

# CSIR NEWS

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Team CSIR



## CMERI/MERADO signs MoU with International Tractors Ltd

The **Central Mechanical Engineering Research Institute (CMERI), Durgapur**, through its extension centre, Mechanical Engineering Research & Development Organization (MERADO), Ludhiana, signed an MoU with the International Tractors Ltd (ITL), Hoshiarpur on 16 May 2008.

ITL is the leading manufacturer and exporter of tractors of various capacities. The product range of parent 'SONALIKA' group consists of threshers, harvester combines, agricultural implements, tractor engines, transmission and multiutility vehicles and is a diversified Rs 5000 crore entity.

MoU would support as basic framework for institutional-industry partnership between CMERI/MERADO and ITL to design and develop farm machinery (supporting precision and conservative agriculture) and its exhaustive field trials. This will also enable the launch of collaborative research projects in the area of bio-diesel, particularly for farm machinery applications. The MoU was signed by Cdr. (Retd.) V.R. Dahake, Scientist-Incharge, MERADO, Ludhiana and Mr A. S. Mittal, Vice Chairman, ITL.

SONALIKA group is a user of CMERI/MERADO developed technology of 35 H.P. tractor, which received the CSIR Technology Award in 2003. The technology was brought into the commercial production of tractors by 'SONALIKA'.

The MoU would foster a closer interaction between ITL and CMERI/ MERADO. Synergizing the efforts would help in tapping the market potential through R&D programmes of mutual interest. Mr Mittal expressed his confidence in CMERI/ MERADO developed technologies and wished this relationship to grow. Cdr. (Retd.) Dahake, thanked Mr Mittal for showing keen interest and confidence. He assured him all possible support for future endeavors of common interest.



Cdr.(Retd.) V.R. Dahake, Scientist Incharge, MERADO, and Mr A.S. Mittal, Vice Chairman, ITL, exchanging the documents of MoU. Mr S.K. Dutta, D.G.M. (HRD, P&A), ITL, is also seen



## MoU signed between CFTRI and ARDA, Bangkok

A 12-member delegation from Agricultural Research Development Agency (ARDA), Bangkok, visited the Central Food Technological Research Institute (CFTRI), Mysore, on 28 January 2008. It was led by Dr Banpot Hongthong, Advisor to Minister of Agriculture and Cooperatives. The visit was intended to promote collaboration and capacity building between the two organizations through research cooperation, human resource development, technology transfers and information exchange in the areas of Agriculture and Food Technology. An MoU to this effect was signed by Dr Napavarn Noparatnaraporn, Director, ARDA and Dr V. Prakash, Director, CFTRI.

The delegates were taken around the institute including Food Engineering Centre, Central Instruments Facility and Services, Nodal Codex Food Laboratory and International School of Milling Technology. The delegation interacted with Director and senior scientists of the institute.

## MoU/Agreement signed by NAL

The National Aerospace Laboratories (NAL), Bangalore, has signed the following MoUs /agreements:

- MoU with Aparna Renewable Energy Sources Private Ltd, Bangalore, for collaborative investigation, monitoring and analysis for potential wind energy sites in India and export services (2 June 2008).
- Non-disclosure agreement with Pratt and Whitney, Canada for Exchange of Proprietary Information (23 June 2008).
- Assignment deed agreement with Mahindra Engineering Design and Development Company Limited/Mahindra Aerospace Private Limited for transfer of activities of Mahindra Engineering Design and Development Company Limited, Mumbai to Mahindra Aerospace Private Limited, Bangalore, (May 2008).
- Master service agreement with Honeywell Technology Solutions Lab Private Ltd, Bangalore, for development of systems for RTA (7 April 2008).
- Non-disclosure agreement with SRF Limited, Chennai, for Exchange of Proprietary Information (4 June 2008).

## CEERI develops Thermionic Emission Microscope

Under a CSIR Network Project, the Central Electronics Engineering Research Institute (CEERI), Pilani, has developed a Thermionic Emission Microscope (THEM) for characterization of various types of cathodes, as a part of the developmental activity to meet indigenous needs of microwave tubes. THEM is available only in a few countries.

THEM is used to study the spatial emission distribution of electron emitters. It comprises the

sub-systems: (a) electrostatic lens, (b) deflection plate, and (c) Faraday cage, as depicted schematically in Fig. 1. The lens is of immersion type, which magnifies the emission

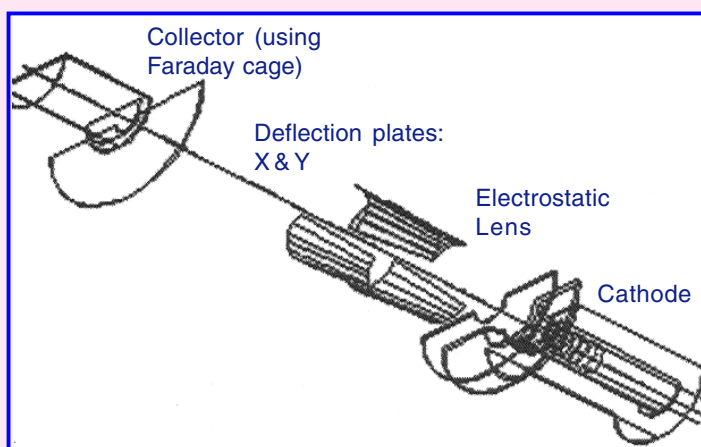


Fig 1 : Schematic diagram of THEM

image to about 10 times for a cathode potential of  $-8$  kV at a distance of 10 cm from cathode. The X and Y deflection plates are used for scanning the image beam in both horizontal and vertical directions in the form of raster scan. The Faraday cage is used to extract elemental currents. These low current signals are amplified by trans-conductance amplifier.

The basic difference between a THEM and SEM is that in the former the object is an emitting area whose image is the primary emission topography; while in the latter, the object could be any specimen whose image is secondary emission topography. The system has a critical importance in the study of

cathodes, which operate under temperature-limited region, such as Gyrotron cathodes, where patchiness of cathode has a bearing on the RF performance.

A prototype of THEM has been developed at CEERI and a cathode has been tested. The spatial resolution is 20 micron. Further work is underway to improve the resolution to 2 micron. The instrument is integrated in a chamber, which supports Auger Electron Spectroscopy (AES) and Low Energy Electron Diffraction Microscopy (LEED). The cathode can be tested *in-situ* using all these analytical tools for a complete characterization.

