

From the Director's Desk



NATIONAL METALLURGICAL LABORATORY
Jamshedpur - 831 007, India

Dear Colleagues,

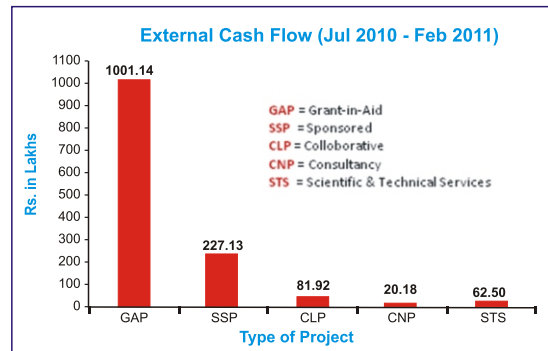
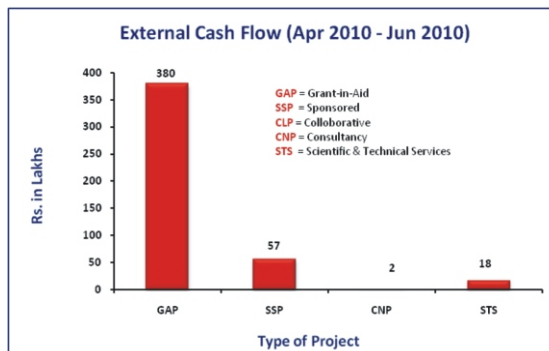
It is once again my pleasure and privilege to convene the 59th Research Council meeting of the National Metallurgical Laboratory. I wish to heartily welcome our chairman Shri H M Nerurkar and the other honorable Research Council members for this meeting. The year 2010 has been a very special year and marks a major milestone in the history of NML. NML celebrated 60 years of its existence i.e., its Diamond Jubilee Anniversary this year. It was time to look back with pride the achievements and contributions made by NML to the industry, society and the academia over the past sixty years and also to assess and chart out a roadmap for the future. We had several events all through the year as part of the Diamond Jubilee Celebrations which is elaborated in the later part of this report. It is also close to a year since the present Research Council took over and also since I assumed the office of the Directorship. After assuming office I had put forth my vision and dream of NML becoming a self sustained technology centre by 2022 and had also defined quantitative goals and targets to be achieved by 2016. We subsequently had several brainstorming sessions with all my colleagues to take their feedback and agreement on the vision, goals and targets. I am very happy to say that this is today our shared vision and each and everyone at NML is passionately committed to these goals and targets.

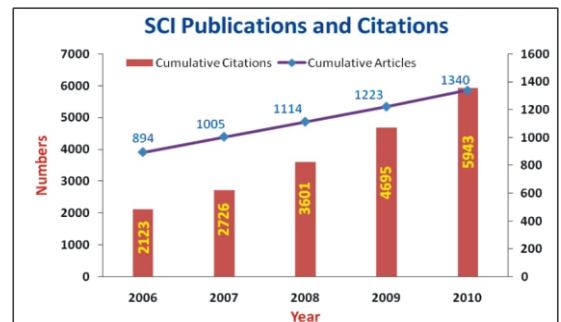
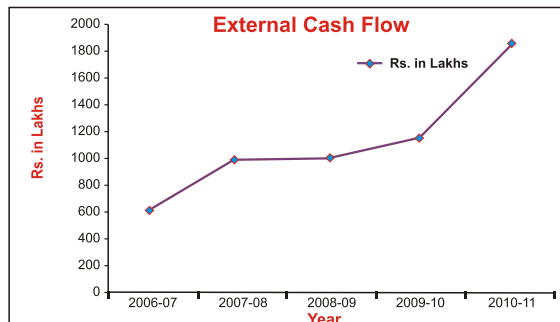


First, I will try to provide you an overview of the progress that we have made on several fronts over the past six months since we had the previous Research Council meeting and report on where we stand today. I would then outline the initiatives that we have taken and the mechanisms that we are trying to put in place to realize the goals and targets set for 2016. The Research Council can then take stock and assess the progress made and deliberate on further steps to be taken to accelerate the pace of growth. In the previous Research Council meeting my senior colleagues elaborated on the core research areas of NML, our current major projects in each of these areas, our infrastructural strength and division-wise detailed roadmap for the future. In this Research Council meeting, we have scheduled presentations on a few of the major government funded research projects. However, we thought that we will utilize this research council meeting for discussions and deliberations on the major projects that NML should take up under the 12th plan. These presentations would be made by generation next who would shape the 12th plan period at NML. The progress made on all the individual projects is included in the compilation which has been circulated to the RC members.

Overall Performance Parameters

The performance of NML in terms of the external cash flow through projects, the publications in SCI journals and the citations received for these papers are summarized and displayed below for the appraisal of the members :



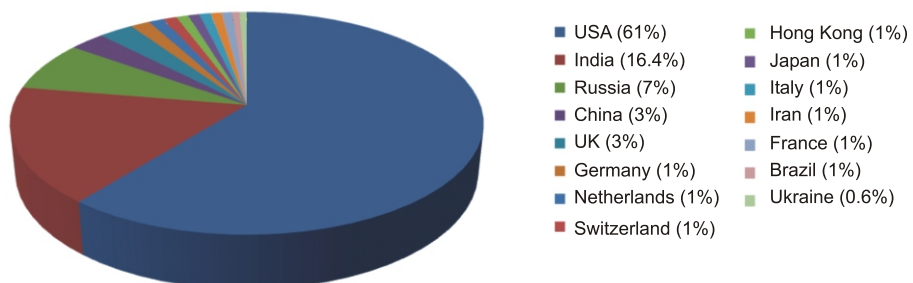


The overall external cash flow this year has shown a significant increase compared to the past. However, a large part of the external cash flow still comes mainly from government sponsored grant in aid projects. We are taking concerted measures to shift towards more industrial funding. The other scientific outputs such as publications in SCI journals as well as citations have remained good.

