



## Conference Report

### Thirty-fifth National Convention of Textile Engineers, 2023 (Theme: Resource-Efficient Technologies in Textile Manufacturing)

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The two-day National Convention of Textile Engineers and National Seminar on “Resource Efficient Technologies in Textile Manufacturing” was successfully organized by the West Bengal State Centre (WBSC) under the aegis of Textile Engineering Division Board jointly with the Department of Jute & Fibre Technology (DJFT), University of Calcutta (CU) and in collaboration with Lohia Crop Limited, Kanpur, and The Textile Association (India), West Bengal Unit, during 11-12 March 2023, at Sir R N Mookharjee Hall, WBSC, The Institution of Engineers (IEI), India. The conference intended to facilitate the exchange of ideas, knowledge sharing and discussions on recent developments and future roadmaps in the field of textiles among researchers, educationists, and industry professionals in India.

The inaugural session was graced by the presence of the Chief Guest, Prof. A K Chattopadhyay, Vice-Chancellor, University of Calcutta and the Guest of Honour, Mr. M C Chakraborty, IDAS, Jute Commissioner, Govt. of India & Secretary, National Jute Board. Dr. Nirmal Das, Chairman, WBSC, during his welcome address, provided an overview of the importance of the National Convention.

In his address, Hon’ble President Er. C Debnath highlighted the achievements and activities of IEI and emphasized the need for such conferences to raise awareness about sustainability through eco-friendly and resource-efficient processes. The organizing Secretary, Dr. Surajit Sengupta, elucidated the theme and sub themes of the event. Dr. D B Shakyawar, Chairman, the Textile Engineering Divisional Sub-Committee of WBSC & Chairman of the Technical

Committee of the National Convention, stressed the achievement of sustainable goals through efficient management of input raw materials and material recycling.

Prof. S C Ray, Chairman, Textile Engineering Divisional Board & Council Member, IEI, highlighted the special features of the National Convention and encouraged the younger generation to become members of this esteemed institution and engage in technical/scientific activities for the greater interest of society. He also stressed the need to reconsider textile manufacturing processes in terms of resource efficiency and environmental protection. The event witnessed the release of two books, entitled “Souvenir cum Book of Abstract” and the “Book of Papers (ISBN No 978-81-955500-6-7)”.

In continuation, Prof. Rabi Chattopadhyay, Emeritus Professor, Indian Institute of Technology (IIT) Delhi and three eminent textile engineers, Er. Sukumar Roy, Managing Director, Amer-SilKetex, Kharagpur; Dr. Anjan Mukhopadhyay, Former Director, Bombay Textile Research Association, Mumbai, and Prof. Abhijit Majumdar, Chair Professor, IIT Delhi were felicitated for their great achievements in the field of textile engineering.

In his address, Mr. M C Chakraborty, Jute commissioner, expressed his concerns about the significant pollution due to the use of plastic items and urged the audience to use natural fibre products to save the environment. He also emphasized the need for a suitable blend of natural and synthetic fibres. He highlighted the necessity for sustainable and cleaner textile manufacturing processes emphasizing the importance of energy and resource efficiency in both current and future practices. The inauguration session ended with a vote of thanks by Prof. Raju Basak, Honorary Secretary, WBSC.

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The convention featured technical sessions each day. The first session, chaired by Prof. S C Ray, Former Head, DJFT, CU, began with the S N Bhaduri Memorial Lecture by Prof. Rabi Chattopadhyay, IIT-Delhi. He discussed the hydraulic properties of fibrous structures, especially jute and coir fibres, yarns and fabrics and their applications in geotextiles. Dr. A K Mukhopadhyay, Eminent Engineer of IEI, addressed the technological challenges regarding price competitiveness and optimization in product and process development. He further discussed the development of various PEEK fibres and the method of changing the crystal phase of PVDF.

Another Eminent Engineer, Prof. A Majumdar, emphasized the need for a unified curriculum for undergraduate Textile Technology courses. He argued that the existing syllabus content is not very pertinent in today's context and advocated for a curriculum that is both relevant and interesting, coupled with the creation of teachers capable of intellectually engaging the students. In the state-of-the-art lecture, Mr. Siddhartha Chakraborty, Managing Director, PyroTex Industries GmbH, Germany & Chief Technology Officer, Thai Acrylic Fibre, Aditya Birla Group, Thailand, focused on textile material recycling. He emphasized that sustainability, circularity, and GRS (global recycle standard) are emerging trends in fibre technology. Waste fibre and virgin polymer blended fibres will be new sustainable solutions for future use.

