Concept Paper

Composite Materials Institute
(CMI)

Technology Upgradation and Skill Development Company
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(A company setup under Section 42 of Companies Ordinance 1984 having capital share)

Background:

Over the past few decades, Pakistan's sports goods manufacturing industry has earned a global reputation for producing good quality products. Conventionally, sports items are made from wood, metals and other materials. However, recently the trend is changing and engineering materials are in a phase of transition towards composite materials also called 'composites'.

Pakistan's exports in recent years show a reasonable share contributed by the sports goods manufacturing sector. Export target for 2005-06 was US$ 389 Million while the export value for the same period was US$ 348 Million (2.11 % share in country's overall exports). Earlier in 2004-05 the exports from sports goods sector were worth US$307 Million. Although the trend is showing a small increase, in reality the sector is critically threatened by the rapidly increasing global demand for composite materials based goods. China and Taiwan are snatching the high-end of the market that was traditionally supposed to be captured by the manufacturing units in Sialkot.

Today's sport goods industry has huge demand for composite materials.- Some applications.

Current facilities available in the cluster are not up to the mark and the techniques and processes employed are outdated. Attempts have been made by the manufacturers to obtain machines and processes fro the Far-East but only partial technology transfers have materialised. The sector shows little prospects of matching the global quality requirements with their available facilities and factory set ups.

In view of this daunting scenario, immediate steps are required to technologically upgrade the sector to cope with the new trends in sports goods materials. However, since composites have earned the position of 'new era' engineering materials, it is recommended that the scope of an upgradation activity should not be restricted to the sports goods segment only, rather the applications of composites should be open for all sectors.

Current facilities for composites based manufacturing are dilapidated

This will open new opportunities for the manufacturing and engineering sector and new product development activities other than the sports items will become possible. Further, this project will pave the way to many other initiatives leading to development and application of composite materials indigenously. Composites are revolutionising industrial and advanced engineering materials. There will be a replacement of conventional materials and this offers Pakistan an opportunity to set up appropriate composite material manufacturing in the country.

Vision:

Set up Composites Manufaturing Institute (CMI) in Sialkot to provide technological support to the manufacturing industry in the domain of composite materials with the primary focus on the following:

1. Carbon fibre manufacturing in Pakistan at economy of scale production.
2. Introduction to latest composite materials that can help improving product quality and strength in different aspects and meet global demand.
3. Introduction and demonstration of processes for composites based manufacturing of sports goods (as pilot project).
4. Provision of material and product testing facilities.
5. Technical training to the workforce as per the industry's requirements.

Outputs:

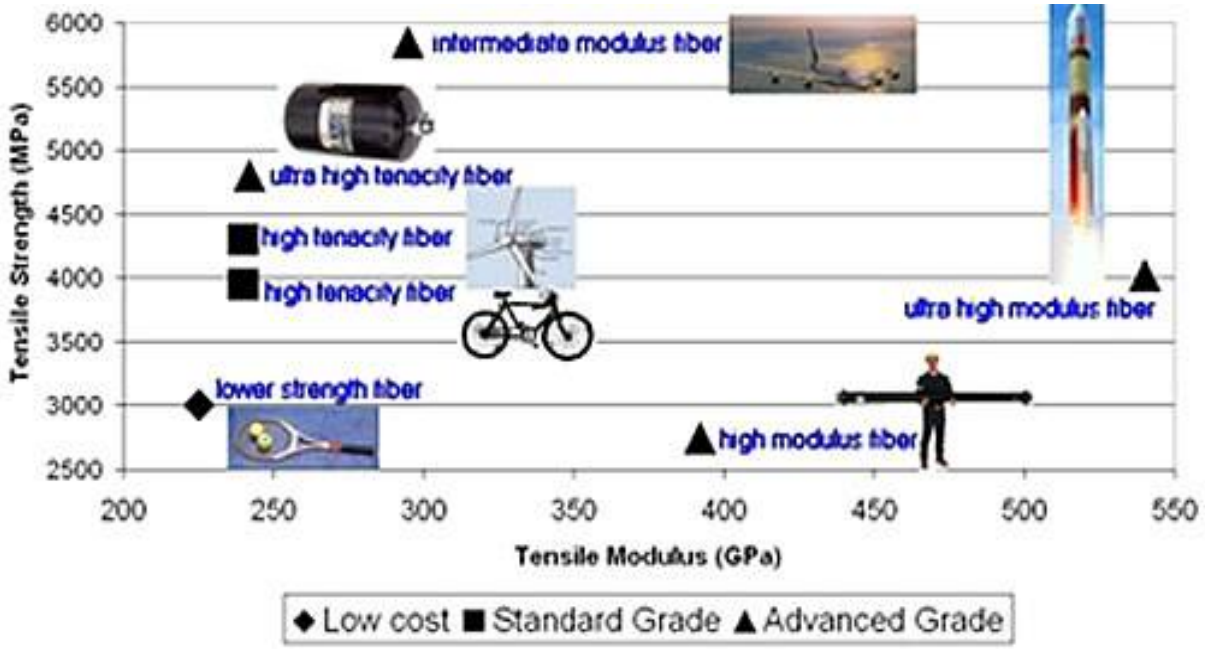
In order to accomplish the vision, a support centre would be established. This centre will serve as the hub of all upgradation activities and pivot point of the project. The project will have following four major outputs:

a- Material Development Wing:

CMI is envisaged to be country's top-notch source of carbon fibres and polymer matrix composite materials reinforced with carbon fibres manufactured indigenously. This will not only help in ensuring a reliable supply of raw materials to existing composites based industry but will also attract new industrial players to plunge into the production of more diversified products made from composite materials. Polymer matrix composite materials with carbon fibre reinforcement find their usage in a variety of industrial applications. Higher the product value better is the grade of carbon fibre required to be used.

Kevlar, trademarked fibre developed by Dupont in 1965

CMI will start with the manufacturing of low grade carbon fibre as technically lesser sophistication will be involved in the process. With the passage of time and continuous improvement plans the facility can be upgraded to produce higher grades of carbon fibre and with more advanced applications as per industry requirements.



Industrial applications of composite materials with reference to various grades of carbon fibre.

CMI will establish a research and development facility that will focus on development of new materials in line with the requirements of sports goods industry initially and other areas subsequently.

b- Prototype Development & Design Services Wing:

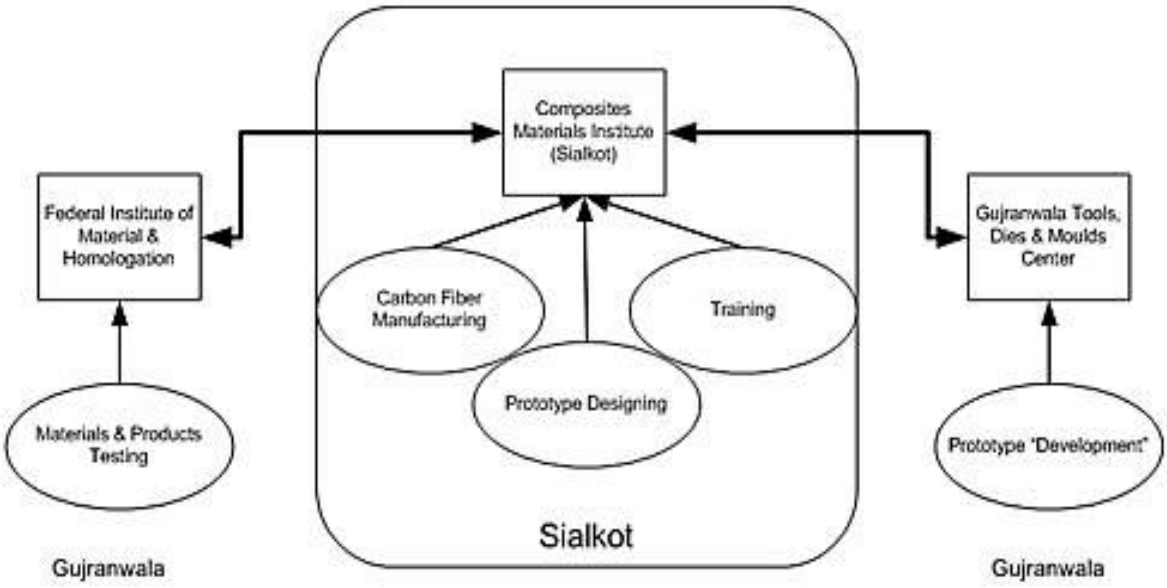
CMI will also cater for product design and development requirements. Sports articles (and subsequently other products) will be designed by qualified designers. This will pave the way towards bringing innovation to 'Made in Pakistan' products as well as manufacturing items that more stringently comply with customer design demands or standard specifications (for example, hockey stick specifications as defined by FIH). Access to CAD/CAM facilities will be ensured. Prototype manufacturing facility at CMI will complement this concept of product development by ensuring production viability of any innovative idea or sophisticated product.