### Operation of THEM and Interpretation of Results

The THEM has been installed in a vacuum analytical chamber and tested using a thermionic cathode of 3.1 mm diameter. The pressure inside the chamber has been maintained at better than  $2 \times 10^{-9}$  Torr. The sample cathode is heated and is brought in front of the THEM. Initially, a large area picture is obtained at low magnification from which the selected area is chosen for data acquisition. As shown in the following figures, the bright areas represent good emission while the dark regions represent poor emission. Emission data acquired is plotted in the form of an Emission Map. The peaks represent high emission while the valleys represent relatively poor emission.

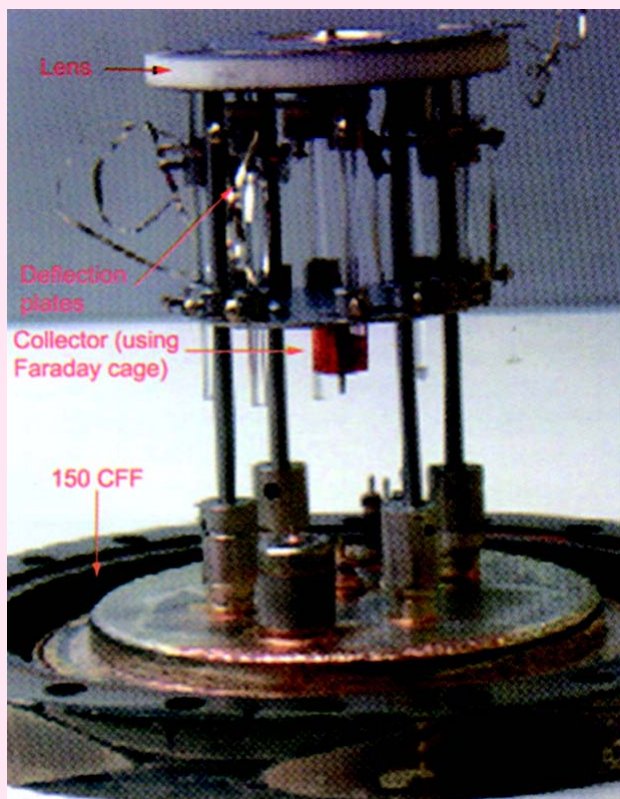


Fig. 2: Schematic diagram of THEM

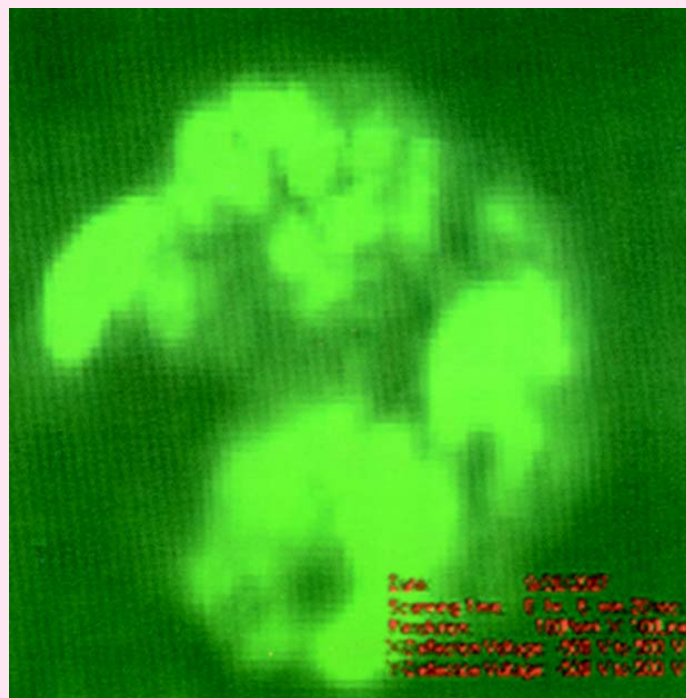


Fig. 3: Image as seen on CRT

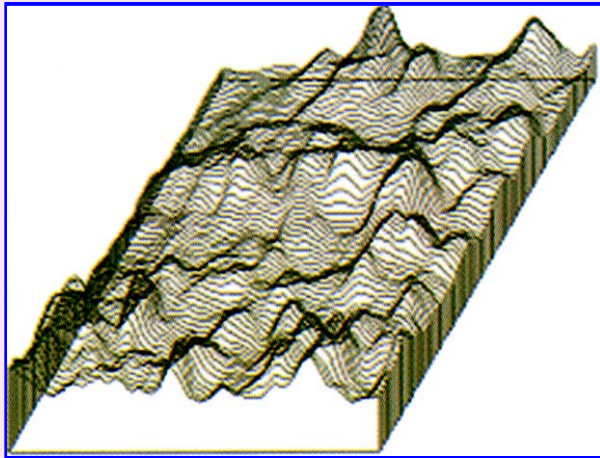


Fig. 4: Emission Plot of Cathode

## Specifications

<b>Lens</b>	
Image magnification	: > 10 times at cathode potential $-10$ kV (max)
Cathode operating current	: 10 mA (max)
<b>Deflection system</b>	
Deflection	: To deflect the image of about $500 \times 300$ $\mu\text{m}$ at $-500$ to $+500$ V of X and Y
<b>Resolution</b>	
Spatial resolution	: $< 2$ $\mu\text{m}$ at an operating voltage of $-8$ kV and 3-4 mA current

## New Project at CEERI

### Design of an Embedded Processor for Smart Camera System

Smart cameras represent a quantum leap in sophistication over commonly available digital cameras. Smart cameras capture high-level description of a scene and perform real-time analysis of what they see. Moving well beyond pixel processing and compression, these systems run a wide range of algorithms to extract meaning from streaming video. These devices can support a wide variety of applications including surveillance, motion analysis, traffic monitoring, etc. Developments in this area have, so far, primarily focused on the development of passive smart camera systems.

