPC and PSC at four different water cement ratios of 0.40, 0.45, 0.50 and 0.55. Out of various composite fine aggregates compositions, 5 composite fine aggregate were selected for making

concrete (one from each fineness modulus range of 1.33-1.69, 1.70-1.89, 1.90-2.09, 2.10-2.49 and 2.50-3.01). With these 5 composite fine aggregate, 80 concrete mix trials were performed and mixes were evaluated for fresh, hardened and durability properties. Based on the study, mix design guidelines for PPC and PSC based cement concrete using coal based bottom ash as fine aggregate will be formulated.

Studies on Mechanical and Thermal Properties of Mass Concrete in Arun 3 - H.E. Project Dam for M/s SJVN Limited

In this study, heat of hydration of three different PPC samples were evaluated. Further concrete mix design of M15 grade (having maximum size of aggregate of 150 mm & 80 mm) and M20 (MSA 40 mm) & M25 (MSA 40 mm) grade concrete mix was carried out using PPC having least heat of hydration. Further, mixes were evaluated for different hardened properties of concrete such as compressive strength, split tensile strength, static modulus of elasticity and density. Mixes were also evaluated for different thermal properties such as Co-efficient of thermal expansion, specific heat thermal conductivity and thermal diffusivity of concrete using Transient Plane Source Method.

Carbonation and microstructural studies on hardened concrete.

IIT Delhi, has entrusted NCB to carry out carbonation and microstructural studies on hardened concrete to ascertain its durability. Various grade of concrete mixes with varying proportions of constituent such as fly ash, marble dust etc. has been prepared and hardened concrete studied through accelerated carbonation test, Mercury intrusion porosity (MIP) test and scanning electron microscope (SEM) test.

Durability test on hardened concrete to ascertain the suitability of aggregate to be used in concreting work of tunnel lining for hydroelectric project.

SJVN has entrusted NCB to carry out feasibility study of aggregate to be used in concreting work of tunnel lining for hydroelectric project based on durability test conducted on hardened concrete. Mixes of various grade with varying percentage of constituent has been prepared (having maximum size of aggregate MSA 40mm), using PPC cement. Hardened concrete further evaluated for compressive strength and durability test such as under water abrasion test, water permeability test and drying shrinkage test, to ascertain the suitability of tunnel excavated aggregate to be used in concreting work of tunnel lining for hydroelectric projects.

Some of the on-going R&D and sponsored projects

Study of Carbonation and Carbonation induced reinforcement corrosion in new cementitious system

Concrete carbonation is a complex physical and chemical reaction between hydration products of cements and CO2. The phase composition, hydration products and microstructure of concrete change significantly before and after the carbonation.

Carbonation induces the reaction of CO2 with hydration products, such as calcium hydroxide (i.e., CH), calcium silicate hydrate (i.e., CSH), ettringite (i.e., AFt) and calcium aluminate hydrate (i.e., CAH) in concrete and results into changes in hydration product and there by microstructural changes of concrete. Since type and amount of hydration products and their microstructure, mineralogy and morphology are somewhat different for different cement/cementitious system, the carbonation product, rate of carbonation and carbonation coefficients are also different.

Concrete carbonation is influenced by internal factors to the concrete properties, technological factors of concrete production and external environmental factors. Internal factors affecting carbonation are type and amount of cement and cementitious materials, water cement ratio, cement to aggregate ratio etc. Technological factors of concrete production affecting carbonation are start time and period of early age curing and temperature of curing. External environmental factors affecting the behavior of carbonation are microclimatic factors such as concentration of CO2, ambient temperature and local humidity, sunshine, wind, wetting and drying cycles. All factors interact and restrict mutually and are highly uncertain.

Existing studies on carbonation and carbonation induced corrosion mainly focused on internal factors of concrete such as material composition, mixing proportion and carbonation depth of concrete measured in the laboratory based on accelerated carbonation test having higher concentration of carbon dioxide. The rate of carbonation in concrete exposed to natural environment is slow because of low concentration of carbon dioxide in the atmosphere. And it has been seen that the rate of carbonation is not same for all cementitious systems and so as the relationship between time and carbonation depth.

It may be noted that, during natural carbonation, the concrete drying rate is generally higher than the carbonation rate and relationships may not hold good for estimation of natural carbonation depth and natural carbonation coefficient. This means Accelerated carbonation is not always found to be representative of natural carbonation. Secondly, this methodology and relationship cannot be generalized for different type of cement and cementitious system. Thirdly, such accelerated tests do not take into account the other external environmental-microclimatic factors such as ambient temperature and local humidity, sunshine, wind, wetting and drying cycles etc. Fourthly, effect of carbonation front on corrosion rate during the propagation phase has not been studied comprehensively.

This project is a follow up of two R&D projects. First one project was related with the developments of methods for the service life design of the concrete structures. In that project accelerated test methods like electrical resistivity, air permeability, RCPT were explored as a tool for quick assessment of service life design of concrete structures subject to carbonation and carbonation model for the blended cements especially PPC (fly ash content 30%) and PSC (slag with 45 %) were developed. In the second project, effect of supplementary cementitious materials like fly ash and slag in single and multi blends on service life design of the RC structures was studied. In that project, fly ash was added as a part replacement to OPC at various percentages i.e. 30%, 35%, 40%

and 50%, slag was added as a part replacement to OPC at various percentages i.e. 50% and 70 % and combination of fly ash and slag as a composite system was also studied. Use of ultrafine materials such as silica fume and ultrafine GGBS was investigated in conjunction to fly ash. Durability studies in terms of carbonation induced corrosion was carried out to assess the performance of high-volume cementitious blends. The project was designed to determine the optimize percentage level of addition of fly ash or slag or combination of both as a part replacement to OPC. In previous study, effect of carbonation on microstructure and environmental impact over carbonation front propagation was not dealt in-depth.

In previous studies, carbonation depth under accelerated environmental conditions for different cementitious systems was studied. However, studies were not conducted under natural environmental conditions. No studies were conducted for rate of corrosion due to carbonation during the propagation phase. Effect of individual environmental parameters over the rate of carbonation and corrosion rate was also not studied. For different cementitious systems, the proportions of hydration products, concentration of ions in pore solution, porosity and pore size distributions in its microstructure is different. Hence, the concrete resistivity and rate of corrosion due to carbonation during the propagation phase will be different. Therefore, this project aims to fill those research gaps & to study the microstructure of individual ternary and quaternary for different cementitious blends.

This study aims to investigate the following parameters:

- Effect of new cementitious systems over the rate of carbonation.
- Effect of environmental parameters like Relative humidity, Temperature and alternative wetting and drying phenomenon over the rate of carbonation and corrosion rate.
- Effect of new cementitious systems over the carbonation induced corrosion rate and to determine the various factors affecting the corrosion rate in propagation phase.
- To correlate the laboratory studies with the field studies
- Validation of existing carbonation model for the new cementitious system.

This project outcome will help in better evaluation of concrete endurance, disclosure of the carbonation mechanism and prediction of the service life of the concrete engineering structure made with new cementitious system.

Utilization of coarser fly ash (having fineness between 250 m2/kg to 320 m2/kg) in concrete as a cementitious material.

Fly ash generation in India during 2018-19 is estimated about 217.04 million tonnes due to combustion of 667.43 million tonne Coal/Lignite. Indian coal is generally of low quality due to presence of high ash content in the range of 30 -45%. During 2018-19 fly ash utilization is around 168.40 million tonne which suggests that about 50 million tons of fly ash is being left unutilized. The disposal of such a huge quantity of ash is a serious issue as the management of fly ash has been troublesome in view of its disposal, causing pollution of land, air and water.

Presently, fly ash is being used in the cement and construction industry on a large scale like in the manufacturing of Portland Pozzolana Cement, production of concrete, construction of roads, dams, stabilization of slopes, etc. The Indian standard code (IS 3812 Part-I) gives the specification of pulverized fuel ash to use in the production of cement concrete, where it is mentioned that the minimum required fineness of fly ash should be 320 m2/kg or more. However, it is noticed that in India there is large amount of coarser fly ash (having fineness 250 to 320 m2/kg) is available. As this coarser fly ash is not satisfying the minimum requirement of fineness as per IS 3812 Part-I, they are not being utilized in the production of cement concrete.

According to "Ministry of Environment, Forests and Climate Change" Notification, New Delhi, dated 18th September 2020, coal or lignite based thermal power plants shall maintain 100% utilization of total ash generated by them.

Various BIS committees asked to be carried out study on the use of fly ash having fineness in the range of 270 to 280 m2/kg in the production of cement concrete and if possible make the amendment in the specifications of fly ash to be used as pozzolanic material. Similarly, Central Electricity Authority (CEA) in their meeting also demands for the reduction of fineness of fly ash to enhance the use of coarser fly ash in mass concreting.

Under this research project NCB is collecting fly ash from 5-10, different thermal power plant situated across the country. Collected fly ash will be characterized under different categories on the basis of chemical, physical, Mineralogical, and morphological properties of fly ash. Further various concrete mix design will be prepared using different percentage of fly ash as a replacement of cement. Laboratory testing on fresh and hardened concrete will be performed to ascertain its suitability in concrete as a cementitious material. Based on the result obtained recommending with regards to use of coarser fly ash will be incorporated.

Expected benefit / End result:

(1) Utilization of coarser fly ash in concrete, which will increase fly ash utilization in India.
(2) Recommendation for Modification in specification (IS 3812 Part-I) of fly ash to use coarser fly ash as cementitious material.

Evaluation of Processed LD Slag as per IS 383:2016 and study its suitability to be used fine aggregate for M/s JSW Steel Limited

LD slag is a by-product of steel industry and it is generated during production of steel in basic oxygen furnace. The free lime and magnesia present in LD slag can cause large volume changes and contributes to expansion in LD slag when used as aggregate in concrete. To overcome the effect of free lime and magnesia, JSW Steel is processing LD slag of fraction below 4.75 mm which can be used as a fine aggregate in concrete.

This study is an experimental work in which processed LD slag was characterized to understand and identify the utilization of processed LD slag as a fine aggregate in concrete. Processed LD slag was characterized for its different physical, chemical and mineralogical properties. Concrete mixes were prepared at two w/c ratios (i.e. 0.65 and 0.40) by replacing conventional fine aggregate (natural/crushed sand) with processed LD slag (provided by sponsor) at replacement levels of 0, 25%, 50%, 75% and 100%. Hence, total 10 concrete mixes were prepared and evaluated for different fresh, hardened and durability properties of concrete

Evaluation of advanced concrete making materials

Rapid growth in industrial sector has resulted in generation of huge amount of industrial bi-products. Improper disposal and inadequate utilization of these industrial bi-products may prove detrimental for environment in long run.

Centre for Construction Development and research is continuously working on research projects aiming to enhance the utilisation of different industrial bi-products (such as LD slag, ferrochrome slag, bottom ash, Electric Arc Furnace slag etc.) as one of the constituent materials in cement concrete as binder or aggregate.

Aforementioned industrial bi-products are characterized for their physical, chemical, mineralogical and microstructural characteristics in order to understand and identify the area of its utilization as one of the component in cement concrete.

Based on characterisation, utilisation of industrial bi-products can be envisaged in the following areas,

i) As a full or part replacement of conventional coarse/ fine aggregate for preparation of concrete.

ii) If glass content along with other physical and chemical parameters are found appropriate, it can be used as cementitious binder for making composite cement. Cement thus prepared, will have to be evaluated for its physical and chemical parameters. Further, concrete prepared using such cement will have to be studied for its various fresh, hardened and long term durability properties and its performance will be compared with the performance of concrete made with conventional cements.

Structural Optimization & Design (SOD)

Studies on mechanical and time dependent properties of Very High Strength Concrete (100 to 130 MPa) and Ultra High Strength Concrete (130 to 180 MPa)

Studies on Mechanical Properties of Normal and High Strength Concrete using different types of indigenous aggregates for concrete grades from M35 to M100 has been carried out recently at NCB. Based on the study, the design parameters for revision of IS: 456-2000 has been already proposed and is being incorporated. The

study included comparison of tested mechanical parameters with different International Codes wherein stress block parameters for flexural design, stress strain characteristics, empirical equation for modulus of elasticity, flexural strength, split tensile strength, shear strength of concrete including effect of span to depth ratio etc. was carried out. Effect of Supplementary Cementitious Materials (SCMs) including comparison of fractured behaviour for normal and high strength concrete has also been studied for various Mechanical Properties of Normal and High Strength Concrete.

NCB completed an R&D project for development of Ultra High-Performance Concrete (UHPC) with compressive strength in excess of 150 MPa, in which guidelines for developing UHPC using indigenous materials were prepared. Mixes were prepared with cementitious materials comprising OPC-53, GGBS, UFGGBS, Silica fume and Nano Silica and were theoretically optimized for maximum particle packing with the help of Modified Andreasen and Andersen equation. To overcome the challenges of lump formation and non-uniform mixing during preparation of UHPC mixes using conventional pan mixer, NCB developed a planetary mixer with variable speed for producing a homogeneous UHPC mix. Planetary mixer has high mixing efficiency and helps in producing homogeneous mix with high powder content and low water to binder ratio. It can be operated at three different speed ranges i.e. low speed (0-125 rpm), medium speed (125-250 rpm) and high speed (250-325 rpm).

Planetary mixer developed at NCB for preparation of UHPC

Based on the knowledge and expertise gathered in aforementioned studies, a new research project was taken up to evaluate mechanical and time dependent properties of Very High Strength Concrete (100 to 130 MPa) and Ultra High Strength Concrete (130 to 180 MPa). This study will cover the critical issues in very high strength concrete and Ultra High Strength Concrete with respect to stress-strain characteristics, modulus of elasticity, flexural strength, split tensile strength, shear strength of concrete and time dependent properties such as creep and shrinkage. The study also aims to study the performance these very high grade concrete using steel fibres of different strength and performance of polypropylene fibres on fire resistance behaviour of these very high grade concrete. Currently, Indian Standard under

revision covers concrete grade M100 and outcome of study will provide data for upgradation of the Indian Standard of design for higher grade concrete above M100.

Under present study, comparison of creep coefficients derived from different creep models like Bazant's B-3, ACI, AASHTO, GL-2000 and FIB model code 2010 for concrete mixes (normal and high strength) having water to cementitious ratio of 0.47, 0.36, 0.27 and 0.20 was done for a relative humidity of 60% and design life of 100 years. For comparison of creep coefficient using different models the age at loading are kept as 7, 28 and 365 days. Thereafter, values are compared with experimentally obtained results of concrete mixes having water to cementitious ratio of 0.47 and 0.20 for age at loading of 28 days and up to 180 days loading period. Time induced creep strain of high strength concrete was determined using creep rig of capacity 2000 KN. Findings of study were proposed to BIS for revisions of relevant Indian Standards and same were disseminated through research papers in national and international journals.

Further, the stress strain characteristics for concrete above 100 MPa was studied and the stress strain parameters were determined for Very High Strength Concrete. The strain at peak stress and ultimate strain obtained was in the range of 2095 micron to 2204 micron for the cylindrical compressive strength in the range of 119.45 MPa to 139.89 MPa. While for high strength concrete the strain at peak stress and ultimate strain are in the range of 2500 to 2600 micron. The stress strain curve obtained are linear same as obtained in the case of high strength concrete. Therefore, for UHPC the design parameters or stress block parameters which governs the flexural design of RCC members needs to be modified accordingly for safe and efficient design. Mechanical properties and Stress Strain characteristics for High strength concrete (Up to 100 MPa) was also studied at elevated temperature. Studies were carried out by incorporating polypropylene fibers which improves the spalling resistance of concrete at higher temperatures. Results from the studies were proposed to BIS for revisions of relevant Indian Standards and same were disseminated through research papers in national and international journals.

(a) Sample under testing after fire exposure

(b) Sample texture after fire exposure

Structural Assessment & Rehabilitation (SAR)

In-service structures, especially commercial, industrial and residential buildings, bridges, tunnels, dams, high-rise buildings, etc. require periodical assessment and stability checks to judge whether they can perform satisfactorily for the intended service life. The distress in any form, such as cracks, spalling of concrete, corrosion of reinforcement, seepage, etc., not only disturbs the aesthetic appearance but also reduces the safety and integrity of the structures under use. Works related to Health and Condition assessment of existing RCC structures, Non-destructive Testing & evaluation of under construction and in-service structures, Quality Inspection and Quality Assurance of ongoing repair & rehabilitation works, etc. are being carried out under the program on Structural Assessment & Rehabilitation.

These works are taken up as sponsored R&D assignments. Our clientele includes reputed organizations like NTPC, PGCIL, NHPC, NHAI, RBI, BHEL, GAIL, AIIMS, CPWD (Delhi), DDA (New Delhi), IPGCL, MCD, BSES, UPRUVNL, etc.

For Health and condition assessment of structures, investigations are done to figure out the root cause of distress and formulate effective strategies for repair & rehabilitation along with strengthening if required. The investigation process involves elaborate visual, information and documentation surveys, non-destructive evaluation techniques and collection of in-situ samples for laboratory assessment. NCB has facilities for various non-destruction evaluation techniques like Rebound Hammer Test, Ultrasonic Pulse Velocity test, core extraction, half-cell potential measurement, Rebar scanning & concrete cover depth measurement, Electrical Resistivity Test, air permeability test besides facilities for chemical analysis (for evaluation of pH, Chlorides, Sulphates etc.) of hardened concrete samples collected from the site and other specialized tests such as Mercury Intrusion Porosimetry (MIP), Differential Thermal & Thermo-Gravimetric analysis (TG-DTA), X-Ray Diffraction (XRD) Analysis, etc., which are made use of in analysis from time to time.

Centre for Construction Development & Research has a versatile team of engineers to provide adequate solution for distressed RCC structures for its clients spread across India. The main emphasis is to provide durable repair strategy for distressed RCC structures to enhance their service life.

20 sponsored projects were completed in the period 2020-2021. Some of the important projects which were completed during this period are:

- Condition Assessment of RCC structures at NTPC Kahalgaon
- Condition Assessment of MGR Bridges at NTPC Rihand
- Condition Assessment of Structures at Nehru Place for DDA
- Quality Assessment of Structures at NTPC North Karanpura
- Condition Assessment of RCC Buildings at GAIL Chhainsa
- Concrete core extraction and testing for PSC poles of BSES
- Condition Assessment of Fire Damaged TG Unit at Anpara for UPRUVNL

Concrete Core Extraction from Column of Parking structure

Strain measurement test on RCC girders for 400m PSC Bridge

UPV Test on ID Fan Foundation

UPV Test on TG Foundation

Site Investigation on Fire damaged TG Deck

Measurement of existing rebar diameter as part of site investigation for a corrosion damaged structure

On-Going R&D Project

Cathodic Protection (CP) to enhance service life of new and existing reinforced concrete structures.

In India, RCC has been extensively used in last 50-60 years and during this period, we have created large number of infrastructural assets in terms of buildings, bridges etc., which are lifeline for the nation. These have been created with huge investment of resources and it cannot be even dreamed of recreating such assets out of limited natural resources. Corrosion of reinforcement is one of the major durability problems which significantly affects the serviceability and load carrying capacity of reinforced concrete structures. Corrosion of steel reinforcement in concrete imposes great financial burden over the country's economy.

Cathodic Protection is one method which can address the problem of reinforcement corrosion from the fundamental aspects, i.e., from the point of view of electrochemical nature of corrosion. It has the potential to offer a much greater increase in service life of corrosion affected reinforced concrete structures as compared to other traditional methods such as coatings, sealers, corrosion inhibitors, etc.

Expected Benefits

Some international standards (ISO, EN, Norwegian) on guidelines for the use of these systems in reinforced concrete structures are available. However, at present, no Indian standards on the use of these systems in reinforced concrete exist. This project aims to investigate the effectiveness of these systems under different corrosive environments and formulate guidelines for their use in reinforced concrete.

Both laboratory based and field based studies are being done under this project which will help in increasing the confidence of construction and repair sector in usage of these systems for preventing and mitigating further corrosion.

Samples cast for laboratory study under R&D project on Cathodic Protection of Reinforced Concrete

Installation of sacrificial anode at site for field study under R&D project on Cathodic Protection of Reinforced Concrete

Construction Technology and Management (CTM)

NCB provides technical services for wide range of construction projects such as buildings, convention centres, roads, bridges and tunnels, construction utility projects, special construction activities like pre-engineered steel structures etc. built by various central / state / autonomous organizations across India through the NCB geographical units located at Ballabhgarh, Hyderabad, Ahmedabad and Bhubaneswar. NCB uses state-of-the-art methodologies with accuracy to perform inspections that reduce risk and assure quality. NCB provides its customers with independent and impartial services that enable them to identify, manage and reduce risk. NCB reputation for independence and integrity enables us to build trust wherever needed. We provide transparent and unbiased inspection, testing, verification and certification solutions so our customers can give assurance in their products, processes, systems and services. We ensure that quality of construction processes follow the latest national and international standards – wherever our clients are within the country.

The scope of Third Party Quality Assurance / Audit includes random inspections, random lifting and testing of samples, random witness of field and laboratory testing done at site / fabrication yard, review of quality system and random non-destructive testing. Necessary advice for quality improvement are provided during inspection. NCB provides necessary technical support during the progress / completion of work. NCB give its recommendations with respect to the discrepancies found at the time of inspection and the corrective measures / remedies so that the discrepancies can be rectified / re-done. Review / audit for regular quality control is covered under the scope for which all the test reports, RMC batch mix printouts, Manufacture's Test Certificates (MTC) and Cement register etc. are made available by the department at site for review. Periodical audit report (generally every month / fortnightly) are submitted containing observations on inspections, material testing, review of quality system and NDT. However, major non-conformances observed and also for non-conforming materials, intimation are given during site inspection itself. The testing under Third Party checking is generally about 10-15% of the mandatory testing being done by the Client. The testing for special items like concrete pipes, DG sets, bearings, pre-stressing wires, pre-engineered sections etc. are witnessed jointly at manufacturer's production unit.

The random inspections of works will be carried out at different major stages to check the conformance as per contract specifications which includes reinforcement checking before casting of major RCC, witnessing of major casting at site, random Inspection of Pre-engineered Section at Fabrication Yard / Factory as well as at site during assembly.

Prestigious projects of national importance were awarded to NCB by Indian Trade Promotion Organization (ITPO), India International Convention Centre (IICC), Central Public Works Dept. (CPWD), State PWDs, All India Institute of Medical Sciences (AIIMS), Delhi Development Authority (DDA), Odisha Industrial Infrastructure Development Corporation (IDCO), State Trade Promotion

Organization's in Karnataka & Tamilnadu, Sports Authority of Gujrat (SAG), etc. The Centre continues to provide specialized services in the area of quality assurance/control and thereby contributing to the durable infrastructure in India.

India International Convention and Expo Centre (IICC) Dwarka, Delhi

Non-Residential Buildings using Pre-Engineered Construction Technology at KG Marg and Africa Avenue, Delhi

Central Public Works Dept.
(Sriniwaspuri, Delhi)

Multistoried Composite Houses,
DDA, Dwarka

Studies on mechanical and durability properties of High Strength Geopolymer Concrete

For preparation of Geopolymer mix an alkaline activator is used to react with Silica and Alumina in a source material of geological origin or in by-product materials such as fly ash or granulated blast furnace slag to produce cementitious binders. NCB took up a project to develop the geopolymer concrete and study its properties for precast products. All the geopolymer concrete mixes were evaluated for different fresh, hardened and long term durability properties and an experimental stretch was cast in NCB premises using geopolymer paver blocks. Based on the study, NCB drafted guidelines for developing geopolymer concrete mixes for precast products. Based on those guidelines and recommendations, IS 17452 (Use of alkali activated concrete for precast products- Guidelines) was formulated in 2020. A patent has been filed for interlocking paver blocks utilizing more fly ash and is under consideration by authorities. The patent was filed after developing the products and also conducting field trails for same. The cost of materials was reduced and made comparable with conventional concrete.

Based on expertise gathered in previous study, a new research project has been taken up which aims to study the hardened and durability properties of normal and high strength geopolymer concrete. This study also aims at preparation of guidelines for structural design based on the mechanical properties whose validation will be done by limited testing on beams and columns of selected grades of reinforced geopolymer concrete. The intended project tries to develop deeper understanding on feasibility of usage of other materials in geopolymer concrete. In present study, study on mechanical properties of finalized mixes of M40 grade has been completed. Further trials of higher grades (M75 and M90) with different combinations are under progress along with carrying out study on mechanical properties of High Strength Geopolymer Concrete.

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

DRAFT IN WIDE CIRCULATION

Reference	Date
CED53/T-82	10-10-2018

TECHNICAL COMMITTEE : Cement Matrix Products Sectional Committee, CED 53

To:
All members of

- Cement Matrix Products Sectional Committee, CED 53
- Civil Engineering Division Council, CEDC
- Others Interested

Dear Sir(s)/Madam(s),

Please find enclosed the following document prepared by the Cement Matrix Products Sectional Committee, CED 53

Sl No.	Doc No.	Title
1	CED 53 (14812) WC	Draft Indian Standard Guidelines for Use of Geopolymeric Concrete for Precast Products

2020

भारतीय मानक
Indian Standard

IS 17452 : 2020

Use of Alkali Activated Concrete for Precast Products — Guidelines

BUREAU OF INDIAN STANDARDS

December 2020

Price Group 4

IS 17452:2020

CENTRE FOR QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES – CQC

The activities of the Centre for Quality Management, Standards and Calibration Services were organised under four programmes: Certified Reference Materials, Calibration Services, Interlaboratory Services and Total Quality Management. These activities address all aspects of Quality Management and provide the entire range of Standardization and Calibration services to cement industry, R&D institutions, Concrete and allied building materials laboratories in India and abroad.

CERTIFIED REFERENCE MATERIALS

NCB's SRM lab is accredited under ISO 17034:2016 by NABL as Reference Material Producers and develops Certified Reference Materials (CRMs) on cement, building materials and fuel (coal and pet coke). So far 79 types of CRMs have been developed to cater the various needs of cement and construction industries. Moreover, 16 Bhartiya Nirdeshak Dravyas (BNDs), the Indian Certified Reference Materials (CRMs) were developed by Centre for Quality Management, Standards and Calibration Services (CQC). These BNDs derive their traceability to SI units from CSIR-National Physical Laboratory (NPL), India, the custodian of national standards in India. BNDs would play key role in maintaining the quality infrastructure of the economy through testing and calibration with precise measurements traceable to SI units. It is intended use for evaluating proficiency of analysts, evaluating/comparing various test methods and calibration of equipment. These BNDs will give a boost to "Make in India" programme and harmonize the quality infrastructure of the country fulfilling the mission of "***Atmanirbhar Bharat***".

On 4th January 2021, four nos. of NCB's BNDs dedicated to the Nation by Hon'ble Prime Minister Shri Narendra Modi Ji on National Metrology Conclave in CSIR-NPL in the presence of Dr Harsh Vardhan, Honorable Minister for Science & Technology, Dr Shekhar C Mande (DG-CSIR), Dr D K Aswal (Director-NPL), Dr B N Mohapatra (DG-NCB) and NCB team.