NML Eprints

NML's global visibility through eprints gateway increased considerably over last six months. NML established its Eprints repository in September 2009, providing its researchers with an easy solution for Open Access. This has allowed researchers to promote their research and to draw an attention among their counterparts over the globe. By the end of this financial year of operation, interest in their work has increased phenomenally and NML repository has achieved 30% increase in traffic, with over 1,10,000 hits per month and a cumulative total of over 1 million hits since inception. The top 15 countries are shown in the Chart below with corresponding number (%) of hits.

Top Fifteen Countries accessing NML Eprints (as on 15 Feb. 2011)



Projects Pursued

We have been pursuing a wide range of projects (more than 130 ongoing projects) including the multi-laboratory networked projects, the supra-institutional project on steel funded by CSIR, several collaborative projects with industries especially Tata Steel, a large number of industry sponsored projects and also many innovative research projects funded by the grant-in-aid bodies.

The network project on *"Technology for assessment and refurbishment of engineering materials and components"* conceived and being coordinated by NML has shown good progress. Some of the outcomes from this project are: application of acoustic emission and non-linear ultrasonic based technology for damage assessment; development of magnetic materials based sensor and sensor device; miniaturisation of a portable ball indentation system; study of creep behaviour of turbine materials; modelling ratcheting fatigue in piping materials; development of erosion retardant substrate materials; modelling of high temperature erosion-corrosion; risk-based analysis of remaining life; development of a fractal based software for damage assessment; and development of coatings for erosion resistance. This project has resulted in several spin-off industrially funded projects in which the expertise and facilities developed through this project are being used extensively.

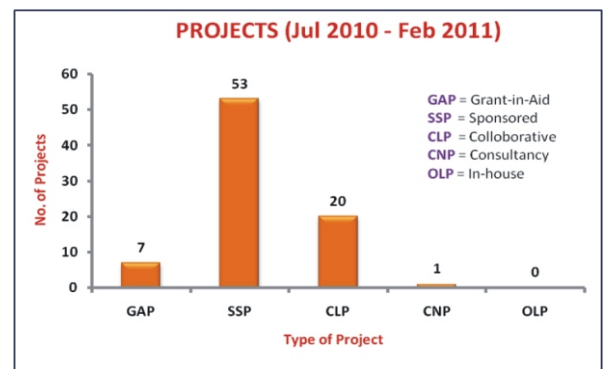
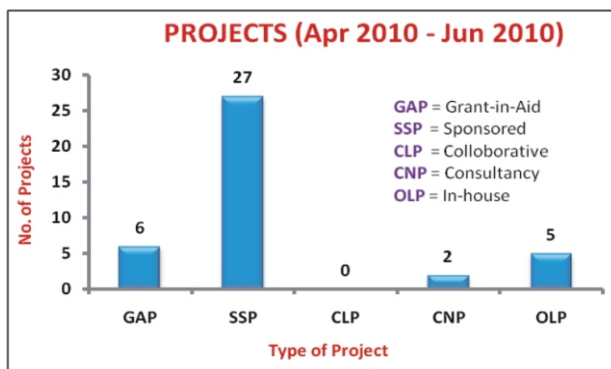


Under the Supra-Institutional project on steel, the main targets are the development of ultra-high strength steel, high deformability TWIP steels and steel foams. On all these three fronts, some progress has been made in the past six months. However, the delay in some of the activities, the scales of development and the lack of industrial partnership in this project has been a matter of concern. Being an applied project of significant relevance, it is necessary to explore its translation to industry upon completion.

In the network project on "Nanostructured Advanced Materials" where NML is playing a major role as a nodal laboratory, the objectives and deliverables were re-defined in a review meeting of the monitoring committee chaired by Prof. K L Chopra to have more focus on specific industrial applications and target components and devices. Among the major deliverables committed from this project are: 1) An injectable scaffold for bone tissue engineering; 2) Development of Si-C-N coatings with hardness (20-30 GPa), toughness $> 1.5 \text{ MPa m}^{-1/2}$ on piston rings and tools; 3) Nano SiO_2 and TiO_2 based hydrophilic (water contact angle $\sim 10^\circ$) and hydrophobic (water contact angle 100-140 $^\circ$) coatings on large glass surfaces; 4) A prototype portable GMI based sensing device capable of monitoring 20 μT or lower magnetic field for structural health monitoring; 5) Rare earth free permanent magnet with energy product $(\text{BH})_{\text{max}} > 5 \text{ MGOe}$ and 6) Zirconia Toughened Alumina (ZTA) nano-composite as tool insert for high speed (250 - 500 m/min) cutting tool. It is important to remain focussed on these deliverables so that at least a few of these processes/products being targeted will ultimately be transferred to the industry.

In the other network projects where NML is partnering other labs, namely - 1) Development of processes for Iron ore resources of India, 2) Development of cost effective mine water reclamation technology for providing safe drinking water, 3) Development of speciality inorganic materials for diverse application, 4) Development of advanced light weight metallic materials for engineering applications, 5) Nanomaterials and nanodevices for application in health and diseases, 6) Engineering of structure against natural and other disasters, 7) Zero emission research initiative, 8) Advancement in metrology and 9) Use of natural occurring minerals for providing safe drinking water at domestic level in the state of Jharkhand, the progress has been reported to be satisfactory. Almost all these projects are applied in nature and targets technology development. The main challenge is however to devise a plan and roadmap to translate the laboratory level successes to a field/industry application through a transfer of the developed technology. For many of these projects, such efforts towards application in the field have already been initiated. Unless concerted steps are taken at this stage to relentlessly pursue in this direction, the outputs from many of these projects will remain confined to technical reports and publications and the successful outcomes from these large-valued projects will remain a matter of debate.

