

Glimpses of
14th NCB International Seminar
on Cement and Building Materials.

01-04 December 2015, New Delhi

TECHNICAL EXHIBITION



NCB NEWS

APRIL 2016



From the desk of Director General

I am very much delighted to present this e- NCB NEWS. This contains technical information on cement, building materials, concrete and construction, NCB's developments and capabilities, technical support services including training on cement and concrete technologies, glimpses of 14th NCB International Seminar, and other useful information.

I hope NCB's efforts in sharing knowledge and information through e- NCB NEWS are quite helpful to the cement and construction industry. I wish all a better innovative future.



**ASHWANI PAHUJA
DIRECTOR GENERAL**

National Council for Cement and Building Materials

Centre for Continuing Education Services (CCE)

announces the launching of

Certificate Course in Cement Technology through Correspondence

On 1st July 2016

For working professionals of Cement Industry

Duration of the Course : 1 Year

For further details please contact :

Head of Centre

Centre for Continuing Education Services (CCE), National Council for Cement and Building Materials

NCB will soon launch PT scheme on
Mechanical Properties of Fly ash & Aggregate, and
Chemical properties of Concrete Admixture.

Laboratories desiring to participate may contact NCB at

ncb.cqc@gmail.com

Information would be available on NCB website

www.ncbindia.com

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

34 KM STONE, DELHI-MATHURA ROAD, BALLABGARH-121004, HARYANA. INDIA

Ph- 91-129-4192222 / 2242051 Fax- 2242100, 2246175 E-mail- ncbcm@ncbindia.com

Website: <http://www.ncbindia.com>

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Visit of UNIDO Team to NCB in connection with the ongoing Project

“ Development and Adoption of Appropriate Technologies for Enhancing Productivity in Cement Sector”

UNIDO Team comprising of Mr. Daniel Lemarchand, Mr. Pieter du Toit and Mr. Ritin Koria, Associate Expert-Innovation of UNIDO visited National Council for Cement and Building Materials (NCB), Ballabgarh (Delhi-NCR) from 14th March to 18th March 2016 in connection with the ongoing project “ Development and Adoption of Appropriate Technologies for Enhancing Productivity in Cement Sector”. UNIDO expert team held detailed discussions with Shri Ashwani Pahuja, Director General and interacted with various centres of NCB. The Team visited the laboratories to obtain a view of the state-of-the-Art facilities in NCB. The UNIDO Expert Team also visited M/s UltraTech Cement Ltd. (Vikram Cement Works, Neemach, India) to observe the alternate fuel handling facilities.

Continuous Education and Services Centre of NCB has conducted Special Group Training Programmes recently on Cement and Concrete Technology for GET's of **Dalmia Cement (Bharat) Limited**, Officers of **Military Engineering Services**, Engineers of **NHPC Ltd.** and Engineers of **M/s DMRC Ltd.**

Special Group Training Programme (7 weeks) was conducted for GET's of **Dalmia Cement (Bharat) Limited** during **1st February to 18th March 2016** at NCB-Ballabgarh. The training was imparted through lecture, group discussions, case studies, computer-based training, films and other audio-visual presentation, advanced simulator trainer, experience sharing, laboratory practical sessions, demonstration/special session with advanced equipment. The Course Content includes Cement basics, raw material, raw mix design and burnability, preblending and homogenization techniques, size reduction, fuels and firing systems, burning process, instrumentation and process control, material handling mechanical engineering aspects, motors and electrical aspects, plant maintenances, energy conservation, analysis and control, commercial aspects, basics of materials management, personnel management and CSR (corporate social responsibility). Practical lab demonstrations on physical and chemical testing of cement were also conducted.



Special Group Training Programmes (2 days) was conducted on **Repair and Retrofitting of Concrete Structures including Water Proofing Materials and Techniques** for officers of **Military Engineering Services** during **10th to 12th February 2016** at NCB-Ballabgarh. The programme was aimed at equipping the participants with required 'know-how' and recent development in material and techniques for repair and rehabilitation of structures including waterproofing. Course content include durability and construction of concrete structures, good construction practices and knowledge on codal provision, non-destructive testing and evaluation of concrete structures, advances in repair material and techniques, repairing and retrofitting of concrete structures, water proofing treatment techniques, cost aspects in repair and retrofitting.