The Ministry of Communications and Information Technology (MCIT)/ Department of Information Technology (DIT) has sponsored a project on 'Design of an Embedded Processor for Smart Camera System' to the Central Electronics Engineering Research Institute (CEERI), Pilani and Indian Institute of Technology (IIT), Delhi. In this project, it is proposed to develop Application Specific

Instruction-set Processor (ASIP), which will facilitate implementation of active smart cameras. This ASIP will have enriched instruction-set to facilitate intelligent processing of captured images and purposive movement of the camera based upon visual feedback. IIT, Delhi will carry out (i) design and analysis of appropriate real time vision algorithms for identifying desirable hardware features for the target architecture for implementation of smart camera system; and (ii) design and analysis of a motion control scheme for the camera with visual feedback for identifying desired hardware block in the ASIP, and CEERI, the design and development of an ASIP for facilitating implementation of active smart camera system. Smart camera system essentially consists of an image acquisition block followed by a processing module built around general-purpose processor and/or a digital signal processor. Key challenge lies in the development of real time algorithms for the processing

architecture to extract high-level descriptors from the streaming video.

It is proposed to analyse and develop real time vision algorithms for tracking objects, human action and interpreting activities. The algorithms, apart from standard accuracy requirements will need to satisfy memory, frame rate and latency constraints for the target processing architecture. Latency, time taken for producing results for a frame, is a critical constraint because this output is used in closed loop control system for purposive motion control of the camera. These issues actually necessitate the development of a special purpose processor architecture different from traditional DSPs. Instruction-set architecture, which has a judicious combination of signal processing operations and efficiency of RISC architecture can actually facilitate efficient implementation of these classes of algorithms.



## New Processes Released by CFTRI

### Chocolate Pasta

Pasta products, noodles, spaghetti and vermicelli which are excellent in nutritional quality are consumed world wide. The use of wheat in pasta products is more widespread because these products are easier to prepare and quick to serve. Upon drying, they can be conveniently stored for a relatively long period without deterioration.

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a chocolate pasta formulation, which could act as a tasty supplement to the nutritional requirements of growing children in India, as cocoa flavour is widely accepted by children. The chocolate pasta has 15-16% protein content, which is 4-5% higher than the normal pasta. The product can be consumed along with milk as breakfast cereals/snacks or dessert.

The chocolate pasta packed in polypropylene pouches stored at ambient temperature has a shelf-life of 9-12 months. The nutrient composition per 100 g pasta (dried) contains 15-16% protein, 400 - 425 calories and 1-1.5% fat. The cooked cocoa pasta has acceptable sensory characteristics in terms of overall quality and mouthfeel, as well as appealing brown colour and chocolate flavour.

## Patents granted to NAL

The following patents have been recently granted to the scientists of National Aerospace Laboratories (NAL), Bangalore:

- Indian patent no 218304 granted to patent application 'A process for the preparation of a novel thermosetting polymer useful for engineering applications' filed by R.M.V.G.K. Rao and A. Vanaja of Fibre Reinforced and Plastics Division (13 June 2008).
- Indian patent no 218310 was granted to patent application 'A device for the direct measurement of aerodynamic loads of structures' filed by R. S. Verma, R. R. Ramesh and N. B. Mathur of Experimental Aerodynamics Division (13 June 2008).

The raw materials used for the product are durum sooji, milk powder and low fat cocoa powder. The process of preparing chocolate pasta include mixing, resting, extrusion and kneading. Extruded and dried strands are packed in PP pouches. The equipment required are mixer, extruder and tray dryer.

The process for the chocolate pasta is ready for commercialization.

## Water-soluble Turmeric Colourant (odourless) Formulation

Curcuminoids enriched colourant (CEC) is prepared from spent turmeric oleoresin or Curcumin-Removed-Turmeric-Oleoresin (CRTO). CEC obtained after removing the turmeric oil is converted into a water-soluble formulation using a novel technique. Being water-soluble and odourless, this could be used as a natural colourant in food products as a replacement for synthetic yellow colour. The formulation has applications in nutraceuticals and pharmaceutical industry.

The major processing steps involved are refining the CRTO to get rid of turmeric oil and enrichment of colour components followed by suitable processing and blending to get a product of desired characteristics.

The necessary plant and machinery are: process vat, pressure filter, distillation unit, blending and bottling units. Boiler, generators, quality control laboratory facilities, effluent treatment systems are the other auxiliary needs. The process know-how is available from the institute (CFTRI) for commercial exploitation.





### Orissa Coconut Development Board & IMMT organize Awareness Seminar on Technology Mission on Coconut

Organized by the Coconut Development Board (CDB) and Institute of Minerals and Materials Technology (IMMT), Bhubaneswar, the title seminar on Coconut was inaugurated by Shri Surendra Nath Naik, Minister for Agriculture, Orissa Government at IIMT, Bhubaneswar on 24 March 2008.

This Technology Mission, being pursued by CDB, addresses various issues on production, processing and marketing of coconut by giving focused attention for the development and adoption of new technologies and their production especially in product diversification and management of insect pest and diseases.

The seminar highlighted the need for value addition in coconut with special reference to Orissa where all raw materials are available in abundance and are cheap. Mr Thomas Mathew, Chief Coconut Development Officer, CDB, welcomed the gathering.

Shri Naik expressed concern on the extensive spread of eriophyid

mite and black headed caterpillar and exhorted the State Department of Agriculture and OUAT, etc., to work together for finding solution to all maladies by utilizing the facilities and opportunities available with CDB. He also applauded the efforts made by IMMT in formulating a technology using *Hyptis* plant for management of mite and requested the institute to spare the technology for large-scale adoption.

Mrs Minnie Mathew, IAS, Chairman, CDB, wished more coconut-based industries would come in the state as the state occupies the 6th position in coconut production in the country and possessed tremendous potential for value addition. Shri U.P. Singh, IAS, Commissioner-cum-Secretary, Orissa, Prof. B. K. Mishra, Director, IMMT; Shri Sukumaran Pillai, Chairman, KERALED, Kerala and the members of CDB: Shri K.M. Salih, Shri Varkala B. Ravikumar, Shri Sundarram Raju, Shri V.V. Limaye spoke on the occasion. A guide book on coconut '*Coconut Palm At A Glance*' prepared by the

project members was released by Chairman, CDB. Dr P.S. Mukherjee, Head, AMT Department, IMMT, proposed the vote of thanks. The minister and the Chairman congratulated the IMMT for developing a biocide for the control of the eriophyid mite.