c- Testing Wing:

Material and product testing facilities will help manufacturers in ensuring compliance to any material specification demanded by their customers as well as final product testing. Composite materials were developed with an objective to have different physical and chemical properties as obtained from different constituent materials. The centre will cater to the requirements of analytical testing in order to verify the precise compositions in raw materials. Further the final product testing to comply against any certification requirements will also be provided.

d- Technical Training Wing:
A significant aspect of introducing a new technology to an industrial cluster is the proportional availability of trained workforce. Sector wide transition to composite material based sports ware will mark the beginning of a total technology change and will create a void for skilled labour. The centre will therefore provide adequate training facilities for the workforce. Worldwide renowned researchers and experts will be invited to deliver lectures and conduct training sessions and seminars to help the technical staff. These experts will also address problems faced by the industry in technological perspective and propose feasible solutions or guide them accordingly.

General Operating System:
A generalized model is presented focussing on integration or synchronization of this proposed centre with other projects planned by TUSDEC.



Distribution of "synergised activities" of the centre

The material and product testing facilities planned to be provided in TUSDEC's Federal Institute of Material & Homologation (FIMH) in Gujranwala will also cater for the composite sector testing needs. For prototype development, partial activities like mould or die making etc which require precision CNC machining or other equipment can be handled in the Gujranwala Tools, Dies and Moulds Centre (GTDMC). However, designing and product design analysis will take place in in CMI.

In order to elaborate the operations of the proposed centre, it will be useful to first give a brief account of the projects with which integration can be considered viable for the success of CMI.

Federal Institute of Material & Homologation (FIMH):

Located in Gujranwala, FIMH envisions becoming a modern testing entity for raw materials being used in various industries in the region in order to meet challenges of reliability in testing and certification, as per national and international norms. FIMH will provide consultancy to improve product design in order to comply with international standards to enhance product quality and its global acceptance. Initially the product testing services will cover surgical instruments and home appliances but later the scope can easily be broadened to include composite materials based sports items or other products. Geographically, Gujranwala is located close to Sialkot, therefore no critical logistics problem will hinder the integration of services with the Composite Materials Institute planned for Sialkot.

Gujranwala Tools, Dies & Moulds Centre (GTDMC):

GTDMC is being set up to provide the Gujranwala industry with design and technical assistance, in addition to training on modern technologies. The centre will be a Common Facility Centre equipped with modern machine tools and equipment required for precision based machining operations. Some examples of the manufacturing facilities to be provided in include Rapid Prototyping, CNC machining, EDM wire cutting, EDM die-sinking, Coordinate Measuring , 3D Scanning, heat treatment, Surface treatment, electroforming, precision grinding, mould welding, laser cutting and engraving and electro chemical machining. Such a versatile manufacturing setup can be of great help especially for the mould making activities as required for composite products manufacturing.

Location:

Composite Materials Institute is planned to be located in the Silakot area and in reach of TUSDEC.s Gujranwala Tools, Dies and Moulds Centre (GTDMC) and Federal Institute of Materials and Homologation (FIMH).