

Interview with Mr. Soumitra Biswas, Advisor & Head-Advanced Composites Programme of TIFAC, New Delhi



Mr.Soumitra Biswas

About TIFAC

TIFAC (Technology Information, Forecasting and Assessment Council) was registered as an autonomous organization under the Society's Act, 1861 in February, 1988 under the aegis of Department of Science and Technology, Govt. of India. TIFAC was mandated with the assessment of state-of the art technologies and set directions for future technological development in India in key socio-economic sectors.

As unique knowledge network institution in India, TIFAC activities encompass a wide array of technology areas and fill a critical gap in the overall Science & Technology system of India. In the last twenty five years, the organization has carried out technology foresight exercise, facilitated and supported technology development projects, prepared technology linked business opportunity reports and implemented mission-mode programmes.

1) What are the problems faced by the small scale industry in India for technology development in composites?

The technology development, its further adaptation and application have never been a very straightforward process. A successful technology innovation requires a strong interactive mechanism complete with the feedback loop for various stakeholders viz. industry, extraneous knowledge sources, inspection & certification agencies and most importantly, the users or the market. The small & medium enterprises (SMEs) play a crucial role in Indian industry. Finance has been recognized as an important driver for such process for the SMEs and the cost of funds should be attractive enough for them for investing in projects involving technological risks. They are often beset by multi-faceted problems, which include the following:

- inadequate infrastructure facilities
- availability of skilled labour
- access to market
- in-house technical & managerial capabilities
- long product development cycle
- extraneous knowledge support
- lack of standards & certification process in some cases
- their internal resistance to change....

2) The Advanced Composites Programme of TIFAC has played a crucial role in promoting composites in India towards development of indigenous technologies. What have been your initiatives for the Indian composites industry?

The Advanced Composites Programme has worked closely with micro, small & medium enterprises (MSMEs) towards developing composite products and processes on-site with technology support sourced from the centres of excellence, leading technology institutions and national laboratories. The technology partners provided support in terms of design, material selection, process optimization, equipment specifications & procurement, prototype development and product testing towards user acceptance. Attractive financial packages, technological risk sharing, market related interventions, strong programme management and knowledge-based project monitoring by experts helped the industry in reducing the product development cycle. These have been critical elements in nurturing technology towards prototype development and subsequent commercialization. The products developed with upgraded technology are successful in replacing some of the imported ones with better efficiency & enhanced life. The programme also facilitated skill development and enhancement for the industry personnel.

Composite products were developed by using varieties of fibres and resin systems along with the development of special purpose fabrication, testing equipment and sophisticated design software. The programme was instrumental in creating good business opportunities in composite applications in the domestic and overseas markets. The industry partners for the programme achieved strong and profitable growth (10 to 30% of increased revenues per year generating 10 to 40% of return on capital employed).

3) What had been the effective approaches for public-private partnership in technology innovation as promoted under the Advanced Composites Programme?

For the successful technology development, the Advanced Composites Programme kept the industry at the heart of all the actions namely, product conceptualization & design, assets creation for prototype development & in-house testing and finally large-scale replication for wider induction. The knowledge partner were involved during the product development cycle for providing support to the industry for successful development of the prototype. The programme also involved key persons from the user groups, certifying agencies etc. in the project monitoring mechanism for effective project management, technology support, product evaluation etc. Such user driven project monitoring has been the cornerstone of project management initiatives by TIFAC and it has greatly helped in improving the market reach of products and their acceptance in the shortest possible time. Thus, the projects were conceptualized with clear time bound objectives and most of them were completed with successful product development.

4) Tell us about the products developed successfully with support from TIFAC

The programme made a visible impact on Indian Railways. Many projects were launched focusing composite applications especially for railways including gear-cases for diesel & electric locomotives, axial-flow fans for diesel locomotives, sleepers for railway girder bridges, modular toilets & FRP doors for passenger coaches, composite interiors for railway coaches & diesel loco driver's cabin. These products after meeting the stringent technical and safety requirements were inducted on a large-scale by the railways, thus enhancing the confidence levels in the industries as well as R&D establishments to promote commercialization of composite technologies.

Composite houseboats, developed for the backwaters of Kerala consumed about 19 tons of composites for the hull, deck and the superstructure, thus making the houseboat one of the largest composite products in the country.

India's first filament wound composite road tanker for horizontal mounting on truck was developed under the programme.

Another milestone achievement has been receiving the prestigious certificate from American Petroleum Institute (API) for developing filament wound composite pipes and pipe-fittings. This has been first of its kind in South Asia and 17th in the world to have API certificate for glass reinforced epoxy pipes for offshore & onshore applications for the oil & gas sector.

An endoskeleton type below-knee composite artificial limb, developed under the programme bagged the prestigious National R&D Award in 2001 from DSIR.

5) A few words on the Centre for Excellence in India on Composite Technology set up by TIFAC

Apart from developing such specific composites applications, *centres of excellence* for assistance in design, prototype development, product evaluation and for technology transfer & absorption by the Indian composite industry were also set up.

RV-TIFAC Composite Design Centre (CDC) was set up in partnership with RSS Trust at the RV College of Engineering Campus, Bangalore. This was a unique experiment towards academia-industry consortium for enhancing the indigenous design development capabilities in composites. CDC has developed over 500 composite products for building & construction sector. The technology for composite door was and is further being transferred to industries by the Centre. The Centre is now taking up in-house & sponsored product development activities.

Composite Technology Centre (COMPTEC) was set up at IIT, Madras with a focus to help the industries with material research & development, product design, manufacturing technology, prototype development and quality assurance in industrial production. The Centre was engaged in design and development of select composite products having high-value and also high-volume requirements in the country. The Centre has provided technical guidance, design consultancy, prototype development, other technical support to the industries. The Centre also conducted short-term courses under continuing education programmes etc. Various characterization & testing equipment were installed at the Centre. The Centre had carried out various testing assignments from the industries on chargeable basis.