The inaugural session was followed by a technical session in which presentations were made by experts on various topics. Dr K. Muralidharan, Director, CDB made a presentation on CDB programmes and TMOc, with special emphasis on product diversification and value addition in coconut; Dr B.K. Mishra, Associate Professor (Entomology), OUAT, on eriophyid mite management; Mr Sreekumar Poduval, Processing Engineer, CDB, on project profiles for establishing integrated coconut processing units. Shri Johar Khan from Andhra Pradesh shared his experiences in the coconut processing sector and requested group activity for sustainability.

### Seminar on Piezo-Ceramic Materials, Actuators and Sensors

The National Aerospace Laboratories (NAL), Bangalore, hosted a one-day seminar on *Piezo-Ceramic Materials, Actuators and Sensors* on 21 June 2008 to discuss the issues related to fabrication of piezo-

ceramics based actuators/sensors and their application in aerospace and other areas. The seminar comprised 11 presentations covering different aspects of piezo materials.

The seminar began with a

welcome address by Dr A.R.Upadhya, Director, NAL, who also chaired the first session. The first lecture was presented by Dr K.Vijayaraju, Scientist, ADA, on the 'Applications of Piezo materials in Aero Structures', followed by a talk

on 'Comparison of Actuator Authority of Piezo-electric and Electrostrictive Actuators' by Prof. S. Gopalakrishnan, IISc, Bangalore. Dr D. Roy Mahapatra spoke on 'Modeling, Analysis and Design of Piezo-Electric Materials and Devices for Smart Structural Applications'.

The theme of the second session was the 'Preparation of Piezo-ceramic Materials and Fabrication of Actuators/Sensors'. The presentations in the session included: 'Development of Piezo-Ceramic Materials and Devices at NAL' by Dr P.K.Panda, 'Enhancing the performance of Piezo Actuators with Mechanical Amplification' by Dr Anantha-suresh, 'Novel Piezo Actuators for Large Displacements by Tape Casting Technique' by Dr R. Hoppener, CEO, Haiku Tech and 'Multi-Layered Ceramic Capacitors for Space Applications' by Dr Madhusoodan Rao, ISRO. The session ended with a talk on 'Piezo Materials and Devices in Aerospace Applications'.

The final session included talks from NAL researchers on 'Applications of Piezoelectric Materials and Devices in Aerospace Structure-Perspectives' by Dr S. Raja, 'Use of Piezoelectric Sensors/ Actuators for Active Vibration Control of Aircraft/Aerospace Structures' by Mrs Shashikala Prakash, 'High Frequency Applications of Piezo Actuators' by Dr Ranjan Moodithaya and 'Development of Smart Actuators for Boundary Layer Separation Control' by Dr G. Ramesh. An interactive panel discussion was held at the end of the sessions where many useful suggestions and ideas emerged.

The seminar ended with a vote of thanks by the Head, Material Sciences, Mr M.K. Sridhar. A visit to the tape casting facility at NAL was also organized at the end of the programme.

## Nutraceutical Meet

The fourth Nutraceutical Summit organized by MM Activ Sci-Tech Communication Co. in collaboration with CSIR and the Central Food Technological Research Institute (CFTRI), Mysore, was held at World Trade Centre, Mumbai, from 21 to 23 February 2008. The focus of the summit was '**NU FUNDAS IN HEALTH AND FOOD EXPO**'.

The Summit and Expo were inaugurated by Shri S.M. Krishna, Governor of Maharashtra. Dr V. Prakash, Director, CFTRI; Shri T.C. Venkat Subramanian, CMD, Exim Bank; Dr Antonio Di Giulio, European Commission, Directorate General for Research and Head, Food, Health and Wellbeing Unit, Shri Dhanraj Khamatkar, FDA Commissioner, Maharashtra; and Shri Jagadish Patankar, Director, MM Activ were present on the occasion.

The Governor in his address noted that health is a primary concern of every government and providing nutritious food to poor should be the top priority. Maharashtra being the hub of nutraceutical and pharmaceutical industry offers enormous potential for value addition, he pointed out.

Dr V. Prakash in his remarks emphasized the need for global interaction with synergy among all the players. 'Nutraceuticals would cascade into food, health and nutrition leading to food as a route of medicine in near future,' he opined.

Shri Dhanraj Khamatkar talked about the economics of pharma business and its closeness to nutraceuticals.

More than 400 delegates from nutraceutical and associated industries including a 12 member delegation from European Union participated in the summit. In the Expo, 25 domestic and international companies showcased their nutraceutical products. In the CEO conclave, R & D Heads, Biotech Companies, Policy makers, Venture Capitalists and Investment bankers participated.

The summit covered topics such as New Developments in Functional Foods for Enhanced Nutrition; Bridging Traditional Knowledge and Modern Nutraceuticals; Nutraceuticals in Disease Prevention and Treatment and Aftercare; Claims, Labelling and Policy Issues.



### Indo-US Workshop on systems, technologies and opportunities for enhanced regional air transportation in India

A workshop on Regional Air Transportation was held at Eagleton Resorts during 8-10 July 2008. This workshop was organized by the National Aerospace Laboratories (NAL), Bangalore, as part of its Golden Jubilee Year celebrations with support from the Indo-US Science and Technology Forum. Support was also provided by AR&DB and Satyam Computers. The principal investigators involved with the workshop were Dr Kota Harinarayana, Raja Ramanna Fellow, NAL and Prof. R. John Hansman, Director of the International Centre for Air Transportation, Massachusetts Institute of Technology, Cambridge, USA.

Participants included faculty from MIT, Purdue, Carnegie Mellon University, Georgia Institute of Technology, Stevens Institute of Technology, senior scientists and administrators from FAA and NASA and industry experts from P&W, Rollys Royce, Honeywell etc. Indian participants included academics from JNCASR, CSTEP, IISc, IIT-Kanpur, IIT-Mumbai, IIM-Bangalore, CSTEP, etc. Industry, was represented by RITES Honeywell India, Satyam Computers, Mahindra Aerospace, TCS, CRL, etc. In addition to NAL, R&D institutions like ADA, ADE and operators such as Air Deccan, Air India also participated. The Ministry of Civil aviation was represented by Joint Secretary, Mr Arun Mishra.