Special Group Training Programmes (3 days) on **Quality Management and Trends in Construction** for engineers of **NHPC Ltd.** during **1st to 3rd March 2016** at TLD-IV, Kalijhira, Darjeeling, and West Bengal. The course was aimed at providing knowledge on various aspects of management related to quality and trends in construction of projects. Course contents includes construction projects management – pre construction and construction stage (i.e. time, cost and quality management), quality management of concrete construction, quality, selection and acceptance criteria of concrete making material (i.e. cement, aggregate, water, mineral and chemical admixtures etc), Concrete properties and mix design, durability of concrete and acceptance criteria, Special concrete, High performance concrete.

Special Group Training Programmes (5 days) on **Quality Control and Quality Assurance in Concrete Construction** for Engineers of **M/s DMRC Ltd.** during **7th to 11th March 2016** at NCB-Ballabgarh. The course content includes quality requirement of cement, water, aggregate and admixtures, principals of concrete mix design as per IS:10262 & properties of fresh and hardened concrete, tests on cement and aggregates, durability of concrete and acceptance criteria self compacting concrete technology, properties of fresh and hardened concrete, non-destructive testing techniques as quality assurance measure, quality requirements of steel and detailing of reinforcement including corrosion aspects, concrete mix design/fresh and hardened concrete, Segmental construction like casting, curing, handling & quality checks, quality control aspects of concrete placement like batching, mixing, transportation, placing, compaction, finishing, curing. Practical lab demonstrations on test of cement and aggregate, concrete mix design/fresh and hardened concrete, non destruction techniques were also conducted during the programme.



NCB NEWS (NCB NEWS is exclusively electronic and for internal circulation only)
TEAM

Convener : Dr. D K Panda
Members : Sh. P N Ojha & Dr. A K Dikshit

Contributors: NCB Scientists & Engineers

DIRECTION & GUIDANCE

Shri Ashwani Pahuja
Director General, NCB

Investigations on Preparation and Evaluation High Volume Fly Ash Cements

The Indian Standard specification **IS 1489 (Part 1)** for Portland Pozzolana Cement (PPC) permits maximum 35 percent fly ash addition in PPC. A need has been felt to evaluate the feasibility of further enhancing the maximum limit of fly ash addition in PPC. It may be noted that European standard **EN-197-1** permits use of pozzolana content (including fly ash) up to 55 percent in pozzolanic cement. NCB has taken up studies on preparation and evaluation of high volume fly ash cements (HVFA) with a view to further enhance utilization of fly ash, reduce CO₂ emissions and enhance sustainability in cement manufacture.

It is desirable that high volume fly ash cements have strength development and durability characteristics comparable to PPC. Various approaches are being tried for achieving desired strength development and other physical characteristics in high volume fly ash cements. The properties of fly ash, especially glass content, reactive silica and particles finer than 45 micron affects its reactivity. Indian fly ashes are found to have lower glass content compared to European fly ashes. Activation of fly ash through grinding/ classification can be helpful in enhancing its reactivity and get desired rate of strength development at higher fly ash content. Other avenues of interest for investigation include grinding of HVFA to higher fineness, separate grinding and blending of constituents and use of mineral as well as chemical activators.

The studies presently under progress at NCB cover evaluation of PPC prepared using up to 50 percent fly ash. To adopt a national approach the studies will be carried out using clinker from cement plants located in different regions/ clusters in the country. Blends of PPC containing higher contents of fly ash up to 50 percent have been prepared and taken up for investigation for their chemical as well as physical properties. Initial studies indicate that at higher fineness levels and with use of good quality clinker and fly ash, the PPC prepared with 40-45 percent fly ash conformed to the requirement of compressive strength as per **IS 1489 (Part 1)**. Studies of the durability characteristics of high volume fly ash cement including rapid chloride permeability, accelerated carbonation and sulphate expansion have also been taken up.

Highlights of NCB's Studies on Waste Utilization in Cement & Construction Sectors