The second technical session featured five distinguished textile personalities as speakers. Chaired by Prof. Rabi Chattopadhyay, IIT-Delhi, the session began with the lecture of Dr. U K Saroop, VP, Lohia Corp. Ltd., Kanpur, who narrated the development of polymer-modified smart jute bags for packaging of edible commodities. He described the recent advancements in food-grade smart jute bags, which are lighter in weight and lower in cost, made in circular weaving consisting of PP in warp and jute in the weft direction (25:75). Prof. A K Samanta, Former Head, DJFT, CU deliberated about 'Ecofriendly Processing of Jute: A Journey towards Sustainability', emphasizing the carbon balancing of jute starting from jute cultivation, transposition, processing, product development and disposal. He advocated for textile processing methods that avoid non-environment-friendly chemicals and explored the scope of enzyme processing. The next invited speaker

Mr. Sudipto Mandal, Manager, Oerlikon India, Mumbai, discussed the development of a processing line to prepare the textile grade fibres from recycled PET bottles. The technology of the Man Made Fibre industry is to be changed considering energy efficiency and sustainability. Sustainability in textiles was the matter of lecture of Dr. B N Bandyopadhyay, President, Kusumgar Corporates, Mumbai. He addressed the causes of environmental pollution raised by synthetic materials and highlighted the significance of reducing carbon footprint and carbon mile, and achieving carbon neutrality in synthetic material production. Prof. Debasis Das, Dean (Tech & Engg), CU, presented a new and sustainable innovation in the form of a PVA-based breathable coating for textiles. This coating will be sustainable for meeting future demands.

The Technical Session III, chaired by Dr. S. N. Chattopadhyay, Principal Scientist & Former Head, ICAR-National Institute of Natural Fibre Engineering and Technology (NINFET), focused on 'Key innovations of the twenty-first century for sustainable textiles'. Dr. Santanu Basak, ICAR-NINFET presented a sustainable method for the development of a natural fibre-based flexural composite, which can be considered as artificial leather. Dr. Manik Bhowmick, ICAR-NINFET discussed the value addition of the Kans grass, a waste abundantly available in West Bengal, for the textile industry. Dr. Deb Prasad Ray, ICAR-NINFET presented the capsule-based retting technology for efficient extraction of jute fibre, known for its low water requirement and high efficiency. Er. Umasankar Mahapatra, Managing Director, Pulcra Chemicals, Mumbai, stressed on the sustainable textile manufacturing using safer processing chemicals. A research study on jute fibre property variation along length was described by Er. Sekhar Das, DJFT, CU. He suggested the segregation for different uses.

Dr. Gautam Bose, Former Head, ICAR-NINFET chaired Technical Session IV on 'Industrial symbiosis and circular economy in the textile industry'. Er. Bivekananda Basu discussed the solutions to develop sustainability in the textile colleges, addressing the frustration in the education sectors, especially in textiles. Dr. R K Ghosh, ICAR-NINFET narrated the production of activated carbon from jute sticks as a remarkable product from jute. Er. Manisha Jagadale, ICAR-NINFET reported on the potential of

banana waste to transit the textile and energy sector towards a circular economy. Dr. Samita Gupta, JD Birla Institute, narrated the development of zero-waste patterns and garments, facilitating the circular economy of jute.

On the second day, Session V on 'Energy efficiency and waste energy utilization in textile processing' commenced with six presentations, chaired by Dr. Surajit Sengupta, Principal Scientist & Former Head, ICAR-NINFET. Utilization of solar energy in tasar post-cocoon technology operations was presented by Er. Debasis Chattopadhyay, Central Silk Board, Ranchi. Dr. G N Sreeveera, Periyar University, Salem, described electrical energy generation and harvesting using low-frequency piezoelectric materials in floor carpets. Nonwoven preparation from Indian flax fibre waste and its uses were explained by Dr. Sanjoy Debnath, ICAR-NINFET. Ms. Suravi Borgohain of Orient Spun Silk & Processing Mills reported the dyeing of Eri silk with turmeric and the preparation of bandage by hand weaving. Dr. Sanchita Biswas Murmu, ICAR-NINFET, showcased a jute stick packaging container for storing freshly harvested perishable fruits. Dr. Deepali Singhee, JD Birla Institute, narrated the process and properties of silk dyed with almond shell waste.

Technical Session VI chaired by Prof. A K Samanta, DJFT, CU, deliberated on 'Innovations in comfortable fashion products and smart clothing'. Ms. Antu Chandra, JD Birla Institute, described the use of popular cartoon characters in children's apparel garments. Dr. L Ammyappan, ICAR-NINFET, presented the functional properties of flax shive and jute stick-based particle boards. Ms. Ishita Sen, Visvabharati University, explored the availability, application, properties, and benefits of natural dyes. Dr. Shaon Ray Chaudhuri, Tripura University, introduced a sustainable and cost-effective process of ramie fibre degumming. Ms. Pratiba M, Periyar University, narrated the self-cleaning properties of cotton fabric coated with a carbon nitride/polyaniline composite using a photocatalytic material. Ms. Sayoni Nath, Govt College of Engineering and Textile Technology (GCETT), Serampore, presented the design and production of fashionable home furnishings by reusing old saree, contributing to circular fashion for sustainability. The application of reactive dyes in the handloom sector was discussed by Ms. Tithi Mitra, Visvabharati University.