The goals of the workshop included understanding the socio-economic aspects of regional air transportation, developing a set of requirements for the type regional aircraft and associated ground infrastructure, identification of a set of core and enabling technologies and studies on the infrastructure status and future trends.

The workshop commenced with a welcome by Dr Kota Harinarayana, introduction to the workshop by Prof. John Hansman, remarks by Dr J.J. Issac of NAL and the role of Indo-US Science and Technology Forum (IUSSTF) by Dr Norman Neuriter of the IUSSTF. In the inaugural talk, Capt. Gopinath spoke about how Air Deccan was conceived and the emphasis was on regional air connectivity. Capt. Gopinath opined that the present situation with high fuel costs in fact presented an opportunity for developing turbo prop aircraft with systems and products suited to India, reducing operational costs. On behalf of NAL, Dr Satish Chandra thanked Capt. Gopinath, the US participants, sponsors and others who made this workshop possible.

Session 1 was devoted to the studies on socio-economic aspects of regional air transportation, competition from other modes of transport like railways, issues of development and economic multiplier effects from air connectivity, etc. The demography of India, the large number of

airstrips and the need to provide linkages using regional transport aircraft was discussed.

Session 2 discussed the development of a set of requirements for regional air transportation systems. Emphasis was on a systems approach and architectures for regional air transportation including operational concepts towards a conflict free, energy efficient, environment-friendly air transportation system. The session also included talks on operational issues for regional aircraft, modelling of air traffic networks and maintenance requirements of a New Generation Regional Aircraft. The session culminated with a presentation on the requirements of New Generation Regional Transport Aircraft.

Session 3 and 4 (9 July) covered the core and enabling technology. Prof. Hansman commenced the sessions with a talk on operational concepts and technological opportunities for regional air transportation. Prof Raj Reddy described concepts from the automotive sector which had used intelligent systems and their use in air transportation. Prof. Narasimha provided insights into aerodynamic concepts that would be required to enhance the performance of new generation regional transport aircraft. Discussion on fuel issues related to the environment and costs and the need for drag reduction was also held. Next generation propulsion systems were described

including reduction in fuel burn and noise levels. The sessions saw discussions on systems issues, use of multi-disciplinary optimization (MDO) approaches and optimization issues. Use of super hydrophobic coatings, integrated vehicle health monitoring, structural health monitoring — the technologies that would be required for a new generation regional aircraft. On board technologies like WAAS, synthetic and enhanced vision, information fusion were noted as important to achieve efficiencies in operation of regional aircraft apart from the use of low cost composites.

The next session commenced with Mr Arun Mishra, Joint Secretary, Ministry of Civil Aviation, describing planning for India's regional air transportation. Dr Bradford from FAA (USA) provided an overview of the air transportation system modernization in the USA, while Dr Toner from NASA discussed the role of fundamental R&D in NextGen, a concept of air transportation system for the USA. Dr Sridhar of NASA discussed simulation and optimization methods for regional traffic management. The session concluded with a talk on airport infrastructure networks.

A panel discussion chaired by Prof. Arunachalam elicited considerable response. Many participants considered the workshop of high value in terms of the topics covered and the urgent need to develop systems and technologies to ensure that regional air transportation was viable and fulfilled the desire of many communities to be connected. In particular, a number of participants supported the idea of continuation of interaction and collaboration in the area.

In Prof. John Hansman's terms, 'All of the comments I received were extremely favourable and I think a number of interesting connections have been made. I was particularly pleased that there was real appreciation on the Indian side for the need to look at the systems issues including the operational and infrastructure issues.'

Dr Upadhyya, Director, NAL, in his concluding remarks said that the workshop had proved useful to NAL and thanked all the participants from the US, India and the organizers of the workshop.

Basically, the workshop provided two major insights : (1) the system's approach to aviation (air transportation) and its value in adding efficiencies and (2) the need for core and enabling technologies that would be required to develop a next generation regional transport aircraft. It opened up possibilities of working jointly on a number of new research areas.

## Workshop on Aero-dynamics for Regional Transport Aircraft

In any aircraft design activity, aerodynamic design is the starting point. The requirements are analyzed and transformed into basic configuration. The first few things that are frozen are the wing area, empty weight, fuel weight, etc. A thorough understanding of the requirements always leads to a better design. Towards this, a one day workshop on aerodynamics for Regional Transport Aircraft (RTA) was held at National Aerospace Laboratories (NAL), Bangalore, on 19 June 2008. The ambitious RTA project aims to develop hi-tech low cost regional turbo-prop 70-seat aircraft which should be able to operate from unprepared short runways. These objectives place a stringent requirement on aerodynamic design. It also aims to incorporate laminar flow wing, which, in the presence of propeller wake results in a formidable aerodynamic challenge.

A group of experts from around the country took part in this workshop to discuss some of these issues. In all, about 55 experts attended which included representatives from IISc, JNCASR, HAL, ADA, IIT Mumbai, IIT-Kanpur, Mahindra-Plexion and Zeus-Numerix.

Dr A. R. Upadhyya, Director, NAL, welcomed the members and spoke on the plans of NAL to take up this project. Dr Kota Harinarayana spoke on the requirements and his plans to induct new technologies. He said that in view of the rising fuel price, it is now time to look back into the use of turbo-props for larger aircraft like RTA with even up to 100-seat. He also stressed the need on use of Natural Laminar Flow (NLF) wing and the need to reduce drag substantially. Prof. Narasimha gave a number of suggestions on



almost every aspect of this aircraft. He said that price of oil, increasing power of computers, environmental concerns like climate change, emissions and noise and globalization are the major factors to be considered while designing new aircraft. As regards the rise in oil price, drag reduction becomes four times more attractive. In so far as globalization is concerned, it is now necessary to go for foreign collaboration which should enable faster delivery, reduced risk and enhanced market reach (branding). He stressed on the need for aerodynamic technology that is simple in terms of first-cost but otherwise sophisticated. The aerodynamic technology must also ensure ease of maintenance. He stressed on the need for integrated aerodynamic approach. He said that NAL should launch a major CFD initiative. Finally, he said that this project has to address environmental concerns including noise and emissions (both national and international standards).