In addition, a large number of industry sponsored projects, collaborative projects with industries, consultancy projects and scientifically stimulating in-house projects have been taken up in the past six months. These include projects with Boeing International, General Electric and other multinational agencies. I would also specifically like to mention that more than twenty sponsored projects have been taken up under the Tata-NML collaborative umbrella. The number of projects taken up under various categories is shown below :





Project Outcomes

The major outcomes from the various projects in the past six months are :

- NML through McNally Bharat has provided the engineering package for Barite beneficiation to Indian Barites and Chemicals Limited (IBCL) and a commercial column flotation unit (fourth commercial installation of NML's column flotation unit) will be installed soon at IBCL.
- Two new alloys have been developed with superior silt erosion properties for hydel turbines. Central Electricity Authority (CEA) is taking the initiative to develop a small component from the new alloy and install it at a hydel power plant to evaluate its performance under actual operating conditions.
- Seven different engine failures of the Indian Air Force were investigated in the past six months.
- A 50 Amps closed cell for sodium extraction was indigenously designed and fabricated and successfully operated for the Heavy Water Board, Dept of Atomic Energy. This is the first stage in the process of development of commercial Na production technology required by atomic energy agencies.
- A single reagent for froth flotation of coal developed jointly by NML and Somu Organics & Chemicals is ready for full plant trials at one of Tata Steels collieries (Jamadoba).
- A software developed by NML for fractal based materials property evaluation will be included as one of the modules in the quantitative metallography software of Alicona, an International company for optical microscopy.
- The NML process for wear resistant ceramics was selected and launched under "Ideas 4 you" a portal for new entrepreneurs, a joint effort of CSIR, The Economic Times, Times of India and NRDC. This has resulted in numerous queries from different prospective entrepreneurs and negotiations are on with many of them.
- A website comprising the database on naturally occurring minerals as water purifiers and other activities of water research laboratory has been launched (<http://www.safewater.in>) and is being extensively cited.
- A 500 LPH continuous arsenic treatment plant, to be installed at Sonarpur, West Bengal, in collaboration with a private entrepreneur using iron/ferruginous manganese ore has been initiated with Sonarpur municipality as a stakeholder.
- A prototype coal mine water treatment pilot plant has been installed and commissioned at NML. A 25000 LPD pilot plant at PB colliery in Dhanbad is expected to be commissioned by December, 2011.
- A prototype sensor based on GMI properties has been developed and used for the structural health monitoring of Johnson screen of the Catalytic Converter Reactor Unit (CCRU) of Mathura Refinery of Indian Oil Corporation Limited.
- Analytical standards have been developed for coal. These certified reference standards for coal are expected to be marketed soon.
- The arsenic removal technology installed at more than six locations in the districts of North 24-Parganas and Nadia through an European commission project with Queens University, Belfast as the leader and NML as the lead Indian partner has been well received by the users and beneficiaries.



MoUs / Agreements Signed

Eight MoUs have been signed with the following organizations since the last Research Council meeting. These are: (1) Utilization of fly ash in making refractory bricks - National Thermal Power Corporation Ltd., Talcher, (2) Developing innovative capabilities, exchange of knowledge and research & development in the area of minerals, metals and materials - Jomo Kenyatta Univ. of Agriculture and Technology, Kenya, (3) Design development and fabrication of miniaturized automated ball indentation - M/s. DUCOM Instruments Pvt. Ltd., Bangalore, (4) Acoustic emission inspection techniques for storage tank bottoms - M/s. Wavesin Solids Advanced Assessment Pvt. Ltd., New Delhi, (5) Information disclosure agreement - M/s. Wavesin Solids Advanced Assessment Pvt. Ltd., New Delhi, (6) Information disclosure agreement - M/s. The Boeing Company, Boeing Research and Technology, St. Louis, Missouri, USA, (7)



Studies on impact of air pollution on corrosion of metallic and non-metallic materials - M/s. Central Pollution Control Board, Delhi, (8) Beneficiation & Pelletisation of Lateritic Iron Ore from Kanhwara, Katni - M/s. Delta Coal & Mining Pvt. Ltd., Bhopal.

It is noteworthy to mention that NML became one of the first non-academic Indian research partners of Boeing International.

Further, recently a memorandum of understanding (MoU) has been signed on 25th January 2011 between the Korea Institute of Geosciences and Mineral Resources (KIGAM) and the National Metallurgical Laboratory (NML) for a period of five years. The form of co-operation under this MoU shall include - Collaborative research on (i) Rare Earth, (ii) Exchanging scientific and technical information; (iii) Collaborating individual research problems of mutual interest, and the study of Techniques and Methods; (iv) Training individual scientists through participation in collaborative projects; (v) Exchanging visits of individual scientists; and (vi) Other forms of co-operation as may be mutually agreed between the parties.

MoUs with General Motors R&D and several other international clients are also under consideration.

