INNOVATIVE WEFT INSERTION PRINCIPLES FOR STITCHBONDING MACHINES

Project manager: D. Reuchsel, Dipl.-Ing. Duration: 10/96 - 09/98

Initial situation

Stitchbonding machines are increasingly used for producing technical textiles. A special advantage of stitchbonding machines is their ability to process threads fed in a stretched-out manner, in longitudinal, crosswise and diagonal positions. Textile fabrics made on stitchbonding machines present higher strengths than woven fabrics. Such strengths may be favourably used in the composite component. This requires the presence of parallel and non-crossing thread layers etc.

Research target

The project was aimed at developing the basic principles for inserting dense and parallel sheets of weft threads. The position in the thread sheet should be possible at various angles. The motion sequences are to be performed by modern computer-controlled servo axes. To determine limit values and functional correlations, servo axis drives for working widths of up to 213" were to be tested.

Research result

In respect of Malimo stitchbonding machines, development and testing efforts focussed on weft insertion methods and weft carrier versions providing for a course-wide parallel weft insertion and for a dense non-course-wide parallel weft insertion at various stitch angles. Special attention was given to the use of computer-controlled and freely programmable axis drives with servomotors.

Test stand 213" :
The computer software for the motor drives of the two servo axes consists of various motion components to meet both speed and accuracy requirements (proof to be furnished for 1400rpm).

Stitchbonding machine - working width 2800mm :
The subassemblies used for weft insertion were developed, manufactured, and installed in a stitchbonding machine. Investigations and measurements focussed on controlling the quality of thread processing when using high modulus fibres. The main goal was to optimize the cams of the two servo axes of the filling carrier drive. Slack variation was minimized, the maximum weft carrier traverse speed was reduced, and the thread running properties in the feeding attachment were improved.

Multiaxial machine :
Basic principles were developed for the multiple insertion of dense parallel thread layers, and the functioning of the chosen working principles was proven. Major attention was paid to an insertion principle called "two courses for hook-up elements using a three-dimensional characteristic for the thread guide motion" as well as to a weft carrier drive concept and the associated computer software. Based upon the results obtained on the first laboratory prototype, the various subassemblies were reviewed. Weft insertion is possible up to +45° and -45° and 90°. For a sliver width of 2", the weft carrier reliably reached 30 double lifts.

Application and economic advantages

For the MSUS warp knitting machine, a weft insertion device for 213" insertion width was developed. At present, preparatory work is performed to process high modulus fibres on that machine. After completing the development work on the P2-S2 stitchbonding machine of 2800mm working width, production on the machine was prepared on the premises of our project partner, Karl Mayer Malimo Textilmaschinenfabrik GmbH. A number of machines have already been supplied to various customers. One machine is being prepared for display at the ITMA 1999, Paris. Upon completion of the project, the development results obtained on the multiaxial machine will be used to build a prototype. Several potential buyers are interested in purchasing the system.