Dr Arvamudhan, NAL, presented details of various configuration studies carried out so far. He discussed the base line configuration in detail. He said that short take-off and landing were the primary design drivers. The key technologies are NLF, drag reduction using riblets, etc. and optimized wing and winglet.

Mr Vineeth of C-CADD spoke on the SARAS experience with particular focus on wind tunnel tests, estimates and flight tests. Mr Jayasimha of HAL spoke on their experience at HAL. He had a number of very practical and useful suggestions to make. He said that the design tools included CAD tools and analysis tools included CFD based methods. However, it is important to use simple models while accounting for all the effects. He was of the opinion that quality has to be built into the process. He also said that it is better to use known technology rather than depend on unproven developments. Prof. Sengupta gave a presentation on the NLF design aspects. He said that the fuselage accounted for most of the drag and hence the reduction of the same is crucial. As regards the wing, passive devices may help delay transition.

The NAL team presented results on the high lift device and propeller studies. The IISc team also discussed the high lift device analysis. Some discussions were also held on multi-disciplinary optimization. Also, experimental work from EAD was presented. Some aspects of drag reduction were presented.

Overall, the workshop provided a good platform for an engaging and exciting discussion on aerodynamic aspects related to aircraft. Experimental, design, computational and flight aspects were covered.

## Workshop on Semi Continuous Bio-Diesel Plant

The Mechanical Engineering Research and Development Organization (MERADO), Ludhiana, an extension centre of the Central Mechanical Engineering Research Institute (CMERI), Durgapur, organized a workshop on 'Semi-continuous bio-diesel plant' on 7 May 2008 at Ludhiana.

The workshop was followed by a live demo of 'Semi-continuous bio-diesel plant of 600 litres/day capacity' which has been designed, fabricated, installed and tested at MERADO. Main advantages of this bio-diesel plant are that it can produce bio-diesel from any edible and non-edible vegetable oil ('Jatropha', 'Karanj', 'Neem', 'Mahua', used cooking oil, hemp, soybean, palm and rice bran etc.) irrespective of its FFA content. These advantages make it a versatile bio-diesel plant and enhance its usefulness. Fast depleting fossil fuel resources, increasing oil prices, import burden on the country apart from environment pollution have created an imperative need to search for options such as bio-diesel.

CDr (Retd.) V.R. Dahake, Scientist Incharge, MERADO, in his welcome address highlighted facilities and capabilities of MERADO and its initiative in the field of bio-fuels. Dr K. Kundu, Project Leader, talked about the Bio-diesel plant, its salient features, advantages and scope.

The participants for the workshop were from industry and government departments.



Dr K. Kundu, Scientist (in Blue Shirt) explaining the bio-diesel plant to the participants

They included: Mr G.K. Nair, M.D., Enviro. Techno Bio Pvt. Ltd, Kochi; Dr Rakesh Sarin, Chief Research Manager, Indian Oil Corporation Limited, Faridabad; Mr R. Siva Kumar, Managing Partner, Kumar Industrial Works, Salem; Dr Abhijit P. Purohit, Senior Executive, Excel Crop Care Ltd, Bhavnagar; and Mr Pramod N. Ghaywat, Plant Manager, Chhatisgarh Bio-fuel Development Authority (Department of Energy, Government of Chhatisgarh), Prof. Kshitij Patukale, Managing Partner, Jayex Bio-fuel Processing Technologies Pvt. Ltd, Pune.

Delegates expressed their happiness and hoped that this technology for the bio-diesel plant would give a new insight into the future development of bio-diesel plants in country. Allied issues related to the bio-diesel production and its probable problems and solutions were discussed during interactive session.

Dr K. Kundu, Scientist and Organizing Secretary, proposed a vote of thanks.

## CIMAP Annual Day Celebrations

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, celebrated its 49th Annual Day at CIMAP on 26 March 2008. Presenting the glimpses of research highlights of the year 2007-08 Dr S.P.S. Khanuja, former Director, CIMAP, referred that the institute is entering the golden year (50th) with the rejuvenated vision of 'discovering the green'. He described how the A,B,C (Agro-Bio-Chemical Sciences) experts of CIMAP are today determined on multidisciplinary synergy for inventing new molecules, genes, their metabolic pathways, enzymes and even species of plants. He pointed out that now the search will not be limited only to the visible genera of higher plants but it is breaking boundaries to go deeper and micro for prospecting lower plants including micro life forms. Dr Khanuja further explained how the national gene bank scope would go deeper with cloned genes of secondary metabolites adding value to the utilization component through system biology route. The plants as source of these genes include morphine producer plant *Papaver somniferum*, artemisinin maker plant *Artemisia annua* and alkaloid reservoir plant *Catharanthus roseus*. The system's biology route is taking shape with heterologous expression of genes involved in menthol biosynthesis pathway of mints as first initiative. Biotransformations coupled with chemical semisynthesis form the other important initiative to generate high value bioactives for pharmaceutical to aroma values.

Dr Khanuja told that CIMAP's presence is now more balanced as national institute with the addition of two resource points one in north east (NEIST, Jorhat) and other in the west (IIAR, Gandhinagar) while the Resource Centres at Bangalore and Hyderabad (South) and Pantnagar and Purara (North) strengthen their visibility both in R&D and technology dissemination in biovillages. Launching of Aroma Biovillages by Minister of Science and Technology and Vice-President CSIR, Shri Kapil Sibal, gives new hopes of technology translating for



## Annual Day Celebrations



Prof. R.C. Sobti delivering his lecture

salt-affected lands in U.P. New plant varieties: CIM- Hariyali (Rosemary), CIM-Jagriti (Brahmi), CIM-Ajar (Kewanch) and CIM-Shakti (Satawar) add to the scope of commercial production by farmers in near future. Application of IT tools in agriculture is emerging as promising novel model in form of mission KHETI (Knowledge Hub for Entrepreneurship and Technology Information). The HRD effort for generating future skilled manpower is making way ahead and so is the technology licensing as a part of institute's research strategy with 56 new programmes at more than 30 locations in the country, Dr Khanuja added.