Foreign Deputations

The international exposure of scientists at NML has been steadily increasing. I am very pleased to inform that several scientists and technical staff went on foreign deputations during this period:

Mr. K. Chennakesavulu (Poland), International Congress of Young Chemists (Young Chem - 2010); *Dr. Jayanta Konar* (Germany), Bilateral Exchange Programme; *Dr. J.K. Sircar* (Germany), Bilateral Exchange Programme; *Dr. Swapan Kr. Das* (Czech Republic), Conference on New Methods of damage and failure analysis of structural parts and Bilateral visit; *Dr. Mita Tarafder* (Czech Republic), Conference on New Methods of damage and failure analysis of structural parts and Bilateral visit; *Dr. S. Ranganathan* (USA), Visited AFRL, Ohio on invitation; *Dr. DDN Singh* (USA), Conference on Metal 2010; *Dr. Sanjay Kumar* (Russia), ILTP Project; *Dr. B. Nayak* (South Korea), Conference on Process Mineralogy' 10; *Ms. Siddhi Gupta* (USA), Student Exchange Visit; *Dr. DDN Singh* (Saudi Arabia), Consultancy project; *Dr. Arvind Sinha* (Bulgaria), Indo-Bulgaria Bilateral Project; *Dr. Ratnakar Singh* (Australia), Conference on IMPC 2010; *Dr. Arvind Sinha* (Germany), Conf. 2nd Indo-German Frontiers of Engineering.

New Infrastructure Added

A number of new equipments have been installed and commissioned in the past six months. These include : (i) HPLC/ION Chromatography System, (ii) Salt Spray Chamber, (iii) Floor stand 2 L Reactor Autoclave, (iv) Temperature Incubator Shaker, (v) Petrographic Optical Microscope, (vi) Powder Blending Equipment, (vii) Confocal Microscope, (viii) High Temperature Box Furnace, (ix) NI Data Acquisition Card, (x) Hardware required for acquiring online Data Acquisition of Temperature, (xi) Arc Melting Furnace, (xii) Trinocular Metallurgical Research Optical Microscope, (xiii) QUV Accelerated Weathering Tester, (xiv) Trinocular Upright Metallurgical Optical Microscope, (xv) Vibratory Cup Mill, and (xvi) Direct Load Creep Tester.

Awards / Distinctions Received

NML has continued to remain in the national limelight with regard to awards and recognitions from national bodies, election to science and engineering academies and editorial boards of journals.

- **NML won CSIR Technology Award - 2010** in the "Business Development and Technology Marketing", awarded on CSIR Foundation Day Celebration held at New Delhi on September 26, 2010.
- **CSIR Technofest - 2010** - Team CSIR-NML-IMMT-CIMFR-AMPRI-NEIST-NIIST-CBRI-CGRI-CMERI-NPL received Gold Award Winner in the "Theme Area 12 - Mining, Minerals & Materials awarded at Pragati Maiden, New Delhi on November 26, 2010. NML was the co-ordinating Laboratory. NML also received Gold Award in the theme area 'WATER' as one of the participating laboratory.
- **Horticulture Award** - NML bagged five first prizes, two Special Prizes and one Certificate of Honour in Potted Rose,



Seasonal Flowers and Display Exhibition. NML had participated in 22nd Annual Flower show from December 24-26, 2010 in Jamshedpur, Jharkhand. The show was jointly organized by Horticulture Society Jamshedpur and JUSCO.

- **IIME Mineral Beneficiation Award** - Mr. K.K. Bhattacharyya
- Dr. Ashok Kr. Roy, Scientist won **Engineering Achievement Award** on 15 September 2010, at the 43rd Engineers Day by the Institutions of Engineers (India).
- Dr. N Parida, Sri C.L. Jha and Sri D.P. Singh have been honored with "**Certificate of Excellence**" for their significant contributions in "Engineering & Technology" on 15 September 2010, 43rd Engineers Day by the Institutions of Engineers (India) during 150th Birth Anniversary celebration of Bharat Ratna Sir M. Visvesvaraya.
- **NDE Award**
 - The paper entitled, "Health assessment of Inner Johnson screen of Catalytic converter reactor unit of oil refinery using magnetic NDE techniques" authored by A.K. Panda, P. Sarkar, Swapan Das, A. Mitra from NML and C. Kannan, Qazi Mohammed Amir, IOCL, Gaziabad received **Best Poster Award** at the National Seminar on NDE-2010 at Kolkata during December 9-11, 2010. The Poster was presented by Mr. P. Sarkar, SRF of NML.
 - Dr. Sarmishtha Palit Sagar, Scientist, received ISNT-IXAR Award for the **Best Paper** in Research & Development category for the year 2010 for the paper entitled, "Ultrasonic Guided Wave Phased Array Inspection of Pipeline", published in the Journal of NDE, Vol. 9, Issue 2, 2010, authored jointly by S. Palit Sagar, Jai Jerry Hua and Joseph L. Rose. The award was given at the Inaugural Day (9th December 2010) function of the National Seminar on NDE 2010 held at Kolkata.
- **48th NMD-64th ATM Award**
 - The First Prize for **Oral Presentation** in Surface Engineering Group by Sri K. Shraavan Kumar in Surface Engineering Group held at Bangalore during 14-16 November 2010.
 - G.S. Tendulkar Prize for **Overall Best Oral Presentation** by Sri K. Shraavan Kumar held at Bangalore during 14-16 November 2010.
 - The First Prize in **Metallography Contest** under the Category of Transmission electron microscopy was bagged by Dr. A.K. Panda, Sri Satnam Singh, Dr. Mainak Ghosh and Dr. Amitava Mitra held at Bangalore during 14-16 November 2010.
 - The Second Prize in **Metallography Contest** under the Category of Scanning electron microscopy was bagged by Dr. A.K. Ray, Sri V Rajinikanth, Sri H. Bapari and Sri Arpan Das held at Bangalore during 14-16 November 2010.
- **NML Diamond Jubilee Award**
 - **Nijhawan Award** (For the Best Technical Paper published in 2009) - Sri Arpan Das and Dr. S. Tarafder
 - **Altekar Award** (For the Best Technology of 2009) - Dr. S Chaudhary (PL), Sri G. Krishna (Co-PL), Dr. R.N. Ghosh, Dr. A.K. Ray, Dr. J. Swaminathan and Sri P.K. Roy
 - **Ramachandra Rao Award** for Best Employee (Technical) - Sri A.K. Sahu and Sri Birendra Kumar & Best Employee (Admin./Non-Technical) - Sri A.K. Nigam and Sri M. Mahato.
 - **Banerjee Award** (For in-house projects completed in 2009) - Dr. J. Pal (PL), Dr. Satadal Ghorai, Sri M.C. Goswami, Sri D.P. Singh and Dr. A.K. Upadhyay
 - **Diamond Jubilee Logo Competition** - Dr. N.G. Goswami
 - **Souvenir Cover Design** - Dr. N.G. Goswami, Ms. S. Banerjee and Sri Arpan Das
- NML Eprints appeared at the **Top Page of Global Eprints Platform** - The article on "Eprints@NML: Digital Repository of National Metallurgical Laboratory (CSIR), India" by Shri A. K. Sahu and Dr. N. G. Goswami has been published





