From the Director's Desk

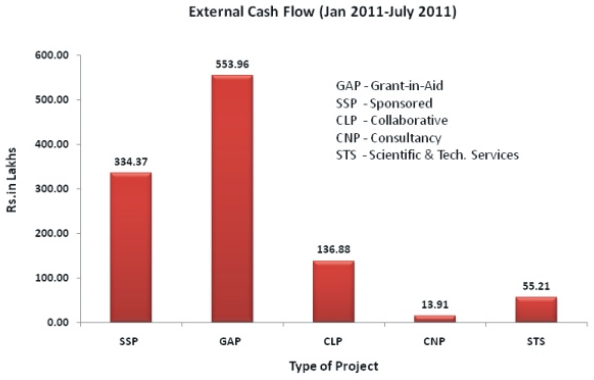
Chairman & Members of the Research Council, Invitees and Dear Colleagues,

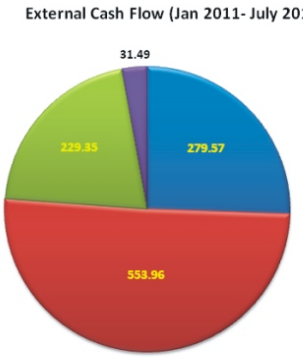
It is my proud privilege to convene the 60th Research Council meeting of CSIR-NML. I take great pleasure in welcoming our chairman Shri H M Nerurkar and the other honorable Research Council members for this meeting. Since the last Research Council Meeting in February, much has happened on several fronts. Firstly, I will present our performance, the progress that we have made in several of the flagship and major sponsored projects, significant outcomes from the projects, new business initiatives launched, laurels and achievements, human resource development and major events organized during this period. I will then highlight where we stand with respect to the Goals and Targets that we have set ourselves in regard to Vision@2022. Finally, I would also briefly mention about the proposed activities under the 12th Five Year Plan. I would request the august Research Council to critically assess the progress made, suggest corrective measures if any and provide advice to accelerate the pace of growth and realize our Vision.

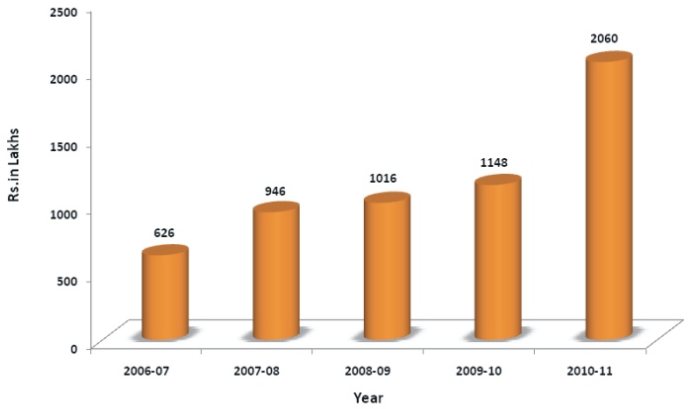
In the first reconstituted Research Council meeting in August last year, I had presented my Vision@2022 for NML as a self-sustained technology centre, our Goals and Targets and the path drawn up towards achieving this. My senior colleagues presented division-wise detailed roadmap for aligning with the Vision and achieving these goals and targets consistent with and leveraging upon the core research, human resource and infrastructural strength of NML. In the subsequent Research Council meeting, we had detailed discussions and deliberations on the major projects that NML should take up under the 12th plan. These presentations were made by the next generation of leadership who would shape the 12th plan period at NML. For this Research Council Meeting, we have placed special emphasis on curiosity driven projects of scientific excitement and these will be presented by some of our talented Young Scientists. The progress made on some of the major CSIR funded network projects will be briefly presented and the since the Supra-Institutional Project has to be mandatorily reviewed by the Research Council this will be presented in some detail. The progress made with respect to all the individual projects (of value >Rs 10 lakhs) is included in the RC agenda compilation which has been circulated to the RC members.