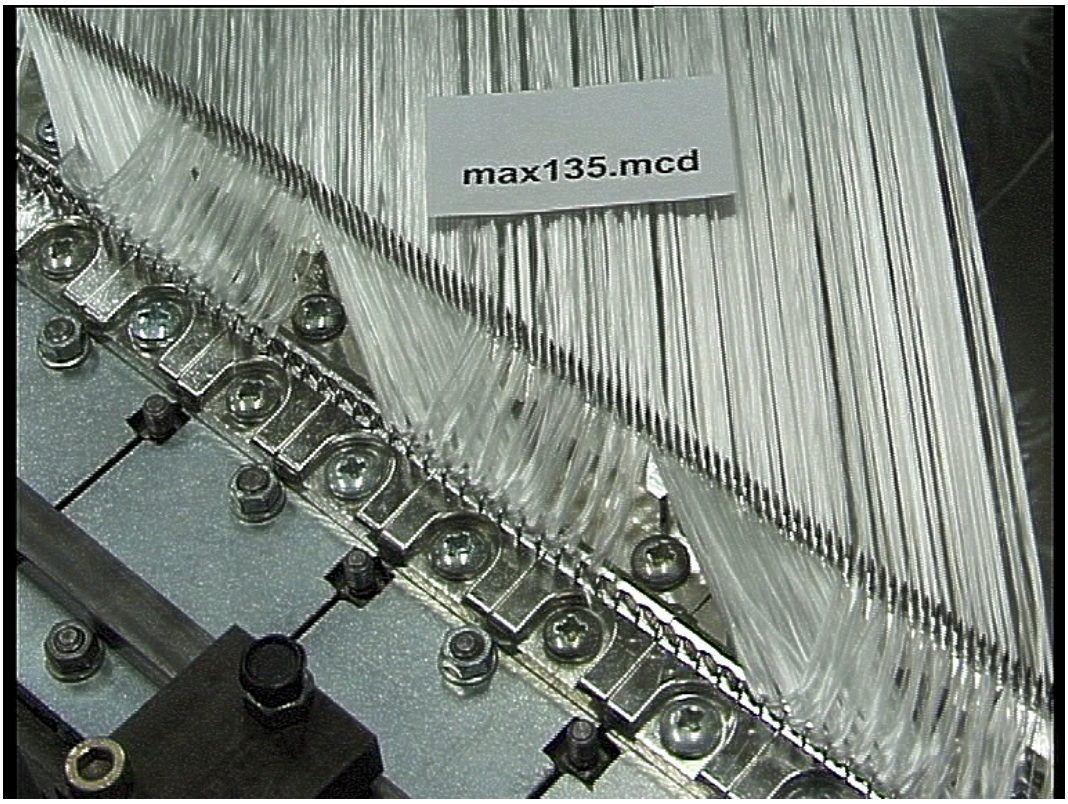

Figure 1: Threading

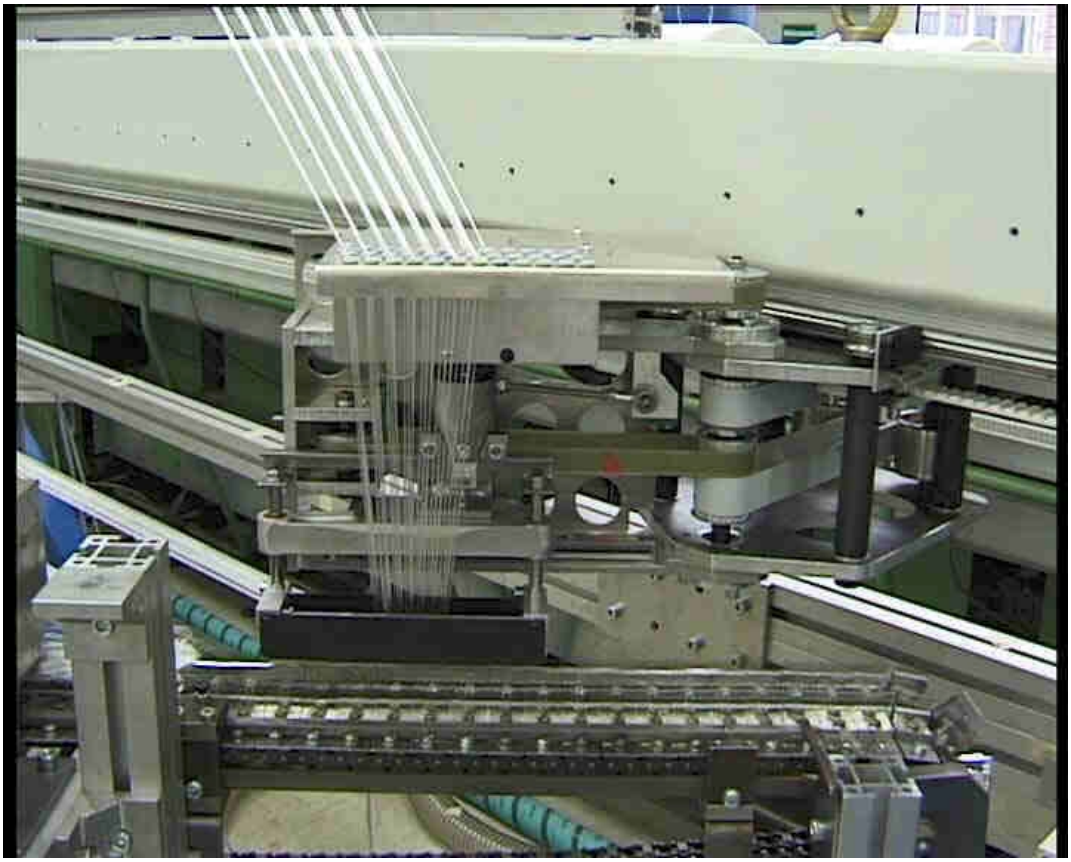

Figure 2: General view of the weft layer (adjusted at -45°)