The Chief

Guest on the occasion Prof. R.C. Sobti, Vice Chancellor, Panjab University, Chandigarh, delivered his lecture on 'Genotype-Phenotype to Genomics and Phenomics – Journey of 107 years'. He said that complete genotype mapping of human population will be

required to detect susceptible genotypic not only for cancer but for other diseases also and also for studying differential responses of drugs/ chemicals & foods. Dr Sobti told that cervix cancer is the third most common cancer occurring in India. Among several risk factors for cervix cancer in women, young marriage, multiple sex partners, cigarette smoking, number of pregnancies, etc. are the major ones. Speaking on the

pharmacogenomics aspects, Dr Sobti said that people respond differently to different drugs and there are genes that control these responses. SNPs (Single Nucleotide Poly-morphism) marker can be used to identify these genes (profiles).

Exhorting upon the young scientists to take challenges in plant based drug development area based on pharmacogenomics tools, Dr Sobti said that drugs developed in foreign countries and tested on the ethnic populations of those countries may not work in our country. It is high time to use and exploit enormous material and opportunities available in our country, by the researchers to develop life saving drugs. He felt CIMAP is the right destination for drug discovery owing to its richness both in the plant genetic resources and expertise with state-of-art genomics laboratories.

The institute signed an agreement with Swaraj Herbal Plants Pvt. Ltd, Barabanki on this occasion for assigning them CIMAP

knowhow and design for manufacturing and supplying improved field distillation unit (mild steel) and CIM-Asvika (stainless steel) on non-exclusive basis. In this way a new model of 'PPP' (Public-Private-Partnership) was established to cover the



Release of HRD Calendar

beneficiaries of CIMAP in large numbers.

New publications of CIMAP, *CIMAP News letter*, *Project Planner*, and *CIMAP HRD Calender*, were released by the Chief Guest Prof. Sobti.

CIMAP staff members were awarded and honoured on this occasion. 'CIM-RACE' award was conferred on Dr AHA Farooqi, senior scientist, for his dedicated and invaluable services for enabling CIMAP towards enhancing R&D performance and achieving targeted milestones. CIM-ONE award was conferred on Shri Uma Shankar Mishra for making CIMAP stand apart on quality and performance front. CIM-FELLOW was conferred on Shri M.P. Darokar in recognition of his highly significant research contribution, establishing excellence in academics as well as scientific sphere, making visible impact and helping CIMAP stand apart on R & D front. The fellowship aims to promote the perpetual spirit of achieving excellence in work through the CIM-FELLOW to colleague members of Team CIMAP. CIM-SHREE award was conferred on Shri Hari Pal to honour the extraordinary qualities of working and dedication shown by him and making CIMAP proud of him.

## NSD Lecture at NGRI 'Sojourn of a Solitary Scientist'



Dr V.P. Dimri, Director, NGRI, presenting a memento to Prof. C. Leelanandam

Prof. C. Leelanandam former Dean, Science College, Osmania University and former Emeritus Scientist, CSIR, delivered a lecture entitled 'Sojourn of a Solitary Scientist' as part of the National Science Day Celebrations at the National Geophysical Research Institute (NGRI), Hyderabad. Prof. Leelanandam, a renowned Petrologist and Geochemist, narrated his feelings, experiences and opinion on a range of issues relevant to earth science research in the country, past and present. He narrated interesting anecdotes based on his interactions with eminent scientists and colleagues at Osmania university, Cambridge University, Gotingen and NGRI during his nearly 50 years of illustrious career. He emphasized the importance of work ethics and presented examples of how careful laboratory practices produce consistent and reproducible analytical results. He emphasized

that academic institutions should strive to create and nurture congenial research environments and underlined the need for properly coordinated team work. He opined that progress in multi-disciplinary sciences, such as earth sciences, is possible only if people with varied expertise come together in problem solving. At the present stage where fruits of advance technology make R&D much easier in terms of data acquisition, it is the integrity and proper work culture of individual scientists that defines meaningful progress. He stressed on the effective participation of the younger scientists in R&D activities.

Earlier, Dr V.P. Dimri, Director, NGRI, welcomed the Chief Guest and reiterated the background and importance of Science Day Celebrations giving details of the International Year of Planet Earth 2008, launched on 12 & 13 February at UNESCO Head Quarters, Paris.



## CSIR Rural Gallery inaugurated at AMPRI

Within its overall mandate, CSIR has evolved a plan for its own orientation to rural development programme in some select areas of focus during Xth Five Year Plan and brought out a focused programme called Rural Action Programme (RAP). The programme is largely concentrated on the effective dissemination modes of prominent rural technologies by setting up of permanent Rural Galleries. Prof V.L. Chopra, former Director General, ICAR and Member Planning Commission, inaugurated the First CSIR Rural Gallery at Advanced Materials and Processes Research Institute (AMPRI), Bhopal, on 28 March 2008.

The gallery at AMPRI has been planned to showcase the prominent CSIR rural technologies for their outreach. It includes five theme showcases and 15 individual laboratory showcases. The theme showcases are the places where collective technological models of various laboratories are placed based on various themes, viz., Natural Fibres, Leather, Ceramics and Handicrafts, Food Technologies, Medicinal and Aromatic Plants. The individual showcases hold various rural technology produces/models of 15 CSIR laboratories namely CIMAP, IIM, IIP, AMPRI, CLRI, CSIO, CFTRI, CGCRI, IHBT, NIIST, CMERI, IIMM, SERC, CBRI and CSMCRI.

On this occasion, Prof. Samir K. Brahmachari, Director General, CSIR laid the foundation stone of a new building complex to be constructed under the extension



Seen (from right) in front row, after the inauguration of the CSIR Rural Gallery at AMPRI are: Prof. V.L. Chopra, Member Planning Commission; Prof. S.K. Brahmachari, Director General, CSIR and Dr N. Ramakrishnan, Director, AMPRI

programme of AMPRI.

The dignitaries, present on the occasion, witnessed the progress made under various R&D activities of the institute and appreciated the work being done in various areas at AMPRI, showcased in the exhibition.

Prof. Chopra in his address appreciated the work being done by AMPRI scientists and underlined that there is a great commitment in them and they are enjoying what they are doing.

Speaking on the occasion, Prof. S.K. Brahmachari, said that scientists of CSIR are recognized across the world. Science is a profession which depends on how rewarding it is, the way you look at the job you are doing. He said, "Being a biotechnologist, I wanted to put India on the Genome Map and I have succeeded in it." He

exhorted AMPRI scientists to work on bio-mimetic materials.