The following BNDs are commercially available:

Sl. No.	BND No.	Material Description
1	5001	OPC–Blaine fineness
2	5002	PPC-Blaine fineness
3	5003	PSC–Blaine fineness
4	5004	Fly ash–Blaine fineness
5	5006	Composite Cement-Blaine fineness
6	5007	WPC-Blaine fineness
7	5011	OPC-Higher Blaine fineness
8	5021	OPC-Middle fineness
9	5051	OPC–Chemical
10	5052	PPC–Chemical

11	5054	Fly Ash-Chemical
12	5091	Coal-Chemical
13	5055	Composite Cement-Chemical
14	5056	Limestone–Chemical
15	5057	Raw Meal–Chemical
16	5058	Clinker–Chemical

Releasing of BNDs by Hon'ble Prime Minister of India

Insight of BNDs by Hon'ble Minister Dr Harsh Vardhan

NCB team with Hon'ble Minister Dr Harsh Vardhan on National Metrology day

Supply of developed Certified Reference Materials (CRMs) was continued to the cement and construction industry laboratories. In 2021, total 6150 vials of different CRMs and 1100 sets of standard lime were supplied to 600 customers of cement plants, testing laboratories, public sector undertakings, R&D institutions including Bangladesh, Bhutan, Nepal, UAE, Tanzania, Hong Kong etc.

CALIBRATION SERVICES

Calibration of Coal Testing Lab Equipment at Power Plant, Punjab

The calibration laboratories continued to implement Quality Management System as per ISO 17025:2005 requirements. More than 1500 equipment/instrument including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers,

environmental chambers, ovens, furnaces, balances, rebound hammers etc. were calibrated at NCB laboratories and at customer's site. The calibration services are being provided to various Central Govt., State Govt., PSUs, Cement & Construction Industries and have shown remarkable growth. It is pertinent to mention that more than 80% customers rated our services as excellent.

Calibration of RMC Plant at New Delhi in November 2020

Calibration services have ensured traceability of the laboratory equipment to SI units and reliability of the results of various tests carried out using these equipment.

INTERLABORATORY SERVICES

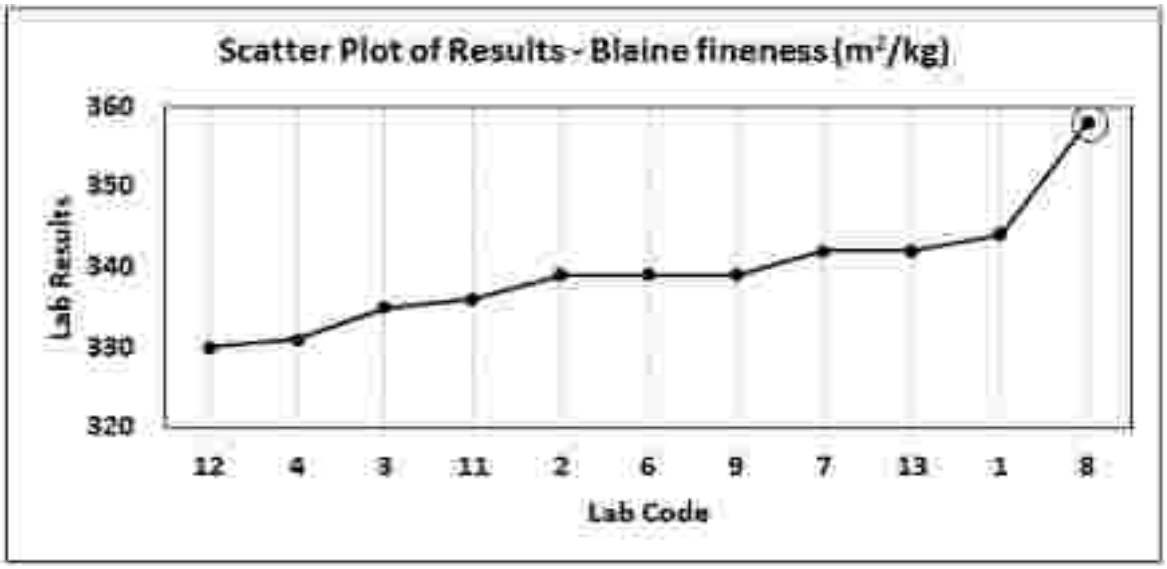
NCB's Interlaboratory Services (ILS) is accredited under ISO/IEC 17043:2010, thus NCB is first accredited PT provider in India.

The present scope of accreditation covers: limestone, clinker, cement, fly ash, concrete admixture, water for concrete & coal/coke/pet coke in chemical field and cement, fly ash, aggregate, mortar/concrete, tile (ceramic), burnt clay building brick & steel bar in mechanical field. In 2020-21, NCB completed 07 PT schemes. The participating laboratories were mainly from reputed private laboratories, cement plants, govt. laboratories, public sector laboratories etc.

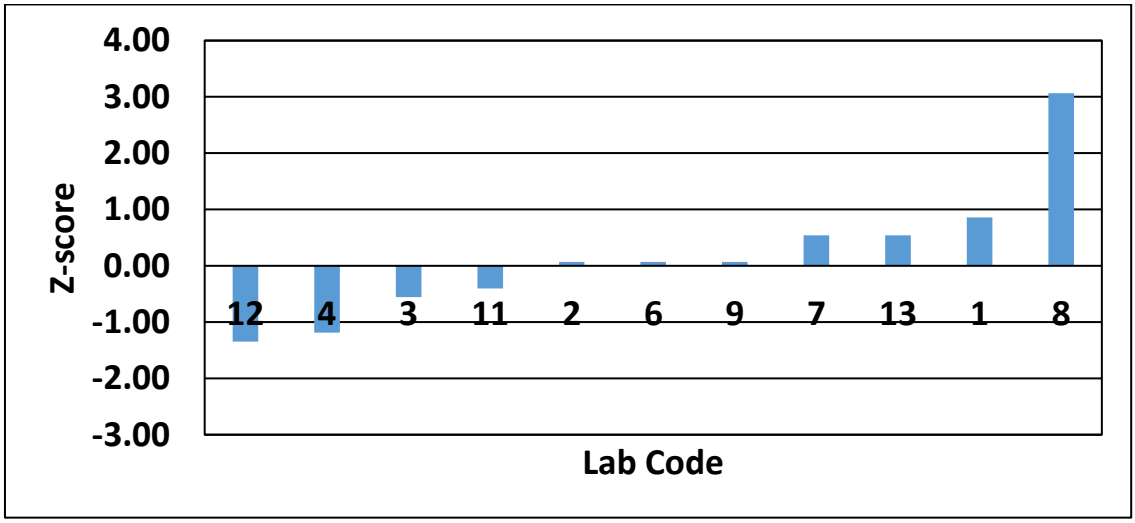
The participating laboratories were provided homogenized samples of PT items for testing in their laboratories. The test data reported by the laboratories were statistically evaluated for central tendency, spread and Z-score. The robust average and standard uncertainty for each parameter were calculated after normalizing the data as per ISO 13528:2015(E). Laboratories were evaluated on the basis of Z-Scores based on robust average and robust standard deviation.

Z-scores/Z'-scores for all the parameters in all schemes were calculated on the basis of results provided by the participant laboratories. As per the above standard, performance of the laboratories with $|Z| \leq 2.0$ is considered satisfactory. The laboratories getting $|Z| \geq 3.0$ are considered outliers and those getting $2.0 < |Z| < 3.0$ score are considered questionable performers. Outliers are encountered due to lack of statistical control and increase in variation in data.

Data received from the laboratories were studied for distribution and scatter. Out of 07 PT schemes, example for PPC-Mechanical is illustrated here as under. The scatter of results in PPC-Mechanical scheme show presence of bias. In the scatter plot of results, code number of the outlier laboratory (Lab code 8) is mentioned along with the data point. Outliers performers are put in circle. The scatter of results for Blaine's fineness test of PPC-Mechanical is shown in the following figure.



Scatter Plot of Test Results – Blaine's fineness (m²/kg) of PPC-Mechanical (ILS/PT/66)



Bar Chart of Laboratory Performance for Sample – Blaine fineness (m²/kg)

TOTAL QUALITY MANAGEMENT

This programme provides consultancy services to various organization industries, academic etc. for implementation of various TQM activities. Moreover, we provide consultancy services for accreditation of the laboratories for obtaining ISO 17025, ISO 17034, ISO 17043 etc. During the year, re-certification audit of Quality Management System based on ISO 9001:2015 of NCB was successfully carried out. The scope of certification covers all the three units of NCB.

CENTRE FOR INDUSTRIAL INFORMATION SERVICES–CIS

The Centre pursued its activities through six programmes viz. Industrial Information and Data Bank, Integrated IT Solutions, Publications, Seminars and Conferences, International and National Linkages and Image Building. CIS collects and disseminates information to cement, building materials and construction industries. Besides other facilities, the Centre includes a modern library and a computer centre.

INDUSTRIAL INFORMATION AND DATA BANK

NCB Library at Ballabgarh Unit serves as the national information centre for cement, building materials and construction industries. The holdings of the Library have grown to 46,929 documents. The library has a bibliographic data base consisting of about 43,900 entries derived from the journals received. NCB scientists as well as cement plants and other user industries utilize it for interactive searches. A library automation system called 'LIBSYS' has been installed. The system is user-friendly and compatible to network communication.

NCB Ballabgarh Library

Memberships of Indian and Overseas professional institutions, as listed below, were served.

MEMBERSHIP	
Indian	**Overseas**
• Indian Roads Congress (IRC), New Delhi	• Precast/ Pre-stressed Concrete Institute (PCI), USA

INTEGRATED IT SOLUTIONS

The Website, www.ncbindia.com was uploaded with promotional information about NCB's activities was done from time-to-time. The following services were continued:

- Indexing Services from Library, through Intranet site and www.ncbindia.com site.
- Announcements on 16th NCB International Seminar, Training Courses and quality related schemes.

- Employment opportunities & RTI related documents.
- Maintenance of hardware and software for whole of the institute including LIMS and LIBSYS.
- Bulk e-mailing services was continued for promotional information.

PUBLICATIONS

Information on technologies and services of NCB is disseminated through NCB Publications regularly. Efforts to widely popularize and promote NCB activities, technology and consultancy services amongst the cement and related building materials industries were continued. The following publications were brought out during the year are as follows:

- NCB Annual Report 2019-20 in English and Hindi versions separately
- News Letter
- NCB Darpan

PARTICIPATION IN WORKSHOPS, SEMINARS AND CONFERENCES

The following NCB officials participated in Seminar & Conferences shown against their names during the period.

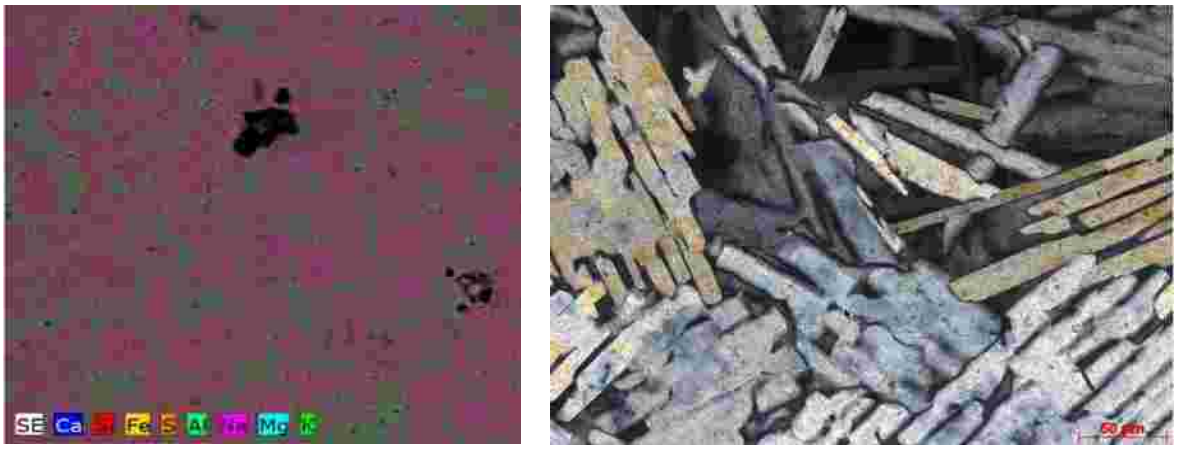
Sl No.	Workshop/Seminar/Events/Conferences	Participant(s)
1.	Webinar Lecture on Utilization of Iron and Steel Slag in Road Construction, 24th & 25th April 2020, Organised by CRRI	Sh. P N Ojha Sh. Amit Trivedi Sh. Pandu Ranga Rao Sh. T V G Reddy Sh. Pankaj Gupta Sh. Harishankar Prasad Sh. Sunil Kr. Soren Sh. Abhishek Singh Sh. Piyush Mittal Sh. Shivang Bansal Sh. Rizwan Anwar Sh. Puneet Kaura Sh. Lalit Yadav
2.	One Day Webinar on "Proposed Changes in IS : 456 : 2000 Plain and Reinforced Concrete – Code of Patrice and IS : 1343 Prestressed Concrete-Code of Practice which are undergoing comprehensive revision", 14 May 2020, organised by Structural Engineering Forum of India (SEFI)	Sh. P N Ojha Sh. Amit Trivedi Sh. Pandu Ranga Rao Sh. T V G Reddy Sh. B S Rao Sh. Sanjay Mundra Sh. Suresh Kumar Sh. Brijesh Singh Sh. Puneet Kaura Sh. Lalit Kumar

3.	Webinar "Interaction Session on RTI Act 2005", 08 July 2020, Organised by National Productivity Council	Sh. Ashutosh Saxena Dr. S K Chaturvedi Dr .D K Panda Sh. Amit Trivedi Sh. Kapil Kukreja Sh. Yogesh Bansal Sh. Rajat Kumar Ghosh
4.	5th International Conference on Multiphase Flow and Heat Transfer (ICMFHT' 20)" through virtual conference on 14th to 16th October 2020 at Lisbon, Portugal.	Sh. Anupam
5.	Earthquake Resistant Design of High-Rise RCC Structures-Modelling, Analysis & Design, on 19th December 2020	Sh. Nitesh Kumar
6.	Sustainable Development of Dams and River Basins" & APG Symposium on Water and Dams" Organised by Indian Committee on Large Dams (INCOLD) on 24th - 27th February 2021 at New Delhi.	Sh. P N Ojha Sh. Brijesh Singh
7.	International Conference on Community Based Research and Innovations in Civil Engineering 18-19 March 2021, Manipal University at Jaipur	Sh. P N Ojha Sh. TVG Reddy Sh. Rizwan Anwar Sh. Brijesh Singh
8.	Enhancing Reliability and Sustainability, India Infrastructure Publishing Pvt. Ltd. In March 2020	Sh. Kapil Kukreja
9.	5th World Congress on Momentum, Heat and Mass Transfer in October 2020	Sh. Anupam, Sh. Anil K Popuri Sh. MVR Rao Sh. Prateek Sharma
10.	35th Indian Engineering Congress (35 IEC) on Online Platform during in Dec 2020	Sh. P N Ojha Sh. Brijesh Singh Sh. Abhishek Singh Sh. Kapil Kukreja
11.	ISO 50001 Training programme in Feb2021	Sh. Ankur Mittal Sh. Prateek Sharma

Webinars & Workshops Organised

WEBINAR ON 'SOLIDIA CLINKER AND SOLIDIA CEMENT'

NCB organised a webinar on Solidia Clinker and Solidia Cement (SC) on 23rd May 2020. The overview of the technology was given by Dr. Sada Sahu, Principal Scientist, Solidia Technologies USA. The webinar was attended by over 40 top cement professionals from UltraTech Cement, Dalmia Cement (B) Ltd., Ambuja Cements Ltd, ACC Ltd., The India Cements Ltd, JSW Cement, J K Lakshmi Cement, J K Cement, My Home Industries Ltd, Birla Corporation, Prism Johnson Ltd., Star Cement and Engineers & Scientists from NCB.



Solidia Clinker & its microstructure

Dr. Sahu told that OPC production on an average emits 810 kg of CO_2/t of clinker. Out of this 540 kg of CO_2 is produced from decomposition of limestone & rest is produced by combustion of fossil fuels to heat the cement kiln. The CO_2 emissions during limestone decomposition and fossil fuel combustion in production of Solidia clinker comes out to be 375 and 190 kg/t of clinker which is 245 kg CO_2/t of clinker less than that produced during the production of OPC. In Solidia concrete, carbonation of low calcium silicate phases takes place. The curing begins only when SC, CO_2 & $H_2O(l)$ are simultaneously present in system and sequesters up to 300 kg of CO_2/t of SC. Solidia Cement reduces CO_2 emissions whereas Solidia Concrete consumes CO_2 gas.

WORKSHOP ON ALTERNATIVE FUEL & RAW MATERIALS

A two-day online workshop was organised by NCB on 29th and 30th July 2020 which covered topics like: Inventory of AFR in India, CPCB guidelines on co-processing of AFR, Environment aspects, Characterization of AFR, System design for pre-processing, Safety aspects, Process problems due to AFR, Case studies, Quality related problems – Clinker quality & mineralogy of clinker, Impact of AFR on cement & concrete properties.

The usage of AFs in cement industry is to be given a major boost due to limited fossil fuel resources, high fossil fuel prices and stringent environmental norms. To achieve high TSR in cement kilns, Indian Cement Manufacturers are adopting all possible AFs according to their geographical availability and economic viability. One basic requirement of the industry is to have a AF feeding and firing system that can handle maximum types of AFs.

National Council for Cement and Building Materials (NCB)
(under administrative control of Ministry of Commerce & Industry, Govt of India)

Organized a 2-day Online Workshop
during 29th – 30th July on

"Maximization of Alternate Fuels and Raw Materials (AFR) Utilization in Cement Industry"

Attendees from organizations

UltraTech Cement Ltd	Chettinad Cement
Dalmia Cement (B) Ltd	Sagar Cement
HeidelbergCement	The India Cements Ltd
ACC Ltd & ACL	JSW Cement
J K Cement Works	The KCP Ltd
Star Cement	Bharathi Cement
Penna Cement	Parashakti Cement
Nuvoco Vistas Corp.	Birla Corporation
J K Lakshmi Cement	Shree Jaya Jyothi Cement
Prism Johnson Ltd.	Wonder Cement
Orient Cement	Other plants

The Workshop was attended by Total 190+ participants

- **143+ participants** from most of the major cement companies of India
- **21 Senior officials** of cement plants during Inaugural & Concluding session
- **26+ NCB officials**

All the participants appreciated the course content and actively participated in the workshop.

The webinar covered topics which could help in increasing usage of various solid, liquid and gaseous fuels in the rotary cement kiln like paper waste, rubber residues, used tires, pulp sludge, plastic residues, biomass, domestic refuse, RDF, agro waste, oil bearing soils, ETP & sewage sludge, tar, chemical wastes, distillation residues, waste solvents, used oils, wax suspensions, petrochemical waste, asphalt slurry, paint waste, oil sludge, landfill and pyrolysis gas.

WEBINAR ON IDENTIFICATION OF ENERGY SAVING OPPORTUNITIES IN CEMENT PLANT

A two-day webinar was organised by NCB on "Identification of energy saving opportunities in cement plant" on 27th & 28th August 2020.The Energy Management expert group is one of the key expert group within NCB which is given the target to facilitate cement industry with every possible energy management solution and services. Updating of knowledge and technical know-how is one of the key factors for efficient plant operation with skill development of work force.

The webinar was inaugurated by DG-NCB along with Sh. Ankur Mittal (Webinar coordinator) and Dr. D K Panda (Head- CCE). More than 60 participants from Indian and foreign cement plants attended this webinar which had fruitful takeways. The participants, experts from OEMs like Loesche, KHD Humboldt Wedag and institutions like Bureau of Energy Efficiency appreciated the quality of presentations presented and content of the webinar. They also requested NCB to increase the frequency of providing such knowledge sharing platforms to the industry.

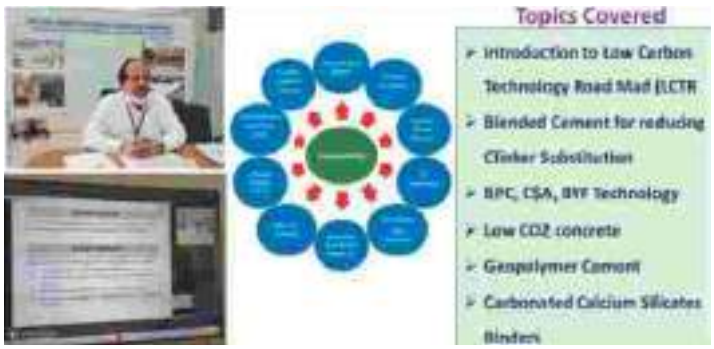
WORKSHOP ON RECENT CHANGES IN INDIAN STANDARDS WITH RESPECT TO QUALITY REQUIREMENTS IN CONCRETE CONSTRUCTION

Online workshop on Recent Changes in Indian Standards with respect to Quality Requirements in Concrete Construction, 30th September 2020 at NCB-Ballabgarh with participation of more than 60 Nos., from cement and construction industry

WORKSHOP ON RECENT CHANGES IN INDIAN STANDARDS WITH

Webinar on Durability Performance of Concrete made with OPC, PPC, PSC and Composite Cement, 14th October 2020 at NCB-Ballabgarh with participation of 26 Nos., from cement and construction industry

WORKSHOP ON LOW CARBON CEMENTS-OPTIONS AND OPPORTUNITIES



One-day workshop on '**Low Carbon Cements-Options and Opportunities**" was organised on 20th October, 2020, with more than 70 participants, from cement and construction industry, under the guidance of leadership of DG-NCB and Dr. S K Chaturvedi (HoC-CRT) covering wide range of topics like Low Carbon Technology road Map, Blended Cements, Geopolymer, Belite, Calcium Sulfoaluminate, BYF Clinkers, Carbonated Calcium Silicate Binders, CO -cured concrete etc., to mitigate carbon and energy footprint for greener cement industry.

WEBINAR ON "UTILIZATION OF BAMBOO AS ALTERNATE FUEL RESOURCE FOR CEMENT PLANTS IN INDIA"

NCB in association with IFGE and North East Cane & Bamboo Development Council, under North Eastern Council, Ministry of DoNER, Govt. of India organised a Webinar on "Utilization of Bamboo as Alternate Fuel Resource for Cement Plants in India" on 05th November 2020. The webinar was inaugurated by Shri Nitin Jairam Gadkari, Hon'ble Minister, MoRTH & Ministry of MSME, GoI, and Dr. Jitendra Singh, Hon'ble MoS (I/C), Ministry of DoNER, GoI.

The objectives of Webinar were:

- To deliberate on characterization and availability of different bamboo species to be used as AFR in Cement Plants.
- To understand the acceptability of the Cement Industry for bamboo as AFR.
- Policy advocacy for utilization of waste land for bamboo plantation by Cement Industry for their use.
- National demonstration plantation of Bamboo as "Energy Crop".

The targeted beneficiaries for the Webinar were:

- Indian Cement Industry.
- National & State Bamboo Missions.
- R&D institutes working in cement & bamboo sector.
- Experts from the bamboo sector who are working on bamboo as "Energy Crop".
- Forest Department & Climate Change Experts.
- Other energy intensive industries like power plants, iron & steel plants who are using bamboo as fuel substitute.

During the inaugural session, key information and ideas were also shared by:

- Dr. Inder Jit Singh, IAS, Secretary, Ministry of DoNER, Govt of India, New Delhi.
- Shri K Moses Chalai, IAS, Secretary, North Eastern Council, Govt of India, Shillong.
- Dr. Alka Bhargava, Addl. Secretary, NBM, Ministry of Agriculture and Farmers' Welfare, Govt of India, New Delhi.
- Shri Annasaheb M K Patil, Former Union Minister for Rural Development, Govt. of India and Founder Chairman, IFGE, New Delhi
- Dr. Shailendra Chaudhari, MD, NECBDC
- Shri Mahendra Singhi, Chairman, NCB
- Dr. B N Mohapatra, DG, NCB

Speaking at the Inaugural session, Sh. Nitin Gadkari expressed his happiness for the initiative taken to accelerate the use of Bamboo. He emphasized upon the need of more intensive use of bamboo resources of the country and asked various sectors to utilize various modes and methods to bring down logistics costs including choosing more cost-efficient transit mode like water, rail or road. Sh. Gadkari called for producing high yielding bamboo varieties. The greater yield and wider bamboo usage will open up more employment generation especially in Northeast India.

Dr. Jitendra Singh said that Ministry of DoNER and North Eastern Council is taking all measures for tapping bamboo resources and technical know-how at all India level. He also said that it is imperative to make bamboo a pan India perspective, for its growth and utilization adding that his ministry is already exploring bamboo reserves in different parts of the country. Dr. Jitendra Singh said that bamboo has great potential for its use as a clean source of energy and can also replace single use plastic, thus promoting the environment and climate cause in India.

Shri Mahendra Singhi shared his thoughts and expressed that more utilization of Bamboo is important for the development of North East. He said that Bamboo can transform rural life, transform Climate and transform profitability of an industry.
Dr. B N Mohapatra, DG-NCB highlighted the activities of NCB carried out under the missions and schemes of Govt. of India like development of low carbon cements for reduction of carbon footprint, training imparted to personnel of cement and construction industry under Skill India, developments of BNDs under Make in India, waste utilization as AFR in cement industry and C&D waste as aggregates in construction industry under Swachh Bharat Mission etc.

WEBINAR ON THE ART OF ASSET MANAGEMENT BY IMPROVING THE OPERATIONAL EFFICIENCY OF CEMENT PLANT

COVID-19 pandemic has impacted not only the daily lives of common people but also dented the economy and manufacturing industry in an unprecedented way. The Indian cement industry is trying to recover the losses incurred during lockdown time. NCB conducted a training programme in the second quarter of FY 2020-21 on "The Art of Asset Management by Improving the Operational Efficiency of Cement Plant", the objective of which was to highlight the best utilization of existing assets of a cement plant like land, human resources, equipment, raw materials, utility assets and logistics. The training was imparted by Sh. J P Gupta (CGM-Holtec Retd.) and Sh. Kapil Kukreja (Webinar Coordinator-NCB) drew attention on to the hidden assets like losses in energy, un-utilised or underutilised capacity of equipment and presented asset management model.

Further to emphasise on better utilization of land, the concept of energy farming was introduced and potential of energy farming in cement plants was presented. 30 participants from various Indian cement plants attended the training and interacted with the faculty. Discussions were held on how energy farming concept may become a game changer in the cement industry. The participants also requested NCB to further discuss the modalities of energy farming with MoEF as well as technical feasibility and economic viability of the energy farming concept in Indian cement industry.

IMPORTANT VISITORS

Date	Name of Visitors	Organisation
28-10-2020	Dr. T. Krishna Prasad	IPS (Retd.), Former DGP & Chairman-Road Safety Authority, Telangana State, Hyderabad.
24-12-2020	Dr. S S Gupta	Senior Development Officer – DPIIT
11-01-2021	Sh. Umesh P. Soni Sh. Ajay Pathik	Ambuja Cements Limited, Mumbai Ambuja Cements Limited, Gurugram
28-01-2021	Dr. S S Gupta Dr. B.P. Thapliyal	Senior Development Officer – DPIIT Director, CPPRI
19-02-2021	Sh. Anil Agrawal Dr. S S Gupta	Additional Secretary – DPIIT Senior Development Officer - DPIIT
08-03-2021	Dr. Megha Mittal	Manav Rachna University
18-03-2021	Ms Aparajita Ji	IAS, SDM- Ballabgarh

INTERNATIONAL LINKAGES / COLLABORATION PROGRAMMES

NCB has been actively interacting and liaising with a number of international bodies and exchanging knowledge and experience particularly in the area of cement and building materials industries.

