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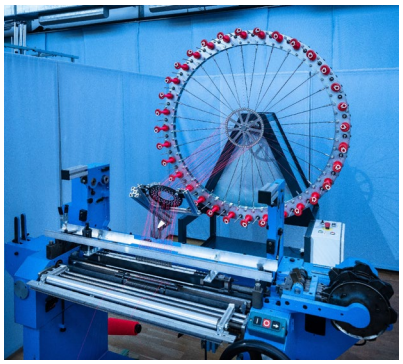
Multi-axial mats – Development of a multi-axial hollow fibre mat structure using a diagonal laying unit

Objective

The aim of the research project was the development of a multi-axial mat structure made of highly sensitive filaments, along with the manufacturing technology required for its production. Such a structure, composed of hollow filaments, can be used for both industrial catalysis and medical applications like dialysis. The innovative technology allows the mat structure to be manufactured in one single step.

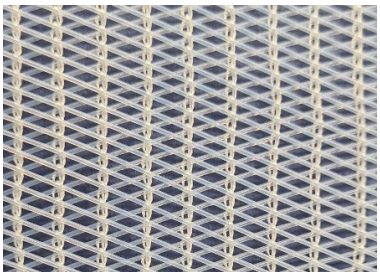
Approach and results

The mat structure has been produced on an optimised crochet galloon machine, which enables the yarn to be inserted into stitches, even when using diagonally running full weft yarns. A new yarn feeding system, utilising a rotating circular creel, was developed and integrated into the knitting process. In addition, a special diagonal positioning device was used to set the desired angle of the hollow filaments in line with the mesh row without damaging sensitive membranes. In order to ensure that threads run as smoothly as possible from the creel via the knitting unit to the take-up, specific adjustments were made to the thread path on the warp knitting machine.



Crochet galloon machine at STFI

The crossing points are joined together in the knitting process so that the desired angle remains fixed across the entire width of the mat without any force being applied. The angle of the weft can be individually adjusted. Further machine optimisations have eliminated challenges such as the application of edges and constrictions in the hollow filaments. In addition, the handling of the machine was simplified and flexible adjustment of the offset angle was enabled.



Mat structure created in the project

The manufacturing process developed in the research project allows the simultaneous production of two layers of hollow filaments at a defined angle. This results in immediate time savings and contributes to the reduction of production costs in the long run.

INNO-KOM

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The final report on this project is available on request.

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