- ◆ Utilization of industrial wastes such as fly ash from thermal power plants and granulated blast furnace slag from iron and steel industries in the manufacture of Portland Pozzolan Cement (PPC) and Portland Slag Cement (PSC)
- ◆ Enhancing the fly ash content in PPC by adopting activation of fly ash through different routes.
- ◆ Use of low grade materials and mine rejects in development of synthetic slag having properties comparable to granulated blast furnace slag conforming to IS:12089-1987
- ◆ Utilization of industrial by-products such as lead-zinc slag, copper slag, LD slag etc from metallurgical industries, spent pot lining (SPL) waste from alumina industry, jarosite from zinc industry, barium sludge from chemical industry as raw material/ mineralizer in the manufacture of OPC.
- ◆ Use of "jarosite", a by-product of zinc industry as partial substitute of conventional mineral gypsum in controlling cement setting.
- ◆ Study on the utilization of different types of slags generated at non-ferrous metallurgical industries such as lead-zinc slag, copper slag, LD slag, E-cat, a waste generated at petroleum refinery and marble dust from marble processing industries as mineral additive and blending component in the manufacture of cement.
- ◆ Development of kiln furniture and pottery wares by using catalytic waste generated at petroleum refinery.
- ◆ Developmental studies on plaster coating, tiles, bricks, blocks etc using industrial wastes such as marble slurry, fly ash, red mud etc.

NCB is well equipped with State-of-the-Art Testing Equipments for Physical, Chemical and Mineralogical Analysis of Raw Materials, Cement and Concrete in its Advanced Laboratories located at Ballabgarh (Delhi NCR), Hyderabad and Ahmedabad (INDIA)

Head of Centre, Centre for Cement Research and Independent Testing

Ph : +91-129-4192246, +91-129-2302422, +91-129-4192222, +91-129-2242051

Fax : +91-129-2242100, +91-129-2246175 E-mail : crtb@ncbindia.com, nccbm@ncbindia.com

Web: www.ncbindia.com

NCB's Studies on Use of Mechanical Mixer in Physical Testing and Use of Fixed W/C Ratio for Compressive Strength Testing of Cements

The standard test methods for the physical properties of OPC, PPC and PSC (IS 4031 : Methods of physical tests for hydraulic cements) specify preparation of cement paste/ mortar using manual gauging. Recently a need has been felt by the Indian cement industry as well as by Bureau of Indian Standards to evaluate use of mechanical mixer for preparation of cement paste/ mortar for physical testing of cement. Use of mechanical mixer in cement testing can be helpful in removing the man-to-man variation in mixing and its effect on determination of normal consistency of cement. Mechanical mixing is also the specified mixing method in ISO, European and USA standard specifications on physical testing of cement.

NCB has taken up a R&D study to evaluate use of mechanical mixer for physical testing of cements. The generated data would be helpful in adoption of mechanical mixing in Indian standard specifications, if found suitable. A number of cement samples covering OPC, PPC and PSC are being tested using the procedure as specified in IS 4031 as well as also by using mechanical mixer for mixing of paste/ mortar but otherwise following the method given in IS 4031. For comparison the tests are also being carried out as per the ISO test methods. Another issue which is being investigated under the above project is use of fixed w/c ratio for compressive strength testing of cement. At present, as per IS 4031, compressive strength is tested using quantity of water calculated as per normal consistency of cement. However the ISO test procedure uses a fixed w/c ratio of 0.5 for compressive strength testing. Under the project, compressive strength is being tested using mechanical mixer at fixed w/c ratio of 0.4 as well as 0.5. The results would be helpful on evaluating and adopting a fixed w/c ratio for compressive strength testing of cement, if found suitable.

Highlights : NCB's NABL Accredited Testing Laboratories at Ballabgarh, Hyderabad & Ahmedabad

X-RAY DIFFRACTOMETER (XRD)

X-ray diffractometry is an essential tool for rapid identification of minerals, compounds and other crystalline phases. This technique is safe, non-destructive and fast for routine automatic operation and has wide applications in cement and construction industries for:

- Mineralogical and phase analysis of raw materials, wastes and industrial by-products
- Burnability studies of cement raw mixes
- Identification of clinker mineral phases, semi-quantitative estimation and polymorphism of clinker phases
- Detection of free lime, periclase, quartz and any other undesired phase in clinker
- Cement quality and adulterants in cement
- Diagnostic studies on causes of scaling and build-ups in cement rotary kiln, coating in cement silos, cause of refractory lining failure, unstable kiln coating, ring formation and kiln shell corrosion
- Hydration studies of cement
- Investigations on damaged concrete structure



Recent Technological Services to the Industry

- ◆ Cement Quality Monitoring Process.
- ◆ Testing of Physical & Chemical Properties of Flyash.
- ◆ Establishing Limestone Consumption Factor of Cement Plants.
- ◆ Investigations on Utilization of By product Sand in the Manufacture of Cement.
- ◆ Utilization of Copper Granulated Slag from Indian Copper Complex, Ghatshila, Jharkhand, in a Cement Industry .
- ◆ Expert Services for Verification of the Rock Strata Encountered during the Execution of the Under ground Drainage Scheme.
- ◆ Burnability Study of Raw Mix for Cement Plants.
- ◆ Investigations on Technical Suitability of Unutilized Materials Such as ETP Sludge, Iron Oxide Sludge and Dry Iron Oxide in the Manufacture of Cement.
- ◆ Investigations on Lump Formation in Cement Bags.
- ◆ Characterization and Physical Testing of Slag Based Cement like Material.
- ◆ Cement , Building Materials and Concrete Testing Services.