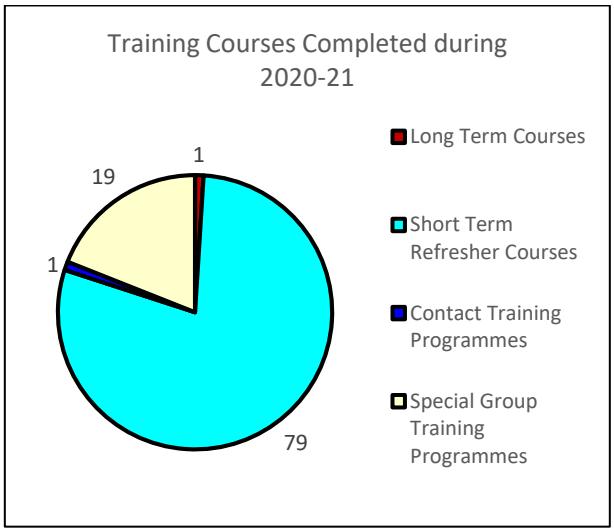
CENTRE FOR CONTINUING EDUCATION SERVICES- CCE

Centre for Continuing Education Services (CCE), has been organizing various need-based and industry-oriented training programmes at all levels, for the participants from cement, concrete and construction industries since its inception in 1972. Participants comprising of industry professionals and fresh graduates/post-graduates in science and different disciplines of engineering have been benefited. A number of Govt./Semi-govt./Private organizations both from India and abroad have availed the training services of NCB for their engineers and professionals.

Considering the training needs of the industry in the COVID-19 scenario CCE imparted online training on cement, concrete and construction technologies through its various short-term online training programmes via Cisco Webex platform to technical professionals of all levels of various organizations.

During the year 2020-21, 100 training programmes (online/offline) were successfully organised with a total of 1242 participants attending the programmes.

The highlights of the training programmes conducted are as under:



Type of Course	Number
Long Term Courses: *PG Diploma in Cement Technology*	**1**
Short Term Online Courses	**79**
Contact Training Programmes	**1**
Special Group Training Programmes	**19**

LONG TERM COURSES

Post-Graduate Diploma in Cement Technology

In its efforts to develop technological talent for the cement industry, NCB has been regularly conducting Post-Graduate Diploma in Cement Technology since 1983. The course is duly approved by All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Govt. of India. Four self-sponsored participants admitted for 2019-20 session have successfully completed the course in July 2020. As in the past, all the students were placed in the cement industry. In the session 2020-21, seventeen students were admitted in the course.

SHORT TERM REFRESHER COURSES

During the year, 79 Short Term Refresher Online Training Courses were organised wherein 774 professionals from cement and construction industries participated. In Cement Technology related area, special emphasis was given to courses such as Maximization of AFR Utilization in Cement Industry; Identification of Energy Saving Opportunities in Cement Plant; The Art of Asset Management by Improving the Operational Efficiency of Cement Plant; Optimisation of Raw Mix to Improve Clinker Productivity; Application of XRD and XRF; Kiln Operation and Optimisation Technologies for Air Pollution Control in Cement Plants; Energy Audit of Captive Power Plant & Waste Heat Recovery System; Different Types of Cement Produced in India and its Application; Heat Balance on Kiln Systems; Fan Engineering; Effect of Minor Constituents on Cement properties; Physical Testing of Cement; Cement grinding system with case studies; Advantages of Computer Aided Ore Body Modelling and Deposit evaluation; Energy Efficiency in Grinding Systems; Advances in Pyro-Processing; Sampling and Testing of Cement as per BIS Standards; Analysis of Coal (Proximate and Ultimate); Chemical Analysis of Hydraulic Cements- I; Optimization of Pyro-processing System in Clinker Manufacturing; Instrumental Methods of Analysis in Quality Control; Burnability & Reactivity of Raw Mix; Ball Mill Optimisation.

In Concrete and Construction related areas, the training programmes on specific topics such as; Performance of Concrete at Elevated Temperature" (Fire Performance); Alkali activated concrete- Geoploymer Concrete; Performance Evaluation of Concrete Structures; Quality Control and Quality Assurance In Concrete Construction; Evaluation of Concrete Structures using NDE with Case Studies; Concrete Mix Proportions and Comparison of Acceptance Criteria in Different Codes; Diagnosis and Remedial Measures for Cracks in Reinforced Concrete; Concrete Mix Design of Self-Compacting Concrete & its Evaluation; Non-Destructive Testing for Assessment of Concrete Structure; Corrosion Inhibitor for Increasing Service Life of New Concrete Structure; Ultra high Performance Concrete : Technology for present and Future were organised.

Lectures Sessions during Online Training Courses

Sl No.	Organization	Topics of the Courses Organised
1	Nuvoco Vistas Corporation Limited, Mumbai	Cement Manufacturing Technology and Quality Control
2	M/s Dalmia Cement Bharat Ltd.	Cement Manufacturing Technology for GETs
3	Cement Corporation of India Ltd. (CCI), Tandur	Energy Efficiency in Electrical Systems Latest developments in Refractories Alternative Fuels & Raw material (AFR) and Emissions associated with usage of AFR and their control techniques
4	M/s Bharat Petroleum Corporation Ltd. (BPCL), Mumbai	Quality Control in Civil Engineering
5	GAIL India Ltd (GAIL), Noida	Cracks and Leakages in Concrete Structures: Causes, Prevention and Repair
6	Power Grid Corporation of India Ltd. (PGCIL), Gurgaon	Quality Control in Construction & Durability Assessment in Concrete Structures – 2 batches Field Quality Assurance – 2 batches
7	Delhi Metro Rail Corporation Limited (DMRC), Delhi	Quality Control and Quality Assurance in Concrete Construction – 4 batches
8	Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA), Bhubaneshwar	Sound Construction Procedures and Workmanship Development of Minor Irrigation Works – 4 batches

CONTACT TRAINING PROGRAMMES

On the request of M/s Tamilnadu News Print & Papers Ltd., Tamil Nadu **one** tailor-made practice-oriented contact training programme was organised for their official on "**Bonds Grindability Index**" at NCB's Hyderabad unit.

SPECIAL GROUP TRAINING COURSES

Nineteen special group training courses on specific topics for the group of engineers/professionals were organised online/offline for the following organizations at NCB-Ballabgarh & Hyderabad units:

Participants of Dalmia Cement (Bharat) Ltd. during Special Group Training Programme at NCB-Ballabgarh Unit

Participants of DMRC during Special Group Training Programme at NCB-Ballabgarh Unit

LIST OF NCB OFFICIALS WHO HAVE UNDERGONE TRAINING

During the lockdown period of COVID-19 pandemic various skill development online training programmes were conducted for the faculty/officials of NCB.

Sl No	Name of the Official	Title of course	Name and address of Training Organisation	Duration and Period
1	Sh. G J Naidu	NABL Assessor's Training Course ISO/IEC 17025:2017	National Accreditation Board for Testing & Calibration Laboratories (NABL)	Virtually – Level 1 for 3 days 19-21 November 2020
2	Sh. V Naga Kumar	Virtual Training Programme on Uncertainty Measurement	National Academy of Construction (NAC), Hyderabad	2 days 26-27 March 2021

NCB HYDERABAD

NCB HYDERABAD UNIT

NCB Hyderabad is the regional centre established in 1982 in a sprawling campus having world class testing, R&D and training facilities. The activities of NCB Hyderabad are illustrated through the respective centers which provide various testing, R&D facilities, training, energy auditing, Third Party quality assurance and other consultancy services to the cement and construction industries. The unit has adopted quality management systems and certified with ISO 9001:2015.

CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING (CRT):

CRT centre executes its activities in the areas of Research and development studies, Industry sponsored projects and testing. Laboratories are NABL accredited (TC-7692) and BIS recognized (OSL-6114835) and equipped with state-of-art facilities. The Independent testing laboratories conduct complete chemical, mechanical, mineralogical and microstructure analysis of various raw materials, in-process materials in cement production, fuels, clinker, pozzolanic materials, different industrial slag materials, industrial waste and by-products, different cements, aggregates, water used in construction, admixtures etc.

R & D activities: ***Use of coarse fly ash in manufacture of cement:*** The utilization level of fly ash in cement and construction industries has increased from a mere 3% in the early 1990's to present level of about 26 percent of the fly ash generated. However, still there are huge quantities of ash, especially the coarser fly ash remaining unutilized. With fly ash generation set to go up further, it is important to continue R&D efforts for improving the properties of poor quality fly ash and seek newer ways for its enhancing the utilization levels in cement and concrete. Studies are taken up on utilization of coarse fly ash, with fineness less than 250 m^2/kg in the manufacture of PPC.

Development of XRF Calibration Standards: Results from the XRF, predominantly depends on the quality of the standards used for the calibration of the equipment. Development of standards for calibration of XRF was taken up for plant laboratory. Various samples of raw materials, raw meal, kiln feed, clinker, cement etc. were collected from the plants and were analysed in the NCB laboratories for chemical composition. This high quality data was used to calibrate the XRF of plant laboratories.

Utilization of industrial waste materials in the manufacture of cement: Use of industrial waste in the manufacture of cement is beneficial from environmental as well as economical point of view. Studies were successfully completed on utilization of chrome sludge from chemical industry in manufacture of clinker. Investigations on use of chrome sludge in development of other building products are in progress.

Establishing Limestone Consumption Factor (LCF): Limestone consumption factor indicates the amount of limestone consumed by the cement plant for production of 1 Tonne of clinker. This study is helpful in monitoring the limestone reserves and plans the mining activities.

Training programs organised

XRF: FUNDAMENTAL PRINCIPLES AND CALIBRATION

One day online training programme on "**XRF: Fundamental Principles and Calibration**" was organised in December 2020, NCB Hyderabad. DG-NCB inaugurated the training programme which was attended by 80 participants from various cement plants in India. CTL Group- US, IRTECH-India and NCB Scientists were the key faculties for the program.

PERFORMANCE EVALUATION OF CONCRETE STRUCTURES

Two days online training program on "**Performance Evaluation of Concrete Structures**" was organised in October 2020, by NCB Hyderabad. 34 participants from Construction Industry & Cement plants i.e. Highways Research Station, KCP Limited, Larsen & Toubro Limited, Madras Atomic Power Station, Marshal Geo Test Laboratory, My Home Ind. Pvt. Ltd, NLC India Limited, National fertilizers Limited, RITES Ltd, RBI attended the training programme.

OPTIMIZATION OF RAW MIX TO IMPROVE CLINKER PRODUCTIVITY

Two days online training program on "**Optimisation of Raw mix to Improve Clinker Productivity**" was organised in October 2020, by NCB Hyderabad. DG-NCB inaugurated the training programme, Opening remarks by Sh. K V Rao, Scientist –E & Head, BIS – Hyderabad 60 participants from various cement plants in India attended the training programme. BIS and NCB scientists were the key faculties for the program.

CENTRE FOR QUALITY MANAGEMENT, STANDARDS & CALIBRATION SERVICES (CQC):

CQC calibrated around 250 Proving Rings (50kN, 100kN, 250kN, 500kN, 1000kN, 2000kN) received from cement and allied industries, testing laboratories & educational institutions to help them maintain accuracy in compressive strength measurements. The laboratory is in the process of obtaining NABL accreditation in the areas of Thermal, Dimension, Mass & Force (Proving rings) calibration.

Assisting in NABL accreditation of plant laboratories: CQC has been providing services in assistance for plant laboratories in obtaining NABL accreditation. The project covers visit to the laboratories, gap analysis, assessment of infrastructure and equipment, skill level assessment of the manpower and providing the recommendations and required training to the plant officials for improving the accuracy of the results as per various National Standards.

CENTRE FOR CONSTRUCTION, DEVELOPMENT AND RESEARCH (CDR)

Centre for Construction Development and Research (CDR) contributes to application of scientific and technical knowledge in developing durable and sustainable civil infrastructure in the southern region of India. The Centre provides services to the cement, concrete, Building materials and construction industry through the structured programmes namely Concrete Technology (CON), Structural Assessment and Rehabilitation (SAR) and Construction Technology and Management (TPQA).

STRUCTURAL ASSESSMENT AND REHABILITATION (SAR):

The distress evaluation, condition assessment, repair and rehabilitation of existing structures such as buildings and industrial structures are becoming increasingly important to make them functional and conforming to the safety and serviceability requirements as these structures are aging, affected by environment conditions, fire damaged structures and heritage structures. RCC Structures were investigated by using visual observations, non-destructive evaluation technique (NDE), partially destructive tests and other field tests followed by laboratory tests on extracted core samples and chemical analysis of hardened concrete as per BIS and international standards. The investigation was generally followed by recommendation for repair and rehabilitation with state of art repair materials and implementation techniques for distressed RC structures covering specifications, cost estimates and bill of quantities and quality inspection during the repair of RCC structures is also conducted. Structures have been investigated for various clients viz., NTPC in Telangana, Uttar

Pradesh, West Bengal, Tamilnadu, Odisha & Karnataka, NSPCL in Chattisgarh & West Bengal, POWERGRID Corp in Karnataka, NALCO in Odisha etc.

CONSTRUCTION TECHNOLOGY AND MANAGEMENT (TPQA)

Third Party Quality Assurance/Audit (TPQA) services have been provided to enhance the program's effectiveness and the opportunities for innovation in the construction industry for a wide range of construction projects such as institutional buildings, residential buildings, skill development centers, hostel blocks, etc in southern states viz., Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Puducherry, Kerala and Goa. With strong organizational and leadership capabilities in management of construction projects, the centre is associated with various Central/ State/ Autonomous Organizations/TTD in delivering durable buildings and structures to meet specified quality standards by ensuring quality workmanship, good construction practices, use of quality materials etc. and inspections done in accordance with ISO/IEC 17020:2012 Type 'A' Accreditation standards.

CONCRETE TECHNOLOGY (CON)

Testing & evaluation of concrete making materials and conducting various grades of concrete mix proportions, using different types of cements like OPC,PPC,PSC and different kinds of aggregates to enhance durability including analysis and Interpretation of Test results for Civil works for various central/state/PSUs/Private limited organizations was taken up. Testing and evaluation of inert drilling waste as a replacement to rock dust, which is traditionally used as a filler in making of fly-ash bricks was also carried out.

CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING AND OPERATIONS (CME):

MANDATORY ENERGY AUDITS:

NCB-Hyderabad team associated with NCB Ballabgarh team in carrying out Mandatory Energy Audits for M/s Manikgarh Cement Works, Gadchandoor, Maharashtra and M/s Gujarat Cement Works, Amreli, Gujarat of UltraTech Cements Ltd. Various Process Measurements in Kiln, Preheater, Precalciner, Raw mill, Coal mill, Cement mill and Packing plants were carried out. The audit comprises of Thermal & Electrical energy measurements and analysis for exploring the measures for energy reduction. The above studies also includes Compressed air audit and Electrical equipments audit which includes study of compressors, major drives, lighting, pumps etc. Detailed Energy audit report prepared including above aspects and submitted to the plants.

Techno Economic Feasibility Report : NCB-H was also associated with engineering and Techno Economic Feasibility Report (TEFR) projects. TEFR study for Malabar cement grinding unit at Kannur & CMM Cement Meghalaya and Implementation of co processing of AFR materials (tyre chips) for Oman Cement Company, Muscat have been executed along with NCB-B team.

Third Party Quality Assurance: The electrical & mechanical quality assurance activities have been taken up in different projects. TPQA electrical team inspected different construction projects like hostels & quarters in Telangana, Tamilnadu and Goa & Convention halls in Karnataka and Tamilnadu. As part of the MOU with Odisha IDCO, TPQA team has also visited around 50 projects in various divisions of IDCO viz. Angul, Berhampur, Balasore, Balangir, Bhubaneswar, Cuttack, Jajpur, Rourkela and Sambalpur in Odisha. The activities inspected at various project sites were verification of procured items and workmanship, use of digital instruments for various measurements, sampling of various items to ensure the quality of items and submitting the detailed inspection report to client.

CENTRE FOR CONTINUING EDUCATION (CCE)

Centre for Continuing Education (CCE) centre organised various training courses to meet the needs of professionals from cement, concrete & construction industry. The centre has well established training complex with excellent infrastructure of class rooms of capacities up to 100 seating capacity with video conferencing facilities. A hostel block attached to the training complex is available for providing residential facility to participants. NCB-H CCE is also equipped with CISCO webex platform for conducting virtual training programs.

NCB has imparted training to various cement and construction companies across various levels of human resources to enhance the momentum of "**National Skill Development Program"**

As part of "**Digital India program**" CCE initiated virtual training programs during COVID-19 through CISCO Webex and 21 Programs conducted for Cement and Construction industry.

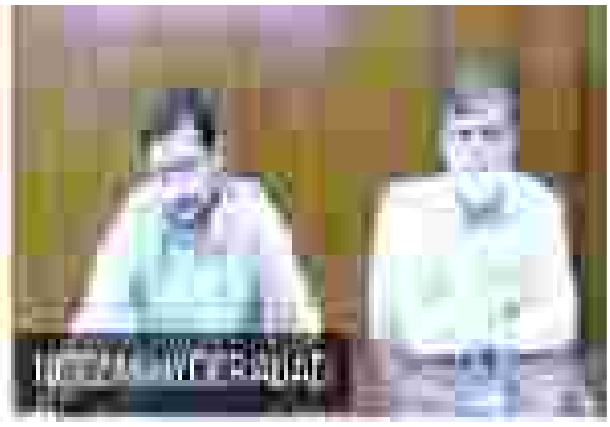
CCE Hyderabad organised 7 short term refresher courses for Cement industry and 5 short term refresher courses for Construction industry through Virtual mode. Special Online Group Training Programmes were conducted for Power Grid Corp. of India Ltd., OIIPCRA-Odisha & CCI-Tandur Officials. Hands on training was imparted through Contact Training Programme on Bonds Grindability Index.

Around 150 participants benefited through NCB Training from Cement Industry representing Chettinad Cement Corp. Pvt. Ltd, Dalmia Cement Ltd, JK Cement Ltd, The Ramco Cements Ltd, Ultratech Cement Ltd, ACC Ltd, Orient Cement Ltd, Penna Cement Ind. Ltd, The India Cements ltd, JSW Cement Ltd, Toshali Cements, West African Cement and Ethio Cement etc.

Around 350 participants benefited through NCB Training from Civil & Construction Industry representing Rites Ltd, RBI, NTPC, NFL, IOCL, LIC, NSPCL, TS-I&CAD, Border Roads Organisation, Madras atomic Power Station, ISRO, CCI, Power Grid, OIIPCRA-Odisha etc.

Special Training Programme for OIIPCRA- Odisha engineers

Special Training Programme for PGCIL engineers



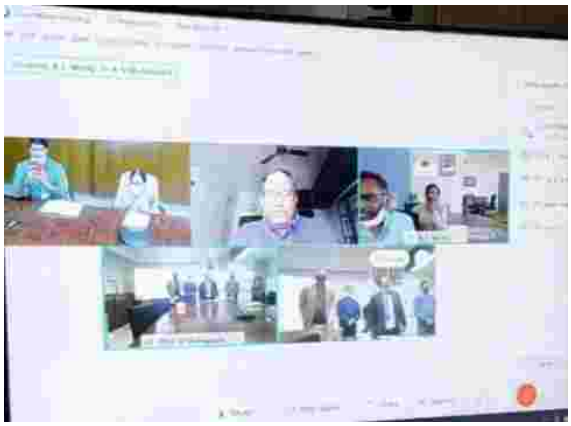
Evaluation of concrete structures using NDE with case studies

XRF: Fundamentals Principles and Calibration

Training Infrastructure:

Interaction with Industry:

NCB-Hyderabad officials interacted with officials of various cement plants, government departments and educational institutions through virtual mode during the pandemic to review the progress of various projects and also for other technical discussions



Interaction with IIT-Hyderabad

Interaction with KTPO Bangalore

Interaction with Kolkata Port Trust

Interaction with UNO & NMDC officials

NCB AHMEDABAD

NCB AHMEDABAD

NCB Ahmedabad Unit has essential facilities for testing of cement, concrete, steel and soil in order to provide Quality Assurance and Quality Control (QA-QC) and Third Party Quality Assurance (TPQA) services to the construction industry.

Facilities includes Universal Testing Machine (UTM), Automatic Compression Testing Machine (ACTM), Physical Testing Laboratory, CBR Testing Machine and Non-Destructive Testing (NDT) equipment such as Rebound hammer, Ferroscan & Ultrasonic Pulse Velocity Test (UPV).

Unit is using these facilities to provide testing and TPQA services to various Government agencies of Gujarat, Union Territory (UI) of Daman & Diu and Dadra and Nagar Haveli. The unit is ISO 9001: 2015 certified and has ISO 17025: 2017 accredited testing laboratories.

Following facilities are available in NCB-Ahmedabad unit.

Testing Facilities

- Cement and Cementitious Materials such as OPC, PPC, PSC, Fly ash, Slag, Silica-fume etc.
- Aggregates – complete physical and chemical analysis, Soundness
- Special Concrete, Advance Concrete Composite, Standard Concrete Mix Designs & Self Compaction Concrete Mix Design
- Ordinary concrete, standard concrete and High Strength Concrete using OPC, PPC, PSC, OPC + Fly ash, OPC+ Fly ash + Silica fume etc.

Structural Assessment & Rehabilitation Services Offered

- In-situ quality assessment, durability investigation and residual life assessment of concrete structures
- NDT, Pile integrity testing
- Distress investigations of buildings, bridges, dams, power plants, chimney etc. deteriorated due to aggressive environment or fire damaged structure
- Consultancy for repairs/rehabilitation & retrofitting

Construction Technology & Management Services Offered

- Quality control services to construction project through mobile laboratories
- Technical Audit (TA), Quality Assurance & Quality Control (QA/QC) and Third Party Quality Audit (TPQA) of new constructions- residential, commercial & institutional buildings; flyovers, concrete roads, bridges etc.

Studies Undertaken

- Carrying out Condition Assessment using Non Destructive Evaluation Technique for various Structures (7 No's) at NID Campus, Ahmedabad.

- Third Party Inspection of Construction of Site Development & Miscellaneous Practice Ground at Swarnim Gujarat Sports University at Desar

- Third Party Inspection of Construction of University officer's and Staff Quarters at Swarnim Gujarat Sports University at Desar

- Carrying out Condition Assessment and to provide suggestion for remedial measures for ESIC Establishments in Mumbai Region viz. (i) ESIC Regional Office Building at Lower Parel at Mumbai and (ii) 5nos. single Storey Independent Structures at ESIC Hospital Wagle Estate at Thane.

- Third Party Inspection of Construction of Work Sports Climbing Wall at Naroda, Ahmedabad.

- Third Party Inspection of Construction of work Hostel at Gandhinagar.

- Third Party Inspection of Providing and Fixing Acoustic wall paneling work Indoor hall at Sama Complex, Vadodara for Sports Authority of Gujarat - Gandhinagar (Government of Gujarat).

- Third Party Inspection of Providing and Fixing HVAC work in Indoor Hall at Sama Complex, Vadodara for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Multipurpose hall, Swimming Pool and Synthetic Track at Desar, Dist: Vadodara for Swarnim Gujarat Sports University, Gujarat (Government of Gujarat).

- Third Party Inspection for SITC of High mast pole work with LED light for Nadiad, Himmatnagar and Bhavnagar sports complex for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Providing and fixing LED light in place of metal light in thirteen indoor hall at ground sports complex for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of LED street light work in sport complex at Godhra, Rajpipla & Saputara for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Light fitting work in Sama Sports complex for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Development of Sports Complex at Nadiad for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Synthetic athletic track at Naroda for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Sports Hostel at Vaghodia for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Indoor Multipurpose Hall and Cricket Ground at Bibipur for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Administrative Building, Boys & Girls Hostel for SGSU at Desar for Swarnim Gujarat Sports University, Gujarat (Government of Gujarat).
- Third Party Inspection of Construction of Sports Complex at Nadiad for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Sports Hostel at Patan for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Sports Hostel at Naroda for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

Sports Complex at Nadiad

Cricket Ground Stadium at Bibipur

Sports Hostel at Desar

Synthetic Athletic track at Naroda

Multipurpose Hall at Desar A glimpse of Third Party Inspection & Quality Assurance project at NCB-Ahmedabad

NCB
BHUBANESWAR

NCB BHUBANESWAR UNIT

NCB Bhubaneswar unit providing services for Odisha Industrial Infrastructure Development Corporation (IDCO) since 2016 and material testing laboratory was set up in the premises provided by IDCO at Mancheswar Industrial Estate, Bhubaneswar as per the MoU signed between NCB and IDCO. Independent Testing Laboratory (ITL) NCB Bhubaneswar has been accredited by NABL for both Mechanical & Chemical parameters in building materials. Also, NCB Bhubaneswar unit pursuing for BIS recognition of their laboratories under Laboratory Recognition Scheme (LRS). NCB Bhubaneswar Unit presently cratering the following services:

1) Independent Testing Laboratory (ITL)
2) Third Party Quality Assurance (TPQA)

The above activities are illustrated below:

INDEPENDENT TESTING LABORATORY (ITL):

ITL executes its activities in the areas of building materials testing from Industry sponsored projects. The Chemical Laboratory has been established to provide technical support to cement industries in Odisha and its neighboring states i.e. West Bengal, Jharkhand, Bihar, Chattisgarh and States of North-East India.

Testing facilities available at ITL NCB Bhubaneswar are listed below:

1] Mechanical Testing Laboratory of Building Materials

Mechanical Testing Laboratory for hydraulic cement, hardened concrete, building bricks (burnt cay & lime pulverized fuel ash), coarse aggregate, fine aggregate, soil, bituminous mix, tiles, granite, kota stone, marble, paver blocks, AAC blocks, etc.

NABL Accreditation obtained during September 2020. Testing services extended to customers including Odisha Industrial Infrastructure Development Corporation (IDCO).

2] Chemical Testing Laboratory of Cement and Cementitious Materials

Chemical testing laboratory for hydraulic cement (OPC, PPC, PSC, Composite Cement), cementitious materials (Fly ash, Slag), construction water, etc.

NABL Accreditation obtained during March 2021. Testing services to customers other than IDCO TPQA Projects commenced.

THIRD PARTY QUALITY ASSURANCE (TPQA):

NCB Bhubaneswar provided TPQA services to IDCO for construction of various multi-storeyed structures for educational institutions, skill development centre, hostel blocks, old age homes, sports complex, stadium, swimming pools, bituminous pavement, rigid pavement, and staff quarters in different districts of Odisha to assure that the quality of the work being carried out at site is as per the project specifications, CPWD specifications and IS standards. Successfully completed about 150 TPQA projects in IDCO during the last 5 years and other TPQA projects are in progress.

Proposals under active consideration for TPQA, Structural Assessment and Rehabilitation, Training Services to various engineering dept. in Odisha and surrounding states

Photographs of Site Inspection:

Checking of Steel Reinforcement

Checking of Steel Reinforcement

Slump test at Site

Concrete Cube filling at Site

Checking Quality of Doors

UPV Test on Concrete Column

Photographs of few Building Projects

Shakti Bhawan, Bhubaneswar

EMC Park, Bhubaneswar

IDCO Tower, Jharsuguda

Old Age, Transgender and drug addict Rehabilitation Centre

English Learning and Technical Institute (ELTI)

Photographs of few Road Projects:

Driving Track, Puluru Hills, Berhampur

Driving Track, Keonjhar

Inspection of Road Work

Inspection of Swimming Pool

Photographs of Concrete Ready-Mix Plant Visit:

RMC Plant: R B Ready-mix, Cuttack

Photographs of Cement Plant Visits:

Cement Plant: NUVOCO Vista, Kalinganagar, Jajpur

Cement Plant: JK Lakshmi, Cuttack

Cement Plant: Orient Cement, Chitapur, Karnataka

NABL ACCREDADATION OF INDEPENDENT TESTING LABORATORY, NCB BHUBANESWAR

Mechanical and Chemical Discipline

INTERNAL AUDIT OF ITL, NCB BHUBANESWAR

VISITS OF INDUSTRIES AND GOVT. AT ITL, NCB BHUBANESWAR

EXTERNAL IN-HOUSE CALIBRATION OF EQUIPMENTS AT ITL, NCB BHUBANESWAR

SKILL DEVELOPMENT ACTIVITIES IN ASSOCIATION WITH CCE HYDERABAD

NCB Bhubaneswar in association with Centre for Continuing Education (CCE) NCB Hyderabad has organised various training courses to meet the needs of professionals from OIIPCRA, Power Grid Corporation of India Limited (PGCIL), cement, concrete & construction industry. The Unit has

well established training facility for both onsite and online training.

