

**INTERNATIONAL DEMONSTRATION-CUM-TRAINING WORKSHOP ON FIBRE –  
REINFORCED COMPOSITES, NATIONAL AEROSPACE LABORATORIES  
(NAL), BANGALORE (INDIA), SEPTEMBER 15-19, 1998**

**PARTICIPATING COUNTRIES: 9**

**NUMBER OF PARTICIPANTS: 14**

Composites are among the priority areas of the NAM S&T Centre and Fibre Reinforced Composites are emerging as one of the fields with wide applications in transport and aerospace industries, among others. In this connection NAM S&T Centre organised a 5-day International Demonstration – cum -Training Workshop on Design and Development of Fibre Reinforced Composites at the National Aerospace Laboratories (NAL), Bangalore during September 15-19, 1998 jointly with the Committee on Science and Technology in Developing Countries (COSTED) of the International Council of Scientific Unions (ICSU).

One representative each from Egypt (Prof. Dr. Olfat Yassin Ali Mansour of the National Research Centre, El Dokki), Malaysia (Mr. Ismail Bin Ahmad of SIRIM Berhad), Mauritius (Dr. Brij Kishore Baguant of the University of Mauritius), Nepal (Prof. Dr. Tulsi P. Pathak of the Research Centre for Applied Science and Technology, Kirtipur) and Zimbabwe (Mr. Beaven Masvaure of SIRDC, Harare), two representatives each from Bangladesh (Mr. M. Fazlur Rahman, Secretary to the Government of Bangladesh in the Ministry of Science and Technology and Vice-President of the Governing Council of the Centre and Dr. K. M. Idriss Ali of Bangladesh Atomic Energy Commission), Sri Lanka (Dr. V. T. L. Bogahawatta of the National Building Research Organisation, Colombo and Mr. J. T. S. Motha of the Industrial Technology Institute, Colombo) and Indonesia (Dr. Sulaeman Kamil, Assistant Minister for Research and Technology and Dr. Bambang Kismond Hadi of the Bandung Institute of Technology) and three representatives from India (Dr. S. A. R. Hashmi, Mr. J. Prabhakar and Dr. O. P. Modi of the Regional Research laboratory, Bhopal) attended the demonstration-cum-training workshop. The nominees of Iraq, Pakistan, Uganda and Zambia however could not participate in this event.

Apart from introduction to composites and to design analysis structures, the workshop included presentation on materials i.e., resin and fibres, tooling techniques and fabrication methods, nondestructive evaluation and quality aspects, filament winding technology, jute-based and wood plastic composites, civil engineering structures, material characterization for light aircraft development and also design tutorials. The practical demonstration included those relating to Hand Lay-Up methods - Civil Engineering Products, Resin Transfer Moulding Technique, Vacuum Bagging and Autoclave Tools. The

workshop faculty included Mr. M. Subba Rao, Mr. M.K Sridhar, Dr R.M.V.G.K. Rao, Mr. S. Ravi, Dr. Ramesh Sundaram, Mr. Anoop Jharia, Dr. M.R. Madhava and Mr. D.V. Venkatasubramanyam from the National Aerospace Laboratories (NAL), Prof. S.K. Nema from Molecular Research Centre, Jabalpur, Dr. Thallak G. Sitharam of Indian Institute of Science (IISc), Bangalore, Dr. R. Gopalan from RV-TIFAC Composites Design Centre and Dr. K.M. Idriss Ali from Bangladesh Atomic Energy Commission. Dr. B.R. Somashekar, Advisor, NAL acted as Workshop Director.

Dr. K. M. Idriss Ali (Bangladesh), Dr. Olfat Yassin Ali Mansour (Egypt), Dr. Bambang Kismond Hadi (Indonesia), Mr. Ismail Bin Ahmad (Malaysia), Dr. V.T.L. Bogahawatta and Mr. J.T.S. Motha of Sri Lanka and Mr. Beaven Masvaure (Zimbabwe) made Country paper presentation.

Mr. M. Fazlur Rahman, Vice-President of the Governing Council of the Centre and Secretary, Science and Technology, Government of Bangladesh, formally inaugurated the workshop. He referred to the S&T imperatives for developing countries and mentioned that we need a knowledge-based transformation, which will invigorate our S&T initiatives. This transformation will involve the development of trained personnel, rapid induction of low, medium and high technologies, understanding the mechanisms of technology transfer, which are getting increasingly complex, and reinforcing the bonds of S&T cooperation. Expressing his happiness that the Workshop would promote the wider application of the versatile composites, where many of us still lack the modern touch, Mr Rahman went on to draw an interesting parallel between the logic of the formation of composites and of the non-aligned movement, such as like composites, NAM reinforces the strength of its individual constituents.

Dr T.S. Prahlad, Director of NAL warmly welcomed the participants to NAL and in his presidential address he explained why he considers NAM's S&T movement to be especially significant. "For historical reasons, most of the NAM member countries missed the industrial revolution. But can we afford to miss the new revolutions in materials, IT-microelectronics and global communication?" he asked. "NAM countries must build their own core S&T strength if they are to participate in these emerging revolutions". Declaring his support for such cooperative ventures, Dr Prahlad presented a quick overview of NAL's strengths in composites, where India would welcome cooperation with other developing countries.

A message from Dr. R. A. Mashelkar, Director General, Council of Scientific & Industrial Research and Secretary to the Government of India was read at the conclusion of the Inaugural Session, wherein he iterated that composites are the materials of the next millennium and he hoped that the Workshop would stimulate collaborative research between the NAM countries.

The vote of Thanks by Dr. Somashekar, Adviser, NAL and workshop Director proved to be an illuminating commentary on the role and possibilities of composites. The only limiting factor appears to be our imagination and the opportunities offered by composites are exciting and infinite. Dr Somashekar explained how composites provide answers to many socio-economic problems, e.g. wood substitution. The Inaugural ceremony ended with the promise that the Workshop would enable participants to design their own product of interest.

The workshop participants also attended the Aeronautical Society of India annual lecture delivered by Dr. APJ Abdul Kalam, Director General Defence R&D Organisation and one of the pioneers of fibre reinforced composites in India. He is presently the Honourable President of the Republic of India.