Overall Performance Parameters

The External Cash Flow achieved by NML during Jan-July 2011 and their sources as well as the trend of the growth of ECF over the last 5 years is shown below :

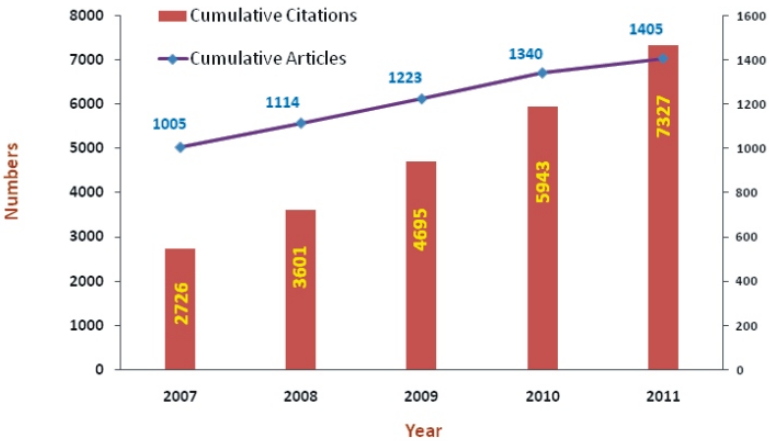






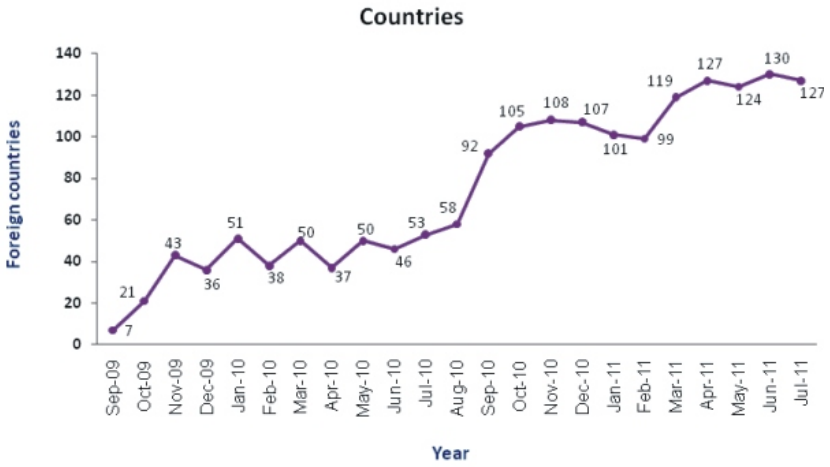
The overall external cash flow over the past six months as well as the just gone-by financial year has shown a significant increase compared to the past. However, that the external cash flow still comes mainly from government sponsored grant in aid projects is a cause of concern. We are taking concerted measures to shift towards more industrial funding. The other scientific outputs such as publications in SCI journals as well as citations have steadily increased.

SCI Publications and Citations



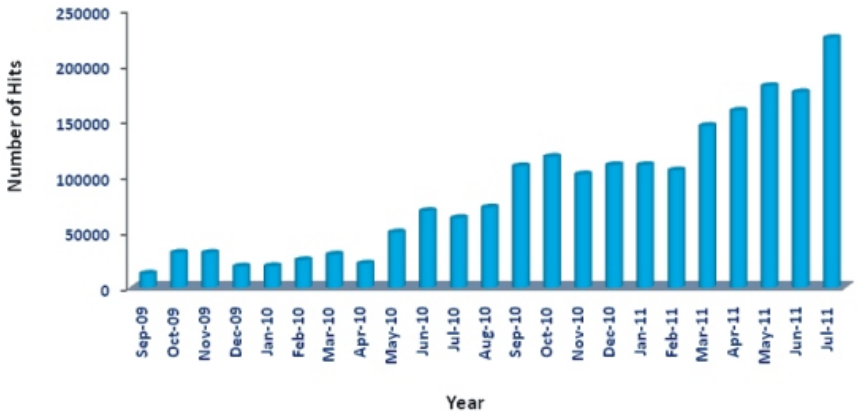
NML Institutional Repository : NML E-prints

NML Institutional repository (NML E-prints) was established in September 2009 with the objective of providing Open Access dissemination of scientific knowledge generated at CSIR-NML. NML's eprints gateway has considerably enhanced its global visibility and its popularity has increased exponentially. Eprints@NML is registered with OAlister, Open DOAR, ROAR and indexed by search engines like - Google, Google Scholar, Base, Scirus etc. NML repository has achieved more than 30% annual increase in traffic, with over 1,75,000 hits per month and a cumulative total of over 10 million hits since inception. A recent review has shown that NML Institutional Repository is ranked 8th in the country and 4th among CSIR laboratories. The number of hits has reached 2.24 lakhs in July 2011.



Showing Growth of NML Eprints in terms of hits

The number of foreign countries accessing NML Eprints has also shown a remarkable increase over the past one year.



