Raina Industries Pvt. Ltd. wins National Technology Award 2021

Successful Commercialisation of Textile Reinforced Concrete

On the auspicious occasion of the National Technology Day on 11th May 2021 in India, the Technology Development Board (TDB), which is a statutory body of the Department of Science & Technology (DST), Government of India presented awards to industrial concerns, MSMEs and Start-ups who have successfully commercialized a technology. According to the Technology Development Board, the award is conferred upon that innovator who on the day (May 11) has managed to successfully develop and then commercialize an indigenous technology. Each year there is a different theme for celebrating this important day in the history of India. The theme is decided by the Technology Development Board (TDB), Govt of India. **"Science and Technology for a Sustainable Future"** is the theme for 2021. **This award for the year 2021 has been conferred upon Raina Industries Private Limited, Mumbai, India.**

Raina Industries Private Limited, Mumbai, India, indigenised Textile Reinforced Concrete and deals with the manufacture and sale of textile reinforced concrete pre-cast elements for the building and construction sector. The development of the innovative composite material Textile Reinforced Concrete (TRC) provides a new way of construction with non-corrosive reinforced elements, such as alkali-resistant glass (AR-Glass) or carbon. Consequently, the necessary concrete cover can be reduced significantly. Only a few millimeters are required to guarantee a good bond behavior between the concrete and the textile reinforcement. As a result, thin construction elements can be realized, which are impressive due to their little weight and slenderness. Also, the use of fine concrete with a maximum grain size of 8 mm allows sharp-edged parts and architectural high-quality surfaces.

Textile Reinforced Concrete (TRC) is a composite material consisting of high-strength fine-grained concrete and textile reinforcement which is mainly fabricated of AR-glass or carbon fibers. Since 1998, the Collaborative Research Center 532 (called SFB 532) at the Institut fuer Textiltechnik, RWTH Aachen University, Aachen Germany has been investigating the basic principles of TRC. The application of TRC allows economic savings in terms of material, transport, and anchorage costs and thus has been severally used for thin-walled and lightweight ventilated façade systems in recent years. After the initial 12 years of research in TRC, the material was open for application in various application fields. Public-Private Partnership Projects have been undertaken and Pilot Buildings set up for applications ranging from foot-over- bridges to Sandwich and ventilated facades. The material has proven itself and has the necessary permissions as well. **TRC currently faces a tremendous market pull in the Indian sub-continent due to its manifold advantages.**

The Challenge - A major challenge faced by steel-reinforced concrete is the corrosion resistance of the steel in the coastal areas of India. India has a coastal line of coastline of 7,517 km and 4500 km of Inland waterways. The temperature in the coastal regions often exceeds 30 °C (86 °F) and is coupled with high levels of humidity. Annual rainfall

in this region averages between 1000 and 3000 mm. These extreme climatic conditions have a great effect on the reinforced structures. Hence, the reinforced structures have to be replaced and restored every couple of years. A sustainable material for solving this problem was not available in India.

The Solution @ **Raina Industries -** In order to encounter the deficits new advanced sustainable materials had been developed in Germany over the past decade. In the field of precast concrete, the concept of textile reinforced concrete (TRC) has been established in Germany. The TRC offers a solution that progresses beyond the state-of-the-art short fiber steel-reinforced concrete. Raina Industries decided to bring this technology to India, indegenise it and manufacture it in India. This advanced material and the associated new manufacturing technologies have the following advantages:

- Reduction of concrete consumption by about 80 %
- Reduction in embodied energy of building component i.e. less cost of production, reduced transportation costs, reduced erection and application costs
- Reduction of End of Life waste by about 80 %
- The advanced TRC material can be used for new and retrofitting works

The Market Size - The Indian construction industry employs 32 million people and its total market size is estimated at ₹ 2,48,000 crores. The construction industry contributes 11 % of the Indian Gross Domestic Product (GDP). Currently, extensive amounts of steel-reinforced concrete are being used for building structures all across India.

Apart from façade elements and street furniture, a major impact was created by manufacturing and installing modular toilets under the Swaach Bharat Mission. The Modular Toilets launched under the brand name Mo-To are primarily made of high-value-added Textile Reinforced Concrete. Textile Reinforced Concrete (TRC).

Raina Industries Private Limited constantly innovates in order to provide technological solutions which help in building the nation.