Proposals under active consideration for training engineers & technicians from Odisha Works Dept., Rural Development Department, Odisha, etc.

DEVELOPMENT WORKS IN NCB BHUBANESWAR

COMPETENCE BUILDING

As part of Competence Building Programme, NCB Bhubaneswar officials conducted morning meetings to discuss and deliberate on technical matters for exchange of ideas and planning of regular activities. Weekly meetings were conducted and officials delivered lectures on topics pertaining to their activities.

Publication & Membership of Technical Committees

Research Papers Published

The following papers were contributed by NCB scientists in various Technical Journals/ Magazines

Centre for Cement Research & Independent Testing - CRT

1. S K Agarwal, S K Chaturvedi, B N Mohapatra (2020), "Effect of Minor Mineral Additions on the Mechanical Properties of PPC", International Cement Review, April 2020, p. 91-102

2. S K Agarwal, S Palla, S K Chaturvedi, B N Mohapatra (NCB), S Bishnoi (IIT-D), S Maity (TARA), (2020), "Investigations of Limestone Calcined Clay Cement Systems", Book: Calcined Clay for Sustainable Concrete, S. Bishnoi (Ed), RILEM Book Series, Volume-25, Springer, Singapore, P.443-454 (https://doi.org/ 10.1007/978-981-15-2806-4_52)

3. Sandeep Gupta, B.M. Mohapatra and Megha Bansal: A review on development of Portland limestone cement: A step towards low carbon economy for Indian cement industry, Current Research in Green and Sustainable Chemistry, Elsevier Journal and Scopus Journal, 2020

4. P N Ojha, Pinky pandey, Kare Halge Karsten and Palash Kumar Saha: "Utilization of construction (C & D) waste and Industrial inorganic waste in cement Manufacturing" Urban Mining and sustainable Waste Management, Springer Publications, 2020, pg27

Centre for Mining, Environment, Plant Engineering & Operation - CME

1. Prateek Sharma: Waste to Energy: Issues, challenges and opportunities for RDF utilization in Indian cement industry" as book chapter.

2. Prateek Sharma: "Indian Cement Industry: A Key Player in the Circular Economy of India", a book chapter in springer series.

3. Ankur Mittal: "Thermal comfort and Energy efficiency in building designs", CMA periodical magazine

4. Ankur Mittal: "Utilization of cement rotary kiln waste heat for calcination of Phosphogypsum", published in Thermal Science and Engineering Progress (TSEP)- ELSEVIER on. (Ref DoI: https://doi.org/10.1016/j.tsep.2020.100729)

Centre for Construction Development and Research - CDR

1. P N Ojha, Abhishek Singh, Brijesh Singh, Vikas Patel: Experimental investigation on use of ferrochrome slag as an alternative to natural aggregates

in concrete structures. **Research on Engineering Structures & Materials March 2021**

2. P N Ojha, Brijesh Singh, Abhishek Singh & Vikas Patel: Experimental Study on Creep & Shrinkage behavior of High Strength Concrete for application pre-stressed Concrete and High Rise Buildings. **Indian Concrete Journal February 2021**

3. P N Ojha, Brijesh Singh Abhishek Singh & Vikas Patel: Comparison of Creep Models and Experimental Verification of Creep Coefficients for Normal and High Strength Concrete. **Asian Concrete Federation Journal December 2020**

4. P N Ojha, Amit Trivedi, Brijesh Singh, Abhishek Singh & Dr. B N Mohapatra: Evaluation of Mechanical and Durability Properties of Concrete Made With Indian Bottom Ash as Replacement of Fine Aggregate. **Asian Concrete Federation Journal December 2020**

5. P N Ojha, Suresh Kumar, Brijesh Singh: Pervious Concrete, Plastic Concrete & CLSM-A special Application Concrete **Journal of Building Materials & Structures November 2020**

6. P N Ojha, Puneet Kaura, Piyush Mittal: Performance evaluation of organic bipolar corrosion inhibiting admixture. **The Indian Concrete Journal (November 2020) : 37-53**

7. Vikas Patel, Brijesh Singh, P N Ojha and B N Mohapatra: Effect on mechanical properties and stress strain characteristics of normal and high strength concrete at elevated temperature. **Journal of Building Materials & Structures October 2020**

8. Brijesh Singh, P N Ojha, V V Arora, Pramod Narayan & Bikram K Patra: Material Properties Investigation and Finite Element Analysis of Idukki Dam in India. **Dam Engineering Journal August 2020**

9. P N Ojha, Suresh Kumar, Brijesh Singh and B N Mohapatra: Case Studies on Laboratory Evaluation and Repair of Concrete Dams in Himalayan Regions of India Using High Performance Concrete. **Dam Engineering Journal July 2020**

10. Lalit Yadav, Amit Trivedi, V V Arora, B N Mohapatra: Case Study on Field trials of developed geopolymer (Slag and Flyash Based) Precast Paver Blocks. **Indian Concrete Journal July 2020**

11. P N Ojha, Piyush Mittal, Abhishek Singh, Brijesh Singh and V V Arora: Optimization and Evaluation of Ultra High Performance Concrete. **Asian Concrete Federation Journal June 2020**

12. Brijesh Singh, Vikas Patel, P N Ojha & V.V Arora: Analysis of Stress Block Parameters for High Strength Concrete. **Asian Concrete Federation Journal June 2020**

13. Brijesh Singh, V.V Arora & Vikas Patel: Experimental Study on Stress-Strain behavior of Normal and High Strength Unconfined Concrete. **Indian Concrete Journal April, 2020**

14. Vikas Patel, Brijesh Singh, V.V Arora: Study on fracture behavior of High Strength Concrete including effect of steel fibre. **Indian Concrete Journal April, 2020**

15. Performance assessment of concrete made with ternary cementitious blends against chloride ingress and CO_2 ingress by VV Arora, Puneet Kaura, Piyush Mittal, B N Mohapatra. **CECR Magazine, May 2020**

Papers presented in Seminars & Workshops

The following papers were contributed by NCB experts in different National and International Seminars, Workshops etc.:

1. Anupam, presented a paper titled "Detailed CFD Modelling and Simulation for optimizing gas flows in a complex duct arrangement." at 5th International Conference on Multiphase Flow and Heat transfer (ICMFHT 20) through virtual conference.

2. Prateek Sharma presented a paper in 35th Indian Engineering Congress on case studies for waste heat recovery in cement industry.

3. Ankur Mittal presented one paper on "Energy Management for Compressed Air in Cement Plant- A Case Study", in webinar organised by International Cement Review (8-11 Feb 2021)

4. Kapil Kukreja, Manoj Kumar Soni, Bibekananda Mohapatra presented a paper on "Green Multi-Storey Society Concept for Urban Area of India", 35th Indian Engineering Congress (35 IEC) on online platform during December 18 - 20, 2020, the Institution of Engineers (India)

INTERNATIONAL CONFERENCE ON COMMUNITY BASED RESEARCH AND INNOVATIONS IN CIVIL ENGINEERING, MARCH 2021

5. Condition Assessment of Induced Draught Cooling Towers Located In Different Climatic Regions of India by Rizwan Anwar, TVG Reddy, Sanjay Mundra, P N Ojha & Brijesh Singh

88th INTERNATIONAL COMMISSION ON LARGE DAMS FEBRUARY 2021

6. Assessment of Concrete Properties of Bhakra Dam in India by Brijesh Singh, V.V. Arora, P N Ojha, Vikas Patel & B N Mohapatra from NCB and Pramod Narayan & Bikram K Patra from CWC

35th INDIAN ENGINEERING CONGRESS DECEMBER 2020

7. Feasibility study of Ferrochrome slag as an alternative to natural aggregates by P N Ojha, Abhishek Singh, Brijesh Singh, B N Mohapatra

REPRESENTATION OF NCB OFFICIALS IN VARIOUS TECHNICAL COMMITTEES

NCB is actively involved with a large number of overseas and Indian organizations in formulating and revising standards and policies through membership or otherwise. The Director General and other officials continued to serve on a number of committees constituted by the Government of India, the Bureau of Indian Standards and other organizations as follows:

Dr. B N Mohapatra, Director General

a. Member, Panel for Building Materials (CED 46:P3), Bureau of Indian Standards, New Delhi.
b. Member of BIS Cement & Concrete sectional committee CED 2, Cement pozzolana and Cement Additives sub-committee CED 2:1 and Concrete Sub-committee CED 2:2.
c. Member of BIS Technical Committee (P4).
d. Member of technical Committee for development of Low Calcined Clay Cement (LC3) with of IIT- Mumbai, Delhi & Chennai & TARA.
e. Member of Research Advisory Committee at DISIR (Dalmia Institute of Scientific and Industrial Research, Rajgangpur, Orissa.
f. Member of scientific committee of 15th International Congress on the Chemistry of Cement (ICCC) held at Prague at 2019.
g. Member in their Technical Committee for the development of Standards for RMC. (Formed by CII – Confederation of Indian Industry).

Sh. Ashutosh Saxena, Joint Director

a. Member, Working Group on Technical Sector of Standard Promotion and Consumer Affairs Deptt. (SP & CAD), Bureau of Indian Standards, New Delhi.
b. Member, Environmental Services Sectional Committee: SSD 07, Bureau of Indian Standards, New Delhi.

Dr. S K Chaturvedi, Joint Director

a. Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
b. Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
c. Member, Cement, Pozzolana and Cement Additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
d. Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
e. Member, Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi.

Sh V V Arora, Joint Director (Retired on May 2020)

a. Chairman, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.
b. Member, Civil Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi.
c. Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
d. Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
e. Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
f. Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
g. Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
h. Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
i. Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.
j. Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
k. Convenor, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
l. Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi.
m. Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
n. Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.
o. Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.
p. Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi.
q. Member, Panel for Building Materials (CED 46:P3), Bureau of Indian Standards, New Delhi.
r. Member, Panel for Load, Forces and Effects (CED 46:P4), Bureau of Indian Standards, New Delhi.
s. Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Prestressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi.
t. Member, Panel for Masonry (CED 46:P7), Bureau of Indian Standards, New Delhi.
u. Member, Panel for Plain Reinforced & Prestressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi.
v. Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi.

Sh. P N Ojha, Joint Director

a) Member, CIVIL Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi.
b) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
c) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
d) Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
e) Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
f) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
g) Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
h) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
i) Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.
j) Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
k) Convenor, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
l) Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi
m) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.
n) Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.
o) Member, Panel for Building Materials (CED 46:P3), Bureau of Indian Standards, New Delhi.
p) Member, Panel for Load, Forces and Effects (CED 46:P4), Bureau of Indian Standards, New Delhi.
q) Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Pre-stressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi.
r) Member, Panel for Plain Reinforced & Pre-stressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi.
s) Member, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.
t) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.
u) Member, Laboratory subcommittee RAMCO, Bureau of Indian Standards, New Delhi.
v) Member, Laboratory subcommittee RAMCO, Bureau of Indian Standards, New Delhi.

Dr. D Yadav, Joint Director

a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
b) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
c) Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
d) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.

Sh. Amit Trivedi, General Manager

a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
b) Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
c) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi.
d) Member, Panel for Masonry (CED 46:P7), Bureau of Indian Standards, New Delhi.
e) Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi.
f) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi.
g) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi.
h) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.
i) Member, Laboratory Subcommittee and CASCO, Bureau of Indian Standards, New Delhi
j) Member, Laboratory subcommittee RAMCO, Bureau of Indian Standards, New Delhi.

Dr. D K Panda, Joint Director

a) Member, Stones Sectional Committee (CED 6), Bureau of Indian Standards, New Delhi.

Sh. Anupam, General Manager

a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi.
b) Member, Environmental Management Sectional

Committee (CHD 34), Bureau of Indian Standards, New Delhi.

c) Member, Coal Beneficiation & Lignite Sub Committee (PCD 7:6 & PCD 7:9), Bureau of Indian Standards, New Delhi.

Sh. B P Ranga Rao, General Manager

a) Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.

b) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi.

c) Member, Water Proofing and Damp Proofing Sectional Committee (CED 41), Bureau of Indian Standards, New Delhi.

d) Member, Construction and Related Engineering Services Sectional Committee (SSD 06), Bureau of Indian Standards, New Delhi.

Sh. M Selvarajan, General Manager (Retired on April 2020)

a) Member, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.

Sh. T V G Reddy, General Manager

a) Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.

b) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.

c) Member, Panel for Administration, Development Control Rules and General Buildings (CED 46:P1), Bureau of Indian Standards, New Delhi.

d) Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi.

Sh. G J Naidu, General Manager

a) Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi.

b) Member, Sieves, Sieving and other Sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi.

Sh. Sanjay Mundra, General Manager

a) Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi.

b) Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Pre-stressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi.

c) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.

d) Member, Water Proofing and Damp Proofing Sectional Committee (CED 41), Bureau of Indian Standards, New Delhi.

Sh. P Anil Kumar, Group Manager

a) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

Sh. Brijesh Singh, Group Manager

a) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
b) Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
c) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
d) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
e) Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
f) Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi
g) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi
h) Member, Panel for Load, Forces and Effects (CED 46:P4), Bureau of Indian Standards, New Delhi.
i) Member, Panel for Plain Reinforced & Pre-stressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi.
j) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.

Sh. Kapil Kukreja, Group Manager

a) Member, Working Group on Technical Sector of Standard Promotion and Consumer Affairs Deptt. (SP & CAD), Bureau of Indian Standards (BIS)
b) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi.
c) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi.
d) Member, Solid Waste Management (CHD 33)

Sh. Ankur Mittal, Group Manager

a) Member, Solid Mineral Fuels Sectional Committee (PCD 07), Bureau of Indian Standards, New Delhi.

Sh. Amit Prakash, Group Manager

a) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi.

Sh. Suresh Kumar Shaw, Group Manager

a) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.

Sh. Manish Kumar Mandre, Group Manager

a) Member, Panel for Revision of IS 2386 (CED 2:2/P10), Bureau of Indian Standards, New Delhi.

Sh. Nitin Chowdhary, Group Manager

a) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi.

Dr. (Mrs) Pinky Pandey, Group Manager

a) Member, Building Limes Sectional Committee (CED 4), Bureau of Indian Standards, New Delhi.

Sh S K Agarwal, Manager

a) Member, Building Limes Sectional Committee (CED 4), Bureau of Indian Standards, New Delhi.

Dr. (Mrs) Varsha T Liju, Manager

a) Member, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.

Sh. Suresh Kumar, Manager

b) Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
c) Convenor, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
d) Member, Panel for Revision of IS 2386 (CED 2:2/P10), Bureau of Indian Standards, New Delhi.
e) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi.
f) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi.

g) Member, Sieves, Sieving and other sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi

Sh. Anand Bohra, Manager

a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi.
b) Member, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.
c) Member, Environmental Services Sectional Committee: SSD 07, Bureau of Indian Standards, New Delhi
d) Member, Environmental Management Sectional Committee (CHD 34), Bureau of Indian Standards, New Delhi.

Sh. Saurabh Bhatnagar, Manager

a) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi.
b) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi.

Sh. M V Ramachandra Rao, Manager

a) Member, Environmental Management Sectional Committee (CHD 34), Bureau of Indian Standards, New Delhi.

Sh. Prateek Sharma, Manager

a) Member, Coal Beneficiation & Lignite Sub Committee (PCD 7:6 & PCD 7:9), Bureau of Indian Standards, New Delhi.
b) Member, Solid Waste Management (CHD 33)

Sh. P Srikanth, Manager

a) Member, Laboratory and RAMCO subcommittee, Bureau of Indian Standards, New Delhi.

Sh. Puneet Kaura, Manager

a) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
b) Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
c) Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi
d) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.

Sh. K P K Reddy, Manager

a) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

Sh. Nikhil Kaushik, Manager

a) Member, Panel for Revision of IS 2386 (CED 2:2/P10), Bureau of Indian Standards, New Delhi.

Sh. Amit Sagar, Manager

a) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi.

Sh. Arup Ghatak, Manager

a) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
b) Member, Construction and Related Engineering Services Sectional Committee (SSD 06), Bureau of Indian Standards, New Delhi.

Sh. Ajay Kumar, Manager

a) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.

Sh. Giasuddin Ahamed, Manager

a) Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi.

Sh. Y N Daniel, Manager

a) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.
b) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi.

Sh Lalit Yadav, Dy. Manager

a) Convenor, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
b) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi
c) Member, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.

Late Mrs. Mithlesh Sharma, Deputy Manager

a) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.

Sh. Munish Kumar, Assistant Manager

a) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.

Sh. Gaurav Bhatnagar, Assistant

a) Member, Solid Mineral Fuels Sectional Committee (PCD 07), Bureau of Indian Standards, New Delhi.
b) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

FINANCE AND ACCOUNTS

FINANCE

CONTRIBUTIONS

Ministry of Commerce & Industry Grant

During the year 2020-21, Grant of Rs. 15.77 Crores received.

FOREIGN EXCHANGE

During the year 2020-21, the Council earned Foreign Exchange amounting to US$ 36476 towards Training Fee, Testing Charges, Sponsored R & D, Seminar, Delegate Fee, Technical Exhibition Etc.

AUDITORS

M/s K S Aiyar & Co, Chartered Accounts, Mumbai were the Auditors of the Council for the year 2020-21.

ACCOUNTS

The Accounts for the 2020-21 duly audited by the Auditors of the Council are given at Annexure (Balance Sheet as at 31st March 2021 and Income & Expenditure Accounts for the year ended 31st March 2021).

INDEPENDENT AUDITORS' REPORT

To,
The Members of National Council for Cement and Building Materials

Opinion
We have audited the accompanying financial statements of **National Council for Cement and Building Materials** ("the entity"). Which comprise the Balance Sheet as at March 31, 2021 and Income and Expenditure Account for the year then ended, and notes to accounts including a summary of significant accounting policies.

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements give a true and fair view of the financial position of the entity as at March 31, 2021, and of its financial performance for the year then ended in accordance with the accounting standards issued by the Institute of Chartered Accountants of India (ICAI).

Basis of Opinion
We conducted our audit in accordance with the Standards on Auditing (SAs) issued by the Institute of Chartered Accountants of India (ICAI). Our responsibility under those standards are further described in the, "Auditor's Responsibility for the Audit of the Financial Statements" section of our report. We are independent of the entity in accordance with the code of Ethics issued by the ICAI and we have fulfilled our other ethical responsibilities in accordance with the code of ethics. We believe that the audit evidence we have obtained is sufficient and appropriate to provide the basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements
Management is responsible for the preparation of these financial statements that give a true and fair view of the state of affairs, results of operations and cash flows of the entity in accordance with the Generally Accepted Accounting Principles in India. This responsibility includes the design implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the entity's ability to continue as going concern, disclosing as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so.

Those Charged with Governance are responsible for overseeing the entity's financial reporting process.

Auditors' Responsibilities for the Audit of Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

We further report that:

a. We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of audit.
b. In our opinion proper books of account as required by law have been maintained by the entity as far as appears from our examination of these books.
c. The Balance Sheet and Income and Expenditure Account dealt with by this report are in agreement with the books of account.

For K. S. Aiyar & Co.
Chartered Accountants
Firm Registration No. 100186W

Raghuvir M. Aiyar
Partner
Membership No. 038128

Place: Mumbai
Date: _____
UDIN:

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
BALANCE SHEET AS AT MARCH 31, 2021

	Schedules		As at March 31, 2021		As at March 31, 2020
SOURCES OF FUNDS					
Capital Fund	A	68,076,146		68,076,146	
Reserves and Surplus	B	1,599,139,439		1,446,202,217	
Building Fund		4,500,000		4,500,000	
Gratuity Fund		95,457,624		92,670,193	
Provision For Leave Encashment		154,354,929		165,944,983	
Capital Grant from Govt of India	C	357,506,192		376,556,565	
Current Liabilities & Provisions	D	137,658,844	2,416,693,173	144,347,511	2,298,297,615
					-
Total			**2,416,693,173**		**2,298,297,615**
APPLICATION OF FUNDS					
Fixed Assets					
Gross Block	E	897,110,965		884,824,426	
Less : Accumulated Depreciation		531,544,686	365,566,279	502,236,421	382,588,005
Lab Equipment Under Inspection			2,715,572		1,094,783
Gratuity Fund Investment					
(Fixed Deposit / Savings Bank / Interest Accrued)		209,635,639		201,975,580	
Leave Fund account		114,005,032		109,728,978	
Current Assets Loans & Advances					
R&D Contribution Outstanding		102,396,410		99,141,830	
Sundry Debtors	F	40,606,077		33,138,965	
Loans and Advances (unsecured and considered good)		141,207,099		168,988,686	
Cash and Bank Balances	G	1,367,014,292	1,974,864,549	1,252,369,071	1,865,343,110
FDR In lien			17,675,873		6,805,663
Interest Accrued on Bank Deposits			55,870,900		42,466,054
Total			**2,416,693,173**		**2,298,297,615**
Significant Accounting Policies	M				
Notes on Accounts	N				

The Schedules referred to above form an integral part of the Balance Sheet.
This is the Balance Sheet referred to in our report of even date.

For and on behalf of
K. S. Aiyar & Co.
Chartered Accountants

Dr S K Chaturvedi
Joint Director(Finance & Accounts)

Dr B N Mohapatra
Director General

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date:

Shri K C Jhanwar
Chairman -NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2021

			For the Year ended March 31, 2021		For the Year ended March 31, 2020
INCOME					
Research & Development Contribution	H		231,593,983		347,508,874
Other Income	I		116,914,602		125,374,813
Grant-in-Aid (Revenue) from Ministry of Commerce & Industry	J		157,700,000		152,500,000
			506,208,585		**625,383,687**
EXPENDITURE					
Employee's Cost	K		296,993,910		253,825,493
Travelling & Conveyance (Including Overseas Travelling)			6,039,890		12,995,078
Lab. Stores Serv.& Comp.(S.W.)			7,831,552		9,436,197
Symposia & Seminars			677,294		13,892,775
Training Programmes			477,788		4,730,322
Repairs and Maintenance			6,664,863		8,627,718
Other Expenses	L		24,328,173		35,185,582
Depreciation		29,308,266		55,195,186	
Less : Transfer from Capital Grant from Govt of India		19,050,373	10,257,893	35,876,871	19,318,315
			353,271,363		**358,011,481**
Surplus for the year transferred to Reserve Fund			**152,937,222**		**267,372,206**
Significant Accounting Policies	M				
Notes on Accounts	N				

The Schedules referred to above form an integral part of the Income and Expenditure Account.
This is the Income and Expenditure Account referred to in our report of even date.

For and on behalf of
K. S. Aiyar & Co.
Chartered Accountants

Dr S K Chaturvedi
Joint Director(Finance & Accounts)

Dr B N Mohapatra
Director General

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date:

Shri K C Jhanwar
Chairman -NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2021

Particulars	As at March 31, 2021 (Amount in Rs.)	As at March 31, 2020 (Amount in Rs.)
SCHEDULE - A		
Capital Fund		
As per the last Balance Sheet	68,076,146	68,076,146
Includes UNIDO Equipment valued at Rs 20,187,535 (Previous Year Rs 20,187,535) (Refer Note 3 (b) of Schedule M)		
TOTAL	**68,076,146**	**68,076,146**
SCHEDULE - B		
Reserves and Surplus		
As per the last Balance Sheet	1,446,202,217	1,148,879,670
Add: Surplus for the year	152,937,222	267,372,206
Less :Depreciation Transferred from Capital Grant from Govt of India for Financial year 2017-18 and 2018-19	-	29,950,341
TOTAL	**1,599,139,439**	**1,446,202,217**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2021

Particulars	As at March 31, 2021 (Amount in Rs.)	As at March 31, 2020 (Amount in Rs.)
SCHEDULE - C		
Capital Grant from Govt of India		
As per the last Balance Sheet	376,556,565	442,383,777
Add : Plan Grant received during the year	-	-
	376,556,565	442,383,777
Less : Grant transferred to Income & Expenditure Account to the extent depreciation charged during the year on assets purchased out of capital grant	19,050,373	35,876,871
Less : Grant transferred to Reserve and Surplus to the extent depreciation charged during the Financial year 2017-18 and 2018-19 on assets purchased out of capital grant	-	29,950,341
TOTAL	**357,506,192**	**376,556,565**
SCHEDULE - D		
Current Liabilities and Provisions		
Retention & Security Money	16,011,060	18,492,770
Other Liabilities	121,647,783	125,854,741
TOTAL	**137,658,843**	**144,347,511**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2021

Particulars	As at March 31, 2021 (Amount in Rs.)	As at March 31, 2020 (Amount in Rs.)
SCHEDULE - F		
Sundry Debtors (Unsecured and Considered Good)		
Others	40,606,077	33,138,965
TOTAL	**40,606,077**	**33,138,965**
SCHEDULE - G		
Cash and Bank Balances		
In Fixed Deposits	1,282,460,868	1,175,737,731
In Saving Accounts	84,228,478	76,228,713
Cash in hand including postage imprest	323,809	401,490
UNESCO Coupons (US Dollar 132.10)	1,137	1,137
TOTAL	**1,367,014,292**	**1,252,369,071**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2021

Particulars	As at March 31, 2021 (Amount in Rs.)	As at March 31, 2020 (Amount in Rs.)
SCHEDULE - H		
Research and Development		
Sponsored Research and Development Contribution	150,987,257	217,461,244
Standardisation and calibration	40,523,508	57,547,752
Symposia & Seminars	71,200	38,358,919
NCB Proficiency Testing Programme	40,012,018	34,140,959
TOTAL	**231,593,983**	**347,508,874**
SCHEDULE - I		
Other Income		
Interest	96,689,829	96,062,354
Sale of Publications	1,500	250
Training Programmes	6,604,758	21,163,906
Miscellaneous Receipts	1,247,100	2,607,978
Licence Fee (Housing Colony)	1,312,959	1,390,491
Interest on Income Tax Refund	11,058,456	4,333,060
TOTAL	**116,914,602**	**125,374,813**
SCHEDULE - J		
Grant from Ministry of Commerce & Industry		
Towards Plan Grant	-	-
Less : Towards Capital Expenditure	-	-
	-	-
Towards Non-Plan Grant from Cement Cess	157,700,000	152,500,000
Grants from Ministry of Environment	-	-
TOTAL	**157,700,000**	**152,500,000**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2021

Particulars	As at March 31, 2021 (Amount in Rs.)	As at March 31, 2020 (Amount in Rs.)
SCHEDULE - K		
Employee's Cost		
Establishment Charges	258,437,358	248,924,027
Contribution to Provident Fund & other Fund	20,550,520	22,147,275
Gratuity (Refer Note 4 of Schedule - M)	16,790,488	(19,064,311)
Social Security & Welfare	1,215,544	1,818,502
TOTAL	**296,993,910**	**253,825,493**
SCHEDULE - L		
Other Expenses		
Rent, Rates and Taxes	3,232,600	2,837,051
Electricity and Water Charges	7,195,097	10,858,961
Foreign Exchange Fluctuation	38,759	183,226
Postage, Telegrams & Telephones	1,852,251	2,791,313
Publications	97,205	281,142
Stationery & Miscellaneous Stores	1,499,204	2,621,563
Books, Periodicals and Membership Fee	2,312,291	3,127,676
Exhibition, Publicity and Advertisements	355,163	2,264,823
Legal Expenses	527,650	757,830
Patents	155,562	122,448
Audit Fees - Statutory Auditors	75,000	75,000
Bank Charges	79,341	192,485
Insurance of Assets	1,215,936	1,552,857
Sundry Expenses	2,390,914	3,705,029
Collaborative Assistance in R&D and	3,301,200	3,997,405
TOTAL	**24,328,173**	**35,368,809**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
DEPRECIATION AS AT 31 MARCH 2021

SCHEDULE - E

(Amount in Rs.)