Earlier, Dr N. Ramakrishnan, Director, AMPRI, highlighted background of AMPRI and underlined the present R&D activities being pursued at the institute.

A CSIR – Planning Commission meeting was organized at AMPRI. From Planning Commission, Prof. V.L. Chopra, Member; Shri A.K. Verma, Advisor (S&T); Shri R.K. Gupta, Joint Advisor (S&T); Dr D. Bharadwaj, Deputy Advisor (S&T) and from CSIR, Prof. Sameer K. Brahmachari, Director General; Ms. Sheila Sangwan, Financial Advisor; Dr Naresh Kumar, Head, RDPD; Shri C.S. Malick, Sr. Dy Financial Advisor; Dr S.K. Sinha, Scientist, RDPD and Dr Ashwani Gupta from DSIR attended the meeting.



## Delegations to CFTRI

The various delegations to the Central Food Technological Research Institute (CFTRI), Mysore, include:

### Delegation from NSTDA, Bangkok

A delegation of five members led by Dr Sakarindr Bhumiratana, President, National Science and Technology Development Agency, Bangkok, visited CFTRI on 5 March 2008. The visit was undertaken by the Thai Government delegation to help them formulate a national policy and strategy on science and technology innovations with a futuristic vision. The team had discussions and exchange of thoughts on S&T developments and HR activities with the CFTRI team.

### Delegation from INRA, France

A scientific and technical delegation of nine members from French National Institute for Agricultural Research (INRA) and - French Agricultural Research Centre for International Development (CIRAD) visited CFTRI on 3 January 2008. The team was led by Dr Xavier Leverve, Scientific Director for Human Nutrition and Food Safety. Discussions were held on human nutrition, food safety, knowledge sharing and societal impact through long-term scientific linkages. The delegation visited various facilities of technological excellence in the institute.

### Delegation from Toulouse Agriculture Centre, France

The team consisting of Dr Marie Lummerzheim, Dr Fargier and Dr Picavet from Toulouse Agriculture Centre (France) visited CFTRI on 16 January 2008. The team had discussion mainly on forging a consortium for collaborative research projects which could strengthen linkages between Toulouse Agriculture Campus and CFTRI in areas of Human Resource and Capacity Building programmes related to food science and technology.

### Delegation from University of Wisconsin Faculty

A seven-member delegation from University of Wisconsin, River Falls, USA, made a study visit to CFTRI on 12 January 2008 as part of their curriculum activities. The delegation consisting of Dr Madsen, Dr Nechville, Dr Carlson, Dr Kroutil and Dr Gallenberg went around some of the facilities such as CFTRI Show case, Central Instruments & Service Facility and Food Engineering Centre, at CFTRI.

## Dr P.S. Ahuja takes additional charge as Director, CIMAP

Consequent upon the voluntary retirement of CIMAP Director Dr S.P.S. Khanuja, Dr P.S. Ahuja, presently Director of Institute of Himalayan Bioresource Technology (IHBT), Palampur (HP), has taken additional charge of post of Director, CIMAP with effect from forenoon of 1 July 2008 till a new appointment of regular director or further order which ever is earlier. In the morning both Dr Khanuja and Dr Ahuja planted a sapling of Champa which was coined as 'Umang' tree. It may be recalled that Dr Ahuja had earlier worked at CIMAP and established the Plant Tissue Culture Laboratory. Dr Ahuja has made outstanding contribution to conservation and genetic improvement of medicinal and aromatic plants of the country using cell culture and molecular techniques. Working at CIMAP, his group released the first somaclonal variety of *Citronella java* named CIMAP Bio-13 which is widely grown by the farmers in Terrai region of Uttar Pradesh and Assam.



Dr Ahuja lauded the contribution made by the outgoing Director Dr S.P.S. Khanuja and said that he would also make all efforts towards taking CIMAP to new heights of progress in the field of medicinal and aromatic plants (MAPs). As Director, IHBT, Dr Ahuja has played a key-role in the introduction of new crops such as Stevia/Ginkgo/Lavender and many important MAPs in the region. This has led to effective diversification and employment generation in the rural areas.



# Announcements

## CRR I TRAINING PROGRAMMES FOR THE YEAR 2008-2009

TITLE OF THE COURSE	DURATION WITH DATES	COURSE FEE	COURSE COORDINATORS
<b>A. PAVEMENT ENGINEERING &amp; MATERIALS</b>			
• Rigid Pavements and Paver Blocks : Design, Construction & Quality Control Aspects	08-12 Sep., 2008 (5 days)	Rs. 6000/-	Dr. Renu Mathur
• Pavement Evaluation Techniques and their applications for Maintenance and Rehabilitation	03-07 Nov., 2008 (5 days)	Rs. 6000/-	Sh. B.M. Sharma
<b>B. ROAD DEVELOPMENT PLANNING &amp; MANAGEMENT</b>			
• International Course on Dissemination of HDM-4	13-24 Oct. 2008 (10 days)	Rs. 25,000/-	Dr. D. Mukhopadhyay
• GIS Application in Planning and Management of Rural Road Network	19- 23 Jan. 2009 (4 days)	Rs. 6000/-	Dr. B. K. Durai
<b>C. GEOTECHNICAL ENGINEERING</b>			
• Geotechnical and Landslide Investigations for Highway Projects	25-29 Aug., 2008 (5 days)	Rs. 6000/-	Sh. Sudhir Mathur
<b>D. BRIDGES &amp; STRUCTURES</b>			
• Bridge Diagnostics, Performance Evaluation and Rehabilitation	21-25 July 2008 (5 days)	Rs. 6000/-	Dr. Ram Kumar
<b>E. TRAFFIC &amp; TRANSPORTATION PLANNING</b>			
• Traffic Management and Safety	07-11 July, 2008 (5 days)	Rs. 6000/-	Sh. Subhash Chand
• Aspects of Transportation Planning and Environmental Impact Assessment Studies for Roads	09-13 Feb., 2009 (5 days)	Rs. 6000/-	Dr. Purnima Parida

### Customized Tailor Made Programmes:

In addition to the above CRR I also organises customized tailor made programmes as per the clients requirements.

**Course Fee:** The course fee as indicated above is payable in advance by crossed bank draft in favour of 'Director, Central Road Research Institute, New Delhi'.

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