The Chairman of Technical Session VII on 'Developments in sustainable functional and technical textiles' was Dr. D. B. Shakyawar, Director, ICAR-NINFET. There were five papers presented in this session. Ms. Adita Banerjee, GCETT, Serampore, reported the modification of Delany and Bazley's model for jute nonwoven fabric and established its utility. Ms. Silpinwita Das, Visvabharati University, provided a comprehensive review of Natural Indigo including its speciality and processing in textiles. Dr. Nageshkumar, ICAR-NINFET, showcased a newly developed digital bundle strength tester for jute fibres, along with an evaluation method and data reliability. Er. Devarun Nath, GCETT, Serampore, described the development of jute yarn wound unsaturated polyester resin composites. Dr. Shweta Tuteja Rakshit, JD Birla Institute, reported the design and development of clothing fasteners suitable for arthritic women.

In technical session VIII, chaired by Prof. Debasis Das, Dean (Technology & Engg), CU, the focus was on 'Chemical management in textile wet processing for pollution control'. Dr. Sankar Roy Maulik, Visvabharati University, discussed a method of discharge printing on naturally dyed textiles. The impact of dyeing of cotton, linen and viscose fabric with river water, reverse osmosis water and waste was examined by Dr. Anil Kumar, Periyar University. Dr. Deepali Singhee, JD Birla Institute, described the use of regular kitchen waste to extract dye for application on cotton fabric, emphasizing the evaluation and potentiality of this waste.

The Valedictory session was marked by the presence of distinguished guests and panel members who shared valuable insights and recommendations. The session commenced with Prof. Rabi Chattopadhyay, Emeritus Prof., IIT Delhi, serving as the Chief Guest. The esteemed panel members included Prof. S C Ray, Dr. D B Shakyawar, Dr. U K Saroop, Dr. Surajit Sengupta and Dr. A. K Mukherjee, President, TAI, WB Unit. The session began with Dr. Sengupta presenting the outcomes and recommendations from the 40 deliberations that took place during the event. Dr. Saroop mentioned the positive and negative attributes of natural and synthetic polymeric fibres. He highlighted that the complete elimination of synthetics from our daily lives is not feasible for achieving sustainability. Synthetics will continue to play a role due to their superior product properties and lower cost. Their

significance has been evident, particularly during the pandemic. Dr. Ray put forth a suggestion for incorporating skill development activities in the textile undergraduate curriculum. He advocated the need for producing cost-efficient, eco-friendly, and sustainable textile products. Dr. Shakyawar urged for increased research and development to upgrade machinery for natural fibre extraction, processing, and testing, by utilizing multi-disciplinary approaches (artificial intelligence, mechanical engineering, textile engineering, computer science and electronic engineering) to increase market acceptability and efficiency. He also proposed greater involvement of policymakers and promotional agencies in similar types of conventions and seminars to drive progress in the industry.

The Chief Guest, in his comments, expressed his appreciation for the participants and commended them for presenting unique and innovative research papers. He highlighted the importance of utilizing input resources such as raw materials, energy, manpower, and infrastructure judiciously for sustainable textile production. He emphasized that the demand for textile products cannot be fulfilled by solely relying on natural or synthetic fibres. Instead, a proper amalgamation of both types of fibres is necessary to achieve the best possible outcome. Furthermore, he stressed the need for increased awareness and guidelines regarding the reuse and recycling of used textiles for developing useful products and contributing to a more sustainable textile industry.

During the Valedictory session, several important recommendations and suggestions were made by the esteemed panel members and participants. These recommendations focus on various aspects of sustainable textile production and the adoption of eco-friendly practices. The key points raised include:

- Emphasis must be given to the judicious use of resources like raw materials, water, energy, etc. in textile processing and manufacturing systems.
- Enhancing awareness and development of eco-friendly and biodegradable textile products is necessary to achieve sustainability goals.
- There is a need for a zero-discharge process/manufacturing system with consideration of carbon footprint, carbon mile, carbon neutrality and net-zero concepts.
- The undergraduate course curriculum on Textile Technology needs updation to include sustainability goals and requirements.
- To address environmental pollution, reduction of the consumption of unwanted products/chemicals, implementation of the scientific disposal system, reuse and recycling are required.
- Eco-friendly chemicals and auxiliaries in green manufacturing and supply chain management should be encouraged.
- Jute-synthetic union bags in packaging edible and nonedible commodities should be promoted as an alternative to 100% poly bags.
- Recognizing that natural and synthetic materials have their area of application, recycling and disposal protocol, combined efforts and judicious utilization will bring success and sustainability in both sectors.
- The biomass or waste of different fibrous products may also be explored for various industrial applications to promote a circular economy.
- Innovations in various fabric manufacturing stages including the use of natural dyes, bio-mordant, enzyme processing, green chemicals for finishing, plasma tech, nano-tech, etc. to align with the industrial 4.0 revolution.
- Emphasis should be given to R & D and entrepreneurship for developing energy-efficient machines integrated with sensors and artificial intelligence.
- Policy decision-makers, promotional agencies and pollution control boards should be involved in seminars, conferences, and interfaces, to seek their opinions and foster collaborations.