by University of Southampton, London (UK) in "Open access and Institutional Repositories with Eprints"; which is a global forum for open access publication and NML Eprints was announced prominently at the top page (<http://www.eprints.org/>).

- **Hindi Week Awards** received by more than 25 employees of NML Family on September 14, 2010.
- **Fellow of National Academy of Sciences** - Dr. S. Srikanth
- The Editorial Board of Bulletin of Materials Science and Transactions of Indian Institute of Metals have inducted Dr S Srikanth as an **Associate Editor**.

Distinguished Visitors

We had several eminent personalities from India and abroad visiting NML during the period and interacting with our scientists and delivering lectures. Prominent among them were:

Prof. T.R. Ramachandran, Former Director, JNARDDC, Nagpur; *Prof. Jaroslav Polak*, Head, Fatigue & Fracture Group, Inst. of Physics of Materials, Brno; *Dr. Tomas Kruml*, Researcher, Fatigue & Fracture Group, Inst. of Physics of Materials, Brno; *Prof. W. Lojowski*, Head, Polish Academy of Sciences, Warsaw; *Dr. Brij M. Moudgil*, University of Florida, Gainesville; *Prof. A.K. Ismail*, Central Metallurgical R&D Institute Cairo, Egypt; *Dr. Guven Onal*, Istanbul Technical University, Mineral Processing Eng. Dept., Turkey; *Dr. Diganta Das*, Scientist, University of Maryland, USA; *Sri S. Machendra Nathan*, Addl. Secretary & Financial Advisor, GOI, Ministry of Steel; *Sri H.M. Nerurkar*, Managing Director, TATA Steel, Jamshedpur; *Dr. Jamshed J. Irani*, Director, Tata Sons, Mumbai; *Prof. Asit Baran Mandal*, Director, Central Leather Research Institute (CLRI), Chennai; *Prof. P. Rama Rao*, ARCI, Hyderabad; *Prof. S.K. Brahmachari*, DG-CSIR, New Delhi; *Dr. Pradeep Nijhawan* S/o Dr. B.R. Nijhawan, USA; *Dr. R.R. Hirwani*, Head, CSIR-URDIP, Pune; *Dr. Naresh Kumar*, Head, HRDC, CSIR, Ghaziabad; *Dr. Mark Denys*, Chief R&D SS, Tata Steel, Jamshedpur; *Sri M.L. Blaggan*, Former Security Officer, NML; *Shri K.N. Gupta*, Former Sr. Dy. Director, NML, Now in Canada; *Sri P.F. Joseph*, Head, Indian Rare Earth Ltd., Chavara; *Prof. K.A. Padmanabhan*, University Chair Professor, Univ. of Hyderabad; *Prof. S. Ranganthan*, Indian Institute of Science, Bangalore; *Dr. Raghubir Singh*, Former Adviser, NML; *Prof. S. Banerjee*, Former Director, NML; *Sri D.C. Galada*, Galada Power & Telecommunication Hyderabad; *Dr. O.N. Mohanty*, Bhubaneswar; *Prof. R.N. Ghosh*, IIT Kharagpur; *Dr. Anuradha Altekar*, D/o Late Prof. V.A. Altekar, Former Director, NML; *Mrs. Sudha Rao*, W/o Late Prof. P. Ramachandra Rao, Former Director, NML; *Prof. A.K. Biswas*, Former Professor, IIT Kanpur; *Sri K.V. Sundarajan*, Chief Post Master General; *Dr. Brajendra Mishra*, Associate Head, Colorado School of Mines, USA; *Dr. Amit Chatterjee*, Adviser to MD, Tata Steel; *Dr. Baldev Raj*, Distinguished Scientist & Director, IGCAR, Kalpakkam; *Sri Rishi Kant*, Manager, Carl Zeiss India Pvt. Ltd., Bangalore; *Sri Mukhtayar Singh*, Head, Jharkhand Electricity Regulatory Control Board; *Prof. S.N. Upadhyay*, Director, Academic Staff College, B.H.U., Varanasi; *Dr. Mano Manoharan*, General Manager, GE Global Research, JFWTC, Bangalore; *Prof. HoWan Chang*, President, KIGAM; *Dr. Jae-chun Lee*, *Dr. Young Joo Lee*, *Dr. Jin-Young Lee*, South Korea; *Dr. Sanak Mishra*, Chief Executive Officer, Arcelor Mittal Steel, New Delhi; *Prof. Gerhard Wilde*, University of Munster, Germany

Human Resource

The following people have joined the laboratory after the last RC meeting. I take this opportunity to wish them a very successful professional life at NML.