Benchmarking Land Requirement for Setting Up a Cement Plant

In the past, sufficient land was made available for setting up a cement factory. It can be noticed that a plant established in early years of development of cement industry has a substantial amount of land due to high footprint of technology adopted. But today, land availability has reduced substantially and this trend goes on decreasing further. In present scenario, land requirement to set up a cement plant is a tricky question. It depends on various factors like technology adopted, facilities envisaged, future expansion plans, shape of land, future energy saving project, provision for renewable energy system etc.

Unavailability of a benchmark regarding land requirement for setting up cement plants of various capacities frequently causes friction and a condition of non-agreement is observed between state authority and entrepreneur. Cases in the past are enough to create doubts in the minds of state authorities regarding allocation of its precious and natural resource. Further, the dilemma lingers on due to absence of ready references.

National Council for Cement and Building Materials (NCB, ISO 9001:2008 certified) is playing a significant role by bridging the gaps between the state authorities and entrepreneur(s), resolving such issues as and when presented to it. In the recent past, NCB has carried benchmarking study for Industrial Promotion and Investment Corporation of Odisha Limited (IPICOL) and has recently assisted the Government of Andhra Pradesh for evaluating the land requirements for setting up the cement plant.

NCB opines that land requirement for setting up a 1.00 MTPA cement plant varies in the range of 40 to 60 hectares (~100 acres to ~150 acres), which includes land for railway siding and Captive Power Plant. However, it excludes the land for staff colony, renewable energy setup, alternative fuel handling system etc. which may vary from plant to plant as per their future planning.

NCB may also provide such technical assistance as required by an entrepreneur for preparation of proposal for land requirement with adequate detailing of plant layout.

Contributed by Shri Kapil Kukreja, Manager, NCB

Highlights of NCB Activities in the Area of Productivity Enhancement and Process Optimization

- *Trouble-shooting in cement plants covering areas such as preheater build-up / coating, ring formation, Unstable burning in kiln, lower degree of calcination, higher temperature / pressure in preheater etc.*
- *Diagnostic studies for plant's specific process problems viz kiln shell corrosion, lump formation in cement silos, fan build-ups and wear, buckling of chimney.*
- *Productivity Enhancement Programme (PEP) covering entire spectrum of cement manufacture.*
- *Technical evaluation of cement plants to establish output capacity of core equipment including scope of further up-gradation and capacity balancing.*
- *Improving blending effect in pre-blending stock piles and blending silos.*
- *Feasibility study for increasing Thermal Substitution Rate (TSR) in cement plant with utilization of non-fossil alternate fuels.*
- *Utilization of alternate fuels in cement manufacture.*
- *Optimization studies of grinding mills covering ball mills, vertical roller mills and roller presses including performance assessment of separators and measures for improvement in output capacities and particle size distribution.*
- *Optimization of operations and improvement in the performance of kiln preheater and cooler system.*
- *Assessment of fan performance including its efficiency.*
- *Gas and air balancing in kiln-preheater-cooler and mills including leakage-survey.*
- *Services for validation of thermal energy being utilized in clinkerisation process in Kcal/kg clinker.*
- *Establishing guide norms / benchmarking for performance monitoring*

NCB's STUDY ON UTILIZATION OF SLAB QUARRY REJECT LIMESTONE IN CEMENT MANUFACTURE

Quarrying operations for raising slabs from flaggy limestone from the limestone deposits left dumps of huge quantities comprising of limestone, small to big boulders of different colours thus of different quality, even cement grade limestone along with very less quantity of kun-kur/ clay and other waste material within the area. Limestone lying in these waste dumps within the limestone deposit area can be utilized for cement manufacture by adopting suitable mineral processing techniques based on the principles of size reduction and separation, and the in pit blending technique. NCB has studied on recovery of limestone from dumps of a limestone deposit belonging to Kurnool System of Indian stratigraphy, located in South India where large scale slab quarry operations has already been carried out. A huge quantity of rejects can be utilized for cement manufacture leading to conservation of mineral and cleaner environment.

