A SUPER-WIDE KNITTING MACHINE FOR WEB AND PARALLEL WEFT

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Initial situation and research target

A detailed priority of this research project is the creation of a new and improved weft insertion system based on an existing one.
The weft insertion systems P2-2S and/or MSUS used at present on stitchbonding and warp knitting machines made by Karl Mayer Malimo Textilmaschinenfabrik GmbH have proved their efficiency in industrial practice and are used with 24 simultaneously inserted weft threads and working widths ranging up to 213 inches (x-direction). To obtain an ever larger working width of 240 inches, the number of weft threads was increased to 30. Under this approach, the insertion frequency is reduced, but the path behind the weft hooks (y-racking for parallel insertion) is extended. Consequently, the thread guide insert is increased by six times the thread pitch of 12.7 mm (corresponds to 6 times 1/2 inch = 76.2 mm), whereas the guide path in the y-direction is increased by approximately 60mm. Research efforts were aimed at finding new opportunities for weft insertion.

Research results

In cooperation with Karl Mayer Malimo Textilmaschinenfabrik GmbH, Chemnitz, a new weft insertion principle has been developed, which allows users to pre-determine and select the time of thread transfer. The system is characterized by the following features:

- the weft carrier is controlled by one single servo drive, and it is provided with two mechanically operated pressing plates,
- each of the laterally arranged and longitudinally guided transfer units is moved by a servo axis, parallel to the hook-up chains,
- rotatable arresting hooks arranged in the transfer units are swivelled simultaneously by means of a servo drive via a rack and may thus be moved in an open or a closed position.

To verify this basic solution under practical conditions, a laboratory prototype was built and tested. Driving was performed by means of a Sinumerik 840D multiaxis control system made by Siemens.
Testing on the test stand showed that the system functions properly. The tests also demonstrated that the possibility of selecting the time of weft thread transfer onto the hook-up chain is a considerable asset. Transfer may be performed at the time of maximum thread consumption (at 2/3 of the weft carrier path). This method allows users to reduce the inherent thread sag at thread transfer to a negligible value.
In addition, this insertion principle provides for overlapping the individual motion steps.

Application and economic advantages

The use of the results of this research project aimed at creating new patterning possibilities in the weft insertion sequence may result in innovative opportunities for making novel articles on knitting machines.

Machine users may employ the new software system to extend their product portfolio and open up new markets for their production.

Machine builders may use the solution to improve the application of modern servo drives in weft insertion systems and are enabled to present extremely cost-effective patterning versions in the shortest possible time, thus extending market share and improving selling prospects.

Figure 1: Test stand

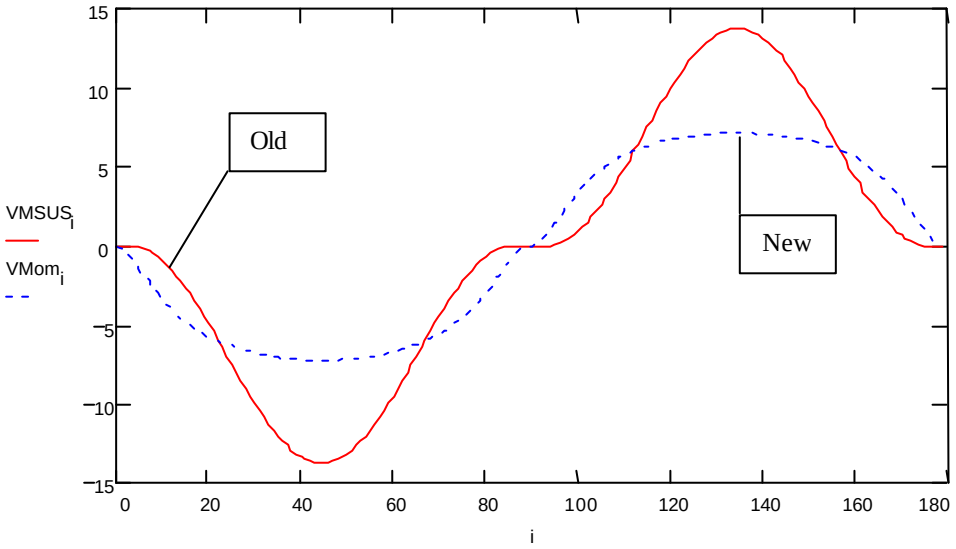

Figure 2: Speed and time of the X-motion

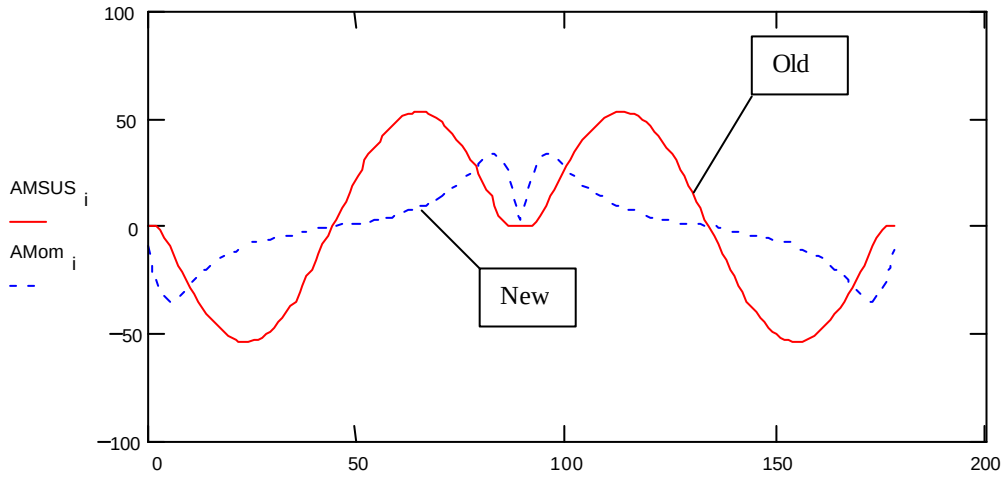

Figure 3: Acceleration and time of the X-motion