Smt. Chanchala Mukhi, Sri Roshan Toppo, Trainees (Compassionate); Sri K Shraavan Kumar, Sri Ranjeet Kr. Singh, Sri Samanata Bagui, Sri A.P. Murugesan, Scientists Gr. IV(2) (Adhoc), Sri M. Annadurai, Finance & Account Officer.

Fourteen of my colleagues, fellow employees, retired during the period of July 2010- February 2011. They are - Ms. Shova, [Safaiwala], Sri Hinsu Ram, [Asst.(G) Gr. I], Sri A.K. Williams, [Asst.(S&P) Gr. I], Sri Rathu Tanti, [Tea/Coffee Maker], Sri B.K. Srivastava, [Gr. I(4)], Sri Chetan Singh, [Gr. II(4)], Sri D.P. Yadav, [Gr. I(4)], Sri Ram Lakhan Singh, [Gr. II(4)], Sri Birendra Prasad, [Gr. II(4)], Sri Joginder Singh, [Gr. I(4)], Sri S.P. Sharma [Security Guard] and Sri Sriram Harijan [Watchman], Dr. T.B. Singh, Scientist, [Gr. IV(5)], and Sri N. Jena, Sr. Technician (1).

I wish them all A Very Happy & Healthy Retired Life.



Diamond Jubilee Anniversary Celebrations



As part of the Diamond Jubilee Anniversary celebrations, we held several events in the past ten months. A special logo was designed for the Diamond Jubilee and is being used in all the communications from NML. A special postal cover was released by the Chief Postmaster General, Jharkhand Circle, Shri K V Sundarajan on 8th Nov, 2010. We are also pursuing with the postal department for the release of a commemorative stamp this year. A diamond Jubilee Commemorative Memento was crafted and given to all the employees and the important dignitaries who visited NML this year.

A diamond jubilee lecture series was initiated and we had several distinguished speakers from the academia, R & D laboratories and industry delivering the diamond jubilee lectures. The speakers thus far were Shri Goutam Mukherjee, Dr. Baldev Raj, Dr. Mano Manoharan, Dr. Amit Chatterjee, Prof. S N Upadhyay, Prof. Brajendra Mishra, Prof. A K Biswas, Prof. K A Padmanabhan, Prof. T R Ramachandran, Dr. Achintya Das and Dr. Sanak Mishra. The lecture series will continue until March 2011. The other lectures scheduled are by Prof. HS Ray, Dr. G Thiagarajan and Prof. S Ranganathan.



The Diamond Jubilee Anniversary celebrations were held between 26-28th Nov. This included the foundation day function on 26th, the Diamond Jubilee function on 27th and a special function for the NML family on 28th. The foundation day awards were given away in the foundation day function. In addition to the Nijhawan award for the Best Paper and the Altekar award for the best technology, two additional awards were re-instituted. These were the Prof. Banerjee award for the best internal project and the Prof. Ramachandra Rao awards for best employees. We were fortunate to have Shri Pradeep Nijhawan who gave away the Nijhawan award, Mrs. Anuradha Altekar present the Altekar award, Prof. Shilowbhadra Banerjee hand over the Banerjee award and Mrs. Sudha Rao present the Ramachandra Rao awards. Prof. S P Mehrotra gave away the special Diamond Jubilee awards for the logo and Souvenir cover competition. Many of NML's past leaders such as Dr. AK Lahiri, Shri Muthukrishnan, Dr. Rajendra Kumar, Dr. KN Gupta, Dr. ON Mohanty, Dr. RN Ghosh, Dr. Raghbir Singh, Dr. RP Goel, Dr. K K Mishra and several others participated both in the foundation day and Diamond Jubilee functions. The Diamond Jubilee function on 27th was a memorable event. It was presided by Shri H M Nerurkar with Dr. J J Irani, Prof. S Ranganathan as guests of honour, the Director General of the CSIR family Prof.





Samir K. Brahmachari as the chief host and Prof. P. Rama Rao as the Chief Guest. A souvenir covering the milestones and events at NML in the last sixty years, its performance over these sixty years, the technology beneficiaries from NML, goodwill messages from a large number of distinguished leaders from the political, academic, industrial and R & D spheres, reminiscences from a large cross section of people associated with NML including her past employees, industrial clients, distinguished visitors and several well wishers was released at the Diamond Jubilee function on 27th Nov. A hindi version 'Samannoy' was also released in the evening of 27th Nov. To propagate and advertise the accomplishments of NML to the common people, a film was made on NML and displayed during the Diamond Jubilee function. A laser show was also made depicting the history and journey of NML through these sixty years and displayed on the evening of 27th Nov. The Biometric and Security Surveillance systems, the NML-Museum and the Diamond Jubilee Committee room were inaugurated on this day. A reminiscences function was held on 27th evening where several of those associated with NML nostalgically recollected their association with NML. A special function was also held on the evening of 28th Nov for all the family members of NML fraternity including her retired employees and their families, where also the film and the laser show were screened.