The **Composite Applications Laboratory (CAL)** was set up at the Dept. of Chemical Engineering, IIT Kharagpur. CAL has been conceptualized as an *industry focused & industry oriented* Centre of Excellence to extend technology support in composite product design & fabrication along with process optimization, QA & QC requirements etc. The state-of-the-art manufacturing and testing facilities have been established to meet the needs of industry. Modern fabrication techniques available with IIT includes *6-axes filament winding system* complete with 60 Tons *hydraulic extractor* unit & *CADWIND software*, gel coater system and vacuum assisted *resin transfer moulding* (VARTM), 100-tons *compression moulding system*. The core services being offered by CAL at IIT include carrying out a few high-end research projects sponsored by the industries, using the equipment for prototype development by industries, product & process design support for composites etc.

Towards imparting adequate knowledge on composite technology to their students, a 3-0-3, 5-credit course on '*manufacturing & characterization of polymer matrix composites*' is being offered to final year B.Tech & first year M.Tech students in the spring semester (commenced in January 2007). This has been planned as an inter-disciplinary programme for students from departments of chemical, aerospace, material science & mechanical engineering.

6) How TIFAC can provide technical and financial support to small players in India?

A technology innovation support programme, called SRIJAN, is being implemented by TIFAC in partnership with SIDBI with the objective of scaling up technology innovations which are yet to be proven at commercial scale. Under this programme, funds are being provided to industries particularly MSMEs for scaling-up/commercialization of technologies pertaining to novel/innovative product or process to prove the techno-economic viability of commercially unproven technologies. This would encourage industries to pursue high-risk innovations and bring the technology to the market, opening up new business opportunities in emerging technology areas.

For the project proposals under the programme, TIFAC carries out technology assessment through its in-house and networked resources, whereas SIDBI is responsible for the financial appraisal, thus synergizing the core competencies of both. The financial assistance from the TIFAC-SIDBI programme is limited to maximum 80% of the approved project cost with minimum 20% to be contributed by the promoter. The assistance as loan would normally be not more than Rs.100 lakhs for each project and would attract simple interest @ 5% per annum.

More details on the programme can be accessed from

http://tifac.org.in/index.php?option=com_content&view=article&id=790&Itemid=1384

7) Tell us a few words on the future composites applications

Globally, composite technology and its applications had made tremendous progress during the last two decades as evident from the present level of consumption of composite materials. The technology for **thermoplastic composites** and its products has widely been demonstrated & utilized in many developed countries. Further, **natural fibre composites** find excellent application as building materials, packaging etc. In modern construction practices, composites are globally used in bridge-decks, pre-formed structural shuttering, fascia claddings, partitions, sandwich panels, flooring etc. Modular composites structures for rehabilitation, project site offices, special purpose cabins & kiosks, ready built toilets for large congregations etc. merit attention in India. The efforts have been insignificant so far in the country for developing such technologies. Technology transfer from developed countries is an expensive proposition when India has good expertise in polymers & composites.

Consumer & sports goods are promising applications for composites worldwide though currently there is hardly any usage of composites in the sector in India. For a growing world market of leisure & sports goods, India needs to direct efforts for the development of composite applications. Similarly, composites can capture more than 50% of the market in the next 5-6 years in **marine sector** if such technology development exercise could be enhanced in partnership with research/academic institutes & industry due to improved life-cycle costs and enhanced safety of using composite for marine applications.

A brief Bio data of
Mr.Soumitra Biswas
Adviser/Scientist-G
TIFAC, Vishwakarma Bhavan
Room # 405, 4th. Floor, 'A' wing, Shaheed Jeet Singh marg,
New Delhi.-110016
Ph: +91 - 11- 2686 3816
Email: soumitra03@hotmail.com; soumitra2000@gmail.com

Academic Qualifications

Two-year Post Graduate Programme in Management from Indian Institute of Management (IIM) Calcutta.

Master of Technology (M. Tech) in Chemical Engineering from Indian Institute of Technology (IIT) Kharagpur.

Bachelor of Technology (B. Tech-Hons.) in Chemical Engineering from IIT Kharagpur.

Professional Training Programmes

One-week training program on Technology Management in February, 1994 at the Indian Institute of Management, Bangalore

Three-week training programme in the International Workshop on R&D Management, organized jointly by the Korea International Cooperation Agency (KOICA) and Korea Industrial Technology Association (KITA) in Seoul during Aug 25 - Sept 12, 1997 and presented the country paper on 'R&D in Industry: Indian Scenario'.

Present Responsibilities

As Head of the **Advanced Composites Programme** of TIFAC, Mr. Biswas is primarily involved in developing indigenous capability in design & development of novel composite products, development of raw materials for composites and also the process technology. 45 industry oriented & demand driven projects in composite applications have been launched under the programme in active collaboration with the research institutes and industries in India. More than **25 composite products** have been developed and commercialized. The products cater to key sectors such as **railways & automobiles, biomedical & orthopaedics, building & construction, chemical process industry and other industrial applications.**

Mr. Biswas also heads the recently launched TIFAC programme on **Bioprocess & Bioproducts** encompassing the technology thrust areas viz., ethanol from ligno-cellulosic biomass, biodiesel, biomass pyrolysis, bio-hydrogen, speciality chemicals, bio-polymers, enzymatic conversion etc. Under the programme, technology development & demonstration projects in collaboration with the Indian SMEs, national labs and academic institutes are being explored for biomass utilization and bio-chemical conversion.