	GROSS BLOCK							DEPRECIATION										NET BLOCK	
PARTICULARS	Cost upto March 31, 2001	Cost from April 1, 2001 to March 31, 2020	Total cost as at March 31, 2020	Addition During the Year 2020-2021	Disposal/ Adjustment out of cost before 2001 2020-2021	Disposal/ Adjustment out of cost after 2001 2020-2021	Total cost as at March 31, 2021	On Old Assets Upto March 31, 2001	On Assets from April 1, 2001 to March 31, 2020	Op.Bal Depreciation as at April 1, 2020	Rate %	On Assets Prior to 1 Aprl 01 during the year 2020-2021	Rate %	On Additions after 1 Aprl 01 2020-2021	Depreciation/ Adjustment on cost before 2001 2020-2021	Dep. / Adj. on cost after 2001 2020-2021	Total Depreciation as at March 31, 2021	WDV As at 31/03/2021	WDV As at March 31, 2020
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LAND (FREE HOLD)	3,924,748		3,924,748				3,924,748	-	-	-		-		-			-	3,924,748	3,924,748
VEHICLES	833,717	5,365,103	6,198,820				6,198,820	799,635	4,762,586	5,562,222	20.0	6,816	15.0	90,378			5,659,416	539,404	636,598
COMPUTER INCLUDING ACCESSORIES		52,915,579	52,915,579	1,131,820		48,590	53,998,809		51,536,502	51,536,502			40.0	984,923			52,521,425	1,477,384	1,379,077
FURNITURE AND OFFICE EQUIPMENTS	10,263,037	27,631,525	37,894,562	2,956,776			40,851,338	9,681,753	2,894,772	12,576,525	10.0	58,128	10.0	2,769,353			15,404,006	25,447,332	25,318,037
LABORATORY EQUIPMENT	79,479,641	337,709,372	417,189,013	8,246,533			425,435,546	74,879,520	261,553,093	336,432,612	10.0	460,012	15.0	12,660,422			349,553,046	75,882,500	80,756,401
MOBILE Quality Control Laboratory	-	5,268,489	5,268,489				5,268,489		5,201,755	5,201,755			15.0	10,010			5,211,765	56,724	66,734
CENTRE FOR CONTINUING EDUCATION																	-		
BUILDINGS	1,922,707	42,119,827	44,042,534				44,042,534	1,184,895	9,265,370	10,450,264	2.5	18,445	10.0	3,285,446			13,754,155	30,288,379	33,592,270
OTHER SERVICES	535,144	24,826,311	25,361,455				25,361,455	525,351	22,579,686	23,105,037	10.0	979	15.0	336,994			23,443,010	1,918,445	2,256,418
SOLAR PAWER PLANT		2,501,000	2,501,000				2,501,000		1,600,640	1,600,640			40.0	360,144			1,960,784	540,216	900,360
LABORATORY PROJECTS																	-		
BUILDINGS	27,973,919	95,389,269	123,363,188				123,363,188	17,338,921	17,413,485	34,752,406	2.5	265,875	10.0	7,797,578			42,815,859	80,547,329	88,610,782
CAPITAL WORK IN PROGRESS BULDG .																	-		
(PG) UNDER CONST		140,802,902	140,802,902				140,802,902												140,802,902
OTHER SERVICES	10,046,554	5,849,746	15,896,300				15,896,300	9,853,795	5,215,602	15,069,397	10.0	19,276	15.0	95,122			15,183,795	712,506	826,903
STAFF HOUSING	8,386,427		8,386,427				8,386,427	5,181,292		5,181,291	2.5	80,128	5.0	-			5,261,419	3,125,008	3,205,136
																	-		
PILOT PLANT FACILITIES																	-		
BUILDINGS	778,010		778,010				778,010	472,304		472,304	2.5	7,643		-			479,947	298,063	305,706
Equipment	301,399		301,399				301,399	295,466		295,466	10.0	593		-			296,059	5,340	5,933
Total	144,445,303	740,379,123	884,824,426	12,335,129	-	48,590	897,110,965	120,212,932	382,023,491	502,236,421		917,897		28,390,369	-		531,544,686	224,763,377	382,588,005

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Schedules forming part of the Accounts as at March 31, 2021

SCHEDULE – M

SIGNIFICANT ACCOUNTING POLICIES

1. The accounts are prepared on a going concern basis as per the historical cost convention.

2. **Recognition of Income:**

   (a) Income from Sponsored Research & Development Contribution is accounted for on the basis of the percentage of work completed during the year.

   (b) Other Incomes, other than Technical Services Fees, are accounted for on accrual basis.

3. **Fixed Assets:**

   a) Fixed Assets are recorded at cost and for the better presentation of financial statements. During the Financial year 2020-2021, the Council has decided to change the depreciation rates and has adopted the rate of depreciation of Income Tax Act 1961 for all block of assets prospectively i.e. rates as per Income Tax Act 1961 will be applied on the written down value and the additions made from the financial year 2020-21 onwards. Old rate of depreciation will continue to apply for assets purchased upto financial year 2000-2001. Depreciation is charged on written down value basis.
   Rate of depreciation is as follows:

		Old Rates % p.a.	Rates as per Income Tax Act 1961 % p.a.
*	Vehicles	20	15
*	Office Furniture and Equipment	10	10
*	Laboratory Equipment	10	15
*	Laboratory Projects Services	10	15
*	Building including Staff Housing	2.5	
	i) Residential Property		5
	ii) Other than Residential Property		10
*	Computers	-	40
*	Solar Power Plant	-	40

   Depreciation has been provided on assets for whole year irrespective of the date of addition.

   (b) Fixed Assets include Laboratory Equipment and Energy Bus received free of cost & custom duty from the United Nations Industrial Development Organisation (UNIDO). The value adopted in the accounts is as per customs CIF assessment upon import or at value advised by UNIDO and the corresponding credit for this amount is included under Capital Fund (Refer Schedule A) Rs. 19,564,057 for Laboratory Equipment and Rs. 623,478 for Energy Bus. The title to these assets has been transferred to Government of India and the further transfer of these fixed assets from the Ministry of Commerce & Industry, Government of India to the Council is pending. However, the Council provides depreciation on these fixed assets in accordance with the rates noted in para 3 (a) above.

4. Liability for Gratuity and Leave Encashment is provided for on the basis of actuarial valuation.

5 **Accounting for Government Grants**:

   a) Government Grant of Revenue nature received from the Government have been accounted for as Income for the year under the Income and Expenditure Account.

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Schedules forming part of the Accounts as at March 31, 2021

SCHEDULE – N

NOTES ON ACCOUNTS

1. Purchases made during the year in respect of laboratory stores, raw materials, miscellaneous consumable stores, publications, tools and accessories are charged to the Income and Expenditure Account and closing stock of these items has not been ascertained or accounted for, as per the decision of the Board of Governors.

2. Fixed Asset Register is being updated with the complete details along with value which is to be reconciled with the Accounts. Physical verification of the Fixed Assets has been carried out in each Centre/Group.

3. Contingent liabilities not provided for in respect of:

   a. Claims not acknowledged as debts by the Council, the liability of which is not ascertainable as pending in various Courts.

   b. Claim for interest by the Andhra Pradesh State Government in 1998, for delay in payment for purchase of Land (amount not intimated).

4. Gratuity Fund Investment has a balance of Rs. 20,96,35,639/- (Rs. 20,19,75,580/-). There is a shortfall of Rs. Nil (Rs. Nil) in the "Gratuity Fund Investment Account" as compared to the "Gratuity Fund account" as at 31st March 2021.

5. The Council has got an actuarial valuation of the leave encashment for and upto the year ended 31st March 2021 and the liability computed is Rs. 15,43,54,929/- (Rs. 16,59,44,983/-).

6. An amount of Rs. 6,31,976 has been deposited with Hon'ble Delhi High Court in connection with a case filed by a former employee. Necessary adjustment will be made after the decision of the Hon'ble Court.

7. The encashment of valuation of UNESCO Coupons of US $ 132.10 are subject to ascertainment and confirmation.

8. R&D Contribution has been arrived after adjusting R&D Contribution received in advance of Rs. 1,69,52,801/- (Rs. 2,07,82,948/-).

9. During the year 2020-21, the council earned foreign exchange amounting to Rs 26,71,685.

10. Expenditure in foreign currency:

Particulars	FY 2020-2021	FY 2019-2020
Expenditure in foreign currency	88,65,316	45,55,192

11. Previous year's figures have been regrouped and rearranged wherever necessary so as to conform to this year's classification.

Institutional Events

74th INDEPENDENCE DAY AT NCB BALLABGARH

DG NCB heartily congratulated his best wishes on the auspicious occasion of 74th Independence Day. He said that History of freedom struggle is the indomitable courage and sign of willpower determination of the people of India. NCB Institute, in order to maintain progress, we have adopted the phrase " न हि ज्ञानेन सदृशं ", that is, there is nothing in this world as pure as knowledge and this is what we consider our ultimate goal. Addressing all the colleagues, he said that 2020 is the year of Corona.

It has been a year of crisis, but every adversity brings an opportunity to us & that adversity should be faced bravely and one should take advantage of that opportunity. Efforts should be made to reap the policy benefits. NCB Institute is also working continuously in the corona epidemic and looking for new opportunities. We are constantly moving in a new direction, like online classes were kept in the institute during the Corona period in which all technical officers and employees fully participated & apprised the institute on his research and work.

In the Institute, twenty two special technical teams named “Expertise Groups” have also been formed. He also informed that a technical team conducted AFR & organised a two-day workshop on the subject in which Indian cement industry actively participated. He said that NCB such workshop must be organised continuously on regular basis and after the workshop session all the participants have discussion so that new people in that field projects can be brought. He directed all his colleagues to make their research world class & make continuous efforts to create and publish more number of papers.

74th INDEPENDENCE DAY & 72ND REPUBLIC AT NCB HYDERABAD

NCB Hyderabad celebrated Independence Day & Republic day with due reverence and hoisted the National Flag.

VIGILANCE AWARENESS WEEK AT NCB BALLABGARH

Vigilance Awareness Week was observed from 27th October to 02nd November 2020 on the theme of "Satark Bharat, Samriddh Bharat (Vigilant India, Prosperous India)".

Activities Undertaken under Vigilance Awareness Week at NCB were:

1. Banners were displayed at all NCB units to create awareness on Vigilance Awareness Week among officials/staff of NCB.

2. DG-NCB and officials / staff at all units / centres of NCB took Integrity Pledge on the inaugural day of Vigilance Awareness Week.

3. Online Lecture on the theme "Satark Bharat, Samriddh Bharat" (Vigilant India, Prosperous India) was organised on 28th October 2020 from 1500 hrs to 1550 hrs. The online talk was given by Dr T. Krishna Prasad, IPS (Retd.), Former DGP & Chairman-Road Safety Authority, Telangana State, Hyderabad. The lecture was attended by DG-NCB, senior officials and other NCB officials/staff. In his lecture, Dr Prasad emphasized on:

· To make internal process – Simple, Clean & Transparent.
· Time-bound disposal of project / task.
· Systematically improve internal processes by leveraging IT.
· Evidence based approach coupled with digitization.
· Process driven Management – minimum subjectivity – minimizes corruption.
· Vendor Process Management.
· Transparent Process of Recruitment & Promotion.
· Being Vigilant will lead to peace of mind and prosperity of the employees.

VIGILANCE AWARENESS WEEK AT NCB HYDERABAD

Vigilance awareness week was observed during 27th October to 2nd November 2020 and integrity pledge was administered.

- Safety pledge was administered on 3rd March 2021
- NCB-Hyderabad officials participated in Rashtriya Ekta Diwas pledge on 31st October 2020 through virtual platform

Under Jan Andolan for COVID-19 campaign, all officials pledged their commitment to wear mask, follow physical distancing and maintain hand hygiene all the time.

71st CONSTITUTION DAY

71st Constitution Day (Samvidhan Diwas) was observed at NCB on 26th November 2020. The day commemorates adoption of Constitution of India as on this day in 1949; the Constituent Assembly of India formally adopted the Constitution of India that came in to effect on 26th January 1950. DG-NCB and Dr. S S Gupta (SDO, DPIIT) lead the reading of Preamble of the Constitution of India to all officials/staff of NCB. The occasion was graced by Shri Shailesh Kumar Agrawal (Executive Director, BMPTC), Dr. D K Aswal (Director, CSIR NPL), Dr. Bipin Thapliyal (Director, CPPRI), and Dr. Nasim Akhtar (Sr. Principal Scientist, CRRI). DG-NCB highlighted the importance of Constitution day stating that it is observed as a mark of respect to the makers of the Constitution of India who played a pivotal role in drafting the Constitution and promote Constitutional values amongst citizens. Dr. Aswal told interesting facts about the specifications of the Constitution books, the materials used and the methodology in which NPL is contributing in ensuring proper preservation of these books in the Central Library of the Parliament of India.

58th NCB DAY

The 58th NCB day was celebrated in NCB-Ballabgarh and its units on 24th December 2020 in the august presence of Chief Guest, Sh Anil Agrawal, Joint Secretary, DPIIT, Ministry of Commerce and Industry, Govt. of India (connected online). Dr. S S Gupta, Guest of Honour for the occasion was present physically at NCB premises to grace the occasion. Other dignitaries connected online were Sh. Mahendra Singhi (Chairman-NCB), Sh. Ashwani Pahuja (Chairman, Research & Advisory Committee-NCB) Dr. V S Narang (Chairman, Advisory Committee, Hyderabad), Sh. Rajendra Chamaria (Chairman-Admin. & Finance Committee, NCB), members of the Board of Governors of NCB and ex-officials of NCB.

After invocation and lamp lighting ceremony by the Guest of Honour and dignitaries on the dais, DG-NCB highlighted the current Research and Innovation activities being carried out at NCB, which are in line to the current requirements of the cement and

building materials sector. All the dignitaries present congratulated all NCB officials on the day and motivated the scientists and engineers of NCB to continue work towards carrying out quality research in the field of cement and concrete.

Chief Guest on the occasion, Sh. Anil Agrawal motivated the scientists and engineers by asking them to be the forerunners in the field of research. He told that small steps towards improvement everyday lead to a bigger change finally and NCB staff should keep on taking such small steps to change for better for their stakeholders and themselves. He also told that NCB has the potential to become a Centre of Excellence in research on cement & concrete. He expressed his satisfaction on the progress of various activities at NCB and also gave new targets to scientists and engineers, assuring them of the support of DPIIT in achieving them.

Awards for best scientist for the year, best employee- technical & support staff and various other competitions held in the year 2020 like Atmanirbhar NCB, Swachhta Pakhwada, Vigilance Awareness week and Hindi Pakhwada were given to NCB staff by Dr. S S Gupta. Special recognition was given to the housekeeping staff of NCB who worked tirelessly during the pandemic to ensure cleanliness of the office, safety of staff as well as beautification of NCB-B campus.

72nd REPUBLIC DAY AT NCB BALLABGARH

During celebration of 72nd Republic Day on 26th January, 2021 at NCB Ballabgarh unit, DG-NCB congratulated entire NCB staff and spoke about importance of the day.

He asked NCB's engineers and scientist to work towards making NCB Atmanirbhar. He told that NCB has to work towards becoming a leading organization in Research and Innovation in the field of cement and concrete and contribute towards the vision laid down by Hon'ble Prime Minister of India.

INTERNATIONAL WOMEN'S DAY 2021

08 March 2021 was observed as "International Women's Day" at National Council for Cement and Building and Materials (NCB) for celebrating the social, economic, cultural and political achievements of women.

On this occasion, Ms Madhumita Sahoo, IAS, Deputy Secretary, Water Resources Department, Govt. of Odisha was the chief guest along with Guest of Honor Dr. Maitreyee Bhattacharya, Principal Scientist, CSIR-NML present via. online mode and Guest of Honor Dr. Megha Bansal, Associate Professor, Manav Rachna University, Faridabad was present physically on the occasion.

Ms Madhumita Sahoo, IAS, discussed about the history of International Women's Day celebrations, highlighted the gender bias that exists in the society and steps taken by government for women empowerment.

Dr. Maitreyee Bhattacharya, quoted the sloka from Manusmriti " " and emphasized that there are lot more accomplishments which are yet to be made by women in our country.

Dr. Megha Bansal encouraged women officials and staff of NCB to outshine in their areas of working. She also distributed appreciation certificates to the women employees of NCB.

DG - NCB highlighted the achievements of women in India and also acknowledged the contribution of Nari Shakti of NCB. He described women as true multi taskers. He also interacted with women officials and staff of NCB and appreciated their hard work and contribution in the success of NCB.

As part of celebrations of International Women's Day, Dr Sunit Brahma, a leading gynecologist & Obstetrician delivered an interactive talk for women officials and staff on 05th March 2021 on the health issues faced by women and how to tackle them effectively. The program was chaired by Mrs. Namita Mohapatra and it turned out to be a very fruitful session with important discussion regarding the latest and mandatory health check-up tips. The meeting was attended by women official of all units of NCB.

It included a session on sharing the individual experiences and challenges faced at various levels during daily working of the staff and also displaying the contributions of eminent women personalities for encouragement of the women staff.

Other Institutional Events

Other Institutional Events

NATIONAL TECHNOLOGY DAY 11th MAY 2020

On National Technology Day, NCB organised two webinars on "**Application of XRD & Optical Microscopy for Process and Quality Optimization**". DG-NCB, author of a book on the "Application of X-Ray Diffractometry in Cement Quality Control System" and an expert in this subject delivered the webinar lectures.

The first webinar was attended by more than 200 cement professionals of M/s UltraTech Cement Ltd. and the second webinar was attended by 80 professionals from various cement companies like ACC Ltd, Ambuja Cements Ltd., JK Cement, Dalmia Cement (B) Ltd., Shree cement, JK Lakshmi Cement, JSW Cement, Star Cement, Prism Johnson Ltd. and Max Cement.

The second webinar was organised on 18th May 2020 which was attended by 85 cement professionals including over 35 participants from different countries like Angola, Argentina, Bhutan, Iran, Kosovo, Myanmar, Oman, Saudi Arabia, Slovakia, Tanzania, UAE and Zimbabwe. More than 40 participants from major cement companies in India like UltraTech Cement Ltd., Wonder Cement, J K Cement, J K Lakshmi Cement and Sanghi cement also participated in the webinar. DG-NCB who is a subject expert gave a presentation on the topic which was well received and applauded by the participants.

WORLD ENVIRONMENT DAY 05th JUNE 2020

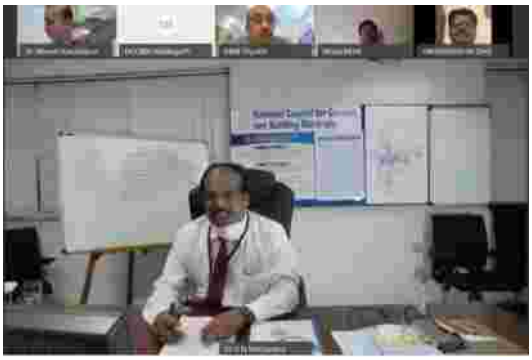
NCB celebrated World Environment Day on 05th June 2020. The theme of World Environment day 2020 was "**Celebrate Biodiversity**". On this occasion, special plantation drive was undertaken by DG-NCB along with other officials.

Through a virtual meeting DG-NCB addressed 140 engineers and scientists on the World Environment day. The World Environment Day is a reminder to express our

gratitude to Mother Nature, which sustains all forms of life. Its main aim is to raise awareness to protect our nature and look at various environmental issues that are growing day by day.

World Environment Day 2020 focussed on Biodiversity was hosted in Colombia in partnership with Germany. This year the theme of World Environment Day 2020 was **"Celebrate Biodiversity"** with slogan **"Time for Nature"**. With 1 million species facing extinction, there has never been a more important time to focus on bio-diversity.

On the occasion of world environment day 2020, a webinar on "Utilization of alternate fuels & raw materials: an Overview" was organised



DG-NCB gave a comprehensive presentation in webinar to about 450 participants from major cement companies of India and abroad. The topics covered by DG-NCB & his multi-disciplinary team during the webinar were: Inventory of AFR in India, CPCB guidelines on co-processing of AFR, Characterization of AFR, System design requirements for using AFR, Process problems experienced due to enhanced usage of AFR and further optimization techniques, Environmental monitoring aspects to be covered, Impact of AFR on cement and concrete properties and Problems related to clinker quality and mineralogy while using AFR. After AFR presentation, DG-NCB had a short interactive session with experts from the cement industry on status of AFR utilization in Indian cement industry & further steps that can be taken to increase AFR utilization.

Experts like Sh Sanjay Mathur, Dr. A K Singh & Bimal Modi from M/s UTCL, Dr. Manish Karandikar & Sh J P Jain from ACC Ltd., Sh Varun Boralkar from Geocycle, Sh S K Handoo from My Home Industries, Sh R B M Tripathi & Uma Shankar Choudhary from J K Cement Works shared their valuable views and suggestions. DG-NCB thanked all panellist for sharing their valuable thoughts and experience on AFR. He assured that NCB will continue to support Indian cement industry in various aspects of AFR utilization & of continued interaction between NCB & industry. He informed that NCB is preparing a compendium on AFR and requested all plants to share data on AFR.

WORLD ACCREDITATION DAY 09th JUNE 2020

NCB celebrated World Accreditation Day on 10th June 2020. World Accreditation Day is celebrated every year on 09th June. It is a global initiative by ILAC and IFA to promote the value of Accreditation. This year's theme focused on "**How Accreditation improves food safety**".

On this occasion, DG spoke about importance of accreditation, its benefits and how NCB has shown commitment to quality & excellence by ensuring accreditation of its various testing & calibration laboratories as per relevant IS standards.

He also emphasized that NCB is also an accredited PT provider, accredited Third Party Quality Inspection agency & is soon going to be accredited Reference Material Producer. He asked scientists and engineers to ensure commitment to quality and adhere to the requirements of various standards.

Sh PN Ojha, Head-CDR, Sh Panduranga Rao, Unit In-charge, Bhubaneswar and Sh Amit Trivedi, Head-CQC & MMS also spoke about significance of accreditation at the event.

HINDI PAKHWADA 2020

Hindi Pakhwada 2020 was celebrated in the institute on 14th September 2020, inaugurated by Hon'ble Director General. Mr. Abhishek Agnihotri, Chairman of Official Language Implementation Committee told that Hindi fortnight in the institute will be celebrated between 14th September to 28th September 2020 and during the fortnight Hindi competitions will be organised for the promotion of Hindi language.

1 Hindi Essay Competition
2 Comment Writing Competition
3 Writing Competition
4 Poetry Recitations / Self Thought Competition

In the Hindi Pakhwada program, the Director General conveyed hearty congratulations to all the members of the Hindi committee & best wishes for the future. Hon'ble Director General also appreciated work done by the Hindi Implementation Committee for the promotion of Hindi language. Along with this, President of Hindi Committee Mr. Abhishek Agnihotri told that the publication of the

second issue of "NCB Darpan" will be released again on NCB Annual Day. Further, first and second winners of Competition will be Honoured by the chief guest on NCB day and incentive prizes will be awarded to other contestants as well. During the Pakhwada, officers and employees who did more work in Hindi language were also Honoured.

हिन्दी पखवाड़ा का आयोजन

राष्ट्रीय सीमेंट एवं भवन सामग्री परिषद् के मुख्यालय में हिंदी पखवाड़े का आयोजन 14 सितम्बर 2020 से 01 अक्टूबर 2020 के बीच बड़े हर्षोल्लास के साथ मनाया गया। कोविड महामारी के कारण केंद्र सरकार द्वारा जारी दिशा-निर्देशों का पालन करते हुये पखवाड़े के दौरान प्रतियोगिताओं का आयोजन किया गया। इस पखवाड़े में निम्नलिखित प्रतियोगितायें आयोजित की गई।

- टिप्पणी लेखन प्रतियोगिता
- निबंध लेखन प्रतियोगिता
- श्रुतलेखन प्रतियोगिता
- कविता / स्वविचार प्रतियोगिता

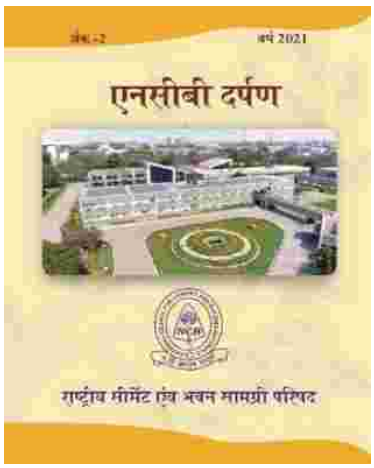
पखवाड़े का शुभारंभ हिंदी दिवस के शुभ अवसर पर माननीय डॉ. बीबेकानंद महापात्र ,महानिदेशक के कर कमलों द्वारा 2020 सितंबर 14 पर किया गया। हिंदी समिति में विशिष्ट कार्य करने के लिए महानिदेशक द्वारा श्री जुबेर अहमद एवं श्री इम्तियाज खान को महानिदेशक डॉ. बीबेकानंद महापात्रद्वारा सम्मानित किया , गया।

महानिदेशक ने सभी सदस्यों एवं कर्मियों से आग्रह किया कि सभी कार्यालय में अधिक से अधिक कार्य हिंदी में करें। हिंदी पखवाड़े का समापन 01 अक्टूबर 2020 को किया गया। इस समापन समारोह में कविता पाठ / स्वविचार प्रतियोगिता का आयोजन भी किया गया। कार्यान्वयन समिति के अध्यक्ष श्री अभिषेक अग्निहोत्री ने भी प्रतियोगिताओं में भाग लेने के

लिये सभी का धन्यवाद दिया तथा भविष्य में संस्थान, नराकास तथा मंत्रालय के अंतर्गत होने वाली सभी प्रतियोगिताओं में अधिक से अधिक संख्या में भाग लेने का आह्वान किया।

एन.सी.बी. दर्पण का विमोचन

राष्ट्रीय सीमेंट एवं भवन सामग्री परिषद् की वार्षिक हिंदी पुस्तक एन.सी.बी. दर्पण के द्वितीय अंक का विमोचन माननीय श्री अनिल अग्रवाल, अपर सचिव, आन्तरिक व्यापार और उद्योग



संवर्धन विभाग, वाणिज्य और उद्योग मंत्रालय, भारत सरकार के द्वारा 19 फरवरी 2021 को एन.सी.बी. बल्लबगढ़ प्रागंण में किया गया। इस अवसर पर डॉ.एस एस गुप्ता, वरिष्ठ विकास अधिकारी, सीमेंट विभाग, आंतरिक व्यापार एंव उद्योग संवर्धन विभाग (DPIIT), भारत सरकार, भी उपस्थित थे। हिंदी पखवाडा 2020 के दौरान आयोजित होने वाली प्रतियोगिताओं के प्रथम पुरस्कार विजेताओं को श्री अनिल अग्रवाल, अपर सचिव, आन्तरिक व्यापार और उद्योग संवर्धन विभाग, वाणिज्य और उद्योग मंत्रालय, भारत सरकार द्वारा कार्यालय के वार्षिक उत्सव के अवसर पर पुरस्कृत किया गया एवं अन्य प्रतिभागियों को महानिदेशक द्वारा सम्मानित किया गया।

विशिष्ट व्यक्तियों द्वारा हिंदी विभाग का अवलोकन :

25 नवंबर 2020 को कर्मचारी चयन आयोग समिति के सदस्यों द्वारा हिंदी विभाग का अवलोकन किया गया। कार्यान्वयन समिति के सदस्यों के साथ राजभाषा के अधिक से अधिक कार्यालय में लागू करने हेतु वार्ता की गयी। हिंदी समिति में सभी सदस्यों को एन.सी.बी. दर्पण के अंक -2 की प्रतिलिपि सप्रेम भेंट की। समिति के सदस्यों द्वारा एन.सी.बी. के आगामी अंक हेतु सुझाव भी दिए गए।

डॉ एस एस गुप्ता, वरिष्ठ विकास अधिकारी, सीमेंट विभाग, आंतरिक व्यापार एवं उद्योग संवर्धन विभाग (DPIIT), भारत सरकार एवं अन्य।

सुश्री अपराजिता, उप-प्रभागीय न्यायाधीश (Sub-divisional Magistrate), बल्लबगढ़ ने दिनांक 18 मार्च 2021 को एन.सी.बी. कार्यालय परिसर में हिंदी समिति के सदस्यों के साथ मुलाकात की। सुश्री अपराजिता जी, एन.सी.बी. दर्पण के सफल प्रकाशन पर हिंदी समिति को बधाई दी एवं भविष्य में आने वाले एन.सी.बी. दर्पण अंक-3 के लिये अपने स्वरचित कविता / विचार देने का आश्वासन दिया। हिंदी समिति के अध्यक्ष श्री अभिषेक अग्निहोत्री जी ने सुश्री अपराजिता जी का हार्दिक धन्यवाद किया एवं उपहार स्वरूप एन.सी.बी. दर्पण के अंक-2 की प्रतिलिपि भेंट की।

हिंदी कार्यान्वयन समिति के सदस्यों ने डॉ राजवीर सिंह, महाप्रबंधक (राजभाषा) एवं सदस्य सचिव से 23 मार्च 2021 नराकास एन एच पी सी फरीदाबाद परिसर में मुलाकात एवं हिंदी दर्पण के अंक-2 की प्रतिलिपि भेंट की।

NATIONAL UNITY DAY

DG-NCB administered Rashtriya Ekta Diwas pledge to officials of NCB on 31st October 2020 through virtual platform. Officials of NCB connected online and took the Rashtriya Ekta Diwas pledge in English and Hindi.