Mineral Processing Technology - 2010



As part of the Diamond Jubilee celebrations, the international seminar on Mineral Processing Technologies - 2010 was organized jointly by NML and Tata Steel under the aegis of the Indian Institute of Mineral Engineers between 15-17 Dec 2010 at NML. The seminar was inaugurated by the Additional Secretary, Ministry of Steel, Shri S. Machendranathan. More than 400 delegates including some renowned experts in mineral engineering from other countries like USA, Canada, Russia, Japan, South Korea, China, South Africa, Germany, Sweden, Turkey, Egypt, Kazakhstan and Australia attended this conference and deliberated on the challenges facing the mineral industry worldwide. They include Prof. Somasundaram, Prof. Brij Moudgil, Prof. S K Kawatra, Dr. Ralph Holmes and Dr. Guven Onal. The seminar received more than 200 contributed technical papers besides 30 plenary and keynote lectures. The sessions covered a wide range of topics on processing of iron ore, coal, bauxite, chromite, beach sands & industrial minerals, bio-mineral processing, hydrometallurgy and environment besides dealing with fundamentals of mineral processing. The seminar was sponsored by a large number of industries and a sponsors' interactive cum presentation session was organized. A trade exhibition was also organized in which many industries participated and the exhibition provided an effective interaction forum with the equipment manufacturers and other user industries. The seminar not only received an overwhelming response but was also well appreciated by a large number of delegates.





Science Quiz

In memory of the late Prof. P. Ramachandra Rao, former director of NML, a Prof. Ramachandra Rao Memorial Science quiz was held for the school children in October 2010 where we had an overwhelming response from more than thirty schools. We were fortunate to have Mrs. Sudha Rao for the quiz who gave away the prizes.

Change Leaders Workshop

Two back-to-back one-week leadership capacity building programmes, called NML Change Leaders Workshops, were organized from 12 April till 23 April 2010. The Workshops were conducted by Mr. Ian Dean of Groman Consulting, SA. About sixty participants comprising of Scientists, Technical Officers and Officers of the Administration, were enrolled in the Workshops. The objective of the two week long programme was to propel NML's personnel into taking proactive leadership roles in Research and Development, Technology Delivery and Management. The programme helped to generate a higher level of confidence amongst the staff which has been reflected in their approach to work in a number of occasions in many cases. It was an enlightening experience, especially for the young Scientists and Officers, who were encouraged to communicate fearlessly, enjoy the open work environment and take active role in the decision making exercises. NML hopes to continue with such efforts at nurturing leadership and re-charging aspirations.

Where we stand vis-a-vis Vision-2016

In the last RC meeting I presented the goals and targets set for 2016 and the proposed roadmap to achieve these. The goals set for 2016 were :

- Meet 50 % of NML's total budget from industrial sponsorship
- Achieve 80% direct utilization of man-power and major equipments
- Develop and commercialize five technologies that will have a lasting impact
- Realize 5% of operational budget from IP licensing and royalties
- Move towards a paperless NML
- Deliver on one national mission project

In the roadmap towards realizing 50% of the total budget from industrial sponsorship, I had indicated that this would be achieved through : (1) Leasing of equipment and facilities to industries; (2) From high end scientific services through sponsored research with major industrial clients; (3) From technology development partnerships with private partners; and (4) From IP licensing and technology transfer royalties. We have already initiated procedures for leasing of all facilities including pilot scale facilities for part of the time and have got in touch with prospective industries who may like to avail the facilities. Our neighbor Tata Steel has already started utilizing several of NML's facilities. We have also interacted with a large number of industries towards securing sponsored research and the number of sponsored projects from industries has shown a considerable increase. We hope to realize at least 10% of our budget for this financial year through industrial funding.

Towards meeting the target of 80% man and machine utilization, the following initiatives have been taken :

- Competency mapping and mapping of time involved in various projects by each scientist has been initiated
- A flexible e-timing system enabled biometric access to be implemented from Feb 2011
- Teleconferencing facilities have been installed in three of the committee rooms and all meetings through teleconferencing are being encouraged. A video conferencing facility with CSIR Headquarters and CSIR labs presently exists. A proposal has been initiated to install another Video-conferencing facility for meetings with all other clients.
- Online project and equipment management systems have been initiated
- Introduction of internal accounting for equipment utilization has been initiated for select equipments.
- Annual leasing of equipment time to industries and institutes has already been initiated.
- Steps towards outsourcing of complete equipment maintenance and, if possible, its running are being taken. However, the response to this from agencies within Jamshedpur has been lukewarm.
- Protocols to outsource pilot scale operation and maintenance are being worked out.





Towards the development and commercialization of technologies, the following initiatives have been taken :

- More thrust is being given on technology development projects.
- Technology development projects in partnership with the industry and with the involvement of the user are being encouraged.
- The available NML technologies have been revisited and a concise technology information document on current and relevant technologies has been prepared and uploaded to the website

On the intellectual property front, to enable a better prospect of licensing the IP, joint ownership of patents with industry is being encouraged especially in collaborative projects. With regard to the paperless office initiatives, several steps have been taken both centrally by CSIR and separate independent initiatives by NML:

- Leave records linked to biometric system (No separate leave applications)
- Installation of automated security surveillance systems
- Online equipment management systems - Online booking of equipment hours with charge/project numbers

Business Development Initiatives

A few new initiatives have been taken by the Business Development Group for the assessment of the existing business models and development of new business models in compliance with the changing market scenario. Some of the initiatives are IP valuation and licensing, e-business initiatives, patinformatics for R&D intelligence, technology mapping, industrial forecasting, competence mapping, resource utilisation, leveraging knowledge and knowledge networking, wealth from knowledge etc.