Online access of foreign countries to NML Eprints

Projects Pursued

NML has been involved with a large number of projects (146 ongoing projects) in diverse areas and spanning the entire spectrum of benefactors from multi-laboratory networked projects of CSIR, the supra-institutional project on steel funded by CSIR, several collaborative projects with industries especially Tata Steel, a large number of

industry sponsored projects, many innovative research projects funded by the grant-in-aid bodies and in-house projects.

The network project on "Technology for assessment and refurbishment of engineering materials and components" conceived and being coordinated by NML has been very successful in terms of the benefits accrued to the industry, new product and protocol development and synergizing the strengths of the various CSIR labs. Some of the significant outcomes from this project over the past six months are: inhouse fabrication of a GMI based sensing device with a sensitivity of 18 μTesla and its application for structural health monitoring of catalytic converter reactor unit (CCRU) of Indian Oil Company Limited and custom designing of a Portable Ball Indentation Unit for BHEL, Hardwar against a commercial order. Separate Miniaturized Portable ball Indentation Systems for remaining life assessment were earlier supplied to BARC, Mumbai, and IOCL, Faridabad. This project has also resulted in several spin-off projects catering to the Power and Oil industries.

Under the Supra-Institutional project on steel, the main targets are the development of ultra-high strength steel (UTS>1800 MPa; YS>1600 MPa and Elongation > 8%), high deformability TWIP steels (UTS>1000 MPa, YS>700 MPa and uniform elongation > 50%) and steel foams. Although efforts have gone into fulfilling these deliverables, the present level of achievement has fallen short of expectations both in terms of the targeted properties and scale of development. A worthwhile achievement in this project however has been the development of two-phase TWIP (Ferrite and austenite: 50:50) steel showing a strength of 850 MPa and uniform elongation of 35%. However, the relevance of the efforts and the continued lack of industrial partnership in this project has remained a matter of concern.

The network project on "Nanostructured Advanced Materials" where NML is playing a major role as a nodal laboratory has made good progress after the monitoring committee redefined the objectives and deliverables last year. Very specific industrial applications and new components and devices have been targeted and success achieved in some. Among the significant achievements of this project thus far are: Development of a process for production of Nano-Hydroxyapatite, its evaluation at Sree Chitra Tirunal Institute and its demonstration to M/S IFGL; Coatings on four piston rings obtained from Ashok Leyland; Laboratory scale development of nano-sized Sr-hexaferrite with superior magnetic properties i.e., coercivity (Hc) of 7000 Oe and remnant magnetization (Br) of 3200 G and Fabrication of Cu-based Bulk Metallic Glass rods up to 3mm diameter. It is expected that some of these ongoing efforts will successfully translate to an industrial application.

NML is also partnering several other CSIR labs in a large number of Network projects 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 minerals for providing safe drinking water at domestic level in the state of Jharkhand. I am told that the progress in all these projects is satisfactory and that some of these may soon find field application. I hope that the project leaders and the project team would carry these forward and devise a plan and roadmap to translate the laboratory level successes to a field/industry application through a transfer of the developed technology.

The Ministry of Steel has been supporting five major projects at NML: 1) Reduction of coke rate using probing and modeling techniques in BF No. 6 & 7 of Bhilai Steel Plant; 2) Improvement in sinter productivity through deep beneficiation and agglomeration for rational utilization of low grade iron ore and fines; 3) Alternative complimentary route to direct steelmaking with reference to Indian raw materials; 4) Development of technology to produce clean coal from high ash and high sulphur Indian coal and 5) Production of low phosphorus steel using DRI through induction furnace route adopting innovative fluxes and/or design (refractory) change. In the first

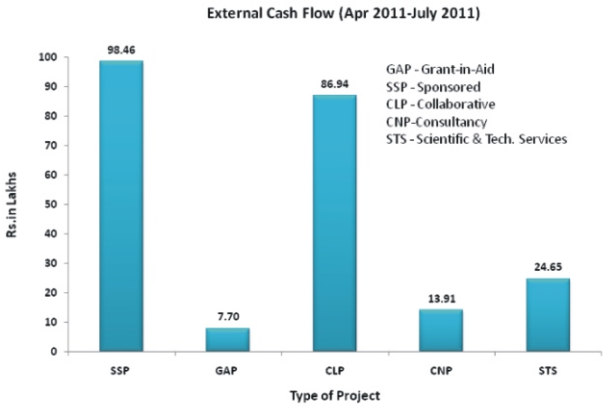
project on Blast Furnace Modeling, a Real Time Process Simulator was developed for on- and off-line monitoring and predicting of blast furnace internal dynamics. These were earlier successfully installed at Bokaro Steel Plant. The off-line version of the process models and RTPS has been installed at BSP, Bhilai. However, it is not fully operational yet because of the non-installation of the probes and an assessment of the reduction in coke rate accruing due to the installation of RTPS not made yet. The 2nd and 3rd projects on deep beneficiation and agglomeration and alternative steelmaking are in their initial stages; the raw materials have been received, characterized, micro-pelletization studies carried out and flow sheet development at lab scale is in progress. The project on the Development of technology for clean coal production is also in the stages of lab scale flow sheet development after receiving the requisite raw materials. In the project on Low-P steel from DRI in an induction furnace, considerable progress is made with the use of basic lined induction furnace. Efforts are on to carry out tests with acid lining and a different combination of flux. If successful, this technology would pave the way for the use of DRI in induction furnaces to produce quality steel benefitting hundreds of MSMEs.