SWACHHATA PAKHWADA

NCB observed "Swachhata Pakhwada" from 01st to 15th November 2020. Swachhata Pledge was administered online on 02nd November 2020 by DG-NCB to officials/staff via virtual platform.

JAN ANDOLAN FOR COVID-19

DG-NCB administered the pledge to all officials of NCB for their commitment to wear mask, follow physical distancing and maintain hand hygiene all the time. We have entered into a phase where our country has to open up society and economy. In these times, the spread of virus can be very fast. Therefore, it is a must to follow COVID Appropriate Behaviour and NCB calls on people to exercise extreme vigilance.

Keeping hands clean, wearing a mask and continuing to maintain physical distance are the main mantras to keep away from the disease as our health experts at the stroke of finding a permanent solution to end this disease. NCB is leaving no stone unturned to ensure safety of our employees and their families by keeping strict monitoring

through regular meetings. Although we may have to be physically apart from each other for a while, we have to come together in ways we never have before, not only for ourselves but also for others.

NATIONAL SAFETY DAY

National Safety Day was first observed at NCB on 04th March 2021, the foundation day of the National Safety Council in 1972 set up by the Ministry of Labour and Employment to develop and bring into practice a voluntary routine on Safety, Health, and Environment. The theme for this year is 'Sadak Suraksha (Road Safety).' A Safety and Health pledge along with a pledge for road safety was administered to all NCB staff.

Visit of Dignitaries to NCB

VISIT OF ADDITIONAL SECRETARY, DPIIT

Shri Anil Agrawal, Additional Secretary-DPIIT, Govt. of India along with Dr. S S Gupta, SDO, DPIIT visited NCB Ballabgarh in February 2021. During the visit, he inaugurated the Optical Microscopy Lab and interacted with NCB's scientists and engineers. In his address to the NCB entire family, Sh Agrawal emphasized on importance of being a National Council and encouraged all to collectively work in making NCB a trusted brand.

He also inaugurated the SUNDIAL constructed by NCB team using the waste generated during the testing of laboratory samples. During his visit he also released the second edition of Hindi magazine Darpan published by CCB's Hindi Rajbhasa Samiti.

VISIT OF SDM BALLABGARH AT NCC-BALLABGARH

In continuation of International Women's Day celebration, Ms Aparajita, an IAS officer of 2018 Haryana cadre and presently, SDM Ballabgarh since August 2020 was also invited to NCB-Ballabgarh campus. Although due to other pressing engagements, she could not grace the occasion on the day. She visited NCB on 18th March 2021.

Ms Aparajita earlier was Assistant Commissioner, Gurugram, Haryana. She completed her Chemical Engineering from BIT Mesra in 2013 and had worked as Deputy Manager (Environment) in ACC Ltd. at Tikaria Grinding Unit for 2 years. During the COVID-19 pandemic she ensured supply of food and other essentials to the needy. In view of her exceptional efforts, she recently got recognized for doing exceptional work during COVID-19 pandemic. During the COVID-19 pandemic she ensured supply of food and other essentials to the needy. In view of her exceptional efforts, she recently got recognized for doing exceptional work during COVID-19 pandemic.

VISIT OF EXPERTS FROM DPIIT, CEMENT AND CONSTRUCTION SECTOR AT NCB- BALLABGARH

A team of distinguished experts from the Cement and Construction sector (members of Standing Selection Committee for promotion activities) led by Dr. S S Gupta (SDO, DPIIT, MoCI, Govt. of India) visited the Sun dial constructed at NCB-Ballabgarh on 24 November 2020. They appreciated the efforts that were made by DG-NCB towards beautification of NCB-B campus by utilizing waste materials.

VISIT OF CPPRI OFFICIALS AT NCB

Dr. B P Thapliyal, Director-CPPRI, Dr. M K Gupta, Scientist-F and other Senior Scientists of CPPRI visited NCB laboratories at Ballabgarh on 28th January 2021 where DG - NCB and other NCB scientists briefed CPPRI team on the latest activities being carried out in NCB in the field of R&D.

Dr. B P Thapliyal was felicitated by DG-NCB for his superannuation on 31st January 2021 in presence of Dr. S S Gupta. Senior Development Officer – DPIIT, Govt. of India and other scientist and engineers from NCB and CPPRI. He also gave a brief introduction of achievements of Dr. Thapliyal and said that NCB looks forward for collaboration with CPPRI on joint research projects in waste utilization.

VISIT OF EESL OFFICIALS AT NCB-BALLABGARH

EESL officials visited NCB-Ballabgarh to interact with DG-NCB with a view of fostering collaboration between the institutions and promote usage of biomass pellets as an alternative fuel in the cement industry. DG informed EESL officials how NCB is working towards helping plants achieve higher Thermal Substitution Rates (TSR) in the cement kilns. The cement industry currently has a TSR of 4% and the target is to achieve 25% TSR by 2030. NCB is also providing process solutions to cement plants which face problems during increase of TSR in their cement kilns.

Webinars and Conferences Attended

Webinars, Seminars and Conferences Attended

WEBINAR ON IMPACT OF COVID ON INDIAN CEMENT INDUSTRY ORGANISED BY ASSOCHAM

DG-NCB gave a special address on Impact of COVID-19 on Indian Cement Industry in the Webinar held on 01st May 2020 by Assocham amongst eminent personalities from cement industry like Sh Mahendra Singhi (MD & CEO-DCBL, President CMA & Chairman-NCB), Sh V R Sharma (MD-JSPL), R Saravanabhavan (SRO-NITI Aayog, GoI), Ms Lopamudra Sengupta (VP-Tech, JSW Cement) and Sh Deepak Sharma (Director & Co-founder, Kanvic Consulting). He reiterated the fact told by other distinguished speakers that impact of COVID-19 pandemic on Indian economy & cement industry has been hugely disruptive. However, he professed that the economic and industrial growth of the country will pick up at much faster rate post COVID and cement industry will witness higher capacity utilization of existing installed capacity and new capacity additions. He told that innovations, optimizations, new manufacturing techniques & products & alternate sources of energy coupled with Government's focus on ease of doing business and other promulgated schemes will be the driving factors for the futuristic growth of the industry.

He informed that NCB has done enormous churning on upcoming futuristic challenges of the industry in the country and has geared itself to take up assignments in the field of sustainability, enhancing waste utilization, application of cleaner technology and low carbon footprint. He emphasized on the need to re-design the operating ways through innovation & research, making efforts for digitization and remote operation of industrial facilities. He acknowledged that by adopting state-of-the-art technological interventions, innovative production techniques & climate-resilient resource optimization measures, cement manufacturers in India are integrating sustainability within their growth aspirations.

NATIONAL POLICY WORKSHOP ON 'COUNTERMEASURES FOR RIVERINE AND MARINE PLASTIC LITTER IN INDIA'

National Productivity Council (NPC) organised National Policy Workshop (Virtual) on Countermeasures for Riverine and Marine Plastic Litter in India.

During the workshop, DG-NCB gave presentation on 'Strategy & Facilitation to encourage Co-processing of Plastic Waste in Cement Kiln' in Webinar on Scenarios to Counter Plastics Litter by Overcoming Barriers and Identifying Enabling Measures held on 22nd May 2020.

INTERCEM ASIA-PACIFIC WEBINAR SERIES

During the third quarter of FY 2020-21, DG-NCB gave a presentation in **Intercem Asia- Pacific** webinar series on NCB's role towards sustainability of Cement and Construction Sector where spoke of steps taken by Indian cement industry for reduction of carbon footprint and studies taken at NCB on Low Carbon Cements and Resource Conservation for enhancing sustainability. He also talked about usage of Alternative Fuels in Indian Cement Industry, energy efficiency improvement and latest technologies like carbon capture and utilization. A similar presentation was given by DG in India Construction Week 2020 where he also told the industry about the NCB's expertise groups of scientists and engineers formed to serve the construction sector.

PARTICIPATION IN WORLD STANDARDS DAY 2020 ORGANISED BY BIS

DG-NCB in **World Standards Day 2020 organised by BIS** with the theme of "Protecting the Planet with Standards". He talked about the recent standardizations which were carried out by BIS based on research at NCB. He made the participants aware about the challenges faced by Indian cement industry which are:

- High carbon footprint during cement manufacture
- Depletion of Cement Grade Limestone & fossil fuel
- Utilization of Industrial wastes
- Maximize the use of total generation of Fly Ash
- Lower Thermal Substitution Rate in Indian cement kilns
- Timely formulation/revision of BIS Standards

NCB is playing a key role in validating variety of industrial wastes as mineral component in cement manufacturing and it is incorporated in number of BIS specifications at right time. More than 40 NCB officials are serving BIS committees, sub committees and panels as Chairman, Convenors and Members.

WEBINAR BY FICCI ON BY-PRODUCT MANAGEMENT FOR INDIAN STEEL INDUSTRY- ECOSYSTEM, OPPORTUNITIES AND CHALLENGES

During the webinar held in January 2021, DG-NCB told about Utilization of Slags in Indian Cement Industry. He gave an insight in to the Indian cement industry and explained how slag, by-product of steel industry is current being used by the cement industry to make blended cements. He also

gave an insight into the properties, characterization, chemical composition and mineralogy of slag and explained the advantages of slag in concrete. He also told about the existing barriers in utilization of Iron and steel slag. As a way forward DG-NCB told that slag should be included as an aggregate for infrastructure & construction activities and in standards and regulations.

Steel slag should be treated, not as a "by-product but as a co-product" in the steel making process. Carbon credits should be allotted to (slag) user departments that can be shared with steel industry. DG also asked to identify collaborative research opportunities to identify areas where different quantity and quality of slags can be used, and also anchor a mission mode approach with all stakeholders to find out optimal use of opportunities for steel slag in Indian infrastructure sectors.

ICR PANEL DISCUSSION ON USAGE OF MSW AS A FUEL IN CEMENT KILN

During the panel discussion, DG-NCB told that two major alternate fuel sources available in India to meet the energy demand of cement industry are MSW and Biomass. The generation of Municipal Solid Waste (MSW) is growing by 5% annually. Out of the total RDF of 28,676 tonnes per day, approx. 13,600 tonnes per day of RDF will be available for co-processing in the cement plants, which can fulfill about 7-8% of the total thermal energy requirement of the cement industry. DG lauded the initiatives taken by the Government to increase the TSR in cement kilns. The TSR of Indian cement industry is 4% and is targeted for 25% TSR by 2030. He told that NCB is giving optimal solutions to plants which are facing problems like CO peaks while using RDF. He also told that in future, other problems may arise while co-processing the waste.

DG-NCB informed that there is wrong perception that co-incineration is a dump yard and any kind & size of waste can be co-processed in cement kilns– This perception needs a change. The waste co-processed in cement kilns needs to be processed to transform it into proper size and quality. This requires investment at plant site. Similarly, the personnel working in the plants need to have experience of running the kiln with high % utilization of alternate fuels.

WEBINAR ON CONSTRUCTION INDUSTRY "CHALLENGES & OPPORTUNITIES IN QUALITY AND PRODUCTIVITY"- UDYOG MANTHAN

During the webinar held in February 2021, DG-NCB gave a presentation on the Best Practices of Improvement in Quality & Productivity in Cement Industry. He spoke about significance of TQM in today's manufacturing process and steps to establish TQM in the organization. He enlightened the attendees about National Standardization Committees and how NCB is contributing in standardization in the field of services provided by Construction and related Engineering service providers with respect to the construction work for buildings and civil engineering, installation and assembly work, Services related to Pre-construction, building completion and finishing work including architectural and engineering services and other related services including maintenance, renovation and restoration.

He told that launching a real digital strategy has become essential for continuous success in the years to come. Building Information Modelling (BIM) should be regarded as the backbone of the new way of working triggered and targeted by the digital strategy. He also highlighted the gaps for sustainable construction and areas where support is required by R&D institutions from Government for improving quality and productivity.

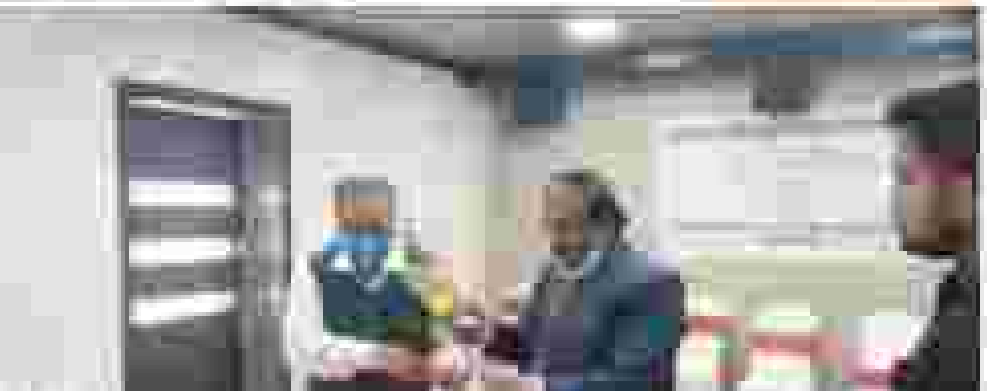
Finally, he told that strengthening Quality Control/Assurance at all construction projects and skill development of man power working in cement construction sector is mandatory for achieving set goals.

WEBINAR ON UTILIZATION OF STEEL SLAGS IN INDIAN CEMENT AND CONSTRUCTION INDUSTRY FOR NATIONAL METALLURGICAL LABORATORY

During the webinar held in February 2021, DG-NCB gave a presentation on the present scenario of slag usage in the Indian Cement industry. He told about the advantages of slag addition in concrete, chemical composition, mineralogy and characterization of steel slag. He also told that NCB has taken up studies for utilization of slag as an alternative to natural fine and coarse aggregates. He also talked about barriers in utilization of steel slag. During the presentation he also told about the

various R&D and sponsored projects carried out and services that are given by NCB to the cement and construction sector towards nation building. He briefly discussed about all the R&D projects and the latest equipment procured by NCB to carry out frontline research activities in the field of cement and concrete.

Interaction with Stakeholders



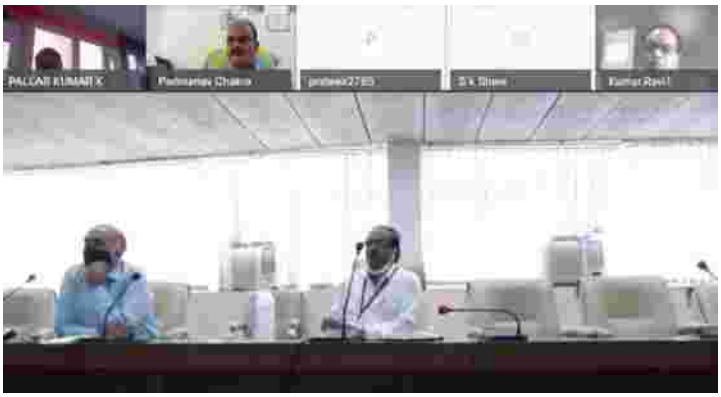
Interaction with Stakeholders

Interaction with Industry

In an effort to bring the Industry and NCB close and work together on subjects on national interest, NCB initiated series of "NCB-Industry Interaction" meetings.

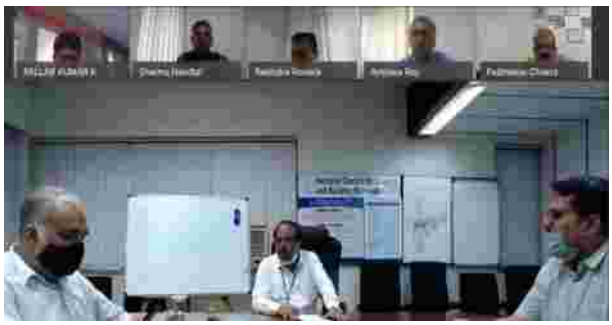
INTERACTION WITH M/s ADHUNIK CEMENT LTD

The first "NCB-Industry Interaction" was done with M/s Adhunik Cement Ltd, a unit of Dalmia Cement (B) Ltd on 26th August 2020. During an hour long discussion, the plant team shared their present operational and process realted problems. Based on the problem shared, a detailed exchange of information covering various aspects like mines limestone characteristics, analysis of all types of fuel being used, raw mix and kiln feed data being maintained, quality of clinker being produced, process parameters like kiln inlet oxygen, kiln burner momentum and emission data was held between the two teams. Plant team also shared details about various measures taken at their end to mitigate the problem. Based on the observations, NCB team suggested a couple of suitable measures to the plant team to tackle the problem.

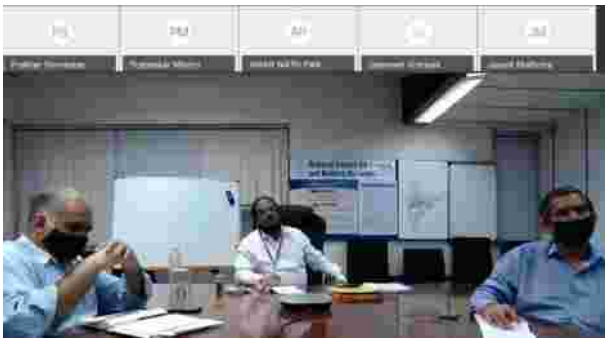


INTERACTION WITH M/s CALCOM CEMENT LTD

Second "NCB-Industry Interaction" was done with M/s Calcom Cement Ltd, a unit of Dalmia Cement (B) Ltd on 27th August 2020. The plant team shared their present problems related to kiln operation. Based on the problem, a detailed exchange of information covering various aspects, like limestone & fuel characteristics, mix design and raw meal data, clinker quality and process parameters took place. Based on the discussions, NCB team suggested to take up relevant study.



INTERACTION WITH M/s J K CEMENT LTD



The third interaction was done with M/s J K Cement Nimbahera and Mangrol on 31st Aug 2020. During an hour long discussion, the plant team shared the details about the plant configuration, the nature of limestone deposits, various corrective materials being used in the raw mix and the kiln operation philosophy being presently adopted.
The plant also shared their process related problems with the engineers and scientists at NCB. Based on the observations of the kiln operation, NCB team suggested taking up a detailed study for doing analysis to identify the source of problem which contributes to such operational behaviour.

INTERACTIVE MEETING WITH KEY OFFICIALS OF CEMENT INDUSTRY IN ODISHA

An interactive meet with key officials of cement industry in the state of Odisha was organised at Hotel Suryansh, Bhubaneswar in January 2021. Sh. Dibyendu Chakrabarti, Scientist –F & Head BIS, Bhubaneswar was the Chief Guest. Representatives of Cement Industry were offcials of M/s JSW Cement, JK Lakshmi Cement, Nuvoco Vistas Cement, Toshali Cement & My Home Cement. Seniors offcials from NCB- Ballabgarh, Hyderabad and other stake holders also connected through online platform.

DG highlighted the services of NCB, various Research Projects undertaken by NCB on cement and building materials, particularly Portland Dolomite Cement, High MgO content in cement, Optimized use of high-grade Lime Stone Mineral Resources, Utilization of Low-Grade Lime Stone, Coarser fly ash in cement manufacturing etc.

NCB's role in developing 16 BNDs Certified Reference Materials (CRMs) on various types of cements and state of the art testing facilities available at NCB Ballabgarh were also showcased. Recent challenges faced by manufacturers in cement manufacturing were also discussed. Research needs in plant blending mechanism of blending PSC and PPC uniformly and in an optimized way to customize and to produce tailor made cements as per the demand of various projects and customers were discussed. It was also informed that several studies on sponsored basis to provide techno economical feasible options for manufacturing such tailor-made cements can be taken up by NCB.

Shri Dibyendu Chakrabarti, Scientist –F & Head BIS, Bhubaneswar recalled the professional association of NCB and BIS & opined that in the coming days, NCB Bhubaneswar can play a major role in providing various services to the cement manufacturing plants in Odisha and neighboring states like Chhattisgarh, West Bengal and Jharkhand because of geographical proximity.

VISIT TO KHD HUMBOLDT

DG-NCB with NCB team visited KHD Humboldt Wedag India Head Office to discuss about installation of pilot plant at NCB-Ballabgarh. They also visited KHD's fabrication yard to gain insight on the ways that fabrication of such machinery is carried out and shall be carried out on pilot basis.

Interaction with Government Organizations/ Institutes/ Dignitaries

MEETING WITH BUREAU OF INDIAN STANDARDS

Ninth meeting of the Panel for Revision of Cement Standards, CED 2:1/P1 in joint session with Fourth meeting of the Working Group for the Revision of IS 650, CED 2:1/P1/WG was held on 19th August 2020 in which NCB officials took part where present status of projects in which BIS is carrying out work along with NCB were discussed.

Various issues and standards were discussed in the meeting like:

- Clinker for Blended Cement (having High MgO)
- Specification for Portland Limestone Cement (PLC)

- Limestone Calcinated Clay Portland Cement (LC3)
- IS 650:1991: Specification for Standard Sand for Testing Cement
- Use of Marble Slurry in cement manufacture
- Geopolymeric concrete
- Guidelines for use of various types of cements
- Use of pulverized fuel ash' in IS 6491:1972, Methods of Sampling Fly Ash
- Ultrafine fly ash High Volume Fly Ash Blended Cements
- IS 6452:1989: High Alumina Cement for Structural Use – Specification
- Performance evaluation of cement samples by mechanical mixing and keeping fixed w/c ratio for compressive strength determination vis-à-vis as per Indian standard test procedures
- Specification for Dry Mix Mortar
- Use of Automatic Blaine Type apparatus in IS 4031 (Part 2)
- Revision of IS 4032:1985 Method of Chemical Analysis of Hydraulic Cement (First Revision)
- Revision of IS 1727: 1967 Methods of Test for Pozzolanic Materials

New proposals to prepare Indian standard on use of Rice Husk Ash as a Pozzolana and on Alkali-Activated Cementitious Materials (A. A. C. M.) were also received and discussed in detail.

VISIT TO CBRI-ROORKEE

During his visit to CSIR-CBRI, DG-NCB discussed with Director CBRI about the opportunities emerging out in building materials area and explored possibilities of joint working. He also visited facilities of CBRI.

VISIT TO CPPRI-SAHARANPUR

Director CPPRI explained activities to DG-NCB. He also congratulated him for expanding research collaborations in such a short span.

MEETING WITH CHIEF SECRETARY, ODISHA

DG-NCB met with Shri Suresh Chandra Mohapatra, Chief Secretary, Govt. of Odisha in January 2021 and discussed on collaborative working of NCB with Govt. of Odisha through Memorandum of Understanding (MoU) for quality assurance/ quality control of construction projects to create sustainable & durable infrastructure, structural assessment & rehabilitation of old structures and skill development in the state of Odisha. Chief Secretary said that for better and durable infrastructure development, NCB should sign MoUs with state owned engineering departments and local bodies of Odisha as per their requirements in consultation with Engineer-in- Chiefs. DG-NCB appraised Chief Secretary about the expansion plans of NCB-Bhubaneswar unit including newly established cement & building materials testing laboratory which has been accredited by NABL.

Dr. B. Pandu Ranga Rao, Unit In-Charge of NCB-Bhubaneswar was also present during the discussions.

MEETING WITH CMD, IDCO

DG-NCB along with UIC NCB-Bhubaneswar met CMD Odisha Industrial Infrastructure Development Corporation (IDCO), to appraise about the expansion plans of NCB-Bhubaneswar unit including newly established cement & building materials testing laboratory. The NCBMteam discussed with CMD about the expansion plans of Bhubaneswar unit and sought the support from IDCO for allocation of additional space. NCB is planning to expand its services in eastern part of the country by setting up a unit in Odisha which caters to the requirement of Odisha and neighbouring states like Chhattisgarh, West Bengal and Jharkhand because of geographical proximity.

MEETING WITH CGM, IDCO

DG-NCB along with UIC NCB-Bhubaneswar met Dr. Bhakta Kabi Das, Chief General Manager (P&C), IDCO- Odisha and discussed on allocation of additional space at IDCO Central Stores, Mancheswar, Bhubaneswar for expansion of laboratory facility. It was also agreed by both NCB & IDCO to extend the validity of existing MoU by another 5 years for providing third party quality assurance and audit of IDCO projects.

MEETING WITH WATER RESOURCES DEPARTMENT, ODISHA

DG-NCB along with NCB-Bhubaneswar team of engineers met Shri Dhiren Kumar Samal, Engineer-In-Chief, Water Resources Dept., Govt. of Odisha and Sh. V S S Patro, Superintending Engineer, OCTMP (WR). Shri Samal suggested NCB to prepare and submit a concept note for improving and inculcating 'Quality' inherently to their engineers in various levels. He also suggested NCB that IT and latest technologies can be integrated in training the engineers. Sh. Patro suggested NCB to establish Soil Testing & Concrete Testing Laboratory at Bhubaneswar unit at the earliest possible time so that OIIPCRA construction works shall opt the services in their on-going and upcoming works.