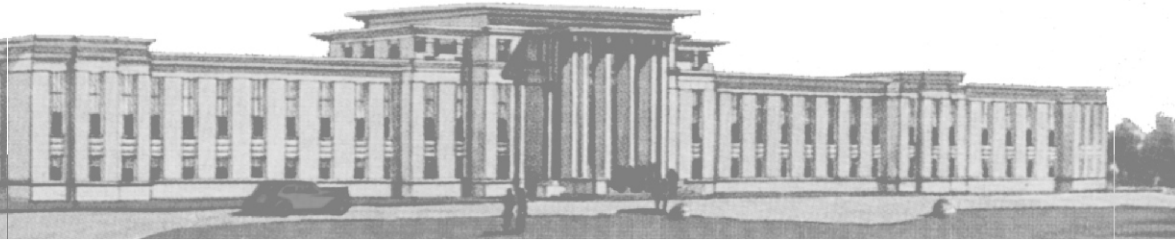
These efforts have a direct impact in developing the knowledgebase and external cash-flow of the laboratory. We have already started receiving a number of queries through the website as a result of the e-business initiatives. Some projects have been initiated as a result of this initiative leading to an increased industrial interaction. As part of the technology mapping exercise an updated technology handbook has been prepared which is available for the reference of customers.

12th Plan Projects

Under the 12th five year plan, CSIR would be undertaking several networked projects with financial support from the planning commission. These include national mission projects and applied industrial projects. NML plans to propose two network projects for partial financial support from CSIR under the 12th plan subject to finding industrial partners for these projects. These are 1) Development of sustainable technology for harnessing the values in wastes and lean ores and 2) Development of commercially viable technologies for magnesium metal extraction, Mg-alloys for automotive applications and MgO-based refractories. A conscious decision has been taken at NML that for the 12th plan projects, the following criteria have to be fulfilled prior to its initiation: i) The user industries will be associated as partners from the project inception stage, ii) Around 30% of the total budget for the project has to be supported by the user industries who will be partners in the project, iii) The deliverables will be a clearly defined product or process (of defined scale and specification) and benchmarked internationally. For scale up and packaging the Engineering firms and Systems organizations will also be included as partners at an appropriate stage. NML will also be playing a major role especially in materials evaluation, qualification and development of structural integrity and damage assessment protocols in the national Mission-2017 project on the commissioning of 2X800 MW ultra-supercritical boilers being taken up by IGCAR, BHEL and NTPC in the 12th plan.

We are also contemplating and debating upon some initiatives to be taken by NML under the 12th plan towards - (1) A national centre for integrated computational materials engineering and (2) Development of an advanced coal characterization - behavior correlation map of India. There is a growing realization that both of these areas presently in its stages of infancy have enormous potential for the future. However, both of these areas are strongly multidisciplinary in nature, beyond the scope of a single organization and would require a national consortia approach. I would request the research council to deliberate on this and initiate the brainstorming.





AcSIR Initiatives at NML

An Academy of Scientific & Innovative Research (AcSIR) was established by CSIR as an institution of national importance for furtherance of the advancement of learning and prosecution of research in the field of science & technology with special emphasis on emerging areas and such areas of inter-disciplinary and trans-disciplinary nature that are not ordinarily taught in regular universities and approved by the Government of India under an Act of the Parliament. The objective of the academy would be to guide research and award degrees in trans-disciplinary areas not ordinarily taught in academic institutions and Universities. This Academy shall nurture a research-propelled, technology-enabled and industry-linked higher education platform so as to achieve a seamless integration of intellectual strengths with current market needs as well as to develop niche capability required to bolster research efforts in futuristic science. The first session of AcSIR has started from January 2011, at National level.

NML will be starting Ph.D courses in emerging and trans-disciplinary areas of metal and materials engineering. Major emphasis will be given to the areas where at present there is negligible or no such program. Mineral beneficiation and engineering, Iron & Steel Making, Structural Integrity Assessment, Integrated Computational Materials Engineering are few of those areas, beside many other globally emerging and important areas. The structure of courses is being planned and detailed course content being developed. A white paper detailing the present national scenario of demand and supply of metallurgy doctorates in the country, the gaps in metallurgical research, the future demands, the future research areas, planning of faculties for the courses, the roadmap for placement, estimated capital and recurring budget and financial sustenance. The admission of students at NML shall be taken up by next semester of AcSIR, that is 1st July 2011. It is aimed to provide opportunity to have brighter & assured career growth - (i) through quality teaching, education & delivery as well as (ii) through placement opportunities. An effort of integration with industry is also in process.

CSIR Initiatives

- As part of CSIR transformation initiatives, the following portals are being launched -
 - **Human Resource portal** : Organization Transformation Design, HR Initiatives & recruitment
 - **Portal for e-Learning and knowledge repository** : Competency Development, Training And Collaboration and Digital Repositories, Knowledge management, Resources And Practices
 - **R&D Planning portal** : Project management, Business development Fellowships
 - **Infrastructure / Engineering and Services Portal** : Facilities Management, Maintenance & Related Services, Contracts Management, E-procurement, Stores / Inventory Management
 - **Policy And Programme Module** : e-Office, Policy Repository, e-file management, Record Management, Automation
 - **Finance & Accounts Module** : e-Finance, e-Accounts, e-Payments, and e-Record Management & Automation of pertinent processesThese portals are expected to be fully operational at NML by the end of this year.
- CSIR Techno Fest-2010 held as a part of India International Trade Fair between 14-27 November, 2010 to take science and technology to the doorstep of the common man. Pavilions in different theme areas, namely - Aerospace, Strategic Sector, Mining, Minerals and Materials, Chemicals and Petrochemicals, Energy, Ecology and Environment, Water, Health Care, Food and Nutrition, Agriculture, Engineering Infrastructure, CSIR 800, Nurturing S&T Human Resource, Intellectual Property, Entrepreneurship and Information Products showcased.
- For the first time in the history of the Republic Day Parade, a Science Tableau showcased CSIR's journey of drug development from generic to genomic medicines.



1st March 2011

S. Srikanth
(S. Srikanth)
DIRECTOR

"NML has a global reputation and you have an excellent staff to realize your vision"

- Pradeep Nijhawan, USA, (Nov. 27, 2010)