

Variable number of threads in braiding machines

Field of application

Braiding machinery serves a wide range of applications, including ropes, wire and cable designs and tubular products made of fiber-reinforced plastics. Manufacturers from different industries, in particular from the aerospace and automotive as well as mechanical engineering sectors, gradually use light-weight components to replace metal parts and components.

State of the art

Presently, the number of threads in a braiding machine can only be changed manually and during machine downtime when using conventional braiding machines. However, for many parts and components it would be useful to vary the number of threads during the braiding process. Existing approaches are mostly based on parking of bobbins. In this case, however, the thread is not completely removed from the process.

Innovation

The Institute of Aircraft Design (IFB) of Stuttgart University developed a new embodiment of a braiding machine with a thread positioning unit close to the braiding point.

The invention can also be implemented by embedding a positioning module into conventional radial or standard braiding machines. This positioning module forms a secondary ring of horn-gears which moves synchronously with the primary horn-gears of the braiding machine. The yarn is taken through to the machine center by this positioning module. Due to the synchronous horn-gear movements, the position of each thread, that is close to the mandrel, is clearly defined.

This is a basic requirement for having access to specific threads during the braiding process. Another module, either a separate module or a component of the positioning tool, could be used for thread manipulation, which acts precisely and selects specific threads. It cuts off single threads while keeping the thread tension or feeds them back into the braiding process in order to adjust the braid to a cross-section change in the axial direction. It would also be possible to vary the material properties of the final product by exchanging or coating individual threads during the braiding process.

Another advantage of the invention is that the use of a secondary set of horn-gears reduces the contact and friction between the 0°-yarns and braiding yarns. This contact leads to twisting of the 0°-yarns, which, in general, contributes to the wear of the fibers.

Your benefits at a glance

- ✓ Highly different ranges of component diameters at a constant braid angle
- ✓ Automated change in numbers and types of threads during the braiding process
- ✓ Minimizing twisting effects when using 0°-yarns
- ✓ As a retrofit kit or optional positioning module for radial and standard braiding machines
- ✓ Improved adaptability of the braid to complex geometries

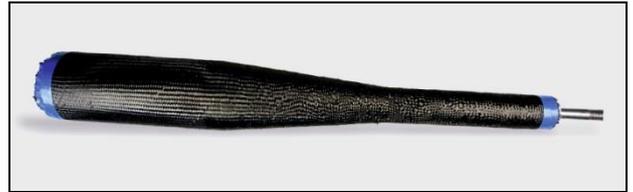


Figure: A smooth, custom transition from full to half bobbin number is ensured by removing threads from the braiding process. It is the first invention which makes an automated approach possible.

State of development / Technology transfer

The invention-related positioning module was created as a submodel at IFB. We are looking for a cooperation partner with whom we could develop a full functioning prototype. Technologie-Lizenz-Büro GmbH is responsible for the exploitation of this technology and supports cooperation.

Patent portfolio

European patent application (EP 3 094 771 B1) granted.

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Reference number: 13/035TLB