COMPRESSED AIR AUDIT

The energy efficiency has gained its importance now a day as it is directly linked with the profitability of the company and it is one of the key parameter to be competitive in the present scenario. For the Industry, excellence in energy efficiency ensures a healthy bottom line through the most productive consumption of all forms of energy. In addition to main process areas the utility areas also should be focused to achieve world class levels in energy efficiency. The main energy intensive utility in any typical cement plant is Compressor which will consume up to 2 units of power. The excellence in compressed air system can be achieved in simple steps and with marginal investments.

We are pleased to offer our services for conducting a detailed compressed air audit at your facility. This proposed study will identify all the possible energy saving measures at your facility in compressors and compressed air distribution system.

The main objectives

- ◆ Analysis of compressed air systems data and identification of suitable energy saving measures with the support of field measurements
- ◆ Conducting detailed compressed air audit, preparing recommendations on energy saving measures. The areas of study and major activities undertaken are mentioned in scope.
- ◆ Prioritizing the measures and preparing action plan in consultation with plant officials.

Benefits of the Compressed Air Audit

A detailed compressed air audit will offer the following benefits:

- ◆ Identification of technically and economically viable energy savings proposals
- ◆ Method of achieving the identified energy savings potential.
- ◆ Management and organizational guidelines to sustain and enhance identified energy savings potential.

The study will cover all types of compressors in your plant above 30 kW.

The macro level approach of the detailed compressed air audit will be as below:

- Identify new energy saving ideas / projects
- Fine tuning of equipment and technology up-gradation
- Identify further improvement opportunities in projects under implementation.

The following areas can offer energy saving opportunities:

The compressors in a typical cement plant are used for purging applications in bag filters and instrumentation. NCB team will study the compressor and compressed air system for the feasibility of energy conservation aspects such as:

- Compressor efficiency of all compressors (above 30 kW)(Specific energy consumption (kW / cfm) by pump up method - where ever possible)
- Fine tuning of compressors
- System pressure optimization (at different sections and at compressors)
- System modification to minimize compressor operation and replacement with rotary blowers
- Compressed air consumption for different sections based on FAD test
- Study of pipe lines for pressure drop optimization and suggesting modifications (required if any) for energy conservation
- Methods to minimize system losses
- Feasibility of installing Variable Frequency Drives (VFD's) for the compressors
- Feasibility of installing centrifugal compressors
- Leakage test in different sections of the plant during the audit period*

*For conducting leakage test the process consumption (instrumentation, bag filter purging, cleaning etc) should be stopped during the leakage test. This can be done during the stoppage / shut down period and takes time period 1 -2 hrs for completion.

The above aspects will be studied in detail and suitable suggestions will be made for possible energy savings in this area. The existing maintenance practices will be reviewed and the better practices will be suggested wherever it is applicable in the areas of Compressors , Air Dryers and Compressed air distribution system.

NCB EXPERIENCE IN CEMENT INDUSTRY

NCB has been very closely associated with energy efficiency improvement of the Indian Cement Industry. It 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 had carried out more than **200 detailed energy audits** till date in various cement plants.

Process of Calibration of Thermometers / Temperature Indicators at NCB- Ballabgarh

NCB's Centre for Quality Management, Standards & Calibration Services (CQC) offers NABL accredited calibration services in various parameters in Mechanical and Thermal Field.

Thermal Field : equipment like Thermometer, RTD, PRT, Thermocouples, Temp. Indicator, RH Sensors, Muffle Furnaces, Environmental Chambers, Hot Air Ovens etc. are calibrated.

In temperature calibration, stability plays a significant and crucial role. It is important that laboratories performing temperature calibration have temperature sources offering excellent stability over long periods of time. For calibration of thermometers/RTD's/temperature sensors with indicators in the range of -10°C to 300°C , the laboratory has three temperature baths which provide desired temperature points with excellent accuracy and stability. For -10°C to 30°C temperature range, "alcohol" bath containing Methyl/Ethyl alcohol is used. For ambient to 90°C temperature range, "water" bath containing distilled water, and 90°C to 300°C temperature range, and "oil" bath containing silicone oil is used. The baths are equipped with PID controller, LED display and holes for inserting thermometers/temp. sensors. These baths are checked every six months for oil/alcohol/water level and operation of controls and displays. The stability of the bath is also checked annually and a watch kept on the bath temperature for stability during the calibration process.