The project on the development of a technology for the production of sodium metal by fused salt electrolysis of sodium chloride sponsored by Heavy water Board is facing some engineering difficulties and time overruns after the initial success in 50 and 100 Ampere cells. The difficulties faced are with respect to collection of sodium metal and the collection of chlorine. The identification of Engineering Consultants for the design and fabrication of 2000 Ampere and 20000 Ampere cells has finally been done by Heavy Water Board. It is hoped that these teething problems will be resolved in consultation with the Engineering Consultants and a 500 Ampere cell will be fabricated and run successfully within the next six months which will enable the design and fabrication of larger capacity electrolytic cells.

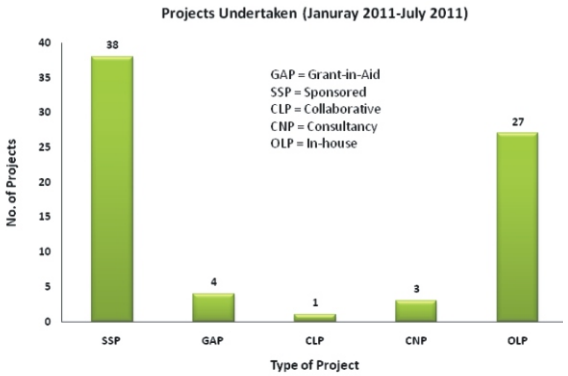
NML had taken up the development of silt erosion resistant material for turbines of hydro-generators with financial support from CPRI, Bengaluru and had successfully developed a new alloy with vastly superior erosion resistant properties. Small components such as guide vanes and nozzle spear of Pelton turbine are being fabricated with the newly developed alloy and will soon be subject to field trials in collaboration with BHEL.

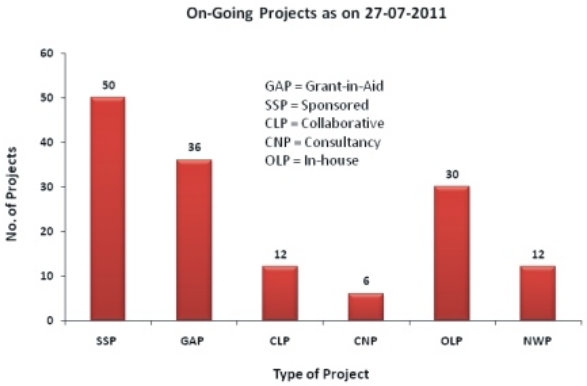
In the MoeS supported project on ocean nodules, large scale (250-500 kg) direct smelting experiments for the recovery of Cu, Ni & Co as an alloy as well as reduction smelting of the resultant Mn-rich slag to produce standard grade Fe-Si-Mn have been successfully carried out. It is expected that the committed deliverables will be achieved within the 12th plan period and keeping with the resolution of the RC, this project will not be carried forward to the 12th plan period.

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 Korea Institute of Geosciences and Mineral Resources, Boeing International, General Electric and other multinational agencies. Among the several sponsored projects taken up under the Tata-NML collaborative umbrella last year, quite a few have been very successful and these are presently being explored for field and pilot scale trials. It is hoped that some of these will eventually find its way to commercial exploitation. The number of projects taken up under various categories is shown below :





Project Outcomes

Some significant outcomes from some of the sponsored projects in the past six months are :

