FIBRE PRESERVING SEWING OF TEXTILE STRUCTURES WITH KNITTING MACHINES

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Initial Situation

Using an example from the much expanded area of geotextiles, the possibility of optimising conventional textile production processes by means of modern drive solutions both qualitatively as well as quantitatively will be demonstrated. The application concerns a double sided geo textile which, filled with powdery bentonite, is implemented as a sealant for waste deposits. This product is produced with a knitting machine. In the production process, the contrast of both continuous pull-off movements of the knitted webs and continuous penetration of the webs through sewing cause both damage to the needle and damage to the textile fabric.

Research Goal

Our goal was to find a simple and employable solution for the basic problem of a quality fulfilling production of relatively inelastic product webs at stitch-bonding machines that would make it possible, through improvement of product quality, to intensify the productivity of the production process. Fibre preserving preparation of the textile feed material with the lowest possible damage of the knitting components was thought to be possible.

Research Results

Utilising the results of the completed work together with our partner, a solution variant for a material drive for a stitch-bonding machine was achieved and employed as a prototype. In the past, our industrial partner had tried to minimise needle damage through passively functioning models. In order to do this, a feathered component (an elastic feather coupling) was employed between the stitch changing transmission and take-off rollers that was intended to reduce some of the needle damage. With the use of a model of this construction, it was possible to reproduce the function and to calculate the amount of needle damage in advance. Using turning measurements both with and without the elastic coupling, the values were evaluated and bench marks for the new drive concept were attained. The complete evaluation of the solutions system revealed a free programmable servo-drive along with a planetary gear system as the optimal variant. This solution, in contrast to mechanical transmission solutions, features a variation of the drive movement laws and a software oriented alteration of the stitch length. Utilising an experimental rig, the highly dynamic demands were simulated and a motion sequence was found and tested that reduced both damage of the needle and product web; the rig additionally allowed for a safe work process. The use of an experimental rig provided a great sum of measurements of the angle and course of torque on the take off roller; it also enabled a simultaneous gathering of the electrical values. It was possible to demonstrate, in the presence of an extended needle life, the positive affect on the quality of the finished good and increased production under working conditions.

Application and Economic Significance

Professional articles, symposiums and trade fairs demonstrate the growing significance of the implementation of knitter made products in the industrial sector. The achieved solution recommendation should lead to an increase in productivity and improve the quality of textile fabrics. During the research project, focus was placed on devising a fundamental concept concerning the fibre preserving knitting of relatively inelastic product webs. The practical experience of our partner could be implemented into a relatively simple and functional solution. Using the help of the new method, the users can stabilise their production process and will be able to improve their market position through increased productivity and product quality. Cetex gGmbH was able to redirect its production processes utilising this project. For 2003, the reworking of another knitting machine has been planned.

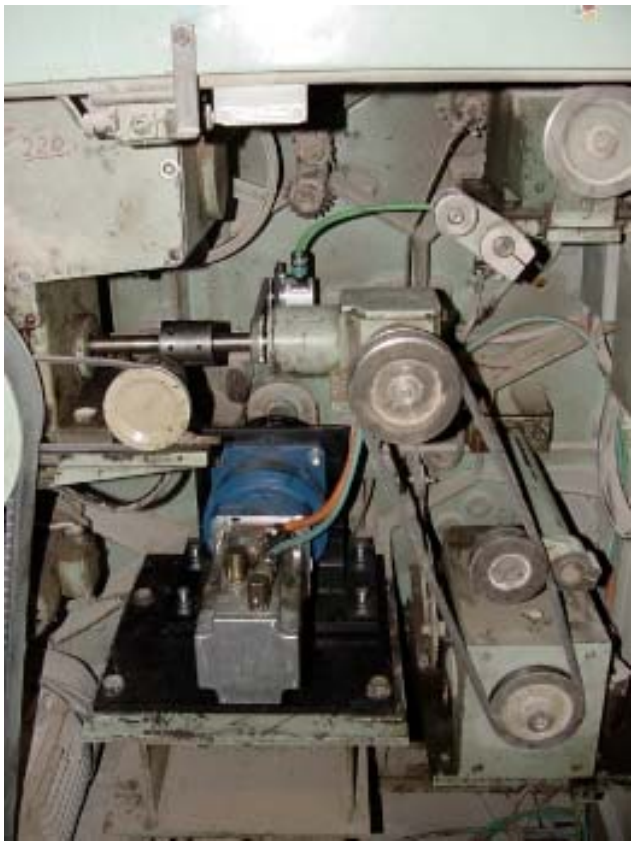

Figure 1: Prototype

Figure 2:
Thin-walled divided measurement hub for the contact-free measurement of the torque of the take-off roller