

# **Influence of fibre orientation on impact performance of needle punched nonwoven based composite**

Rupayan Roy

*Department of Fashion Technology, National Institute of Fashion Technology Kannur, Kerala-670562, India*

*E-Mail Id- rupayan.roy.nift.ac.in*

## **Abstract**

In the present work the authors have investigated the influence of fibre arrangement in the structure on the low velocity impact performance of needle punched nonwoven based polyester epoxy composite. The fibre orientation is measured in the nonwoven fabrics by using tracer fibre technique. The impact performance is evaluated in terms of peak force to break and energy absorption. The tensile strength is measured in terms of tenacity. A five factors three levels Box Behnken design is used to prepare the samples and analyse the results. It is found that the impact performance and tensile strength are highly dependent on the measured fibre orientation. An overall optimization has been carried out to find the best combination for maximum impact performance and tensile strength.

**Keywords:** *fibre orientation, nonwoven, composite, impact performance, tenacity*

## **References:**

1. Roy, R., & Ishtiaque, S. M. (2019). Influence of punching parameters on fibre orientation and related physical and mechanical properties of needle punched nonwoven. *Fibers and Polymers*, 20, 191-198.
2. Roy, R., Ishtiaque, S. M., & Dixit, P. (2022). Impact of fibre orientation on thickness and tensile strength of needle-punched nonwoven: optimization of carding parameters. *Journal of Industrial Textiles*, 51(3\_suppl), 4801S-4817S.
3. Dixit, P., Ishtiaque, S. M., & Roy, R. (2020). Influence of sequential punching in layered structure of needle punched nonwoven on the filtration behavior. *Composites Part B: Engineering*, 182, 107654.
4. Roy, R., & Ishtiaque, S. M. (2020). Optimal design of a composite fibrous filter media through vertical integration of fibres in needle punched nonwoven. *Composites Communications*, 22, 100484.