- Transfer of Column Flotation Technology and Manufacture of Spargers for Beneficiation of Beach Sand Sillimanite to M/S V V Minerals, Tirunelveli, Tamilnadu
- Plant trials (at Jamadoba) for a single flotation reagent for coal are promising. Longer trials planned
- Process developed at lab scale for conversion of hematite to magnetite with requisite purity and magnetic property for Heavy Media Separation applications
- Developed a process at lab scale for the Paving blocks using steel slag as main raw material. The product meets Indian standard specification IS 15258:2006
- Established feasibility of using surface wave probe to detect surface cracks for 700 mm to 1100 mm diameter HSS rolls
- HVOF based process developed at lab scale to deposit Zn:Ni (89:11) coatings (<10 m) on CRM sheets
- Degree of cementite dissolution at various wire drawing strains has been clearly demonstrated in cold drawn high C steel wires
- Strain controlled cyclic lives of rebars established & correlated to UTS/YS ratio

- Developed a technology for the smelting of chromium and nickel bearing magnetite from Nagaland (at pilot scale in a 500 kva Submerged Arc Furnace)

Most of these are the outcome of Tata Steel - NML collaborative projects.

MoUs/ Agreements Signed

Eleven MoUs have been signed with the following organizations since the last Research Council meeting. These are: (1) Magnetic Non-destructive evaluation techniques-M/s.Gontermann Peipers (india) Ltd, (2) Validation of the process on recovery of precious metals from e-waste using a novel process of recovery of metals from e-waste.- M/s ECO Recycling Ltd., (3) Design and fabrication of portable electromagnetic sensing device- M/s Technofour Ltd., (4) Exploitation of fume extraction dust for development of paving blocks- M/s Mahindra Ugine Steel Company Ltd., (5) Development of nano- hydroxyapatite based Injectable Scaffolds - M/s IFGL Refractories Ltd. (Kalunya), (6) Evaluation of corrosion mitigating materials used in industrial applications - M/s CARIRI, Trinidad & Tobago, (7) Beneficiation and agglomeration of chromite ore burden - M/s Bahar Oman Holding LLC, Muscat, Oman, (8) Engagement of Dr.SR Singh as Technical and Business Development Consultant - M/s CSIR-NML (9) Supply of Sparger System to NML flotation column - M/s Diva Envitec Private Limited, (10) Sparging System for flotation column - M/s Diva Envitec Private Limited,Mumbai, (11) Energy Audit - M/s Petroleum Conservation Research Association, (12) Development of Fracture Toughness Module for Mex3D Software (NML-FM) - M/s Alicona Imaging, Austria.

Foreign Deputations

- Dr. DDN Singh, Consultancy Assignment, King Saud University, Riyadh, Saudi Arabia
- Dr. Manish Kr Jha, Conference TMS 2011 Annual Meeting & Exhibition, San Diego, USA
- Dr. Jayanta Konar, Training on HPLC-IC Singapore
- Ms Rupa Das, Training on HPLC-IC, Singapore
- Dr. A.K. Mohanty, Conference PITTCON - 2011, Atlanta, USA
- Dr. Sanjay Kumar, Bilateral exchange program, Portugal
- Dr. B.D. Pandey, Discussions on Collaborative project on bioleaching of gold and rare metals, KIGAM Korea
- Dr. DDN Singh, Consultancy assignment in the area of corrosion & prevention, CARIRI Trinidad & Tobago
- Ms Ojaswini Mohanta, Conference on "Recent trends in Nanomaganetism spintronics and their application", Spain
- Mr. V. Rajnikanth, On-site equipment training on EPMA, JEOL, Tokyo, Japan
- Mr. Himanshu Bapari,On-site equipment training on EPMA, JEOL, Tokyo, Japan
- Dr. Vinay Kumar(Moscow), Indo-Russian Exchange visit under ILTP, IGIC Moscow
- Dr. Manish Jha (Moscow), Indo-Russian Exchange visit under ILTP, IGIC Moscow
- Dr. Ranjeesh Kumar, Study leave for Post doctoral Fellowship, Welding Institute, Ghent, Belgium,
- Dr. Suman Kumari Mishra, International conference on Materials for advanced technologies, Suntec, Singapore.

New Infrastructure Added

A number of new equipments have been installed and commissioned in the past six months. These include:

(I) Fully automatic pilot plant for making fly ash based geopolymer pavement block, , (ii) Micro hardness Tester and with high resolution camera, (iii) Multi Process Welding Power Source, (iv) Horizontal Tubular Furnace, (v) Table top centrifuge, (vi) CNC Wire Cut EDM machine, (vii) Jet Polishing Machine, (vii) Series 3210 Split Tube Furnace FRMA Double Pivot Mounting Assembly, (ix) 7500 AFM/STM High-Temperature Low-Vacuum System, (x) Nano Tribometer, (xi) Controlled Atmosphere Horizontal Tubular Furnace.

