

## SEWING INSTALLATION WITH VARIABLE ANGLES AND STITCH DIRECTIONS

Project manager: Dipl.-Ing. Martin Märker

Duration: 05/00 – 07/01

### Initial Situation

In the technical textiles sector, novel textiles are increasingly gaining market share. Complex material requirements call for the use of a wider range of hybrid material structures with characteristics coping with the flux of forces involved. The purpose-oriented insertion of diagonal double saddle stitch seams in multi-layer textile material constructions (composites) stabilizes the fabric layers and increases strength while providing protection against delamination.

### Research target

The aim of the research project is the development of a sewing installation for technical textiles which is able to insert thread-type linear reinforcements in multi-layer webs, at variable angles.

### Research results

Within the framework of the “bias sewing” research project sponsored by the Federal Ministry of Economics and Technology (BMWi), Cetex gGmbH developed, manufactured and tested the Cetex PSN 3020 programmable bias sewing test installation having a sewing area of 300 x 200mm. Provided with a maximum swivelling angle of 45°, the installation processes up to 9mm thick material to be sewn. The material is placed in an exchangeable material carrier and clamped so that it can be removed. Two servo axes, the motions of which are controlled by a CNC system and synchronized with the needle motion of the sewing machine, ensure an exact positioning of the material for stitch formation. Using a hydraulic lifting device, the sewing head is swivelled between 0° and 45° relative to the standard position of the needles. This allows for inserting diagonal stitches in the material to be sewn.

The driving and control system of the experimental set-up of the sewing installation is based on components of the Sinumerik 840 D control system in connection with components of the Simodrive 611 D driving system. The drive and control concept allows for an easy programming of a large variety of seam constructions, such as straight, circular and curved seams, zigzag stitches and stitching patterns of embroidery design, with variable stitch length and bias angle parameters. The set-up ensures high levels of accuracy and the reproducibility of sewing parameters.

Additionally, initial tests showed that the machine may also be used for the sewing on of composites (stiff parts) by means of fillet stitching.

### Application and economic advantages

The method was used to identify new areas of application for made-up technical textiles and gain new knowledge in terms of textile engineering developments. The method of inserting diagonal sewing threads in the z-direction of textile layers of reinforcing textiles opens up new and innovative fields of application, the scope, process benefits and prospects of which have not been fully assessed yet.

For this reason, work under this project is economically reasonable and should be continued.

The research project was sponsored by the Federal Ministry of Economics, through Fraunhofer Services GmbH, Berlin.

## SEWING INSTALLATION WITH VARIABLE ANGLES AND STITCH DIRECTIONS

---

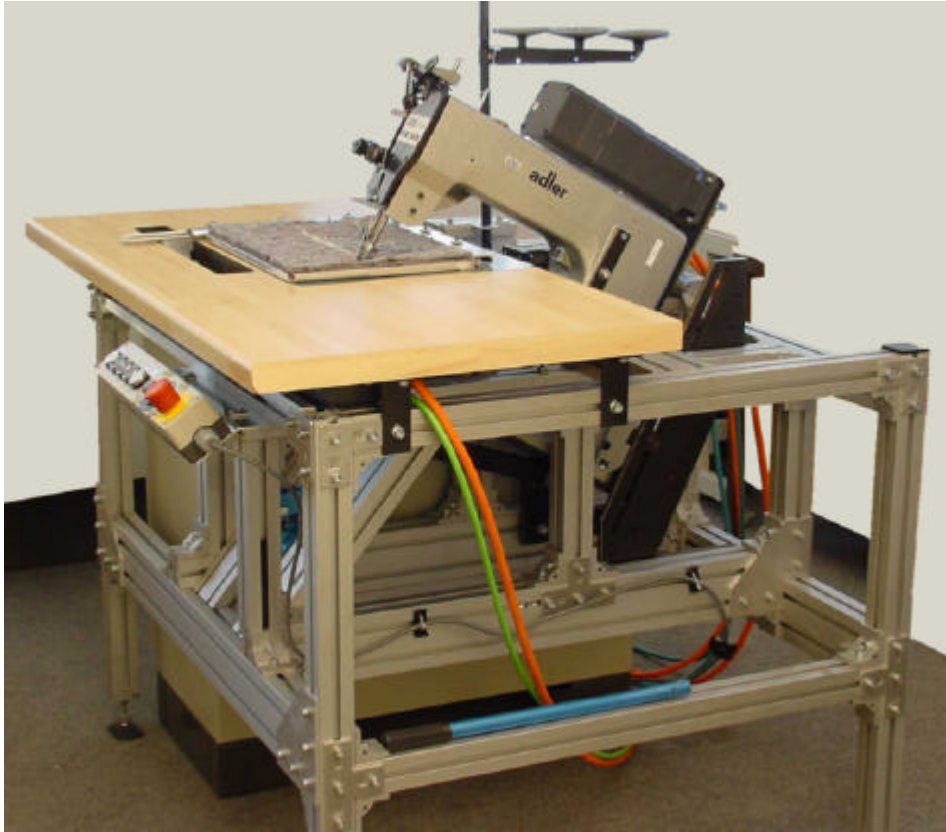


Figure 1: Sewing installation PSN 3020 of Cetex gGmbH



Figure 2: The needle at bias sewing

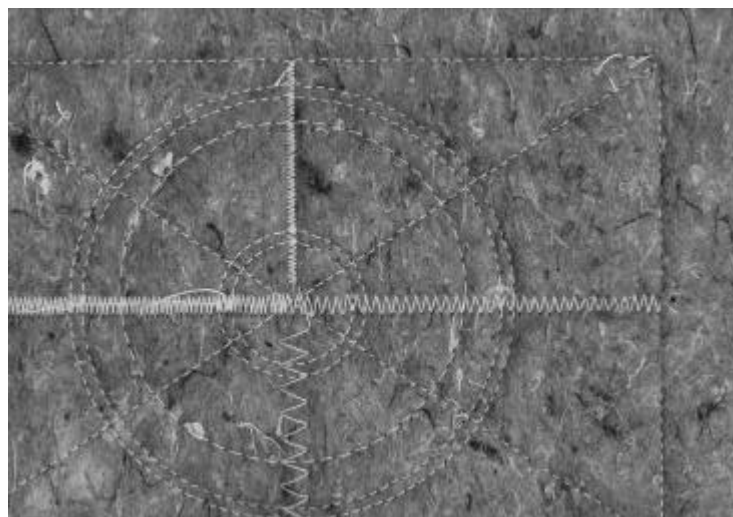


Figure 3: Seam sample