For calibration of a thermometer/temp. indicator, appropriate bath is chosen and the device under calibration (DUC) is mounted on the bath along with reference standard probes. The temperature is set on the desired set point and when the temperature stabilizes, the temperatures on both DUC and reference standard are noted. It should be noted that for a single set point, multiple observations are recorded. To take measurements on thermometers with graduated scale, magnifying glass or reading telescope with linear magnification of 10 is generally used.



During the calibration procedure, it has to be ensured that the stability of the temperature is maintained. The whole procedure is repeated over the desired calibration range of the temperature.

After readings are recorded, the mean readings of each observations of the reference thermometers as well those under test are recorded. The actual measured value of the temperature is finally interpolated from the corresponding reference calibration certificate.

QUALITY MANAGEMENT, STANDARDS & CALIBRATION SERVICES

TOTAL QUALITY MANAGEMENT

- ◆ Laboratory Assessment and Proficiency Improvement
- ◆ Assistance in NABL Accreditation, Laboratory Management System,
- ◆ Assessment of Quality Assurance System
- ◆ Setting up of Laboratories
- ◆ Development of Customized Reference Materials for Calibration of XRF/XRD and application of statistical tools and techniques. (email : ncb.cqc@gmail.com)

CERTIFIED REFERENCE MATERIALS (Physical and Chemical Parameters)

Cement, fly ash, clinker, limestone, granulated slag, gypsum, hydrated lime, clay, laterite, red ochre, raw meal, coal, sand and flow table, for equipment calibration and proficiency checking. (email : cqcb@ncbindia.com)

CALIBRATION SERVICES (NABL ACCREDITED AS PER ISO 17025:2005)

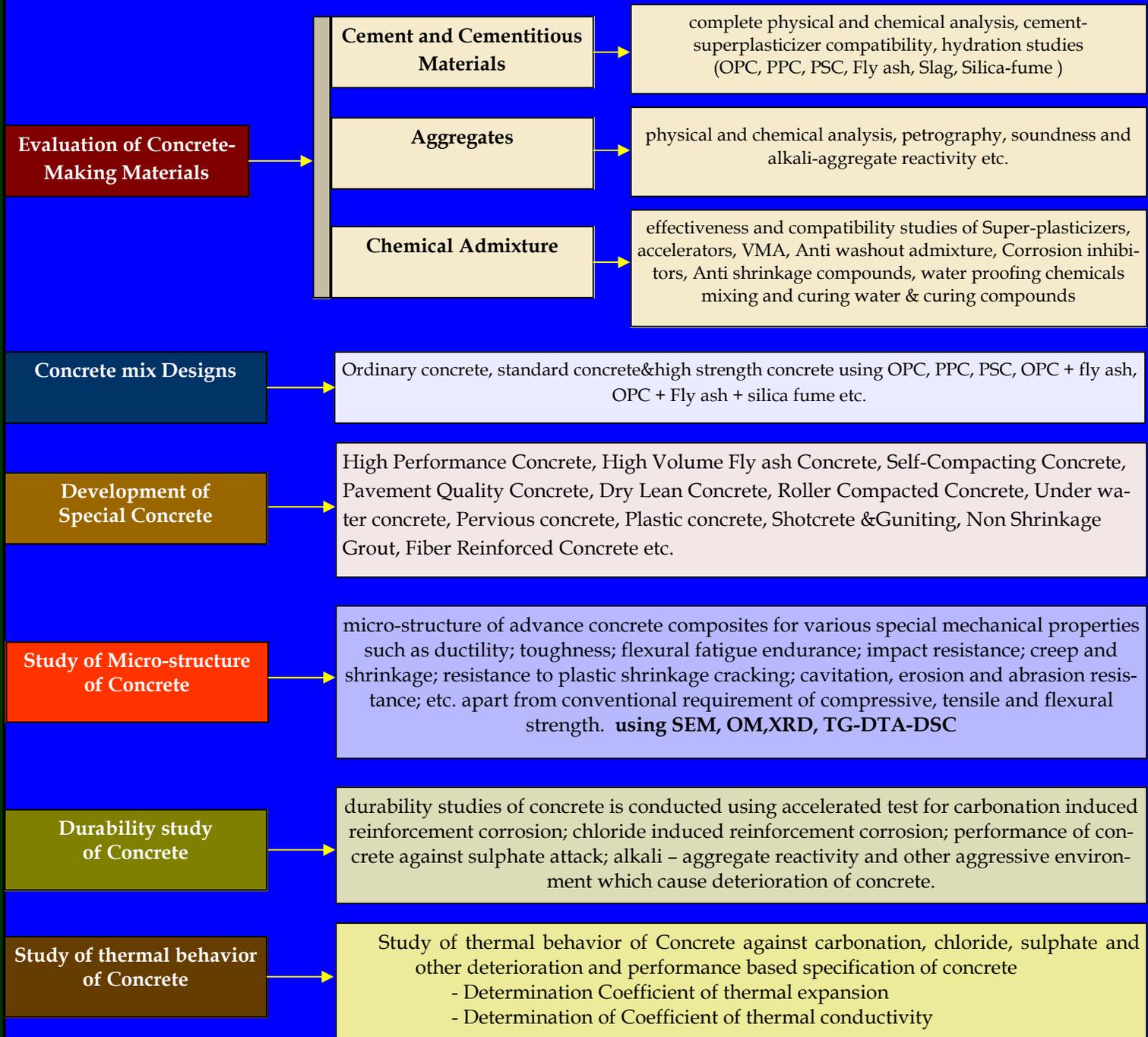
Dial gauge, Slip gauge, Vernier caliper, Micrometer, Measuring tapes, Glass scale, Force measuring instruments, Load indicator, Compression testing machine, Universal testing machine(in compression and tension), Pressure gauge, Test sieve, Thermometer, Tachometer, Concrete test hammer, Dead weight tester, Mortar vibrating machine, Blaine's cell, Flow table, Weighing balance, Standard weights, Stop watch, Multimeter. (email : ncb.cqc@gmail.com)