Awards / Distinctions/ Fellowships Received

- NML has bagged the Best Jury Award for Innovative Initiatives in e-Governance for the project *"Web based information system for managing manpower utilization in projects of R&D organization"* at the e-World Forum. Ms. Beena Kumari, Dr. S. K. Pal, A. K. Upadhyay and Dr. Anuradha Madhurkar were the team members. The Award function was held at Hotel Ashok, New Delhi on 2nd August, 2011. Amongst the dignitaries present, on the Awards Night, Mr. Jyotiraditya Scindia, Minister of State for Commerce and Industry, Govt. of India, was the chief guest and Mr. R. Chandrashekhar, Secretary, Department of Telecommunication, Ministry of IT, Govt. of India, Mr. Shankar Agarwal, Additional Secretary, Department of Information Technology, Ministry of Communication & IT, Govt. of India and Mr. Tariq Ahmad Khan, High Commissioner, Bangladesh, were the guests of honour.
- Dr. Sital Kumar Pal has been awarded Raman Research Fellowship for 2011-12. He will be visiting the Instituto de Ciencia de Materiales in Madrid, Spain under the Fellowship.
- Dr. J. Swaminathan is nominated by CSIR for the CSIR-DAAD Exchange of Scientists Program for 2011. The corresponding German nomination for the exchange program is Prof. Ulrich Krupp, Institute of Materials Design and Structural Integrity, Osnabruck.
- Shri Shravan Kumar, Scientist, has received Prof. Bala Deva Upadhyaya Memorial GOLD Medal from IIT Kanpur on May 28, 2011 for best M. Tech. Thesis in Physical Metallurgy including Materials Processing in Materials & Metallurgical Engineering Department for the Year 2011.
- Town Official Language Implementation Committee, Jamshedpur (Office) has been adjudged FIRST for commendable performance in implementing the Official Language Policy of the Union during the year 2009-10. The contribution of its member- Secretary Dr. Purushottam Kumar, Hindi Officer, NML is highly appreciated.
- Shri. Parikshit Mahato, Project Asst., and Ms. Sudarshana Banerjee, Project Asst., received the 1st and 2nd prize respectively in the Quiz competition on ceramics held in the ICS Founder's Day celebration 2011, organized by Indian Ceramic Society, Jamshedpur Chapter on 16th May, 2011.
- Shri Abhishek Tripathi, M Tech Trainee from IT-BHU, received third prize in oral presentation category in the students' seminar on metallurgical engineering "Behind the Teacher's Desk" held at NML during 25-26, March 2011.

Distinguished Visitors

- Prof. Gerhard Wilde, Institute of Materials Physics, University of Muenster, Germany delivered a talk on "Thermodynamics and relaxation kinetics near the glass transition" on the 9th of Feb' 2011 at NML.
- Dr. Sanak Mishra, Chief Executive Officer, ArcelorMittal India Ltd., New Delhi, delivered one of the diamond jubilee lectures on "The Role of Engineers and Technologists in Sustainable Development" on Feb 14, 2011 at NML.
- Mr. Christian Bochert, MD, Buehler, Germany delivered a talk on "Introduction to Buehler - The Science behind Materials Preparation" on Feb 17, 2011 at NML.
- National Science Day was celebrated at NML on Feb 28, 2011. Prof. S. Ranganathan, Homi Bhabha, Visiting Professor, National Institute of Advanced Studies, Bengaluru delivered the Science Day lecture on "Heritage Science: A look into the interdisciplinary fields of Archaeometallurgy, Geoarchaeology and Digital Heritage".
- Dr. Shantanu Bhowmik, Associate Professor, Faculty of Aerospace Engineering, Delft University of Technology delivered a talk on "The Netherlands Emerging Materials Technologies of 21st Century" on 4th of March 2011 at NML.

- Dr. J. Cutler, Director of Industrial Science, Canadian Light source delivered a talk on "Minerals, Metals and Materials: Understanding the world around us" on the 11th of March 2011 at NML.
- Dr. G. Thyagarajan, Former Director, CSIR-CLRI, Chennai delivered one of the diamond jubilee lectures on "Innovation: India's Performance in Global Optic" on 26th of May 2011 at NML.
- Prof. Animesh Jha, Institute of Materials Research, University of Leeds, U.K. delivered the lecture on "The Alkali Roasting of Complex Oxide Minerals for High Purity Chemicals-Beyond Le Chatelier into 21st Century" on 18th of May 2011 at NML.

Human Resource

The following people have joined the laboratory after the last RC meeting : Shri Ranjeet Kumar Singh, Scientist, Shri A P Murugesan, Shri Sumanta Bagui, and Shri K Shravan Kumar, Scientists; Shri Ved Prakash, Asstt(S&P) Gr.I on transfer from NAL, Bangalore. I wish them a fruitful career at NML.