MEETING WITH DS CUM PROJECT DIRECTOR, OIIPCRA

DG-NCB along with NCB-Bhubaneswar team of engineers met Ms. Madhusmita Sahoo, IAS Dy. Secretary, Govt. DoWR cum Project Director, OIIPCRA and discussed on training plan for recently awarded capacity building of 150 engineers. Project Director assured that scope of NCB services in capacity building training will be explored further. NCB also submitted Request for Proposal for third party quality assurance and audit of OIIPCRA projects funded by World Bank, which is under active consideration.

MEETING WITH COMMISSIONER, BHUBANESWAR MUNICIPAL CORPORATION

DG-NCB along with UIC NCB-Bhubaneswar met Sh. Prem Chandra Choudhary, IAS, Commissioner-Bhubaneswar Municipal Corporation (BMC) & Sh. Satyanarayana Patro, Executive Engineer, BMC to brief the services offered by NCB. Sh. Choudhary mentioned that NCB shall forward an introductory letter along with the credentials so that BMC can consult NCB and opt for its services in near future.

MEETING WITH ODISHA WORKS DEPARTMENT

DG-NCB met Sh. Anil Kantha Tripathy, Engineer- In-Chief, Works Dept. Govt. of Odisha and Sh. Durga Prasanna Mishra, Superintending Engineer, Buildings Dept. Govt. of Odisha and explained NCB activities. Sh. Tripathy suggested NCB to submit introductory letter with all credentials so that OWD can consult for various services like TPQA, SAR, CCE etc. Sh. Mishra also mentioned that he and Chief Engineer will visit NCB Bhubaneswar Laboratory to assess the facilities and to explore possibilities for opting the services of NCB in near future.

MEETING WITH NSDC AND RURAL DEVELOPMENT

DG-NCB met Shri Debi Prasad Mohanty, Consultant-National Skill Development Corporation (NSDC) and Dr. Pradeep Rout, Rural Development (RD) to discuss on collaboration with NSDC & RD for skill development programs in hybrid mode for the benefit of construction trade workers. Dr. Rout also suggested NCB to join hands with Odisha Knowledge Corporation for imparting training in vernacular language.

VISIT OF DG-NCB AT GSI, FARIDABAD

DG-NCB was invited on the occasion of celebration of 170 Foundation Day of Geological Survey of India on 04th March 2021 by Dr. Ravindra Kumar, Deputy Director General (G), National Centre of Excellence in Geoscience Research, GSI, Faridabad. On this occasion Mr. G. C. Pati, Chairman, Central Ground Water Board, Shri G. K. Sharma, Head of Department of Geology, Kumaon University, Nainital, Dr. Sanjay Wahi, Director, Geology (retd.) GSI and Dr. Smt. Sheel Singh, Principal, KL Mehta Dayanand College Women, Faridabad were also present.

The purpose of this visit was to explore new avenues for collaborations in the area of R&D, mineral inventory etc. DG- NCB gave a presentation on various activities carried out at NCB. During the visit, NCB team interacted with experienced scientists to explore the possibilities of joint research work in the area of Mineralogy and Petrography of Raw materials and Clinkers. A quick visit to NCEGR, GSI Faridabad state of the art laboratories facilities was also undertaken.

MoUs and Internship

MoUs WITH EDUCATIONAL INSTITUTES & RESEARCH ORGANIZATIONS

DG-NCB route to his vision and mission to collaborate with pioneer research institutes and carry out frontline research in field of cement and concrete visited prestigious institutes like IIT-Roorkee, CBRI-Roorkee and CPPRI Saharanpur. He discussed with research fraternity about niche areas of collaboration and furthering the collaboration. NCB has recently entered in to MoUs with various IITs and NITs in India which aims for: Facilitation of internship/ training for students, sharing facilities like laboratory, library, proprietary software & in house developed components, exchange ideas and manpower to enhance R&D activities, explore possibility of conducting joint seminars / workshops explore opportunities for securing funding for joint research projects.

MoU WITH IIT ROORKEE

DG-NCB signed a **MoU with** Dean Research SRIC, **IIT Roorkee** for recognition of NCB as extended research centre for IIT Roorkee. The MoU will surely increase the pace of research and expedite in expanding NCB's footprint in cement and construction sector. DG-NCB also visited IIT Roorkee facilities and explored opportunities for further areas of collaboration.

MoU WITH IIT HYDERABAD

A **MoU** was signed by DG-NCB and Prof. B S Murty Director, **IIT Hyderabad** in presence of representatives from both the institutions.

MoU WITH NATIONAL INSTITUTE OF TECHNOLOGY- MEGHALAYA

A MoU was signed by DG-NCB and Prof. (Dr.) Bibhuti Bhusan Biswal, Director, National Institute of Technology- Meghalaya in presence of representatives from both the institutions.

MoU WITH NATIONAL INSTITUTE OF TECHNOLOGY- SURATHKAL

A **MoU** was signed by DG-NCB and Prof. (Dr.) K U Rao, Director, **National Institute of Technology- Surathkal** in presence of representatives from both the institutions.

MoU WITH NATIONAL PRODUCITVITY COUNCIL

An MoU was signed between NCB and NPC on 15th March 2021 with the objective of fostering collaboration between the two institutions to promote research, development & innovation activity at both the institutions. DG-NCB also visited the facilities available at NPC, New Delhi and explored opportunities for further areas of collaboration.

MoU WITH CPPRI

NCB and CPPRI entered into an MoU on 05th January 2021 for collaboration on joint research projects on waste utilization.

MoU WITH IIT BHUBANESWAR & NIT ROURKELA

With a view to enhance its academic outreach, NCB signed a MoU with Prof. Sujit Roy, Dean (Research & Development), IIT-Bhubaneswar on 29th January 2021 and Prof. Animesh Biswas, Director, NIT-Rourkela on 23rd February 2021 with the objective of fostering collaboration between the institutions to promote academic and research interactions. The MoU covers submission of collaborative research projects, students' training, FDPs, availability of instrumentation facilities, laboratory & library facilities and other aspects of capacity building in order to bridge the industry-academia gap. The MoUs are set to increase the pace of research and expedite in expanding NCB's footprint in cement and construction sector.

Internship

INDUSTRIAL TRAINING OF STUDENTS OF BITS-PILANI CAMPUS AT NCB

NCB, a well-established Practice School Station, recognized for internship by BITS welcomed 20 fresh interns in its campus in May 2020 to carry out their industrial training projects. DG-NCB welcomed the students for their industrial training assignments and told that the institute adheres to a sense of values which makes it unique in its field of endeavour.

NCB is committed to provide services of highest quality to its clients and come out with novel, viable and sustainable solutions, not only for good of their business but also for the society at large. He briefly explained various on-going R&D works currently being carried out at NCB. He also wished some of such projects would bring out much interest in younger generation.

Project allocation was done after carrying out discussions, according to discipline and interest. Students shall be working on projects like: (i) Utilization of coarse fly ash in cement manufacturing, (ii) Cement manufacturing, economy, specifications & its correlation of characteristics, (iii) Energy efficient manufacturing of clinker using alternative raw materials and economic analysis, (iv) Mechanical properties of structural light weight concrete, (v) Compressive Behaviour of High Strength Reinforced Concrete Columns, (vi) Implementation of pre-cast/ pre-fab technologies in housing sector, (vii) Study of low cost housing using sustainable glass fibre reinforced gypsum technology, (viii) Fresh, hardened and durability performance evaluation of concrete made with Portland Limestone Cement, (ix) Effect of aggregate on fresh and hardened concrete properties, (x) Thermodynamics & Kinetics of carbon steel reinforcement corrosion in concrete, (xi) Process impact & remedial measures to enhance alternative fuels in Indian cement industry, (xii) Quality Assurance of ELV works at India Trade Promotion Organization (ITPO) Pragati Maidan, (xiii) Thermodynamic calculations of heat balance of cement kiln, (xiv) Thermal dehydration kinetics of phospho-gypsum and making usable for cement manufacturing process, (xv) Study and analysis of the optimum ratio of coal and renewable based electrical power generation in India with respect to carbon footprint, (xvi) Simulation of heat flow using python, (xvii) Utilization of Refused Derived Fuel (RDF) in cement industry, (xviii) Cement manufacturing process and developments in kiln burners during their internship at NCB-B.

Appendices

Appendix - I

Rolling Plan of Missions within the Framework of Centres

A. CENTRE – CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)

Mission 1: Utilization of Marginal Grade Raw Materials in the Manufacture of Cement and Building

Mission 2: Development of Newer Cements, Composites and Alternate Binding and Building Materials

Mission 3: Development of Newer Processes of Manufacturing Cement and other Binding and Buildings Materials

Mission 4: Raw Mix Design Optimization

Mission 5: Utilization of Industrial and other Wastes for Cement and Building Materials

Mission 6: Development of Newer Refractories

Mission 7: Improved Refractory Engineering Practices

Mission 8: Study of Fundamental Concepts in Material Science and Fundamental Studies Relating to Areas of Fuel Combustion, Pyro-processing, Size Reduction, etc.

Mission 9: Independent Testing

B. CENTRE – MINING, ENVIRONMENT, PLANT ENGINEERING AND OPERATION (CME)

Mission 1: Compilation and Updating of National Inventory of Cement Grade Limestone Deposits

Mission 2: Identification, Exploration, Evaluation and Assessment of Limestone Deposits and other Cement Raw Materials

Mission 3: Upgradation and Quality Establishment of Limestone (at Quarries) and Mineral Conservation

Mission 4: Application of Remote Sensing Techniques

Mission 5: Advanced Survey Techniques including Geographical Information System (GIS) and Global Positioning System (GPS)

Mission 6: Application of Geophysical Techniques for Mineral Exploration, Ground Water Investigation, etc.

Mission 7: Mine Planning and Scheduling

Mission 8: Improved Machinery Application and Improved Technological Upgradation for Mining Practices

Mission 9: Sustainable Development through Environmental Improvement including Survey of Land and Water Resources.

Mission 10: Pollution Control Technologies for Particulate Gaseous Emissions and Liquid Effluents

Mission 11: Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for Industrial Projects and Mines

Mission 12: Environmental Management System (EMS) and ISO - 14001 Certification for Process Industries

Mission 13: Utilization of Hazardous Wastes as Supplementary Fuel

Mission 14: Monitoring of Environmental Parameters for Water, Ambient Air Quality, Noise and Vibration Studies

Mission 15: Rehabilitation and Reclamation of Mined out Areas

Mission 16: Improving Capacity Utilization and Increasing the Rate of Production in Kilns and Mills towards Improving Total Factor Productivity in Cement Industry through Process Optimization, Diagnostic Studies and Trouble Shooting and Improvement in Operation

Mission 17: Benchmarks, Best Practices, Operational Norms and Technical Audit including Plant Monitoring

Mission 18: Productivity Enhancement Programme (PEP)

Mission 19: Technological Upgradation

Mission 20: Improving Utilization of Coals

Mission 21: Utilization of Alternate Fuels such as Lignite, Natural Gas, Combustible Wastes etc.

Mission 22: Improvements in Fuel Combustion Efficiency

Mission 23: Optimization of Energy (Both Thermal and Electrical) Consumption

Mission 24: Energy Auditing, Management and Monitoring

Mission 25: Waste Heat Utilization including Cogeneration

Mission 26: Creating Awareness and Motivation for Energy Conservation

Mission 27: Total Productive Maintenance (TPM)

Mission 28: Preventive/Predictive Maintenance Programme, Condition Monitoring Techniques and Tribology including Computerised Maintenance

Mission 29: Inventory Control and Spare Parts Management

Mission 30: Risk Analysis and Improving Safety in Cement Plants

Mission 31: Turnkey Consultancy for Setting up Modern Medium and Large Cement Plants from Concept to Commissioning including Fund Sourcing

Mission 32: Establishing Modern Energy Efficient CRI-MVSK and Rotary Kiln based Mini Cement Plants from Concept to Commissioning

Mission 33: Improvements in System Design and Engineering of Plant and Machinery (including CRI designed indigenous Precalcinator System, Burners for High Ash Coals, Refractory Lining System and Coal Quality Modulation System)

Mission 34: Modernization and Technological Upgradation in Cement Plants

Mission 35: Upgradation and Modification of VSK based Cement and Lime Plants

Mission 36: Developing Systems Designs for Bulk Movement of Cement by Rail, Road and Waterways

Mission 37: Marketing Strategies and Logistics

Mission 38: Improvements in Packaging of Cement

C. CENTRE – CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)

Mission 1: Analysis and Design of Structures for Safety and Economy and Development of Related Software Packages

Mission 2: Rationalizing Designs of Structures and Foundations in Cement Plants and Other Constructions

Mission 3: Performance Evaluation of Structures including Machine Foundations through Site Inspection and Testing

Mission 4: Formulation and Evaluation of Protective System for Enhancing the Service Life of Concrete Structures

Mission 5: Evaluation of Concrete Construction through Non-Destructive Investigations

Mission 6: Improving Durability of Concrete Construction through Distress Investigations and Rehabilitation Procedures

Mission 7: Improved Quality Control Procedures for Enhancing Durability

Mission 8: Rational Utilization of Cement and other Ingredients in Concrete, including Admixtures

Mission 9: Promotion of Ready Mix Concrete Technology in India

Mission 10: Development of Concrete for Special and Newer usages such as Underwater Concreting, Special Concrete Exposed to Extreme Temperature etc

Mission 11: Development and Evaluation of Prefab Systems Appropriate for Housing Programmes

Mission 12: Application of Alternative Building Materials and Development of Construction Techniques for Low Cost Housing

Mission 13: Improvements in Construction Technology of Cement Concrete Pavements and Canal Linings

Mission 14: Development of Precast Architectural Concrete Elements and Concrete Finishes

Mission 15: Preventive Maintenance Programme for Enhancing Service Life of Buildings

Mission 16: Extended Application of Concrete for Non-Structural Usage

Mission 17: Improvement in Construction Management Techniques

D. CENTRE – INDUSTRIAL INFORMATION SERVICES (CIS)

Mission 1: Collection, Documentation and Retrieval of Information for Development of Cement and Building Materials Industries

Mission 2: Establishing National Data Bank for the Cement and Building Materials Industries

Mission 3: Providing Library Services

Mission 4: Establishing Display Centre and Sample Museum and Participation in Exhibition and Trade Fairs

Mission 5: Publication of R & D Projects, Technology Digests, R & D Journals, Trend Reports, Promotional Literature etc

Mission 6: Organising Workshops and Seminars at National and International Levels on Topical Subjects in the Areas of Cement and Building Materials

Mission 7: Promoting International Linkages for Development of Technologies in the Field of Cement and Building Materials

E. CENTRE – CONTINUING EDUCATION SERVICES (CCE)

Mission 1: Improving the Talent of Personnel at Entry Level to Cement Industry

Mission 2: Improving Technical and Managerial Skills/Knowledge of NCB Officials through Inhouse/ External Programmes

Mission 3: Manpower Planning and Human Resource Development Strategies for Cement and Building Material Industries

Mission 4: Upgrading Technological Talent of Personnel in the Cement and Building Materials Industries

Mission 5: Improving Operational Skills of Personnel in the Cement Industry through Simulator Based Courses

Mission 6: Training of Personnel in Computer Programming, Application and Information Technology at Different Levels of Participation

Mission 7: Training of Personnel in Software Development, System Analysis and Information Technology Applicable to Cement Manufacturing Process Industry, Structural Design and Investigations

F. CENTRE – QUALITY MANAGEMENT, STANDARDS AN CALIBRATION SERVICES (CQC)

Mission 1: Providing Traceable Calibration Services to the Industry for Ensuring Manufacture of Quality Product

Mission 2: National and International Standardization

Mission 3: Quality Management, Quality Assessment and Quality Improvement in Cement and Building Materials Industries

Mission 4: Development of Improved Methodologies for Testing and Quality Control including Rapid Methods of Testing and Quality of Cement and Other Building Materials in the Field

Mission 5: Inter-Laboratory Proficiency Testing

Mission 6: Quality Related Services

Mission 7: Development of New Standard Reference Materials

Mission 8: Providing Standard Reference Materials (SRMs), Developed by NCB, to the Industry for Ensuring Accuracy of Testing for Quality Control

These Programmes and Missions are proposed to be achieved through the pursuit of specific projects with specified targets of time, cost and assured end products

Appendix II

Completed R&D Project Programme 2020 – 2021

S.No.	Code	Project Title	Start Date	End Date
1.	COB-11	Investigation for Standardization of High Magnesia (MgO) Clinker for the Manufacture of Blended Cement such as PPC and PSC	April 2019	March 2021
2.	CON-16	Fresh, Hardened and Durability Performance Evaluation of Concrete made with Portland Limestone Cement (PLC)	April 2019	March 2021

Appendix – III

Sponsored Projects Completed During the Year 2020-21

National Council for Cement and Building Materials has completed 129 sponsored projects in the year 2020-21. Centre for Cement Research and Independent Testing (CRT) completed 25 nos. of projects, Centre for Centre for Mining, Environment, Plant Engineering & Operation (CME) have completed 9 nos. of sponsored projects, Centre for Construction Development and Research (CDR) have completed 95 nos. of sponsored projects.

Centre for Cement Research and Independent Testing (CRT)

Centre for Cement Research and Independent Testing (CRT) has completed 25 nos. sponsor projects during the year 2020-21, the distribution of 25 number sponsor projects as under: -

Project Title	Name of sponsor
Investigation on utilization of ladle furnace slag as a raw mix component in manufacture of clinker	M/s JSW Steel, Banglore, Karnataka
Establishing limestone consumption factor	M/s Ultratech Cement Limited (Unit: Sidhi Cement Works), Jaypee Vihar, Majhigawan, Sidhi, M.P. -486776
Investigation of Raw mix burnability, preparation of bulk clinker sample and performance evaluation of cement compositions	M/s Dalmia Cement (Bharat) Limited, Meghalaya
Preparation of Controlled Low Strength Mine Backfill Composites (CLSMBC)	S K Mines M/s Hindustan Zinc Limited, Udaipur
Establishing limestone consumption factor	M/s Prism Johnson Limited (Formerly Prism Cement Limited), M.P
Testing of samples of coal and limestone bond index and burnability of kiln feed samples,	M/s ACC Ltd Gagal
Establishing limestone consumption factor	M/s Birla Jaypee Cement, Satna, (M.P.).
Establishing limestone consumption factor	M/s KJS Cement (I) Limited, NH-7, Village Amilia, Distt-Satna (M.P)-485771
Establishing limestone consumption factor	M/s Heidelberg Cement India Ltd, Narsingarh, Damoh , M.P.
Testing of fuel samples and burnability of kiln feed samples	M/s UltraTech Cement Limited (Unit Manikgarh Cement works U2), Chandra pur, Maharastra.

Project Title	Name of sponsor
Burnability of Raw Mix samples and Bond Work Index of Limestone sample	M/s RCCPL, Maihar, Satna, M.P.
Establishing limestone consumption factor	M/s RCCPL Private Limited (Formerly Reliance Cement Company Pvt.Ltd), Village-Itahra, P.O-Bharauli, Maihar-485775, Satna, M.P.
Testing of fuel samples and burnability of kiln feed samples	M/s UltraTech Cement Limited (Unit Manikgarh Cement works U1), Chandra pur, Maharastra.
Establishing limestone consumption factor for	M/s Birla Corporation Limited, PO-Birla Vikas, Satna-485005, Madhya Pradesh.
Establishing limestone consumption factor for	M/s ACC Kymore, M.P
Evaluation of burnability of raw mix, bond work index of limestone and testing white cement samples	M/s UltraTech Cement Ltd., Unit Birla White, Kharia Khangar, Rajastan.
Establishing limestone consumption factor	M/s Ramco Cement Ltd, KSR Nagar, Jaggayyapeta, Krishna Dist, A.P
Evaluation of burnability of raw mix	M/s JKLakshmi cement Limited, Durg, C.G.
Investigations on the use of Chrome sludge as raw mix component for manufacture of cement	M/s Vishnu chemicals Ltd, Hyderabad
Establishing limestone consumption factor	M/s Ultratech Cement Ltd (Maihar Cement Works) Sarlanagar, Satna Distt. Maihar, M.P
Burnability of Raw Mix samples and Bond Work Index of Limestone sample	M/s RCCPL, Maihar, Satna, M.P.
Establishing limestone consumption factor	M/s Vikram Cement, Neemuch, M.P.
Investigation on coating and build-ups sample of cement rotary kiln	M/s Saurashtra Cement, Ranava, Gujarat
Burnability of Raw Mix samples	M/s Ultratech Cement bLtd., Manikgarh Cement Works, Gadchandur, Korpana, Chadrapur, M.H..
Burnability of Raw Mix samples	M/s Ultratech Cement Ltd., Rajshree Cement Works

Centre for Mining, Environment, Plant Engineering & Operation (CME)

Centre for Mining, Environment, Plant Engineering & Operation (CME) has completed 9 nos. of sponsor projects in the year 2020-21. Details of projects are given below:

Project Title	Sponsor
Capacity assessment study	M/s Meghalaya Cement Ltd
Compressed Air Audit	Saurashtra Cement Ltd. Ranavav (Gujarat)
Potential Assessment Study for old DCs (Cement Sector)	Bureau of Energy Efficiency, New Delhi
Mandatory Energy Audit	Ultratech Cement Ltd. Mumbai (05 integrated units)
Mandatory Energy Audit	Ambuja Cement Ltd, Dadri (UP)
Preparation of Pre-Feasibility Report for setting up a 1.6 MTPA Cement Plant	M/s Canis Mines & Minerals LLP, Meghalaya
TEFR for setting up a Cement Grinding Unit at Kannur, Kerala for M/s Malabar Cements Ltd, Kerala	M/s Malabar Cements Ltd. (MCL) Kerala
Preparation of Detailed Project Report for setting up a 0.3 mtpa Bulk Cement Terminal at Ernakulam wharf, Cochin Port Trust, Kerala for M/s Malabar Cements Ltd, Kerala.	M/s Malabar Cements Ltd. (MCL) Kerala
Impact of Mining on Salinity, Ground Water Level/Quality AAQ and land use pattern	Saurashtra Cement Ltd. Ranavav (Gujarat)

Centre for Construction Development and Research (CDR)

Centre for Construction Development and Research (CDR) has completed 95 nos. sponsored projects during the year 2020-21. The details are given below:

Concrete Technology (CON)

Title	Name of Sponsor
Detailed Study of High Performance Concrete (HPC) Work in Barrage Spillway at Tapovan Vishnugad Hydro Power Project, Joshimath and Third Party Quality Assurance (TPQA) for Production and Placement of HPC	NTPC Limited, TVHPP Project, Chamoli, Uttrakhand
Evaluation of Materials and Concrete Mix Designs for the Work of Construction of Steam Generator & Auxiliaries Package (GA 1) for 3 X 660 MW) Ghatampur Thermal Power Project	Neyveli Uttar Pradesh Power Limited, Panki Power Plant, Kanpur, UP
Investigation on Application of Carbon Nanotubes for Improving Performance of Cement Concrete and Concrete based Precast Building Products	Indian Oil Corporation Limited, Research & Development Centre, Sector-13, Faridabad
Concrete Mix Designs of M35 and M45 grades with PCE base admixture for the additional work of 3 X660 MW NUPPL, Ghatampur Thermal Power Project	BGR Energy System Limited, 443, Anna Salai, Teynampet, Chennai
Durability Study on PSC made using composite slag (mix of BF slag and LD slag) for Tata Steel Limited.	Tata Steel Limited, Process Technology Group, Jamshedpur
Evaluation of Materials & Concrete Mix Design for Flue gas desulphurization (FGD) package for Rihand stage-II and III to M/s Mitsubishi Hitachi Power Systems India Private Limited.	NTPC Limited, Rihand Super Thermal Power Plant, PO: Rihandnagar, Sonebhadra
Evaluation of Materials & Concrete Mix Design for Flue Gas Desulphurization (FGD) Package for Kudgi STPP to M/s ISGEC Heavy Engineering Limited	NTPC Limited, Kudgi Super Thermal Power Station, Kudgi
Evaluation of Materials & Concrete Mix Design for Construction of Steam Generator & Associated Packages of 2x660 MW Khurja Super Thermal Power Plant	L&T MHPS, Kudgi Super Thermal Power Station, Kudgi
Evaluation of Materials & Concrete Mix Design for All civil and architectural work for CHP including final Micro level grading, backfilling up to required level and handing over of all Foundations/	Hindustan Steelworks Construction Limited, Bokaro Steel City

Buildings/ Structures to structural/ Mechanical/ Electrical agencies and final handing over to customer for onward operation purposes at 3 x 800 MW PVUNL Patratu STPP	
Evaluation of Materials & Concrete Mix Design for concrete mix M-25, M-30 & M-39 (Road work) and WMM Road works for township package 3x800 MW PVUN (Stage-I) Patratu, Ramgarh	Patratu Vidyut Utpadan Nigam Limited, Patratu, Distt. Ramgarh, Jharkhand
Evaluation of Materials & Concrete Mix Design for concrete mix M-35 (TG) for 3x800 MW PVUNL (Phase-I) Patratu	Patratu Vidyut Utpadan Nigam Limited, Patratu, Distt. Ramgarh, Jharkhand
Evaluation of Materials & Concrete Mix Design for the Civil Work of Ash Dyke Package for Tanda Stage-2 on M/s Kanwar Enterprises Pvt. Ltd.	NTPC Limited, Tanda Super Thermal Plant, Ambedkar Nagar, UP
Micro Structure Study of Concrete Sample	IIT Delhi, Hauz Khas, New Delhi
Evaluation of Materials & Concrete Mix Design for the Civil Work for 4X500MW FGD at Simhadri Super Thermal Power Plant, Visakhapatnam, Andhra Pradesh of Client National Thermal Power Corporation	NTPC Limited, Simhadri Super Thermal Power Plant, Post NTPC Simhadri, Distt. Vishakhapatnam (AP)
Evaluation of Materials & Concrete Mix Design for the work of FGD (Flue Gas Desulfurization)	NTPC Limited, North Karanpura Super Thermal Power Project, Distt. Chatra, Jharkhand
Evaluation of Materials & Concrete Mix Design for concrete mix M-25 & M-30 for "Water Treatment Plant Civil Works" at 3x800 MW PVUNL (phase I), Patratu	Patratu Vidyut Utpadan Nigam Limited, (PVUN), Patratu, Distt: Ramgarh, Jharkhand
Evaluation of Materials & Concrete Mix Design for WFGD Project civil works at NTPC Sipat Bilaspur (C.G.)	NTPC Sipat, Sipat Super Thermal Power Project, Village-Sipat, Bilaspur, Chhattisgarh
Testing and Evaluation of Fine Aggregates	Punatsangchhu-I Hydroelectric Project Authority, Quality Control Wing, Bjimthangkha, Bhutan
Evaluation of Materials & Concrete Mix Design for Chimney Shell, Chimney Foundation & other external platform & grade slag	NTPC Limited, Sipat Super Thermal Power Project, Village-Sipat, Bilaspur, Chhattisgarh