PROFICIENCY TESTING (NABL ACCREDITED AS PER ISO 17043:2010)

Cement, fly ash, limestone, coal/pet coke, clinker, granulated slag, water for concrete & aggregate. (email : ncb.cqc@gmail.com)

Concrete Technology : NCB's Services to Industry

CONCRETE TECHNOLOGY



State of the Art Facilities

at NCB Units: Ballabgarh, Hyderabad & Ahmedabad

- ◆ NABL Accredited and BIS Recognized Chemical and Physical Testing Laboratories.
- ◆ Advance Concrete Composite Laboratory.
- ◆ Nondestructive Testing and Distress Investigation Laboratory.
- ◆ Concrete Durability Studies Laboratory.
- ◆ Advance Analytical Instrumental Laboratory with XRD, SEM, EDAX, DTA, TGA, DTG
- ◆ NABL Accredited Calibration Laboratories in Thermal & Mechanical Fields.
- ◆ NABL Accredited Proficiency Testing Services in Chemical & Mechanical Fields.



NCB's Certificate Course in Cement Technology through Correspondence

Eligibility

Working professionals of Cement Industry with minimum qualification of **Graduate in Science** or **Diploma in Engineering** in relevant disciplines.

Course Scheme

The ONE YEAR course is divided in trimester of four months each.

- ◆ Course material will be sent to the participants along with assignments for each trimester.
- ◆ Before completion of each trimester, one week (5 working days) interactive class / lecture sessions / laboratory demonstrations etc. will be conducted at NCB units - Ballabgarh or Hyderabad.
- ◆ During IInd trimester, hand-on-practise sessions on NCB's Cement Process Simulator for cement plant operation will also be conducted during 5 days class room interactive/training sessions at NCB units.
- ◆ During IIIrd trimester, demonstrations in NCB's laboratories will also be conducted during 5 days class room interactive/training sessions at NCB units.
- ◆ At the end of IIIrd trimester, an examination will be conducted at NCB-Ballabgarh and Hyderabad simultaneously.

It is mandatory for the participants to submit assignments of all the trimester; attend class room interactive/training sessions at the end of IInd & IIIrd trimester and take the examination at the end of IIIrd trimester.

A participant, in case, is unable to attend the interactive class room lecture sessions of Ist trimester; he or she may be allowed to attend the course for the successive IInd and IIIrd trimesters depending upon his/ her timely submission of assignment of Ist trimester. A participant in case, is unable to attend interactive class room session/ lab demonstration during IInd and IIIrd trimester but attended or timely submitted the assignment of Ist trimester during the course; he or she will be allowed to pursue the course in the next successive year sessions. Each participant will be given maximum two such opportunities to pursue the course and is required to complete the course within three years from date of registration.