Several of our colleagues also superannuated during this period : Shri Narottam Jena, Sr. Tech(1), Dr. T.B.Singh, Sct.Gr.IV(5), Shri C. L. Jha, Sr.T.O.(3), Shri K R K Rao, Dr. S R Singh, Sct.Gr.IV(6), Shri Gour Mukherjee, S.O.(F&A)-Adhoc, Smt. Jagmotin Bai, Safaiwala, Shri B. Sengupta, S.O.(G), and Dr. K V Rao, Sct.Gr.IV(5). I wish them all A Very Happy & Healthy Retired Life.

42nd Shanti Swarup Bhatnagar Memorial Tournament Indoor Finals

The 42nd Shanti Swarup Bhatnagar Memorial Tournament Indoor Finals was hosted by NML at the JRD Tata Sports Complex, Jamshedpur from 2nd to 5th April, 2011. Over 170 sportsmen/women, representing 32 laboratories of CSIR family spread across the country took part in this grand Indoor Finale, 2011. Smt. Himani Pandey, Deputy Commissioner, East Singhbhum, Jamshedpur as a Chief Guest inaugurated the tournament in the presence of Shri Akhilesh Jha, IPS Sr.Superintendent of Police, Jamshedpur & Padmashree Shri Charles Borromeo, Sr. Manager (Sports), Tata Steel as guests of honour.

Prof. Dr. Vani Brahmachari as Chief Host concluded the tournament in the presence of Dr. P. G. Rao, President & Dr. Daljit S. Bedi, Secretary, CSIR - Sports Promotion Board. Ms. Deepika Kumari, gold medalist of Commonwealth Games, 2010 as Guest of honour was felicitated in a grand manner in the valedictory function. The function was a resounding success and the participants to the event had warm words of appreciation.

Other Activities

Recently NML has launched a school-NML Interactive Program (SNIP). Under the program, students can visit the laboratory on every Friday. The program has been designed to give them an exposure to a modern scientific laboratory, look at some of the ongoing projects to develop interest for science as a career advancement prospect. The visit includes a batch of 25 students (Std. VIII to XII) accompanied by one to two teachers. Within

School-NML Interactive Programme

the past few weeks, more than 200 students from six schools including Loyola School, DBMS English School, DAV Public School, Bistupur, Motilal Nehru Public School, J.H. Tarapore, Dhatkidih, Narbheram Hansraj English School, Bistupur, have participated and benefitted from this program.

Where we Stand vis a vis Vision@2022

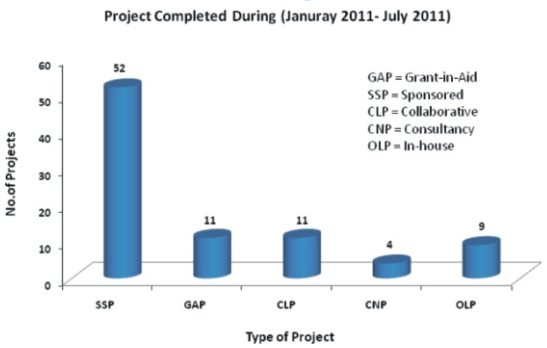
Immediately upon assuming office, I had outlined my Vision@2022 for NML. In that context, we had set the goals and targets for 2016 which would put us on the path towards Vision@2022. These were:

- 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

It is imperative that we continuously calibrate our performance with respect to these goals and targets.

Enhanced Industrial Sponsorship

The trends in the extent industrial funding vis-à-vis the CSIR budget and external cash flow are displayed below :



It is seen that the contribution of the industrial sponsorship to the External Cash Flow has showed an increasing trend in the past two years. However, for the period Jan-July 2011, industrial projects contributed about Rs 540 lakhs against an ECF of Rs 1094 lakhs, which is significantly higher. As part of the roadmap towards enhanced industry sponsorship and partnership, we have already initiated collaboration with several industrial partners and

also started leasing of several facilities including pilot scale facilities for part of the time. Tata Steel has been effectively utilizing several of NML's facilities. We have also created an e-customer desk for logging in business queries. Around 200 business queries have been received through the e-customer desk during the reporting period.