Evaluation of Material and Concrete Mix Design for Chimney shell of FGD Package of NTPC, Gadarwara, Madhya Pradesh	Ultracon Infrachem (P) Ltd., Rajiv Colony, Opp. Hotel Melfort, NH-8, Gurugram
Evaluation of Material and Concrete Mix Design for Chimney shell of FGD Package of NTPC, Gadarwara, Madhya Pradesh	NTPC Limited, Gadarwara Super Thermal Power Plant, Madhya Pradesh
Evaluation of Materials & Concrete Mix Design Flue Gas Desulphurization system Package	NPGC Limited, Nabinagar Super Thermal Power Plant, Aurangabad, Bihar
Evaluation of Materials & Concrete Mix Design for development of 20MW Solar PV Project for Rihand Nagar	Rihand Super Thermal Power Plant, NTPC Limited, PO: Rihandnagar, Sonebhadra
Evaluation of Coarse and Fine Aggregates for Construction of Steam Generator & Associated Packages of 2X660MW Khurja Super Thermal Power Plant (THDC)	THDC India Limited, Khurja Super Thermal Power Plant, Khurja (UP)
Evaluation of Materials & Concrete Mix Design for Construction of Helper Cell ID FRPCT Package for 2X500MW Rihand STPP, Stage-II	Paharpur Cooling Tower Limited, C/o NTPC Limited, PO Rihand Nagar, Distt: Sonebhadra
Testing of Coarse Aggregate for Concrete work for Steam Generator and associated packages including site levelling at THDC Khurja Super Thermal Power Project (2x660 MW) (Executing Agency: M/s L&T – MHPS)	THDC India Limited, C/o NTPC Limited, Khurja Super Thermal Power Plant, VPO – Dashera Kherli, Tehsil – Khurja, Bulandsahar
Condition Assessment of RCC Structures at NCPS Dadri: (1) RCC Chimney Stage-I & II, (2) TG Deck Slab & column of Stage-I & II, (3) RCC Foundations of Boiler Area, (4) Natural Draft Cooling Towers Stage-I & II	NTPC Limited, National Capital Power Project, Dadri, Gautam Budh Nagar, Uttar Pradesh
Condition assessment and Recommendation on Repair & Restoration/ Strengthening measures of various RCC Structures at NTPC Kahalgaon, Stage-I, vide CS: 9053 (C.No.-47909). (P.O No. 4000178208-026-1025)	NTPC Limited, Kahalgaon Super Thermal Power Project, P.O Kahalgaon STP, Kahalgaon, Bhagalpur, Bihar
Ultrasonic Pulse Velocity Test (UPV) on TDBFP-2 Nos. of Foundations (Unit-1), MDBFP-2 Nos. of Foundations (Unit-1 & 3), Mill fan-5 Nos. of foundations, (Unit-1) Structure, for North-Karanpura Thermal Power Project.	Sunil Hitech Engineers Ltd., East High Court Road, Ramdaspeth, Nagpur

Condition Assessment study of RCC Chimney unit# 4, 5 & 6 at NTPC Ramagundam Super Thermal, Power Station, Ramagundam, Telangana	NTPC Ltd, Ramagundam Super Thermal Power Station, Jyothi Nagar, Dist. Peddapalli, Telangana
Condition Assessment Study using Non Destructive & Partial destructive Evaluation Technique including repair methodology and schedule of items for repair & restoration work of Minor Bridges/culverts at NTPC Rihand	Rihand Super Thermal Power Plant, NTPC Limited, PO: Rihandnagar, Sonebhadra
Condition assessment of 03 Nos. RCC Chimneys of Stage-II (3x500MW) of NTPC's Korba Super Thermal Power Station Korba, Chhattisgarh	NTPC Limited, Korba Super Thermal Power Station, P.O. Vikas Bhawan Jamnipali, Korba
Condition assessment and recommendations on Waterproofing and Repair/Restoration Measures of TG Hall Roof Slab of Stage-1&2 and Roof Slab of Ash Slurry Pump House at NTPC's Singrauli Super Thermal Power Station (SSTPS).	NTPC Limited, Singrauli Super Thermal Power Station, P.O. Shakti Nagar, Distt. Sonebhadra, Uttar Pradesh
Preliminary Site Inspection for Condition assessment of various RCC Structures (total 40 nos.) of Singrauli Super Thermal Power Station, Distt. Sonebhadra, Uttar Pradesh	NTPC Limited, Singrauli Super Thermal Power Station, P.O. Shakti Nagar, Distt. Sonebhadra, Uttar Pradesh
Part (I) Preliminary site Inspection (soundness/strength and integrity of concrete) of T.G Deck of Unit#7 DTPP after the fire incidence occurred at 'D' Thermal power project, Anpara-U.P. Part (II) Condition assessment of fire damaged concrete in bearing pedestals 1,2,3,4 & deck slab of TG unit no#7 at 'D'TPP Anpara, Sonebhadra, UP).	Electricity civil construction Division – IV, ANPARA "D" Thermal Power Project, Anpara, Sonebhadra, Uttar Pradesh
Extraction and testing of concrete cores from the Foundation Pads of Transmission Line Towers in 400KV Kudigi-Narendra DC Transmission line in Karnataka	Powergrid Corporation of India Ltd., SRTS-II, Regional Headquarter, Bengaluru
Condition assessment and formulating repair and remedial measures for DDA building comprises of Canera Bank Block (Bldg.Nos.-2-5) and Basement Parking at District Center, Nehru Place, New Delhi	Delhi Development Authority, Seed Bed Park, Sakarpur, Delhi
Carrying out concrete core testing for the work of constructing 311.75m concrete spillways at Amwar, Uttar Pradesh	Kanhar Const. Division-III, Pipari, Sonbhadra, Uttar Pradesh

Preliminary Site Inspection for Condition Assessment of Structural and RCC Structures of Plant Area Stage-1 at NTPC Tanda	Tanda Thermal Power Station, NTPC Tanda, PO: Vidyutnagar, Dist.: Ambedkar Nagar, Uttar Pradesh
Carrying out Non Destructive Testing on various structures of TG Unit #2 of 3x660MW North Karanpura STPP, Jharkhand as per IS: 516 – 2018 (Part-5/Sec-1)	NTPC Limited, North Karanpura Tandwa Village & Post, Chatra Distt
Carrying out Non Destructive Testing on Grouting Portion of pedestal of TG Unit#2 of 2x660Mw Meja Thermal Power Station as per IS:13311 (Part-2)-1992 and IS:516-2018 (Part-5/Sec-1)	NTPC Limited, 2x660 MW Meja Thermal Power Project, Kohdar Gaht, Meja, Allahabad
Condition Assessment & Recommendations on Repair, Restoration/Strengthening Measures of Cooling Tower Structures NTPC Faridabad	NTPC Limited, SSC-Hydro and DBF (Fbd), Village-Mujedi, P.O Nimka, Faridabad
Carrying out UPV & Concrete Core testing on RCC Tower & Reactor Foundations at 765/400/220 kV Bhadla II Substation, Jodhpur, Rajasthan	Power Grid Corporation of India Ltd Village Kan Sangh Ki Sid, Tehsil-Bap District-Jodhpur, Rajasthan
Carrying out Non Destructive Testing on various Dynamic Machine Foundations of BGT Unit#1 & Unit#3 of 3x660MW North Karanpura STPP, Jharkhand as per IS:516-2018 (Part-5/Sec-1)	NTPC Limited, 3x660 MW, NTPC North Karanpura STPP, Tandwa, Chatra, Jharkhand
Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Vacant land of unused CTC at Janta Mazdoor Colony in Ward No.259 Shahdara North	Executive Engineer (Pr), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
Third Party Quality Assurance/Quality Audit for Work of Construction of ward level Office at Sunder Nagari Ward NO. 244 and LIG Flats, Loni Road, Ward NO. 246, Shahdara (North) Zone	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shahdara, Delhi
Third Party Quality Assurance/Quality Audit for Construction of Multilevel underground Car Parking at Subhash Nagar Community Hall and Construction Hall and Construction of Community Hall above the underground car parking in WZ	South Delhi Municipal Corporation, Delhi
Third Party Quality Assurance/Quality Audit for Construction of Conventional underground Multilevel Car Parking at Subhash Nagar, Rajouri Garden in West Zone	South Delhi Municipal Corporation, Delhi

Third Party Quality Assurance/Audit for Work of "C/o Multilevel Parking cum commercial Complex Building at Krishna Nagar in Ward No. 229 Shah-S Zone"	Executive Engineer (Pr-I) Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
Third Party Quality Assurance/Audit for Work of Construction of Maternity Home Chandiwala after Dismantling of Old Building in Ward No. 247 Shahdara (North) Zone	Executive Engineer (Project)-I, East Delhi Municipal Corporation, Shahdara North Zone, Delhi
Third Party Quality Assurance/Audit for the Work of 'Redevelopment & Maintenance of Industrial Area S.H : Improvement and Upgradation of Roads and Drains at Lawrence Road Industrial Area Block-A, B & C	Delhi State Industrial Infrastructure Development Corporation Ltd, Wazirpur Industrial Area, Delhi
Third Party Quality Assurance/Audit for Work of Construction of Additional Classrooms and 1 toilet at M. C. Pry. School Awasiya Parisar, New Usmanpur, Ward No. 251, Shah (N) Zone	Executive Engineer (Pr-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
Third Party Quality Assurance/Audit for Work of Construction of EDMC Ward Office at Tejab Mill Ward No. 237 AC-62 Shahdara South Zone	Executive Engineer (Pr-I), East Delhi Municipal Corporation, Krishna Nagar, New Delhi
Third Party Quality Assurance / Audit for Work of Construction of Dhalao at Different Location along Drain No. 1 and Escape Drain in Sh. N SH: 1. Construction of Six Dhalaos on the Bank of Trunk Drain No. 1 a) Opposite Govt. Boys Sr. Sec. School, Jafrabad b) Downstream of Maujpur Chowk Bridge c) Near Kardampuri Bridge Opposite C-12, Yamuna Vihar d) Opposite C-4, Yamuna Vihar e) Upstream of Gokalpur Metro Station, Gokalpur Village f) near Downstream of foot over Brige Ganga Vihar Gokalpur Metro Station, Gokalpur Village f) Near Downstream of Foot Over Bridge Ganga Vihar	Executive Engineer (Pr-II) Shahdara North, East Delhi Municipal Corporation, , Delhi
Third Party Quality Assurance / Audit for Work of Construction of Dhalao at Various Locations Nearby of 1 of FC Drain in Shahdara North Zone SH: Construction of Seven Dhalaos on the Bank of Escape Drain at: a) Upstream of Khajur Bridge b) Upstream of Chand Bagh Pulia c) Downstream of old Mustafabad Bridge d) Downstream of Brijpuri Culvert near Bhagirathi Vihar and on the Bank of	Executive Engineer (Pr-II) Shahdara North, East Delhi Municipal Corporation, , Delhi

Karawal Nagar drain e) Upstream of bridge Prem Vihar f) Upstream of Panchal Vihar Bridge g) Downstream of Alok Kunj School, Lal Bagh Road	
Third Party Quality Assurance / Audit for Work of **(i)** Improvement Development of unauthorized colony at S. No. 98/1639 in Dichaon enclave, Opp. D.K. Depot, Nangloi in C-139, NGZ. SH: Construction of road and drain by pdg. SDBC and Interlocking tiles in C-139 NGZ. by pdg. from in Dichaon Kalan. **(ii)** Improvement Development of unauthorized colony at S.No. 586/1639 in Jai Vihar Phase-I, Najafgarh. SH: Construction of road and drain by pdg. SDBC and Interlocking tiles in C-139 NGZ. by pdg. from in Dichaon Kalan. **(iii)** Construction of outfall drain along Phirni Road of Village Kharkhari Jatmal in C-133 NGZ.	Executive Engineer, (M-I) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi
Third Party Quality Assurance / Audit for Work of (1) Imp. Dev of U/A Colony at S. No. 1155 Dabar Enclave (SR. Block A) Rawta Mode Jafferpur Najafgarh in C-140 NGZ. SH: Const. of Road and drain by pdg. SDBC and Interlocking Tiles in C-140 NGZ. (2) Improvement Development of Unauthorized Colony at S. No. 534/1639 in Naveen Place in C-139, NGZ.SH: Construction of outfall drain from Park to Main Road Bahadurgarh Road in C-139, NGZ by pdg. from in Dichaon Kalan. (3) Construction of outfall RCC drain from Shikarpur Village to FC drain in Village Shikarpur in C-133 NGZ.	Executive Engineer, (M-)-I, NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
Third Party Quality Assurance / Audit for Work of Construction of M C Pry. School Parshad Nagar in Ward No. 95 in KBZ	Executive Engineer, (Project) KBZ, North Delhi Municipal Corporation, under Zakhira Flyover, Delhi
Third Party Quality Assurance / Audit for the Work of "Construction of Hostel Block for Boys and Girls in Medical College at Hindu Rao Hospital in C-280/CLZ".	Executive Engineer (Pr.), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
Third Party Quality Assurance / Audit for Work of "Re-construction of Ayurvedic Dispensary at J-Block Sant Ravi Dass Nagar (Jahangirpuri) in C-19/CLZ".	Executive Engineer (Pr.), CLZ, North Delhi Municipal

	Corporation, Shakti Nagar, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Pucca School Building at M C Pry. School Mandoli (Boys) Shahdara (North) Zone".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "C/o Community Hall R-Block Resettlement colony Janakpuri in AC-11 (Nangloi) Rohini Zone"	Executive Engineer (M-I), RZ, North Delhi Municipal Corporation, Keshav Puram, New Delhi
Third Party Quality Assurance / Audit for the Work of "Construction of CNG Crematorium Hall at Subhash Nagar cremation ground in Tihar Village in C-112/WZ/SDMC".	Executive Engineer (M-I), WZ, South Delhi Municipal Corporation, Rajouri Garden, New Delhi
Third Party Quality Assurance / Audit for Work of "Construction of 14 nos. class rooms, 1 store room, 1 computer room, 1 office room, 1 library room, 1 hall, toilet at M C Pry. School in Nangli Razapur Ward no. 153, Central Zone"	Executive Engineer (Pr-II), Central, South Delhi Municipal Corporation, Under Sewa Nagar Flyover, New Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Boundary wall surrounding the vacant land and land for cultivation at Leprosy Home EDMC, Tahirpur in New Seemapuri".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "Strengthening of 52 Cusec drain (Khanna tent house – Loni Road) by Pdg. RMC from of service road and damaged boundary wall from Mandoli Road to SI Culvert New Jafrabad (DDA Colony) in Babarpur".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "Providing and Installation of ETP/STP at SDN Hospital Shahdara (North) Zone".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for work of "Construction of Pucca school building at M.C. Pry. School Sector-13, Rohini in Rohini Zone."	Executive Engineer (Pr.), Rohini Zone, North Delhi Municipal Corporation, Sector-17, New Delhi
Third Party Quality Assurance / Audit for work of "Construction of 23 rooms at M.C. Pry. School Sector-16 J-Block, Rohini in Rohini Zone after dismantling of 17 old existing class rooms."	Executive Engineer (Pr.), Rohini Zone, North Delhi Municipal Corporation, Sector-17, New Delhi

Third Party Quality Assurance / Audit for work of "Construction of North DMC Pry. School building at Sector-4 in ward no. 45 in Rohini in Rohini Zone."	Executive Engineer (Pr.), Rohini Zone, North Delhi Municipal Corporation, Sector-17, New Delhi
Third Party Quality Assurance / Audit for Work of "Construction of MC Pry School Block E-II Nand Nagari Shahdara (North) Zone".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, New Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Multi-Purpose Hall at M.C. Pry School Saraswati Vihar in Ward No C-65, Rohini Zone now Keshav Puram Zone."	Executive Engineer (M-I), KPZ-S, North Delhi Municipal Corporation, Keshav Puram, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of CTC at C-1 Block Nand Nagari near Tanga Stand in Ward No. 37E Shahdara (South) in Durga Puri Shahdara (North)".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "On Rampura road approaching towards Rohtak Road (On Delhi – Bhatinda Line, Level Crossing No. 5B)."SH: Construction of Sump Well & Pump house (Balance work) and other remaining works i.e. construction of service road, footpath, covering of drain, staircase, etc for Road Under Bridge at Rampura.	Executive Engineer (Pr), RZ, North Delhi Municipal Corporation, Rohini, Delhi
Third Party Quality Assurance / Audit for Work of "Improvement and strengthening of internal road in sector-22 Rohini in Narela Zone."	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
Third Party Quality Assurance / Audit for Work of "Construction / Improvement of Road from Chabra Sweet to Maharaj Nahar Singh Marg in JJ Colony, Wazirpur in C-65/CLZ." SH: Construction of Road by providing RMC and SW Drainage System.	Executive Engineer (Pr.), KPZ, North Delhi Municipal Corporation, Sawan Park, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of M.C Pry School at Block-6 in Trilok Puri in ward no. 210 in Shahdara South Zone".	Executive Engineer (Pr.-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
Third Party Quality Assurance / Audit for Work of "improvement to M C Pry. School at Arya Pura, Subzi Mandi in C-13/CLZ".	Executive Engineer (Pr), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi

Third Party Quality Assurance / Audit for Work of "Imp. Dev. Of road and drain by pdg. RMC from Kasana Builders to DDA Park Chowk(Demolishing CC, B/W, Surface dressing, B/Agg. RMC etc.) in Raj Nagar-II in ward no. 46S/NGZ".	Executive Engineer (M-III), NGZ, South Delhi Municipal Corporation, Dwarka, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Storm water covered brick work outfall drain and improvement of side berms by providing CC interlocking pavers on Ekasur Vithi Marg from around about near B-Block Kailash Colony to Hans Raj Gupta Marg in front of E, C, M and W Block and from C-54 to C-120, C-79 to C-123, C-155 to C-189 and C-189 to C-128 and C-155 to C-150 in C-Block of G.K-I in ward no. 86 South Zone"	Executive Engineer (Pr.-I), South, South Delhi Municipal Corporation, Sewa Nagar, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of 9 nos. class rooms 1 nursery, 1 computer, 1 staff, 1 science, 1 medical, 1 sport and urial blocks boys and girls and teacher on each floor in M C Pry. School Hamidpur in ward no. 4 after demolishing of old structure in Narela Zone. Part-B dismantling and Part-C provision of EI and allied works".	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of 8 nos. class rooms 1 office, 1 Computer, 1 lab, 1 Staff, 1 Science 1 Sport, 1 Hall and toilet blocks in M C Pry. School Sawda J J Colon Block-B in ward no. 30 Narela Zone. Part-B Dismantling and part –C Provision of EI and allied works".	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Dhalao at Pusta road from Khajuri Chowk to Tronica City (LHS) Opp. Turning point of Kali Ghata Road in ward no. 61E, AC-70 Shah(N) Zone".	Executive Engineer (Pr-II), Shah-N, East Delhi Municipal Corporation, Shahdara, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of NDMC Pry. School at E-1 Block, Mangolpuri Ward no. 46 (56N) in Rohini Zone"	Executive Engineer (Pr.), RZ, North Delhi Municipal Corporation, Rohini, Delhi
Third Party Quality Assurance / Audit for the Work of "Construction of Centralized kitchen for West	Executive Engineer (Pr.-II), WZ, South Delhi Municipal

Zone at M.C. Pry. School in B-3A Block, Janakpuri in West Zone."	Corporation, Under Dabri Flyover, New Delhi
Third Party Quality Assurance / Audit for Work of "Imp. Dev. of drainage system in Shalimar Bagh (S) in ward C-63/KPZ." SH: (A) Imp. Dev. of drainage system from PDP School to AF Block, Shalimar Bagh. H.No. 126A to 195A garage in BC (East) Block, Shalimar Bagh.	Executive Engineer (M-I), KPZ, North Delhi Municipal Corporation, Keshav Puram, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of additional class room at MC Pry. School at A-3, Mayur Vihar Ph-III in W.No. 06-E(216) in Shahdara (South) Zone".	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Pucca School building at MC Pry School A-4 Block Nand Nagari Sahadara North Zone".	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, GT Road, Opp. Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Pucca School building at MC Pry School B-4 Block Nand Nagari Shahdara North Zone".	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, GT Road, Opp. Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Additional class rooms in M C Pry. School Kardampuri in ward no. 258 Shahdara North".	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, GT Road, Opp. Shyam Lal College, Delhi
Third Party Quality Assurance / Audit for Work of "Construction of outfall drain in Bakkarwala village from PWD road near Statue on Mundka road in ward no. 19-S/WZ Ranholla".	Executive Engineer (M-IV), WZ, South Delhi Municipal Corporation, Rajouri Garden, New Delhi
Third Party Quality Assurance / Audit for Work of "Construction of Mega Kitchen in M C Pry. School Village Bagdola, Najafgarh Zone".	Executive Engineer (Pr.), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
TPQA for work of "providing Green cover to curb Air pollution in AC-60 in Shahdara South Zone. SH: Providing and laying interlocking paver blocks and tree guard at different sites in AC-60 Shahdara South Zone."	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
TPQA for work of "providing green cover to curb air pollution in AC-60 in Shah-S. SH: Pdg. and laying interlocking paver blocks and tree guard at RR Kolhi	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal

Marg from Geeta Colony Police Station to H. No. 5/2/17 (Dua Associates) in AC-60 in Shahdara South Zone".	Corporation, Krishna Nagar, Delhi
TPQA for work of "Providing green cover to curb air pollution in AC-59 Shah-S". SH: Providing and laying interlocking paver blocks and tree guard at different sites in AC-59 Shah-S Zone.	Executive Engineer (Pr-I),Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi

Appendix – IV

Research and Development Programme 2020 - 2021: In Progress

Sl. No	Project No.	Project title	Date of Commencement	Date of Completion
1.	WAU-17	Investigations on Utilization of Coarse Flyash (200-250 m2/kg) in Cement	April 2020	September 2021
2.	COB-12	Development of new clinker system using industrial by products and low limestone content	April 2020	March 2023
3.	COB-13	Investigations on role of Particle size distribution (PSD) on performance of blended cements and concrete	April 2020	March 2022
4.	WAU-14	Improvement of Fly Ash Quality, Through Chemical / Mineral Doping In Coal During Its Generation In Thermal Power Plant, and Study Its Effects In Cement And Concrete	April 2017	March 2022
5.	WAU-16	Development of Portland composite cement based on flyash and limestone	April 2019	March 2022
6.	EMG-01	Process design and integration of RDF Gasification in cement manufacturing process	April 2020	March 2022
7.	PSD-02	Design and Development of Transfer Chute to Handle Alternate Fuels and Their Mix in Indian Cement Plants	April 2020	March 2022
8.	CTM-05	Studies on Mechanical and Durability properties of High Strength Geopolymer Concrete	April 2020	March 2022
9.	CON-17	Study of Carbonation and Carbonation induced reinforcement corrosion in new cementitious system	April 2020	March 2023
10.	SOD-12	Studies on mechanical and time dependent properties of Very High Strength Concrete (100 to 130 MPa) and Ultra High	April 2020	March 2023

Sl. No	Project No.	Project title	Date of Commencement	Date of Completion
		Strength Concrete (130 To 180 MPa)		
11.	CON-18	Utilization of Coarser Flyash (having fineness between 250 m2/kg to 320 m2/kg) in Concrete as a cementitious material	April 2020	March 2021* *Extended up to 30 Sep 2022
12.	SAR-01	Cathodic Protection (CP) of RCC structures to enhance service life of new and existing structures using three system (Sacrificial anode, ICCP and hybrid system)	October 2020	September 2023
13.	CTM- 03	Use of Advanced Electronics in Construction and Condition Assessment of Concrete Structures	April 2017	March 2020* * Extended up to March 2022
14.	EMG-02	Solar thermal calcination of phosphogypsum for cement manufacture	April 2020	March 2021* * Extended up to December 2021; on cost basis

Appendix –V

NCB Patents Granted/ Filed During 2010-2020

Patents Granted:

Sl. No.	Patent No	Title	Names of Inventors
1.	248230	A Ceramic Composition for Preparing Scientific Pottery ware and Process of Preparation thereof	Sh. S Raina Dr. K Mohan Dr. K M Sharma Dr. M M Ali Sh. S K Chaturvedi Dr. D Yadav Sh. S K Agarwal
2.	251637	A decorative plaster coating	Sh. S. Raina Dr. K. Mohan Dr. K.M. Sharma Dr. M.M. Ali Sh. S.K. Chaturvedi Sh. S.K. Agarwal
3.	288839	Decorative tiles utilizing marble dust and a process for preparation thereof	Sh. S. Raina Dr. K. Mohan Dr. K.M. Sharma Dr. M.M. Ali Sh. S.K. Chaturvedi Sh. S.K. Agarwal
4.	289766	Cement and flyash based aesthetic building bricks tiles utilizing marble dust and a process for preparation thereof	Sh. S. Raina Dr. K. Mohan Dr. K.M. Sharma Dr. M.M. Ali Sh. S.K. Chaturvedi Sh. S.K. Agarwal
5.	344069	Mineralizing effect of "barium sludge- an industrial byproduct" in the manufacture of ordinary Portland cement	Sh. A Pahuja Dr. M M Ali Dr. V P Chatterjee Sh. S K Chaturvedi Sh. S K Agarwal
6.	314591	Rationalizing formulations and curing conditions for improving properties of hardened Geopolymeric Cement	Sh. Ashwani Pahuja Dr. M M Ali Dr. R S Gupta Dr. S Vanguri Dr. V Liju

Sl. No.	Patent No	Title	Names of Inventors
7.	337143	Process for the Preparation of sulphoaluminate - belite cement utilizing high magnesia / dolomitic limestone	Sh. Ashwani Pahuja Dr. M M Ali Sh. P S Sharma Dr. V P Chatterjee
8.	340210	Nanosilica blended ordinary Portland cement compositions with improved performance characteristics and a process thereof	Sh. Ashwani Pahuja Dr. M M Ali Dr. S Harsh Sh. Suresh Vanguri Dr. Varsha Liju
9.	344307	Fast process for determining expected 28-days compressive strength of concrete made with Portland Pozzolana Cement (PPC)	Sh. V V Arora Sh. Suresh Kumar Sh. Manish Kumar Mandre
10.	294833	A process for producing of Ordinary Portland Cement	Sh M Vasudeva Dr M M Ali Dr D Yadav Dr J M Shatma NALCO Officials
11.	295058	A process for preparation of synthetic slag from low grade limestone and dolomite	Sh. A Pahuja Dr. M M Ali Sh. P S Sharma Sh. S K Chaturvedi Sh. S K Agarwal Dr. V P Chatterjee Dr. D. Yadav Sh. Tashi Tshering Sh. Udai Kaflay
12.	347356	Marble dust as mineral additive in the manufacture of ordinary Portland cement	Sh. A Pahuja Dr. M M Ali Sh. P S Harma Sh. S K Agarwal Sh. Ashish Goyal
13.	355368	Method for rapid estimation of Na_2O and K_2O in different types of cement and raw materials	Sh. Ashwani Pahuja Dr M M Ali Sh. S K Chaturvedi Sh. S. C. Sharma

Patents Filed:

	Application No.	Title	Name of Inventors
1.	1195/DEL/2015	Investigations on the use of limestone mine reject on the properties of OPC clinker and resultant cement	Sh Ashwani Pahuja Dr M M Ali Dr V P Chatterjee Sh S K Chaturvedi Sh S K Agarwal
2.	201711000524 Dt:05-01-2017	A Process for Preparing Tiles	Sh Ashwani Pahuja Dr. S K Chaturvedi Dr S Harsh Dr. R S Gupta Sh. S Vanguri Dr. V Liju Dr. M N K Prasad Bolisetty
3.	201811047884 Dt:18-12-2018	Geoploymer concrete paving block and a process for preparation thereof	Sh. V.V. Arora Sh. Amit Trivedi Sh. Lalit Kumar
4.	201911049295	Composition of PPC and PSC using High Magnesia (MgO) clinker	Dr B N Mohapatra Dr S K Chaturvedi Sh G J Naidu Sh Giasuddin Ahemad

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
34 KM Stone, Delhi-Mathura Road (NH-2), Ballabgarh-121 004,
Haryana, India