Award of Certificate : A certificate will be awarded to the participants on the basis of marks obtained in the assignments and the final examination.

Course Duration : 12 months (one year)

Course Fee : Rs 60,000/-per participant plus service tax as notified by Govt. of India from time to time. (US\$: 3000/- per participant for overseas candidates)

Payment Terms : Rs. 20,000/- per trimester plus service tax as applicable payable at the time of admission/start of each trimester

For further details please contact:

Centre for Continuing Education Services(CCE)
National Council for Cement and Building Materials
34 Km Stone, Delhi-Mathura Road (NH-2)
Ballabgarh-121 004, Haryana, INDIA,
Phone:+91-129-4192245/ 4192469/468, 2241453,
E mail: ceeb@ncbindia.com; ncbce@gmail.com

Centre for Continuing Education Services(CCE)
National Council for Cement and Building Materials
NCB Bhavan, Old Bombay Road,
Mehidipatnam-Ganchibowl Road, **Hyderabad 500 008**
Phone:+91-040-23180439, 23001933, 23180413
E mail: ceeh@ncbindia.com, hyd2_ncbhrc@bsnl.in

website: www.ncbindia.com

Interested participants are requested to provide us their name (s) along with contact details.

Project Management, Monitoring & Control

In today's world, an effective Project Management is a key factor for the success of a project. Project management, however, is a complex process involving number of agencies playing diverse and divergent roles. The role of the Consultant/ Purchaser assumes greater significance for effective management and timely execution of the project as different agencies try to manage their activities in a manner suitable to them.

The three possible modes of project execution are:

- Turn-key (Single contractor)
- Semi Turn-key (3-6 suppliers and contractors)
- Shopping in packages (60-70 suppliers/ contractors)

Turn-key and Semi Turn-key are the most preferred modes of project execution in international projects. The decision regarding method of execution and corresponding contracting plan has to be arrived during the planning stage itself. This decision is of paramount importance to the final outcome of the project in terms of investment cost, execution schedule and technical performance. Recently, NCB has started work on "Project Management & Monitoring for setting up a 600 tpd Greenfield cement plant in Republic of Congo". The total project cost is of US\$ 55 million, funded by a soft loan from EXIM bank of India. Based on the "Technical Appraisal of limestone deposits & recommendation study" conducted by NCB in Tao Tao, Louvakou district, NIARI department, it turned out that there are possibilities of establishing a cement plant of the said capacity. The role of NCB in the project shall be:

- Development of the Terms of References
- Preparation of EPC tender specification for bidding.
- Participation in bid opening.
- Evaluation of offers received and recommendation for contract finalization.
- Monitoring and control of the project implementation.
- Support for project supervision.

Thus far, in this project, Terms of Reference and EPC tender for bidding prepared by NCB has been accepted by Government of Republic of Congo. This tender is also published in the website of Govt. of RoC. Offer evaluation stage shall begin soon which will be followed by award of contract to the most suitable agency. From thereon, NCB shall monitor the activities during implementation phase and submit reports to the Government of RoC from time to time.

Contributed by Shri Saurabh Bhatnagar, Dy Manager, NCB

Marble Slurry as Raw Mix Component for the Manufacture of Ordinary of Ordinary Portland Cement

Marble slurry samples collected from different marble clusters of Kishangarh, Abu Road, Makrana, Rajsamand, Udaipur and Chittorgarh in the State of Rajasthan on characterization showed 15-25% moisture, 23-51% CaO, 3-24% SiO₂ and 3-21% MgO. Physico-Chemical and mineralogical evaluation of above samples showed their compatibility for cement manufacture.

Raw mixes designed by utilizing 5-15% marble slurry samples along with other conventional raw materials having LSF 0.92-0.93 on clinker basis on burning showed clinkers with appropriate mineral phase development .

The marble slurry dose depends upon CaO and MgO contents in the samples.

Utilization of Fluorspar Tailing Waste for the Manufacture of Cement

A study was carried out on utilization of fluorspar tailing, a waste which contained about 70% silica, 6% Fe₂O₃ and 5% Al₂O₃ .It was calcined at the optimized temperature of 1000°C and was found pozzolanic similar to calcined clay. The calcined fluorspar tailing was found to be suitable as mineral admixture up to 5% in OPC giving performance comparable to control OPC