Effective Manpower and Equipment Utilization

Towards meeting the target of 80% man and machine utilization, we have firstly put in place mechanisms where both man hour utilization in projects by scientists and equipment utilization time are properly recorded. For the period Jan-July 2011, the man hour utilization stands at 62.4% (9786 man days accounted through projects against the total available man days of 15680). Business development group has successfully developed and implemented Manpower involvement portal for effective maximum utilization and monitoring of manpower in research projects. The portal has been voted as the Best Project in the Jury Choice category of eWorld 2011 Awards. In addition, the following initiatives have been launched for the effective utilization of scientific manpower :

Knowledge Mapping

- International collaboration map based on authors, institutes and subjects for the last ten years and publication data of India and several other countries have been prepared
- Knowledge network of authors and subjects based on publication data for the last twenty years was prepared

Competency Mapping

Data has already been collected on the technical competence of the Gr III & IV staff through an online questionnaire. The first draft of the report has been prepared. An analysis based on the academic qualification of the individual and the core area of work in which he/she is involved has been carried out and presented. Further data is being collected to enable a mapping between the core areas of work of the scientist and the core areas of projects in which he/she is involved.

Development & Commercialization of Technologies

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

- Technology development projects in partnership with the industry are being taken up. The development of technology for CRGO steel as well as amorphous Fe-Si-B alloys is proposed to be taken up jointly with Tata Steel and M N Dastur & Co. A technology for the economic production of Mg is also being taken up jointly with several industries as well as the other stake holders.
- Basic Engineering Packages are being developed for some of the available NML technologies which have commercial potential.

Leveraging on Intellectual Property

With the objective of realizing 5% of operational budget from IP licensing and royalties, several initiatives have been taken.

- A methodology for calculation of Benefit to Cost Ratio (BCR) was devised and BCR of IP portfolios was calculated.
- Patents are being filed jointly with the industries. Based on the collaborative work between NML and Tata Steel, several joint patents are proposed to be filed.
- Patinformatics report of major R&D programme was prepared to assess the state-of-the art of the research progress. Patinformatics study is being used as a decision making tool for future R&D investment and protection of IP portfolios

Towards a Paperless NML

In this pursuit, CSIR has initiated a CSIR Enterprise Transformation & ICT Intervention Initiative, wherein six portals on 1) Human Resource Management, 2) E-learning & Knowledge Repository, 3) Infrastructure/ Engineering Services, 4) Policy and programme module, 5) Stores and Purchase module and 6) Finance & Accounts Module have been created. The necessary hardware has been procured at NML. These are presently being installed and commissioned and the required data for the creation of databases are being generated. In addition, NML has already implemented the following:

- Biometric time attendance and automated leave accounting system
- Automated security surveillance systems
- On-line Equipment Management Systems
- Video and Tele Conferencing facilities
- Under National Knowledge Network (NKN) initiative, the NKN router has been received from National Informatics Centre, NIC (Ministry of Communication & IT, Govt. of India). Activation of NKN linking from NIC is awaited. On the basis of proposal from Centre for Development of Advanced Computing (C-DAC), Ministry of IT, modalities are being worked out for institutional collaboration with C-DAC under GARUDA-NKN partnership, which is the National High performance Grid computing initiative.

12th Plan Projects

As discussed in the previous Research Council Meeting, NML will be leading two CSIR network projects under the 12th plan, namely 1) Development of Zero Waste Technology for Processing and Utilization of Thermal Coal and 2) Development of commercially viable magnesium metal production technologies. Based on the inputs provided by the Research Council in its last meeting, the objectives, activities and goals in both these have been redefined. The projects now target clearly focused deliverables. In addition, NML will partner other CSIR laboratories in some of the other network projects i.e., 1) CSIR clean technology build up for rare earths material; 2) Nano-bioceramic composites for wound care and 3) Development of Composite Armor for protection against medium caliber threats.

NML will 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.

A few major projects are also proposed to be taken up by NML under the 12th plan in partnership with the industry with partial financial support from the ministries. These are 1) Development of technology for CRGO Steel and Amorphous Fe-Si-B Alloys for Electrical Applications; 2) Integrated Computational Materials Engineering for Design of New Alloys; 3) Turbine Materials Evaluation, Thin specimen creep testing and for LCF on coated superalloys 4) Beneficiation and agglomeration of low grade iron ores, iron ore tailings and slimes; 5) Development of Al-alloy conductors and 6) Life-cycle integrated energy and environmental analysis for metallurgical processes and industries. Discussions are on with the relevant industrial partners for the formulation of project proposals and seeking financial support. It is hoped that these projects will fructify in due course of time.

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(S. Srikanth)
DIRECTOR

"We owe a lot to the Indian, who taught us how to count, without which no worthwhile scientific discovery could have been made."

- Albert Einsten