

Yarn connections in knitting

Development of concepts and solutions to tie yarns together

Graduate



Tobias Funk

Initial Situation: The knitting process for the production of garments must become more efficient. For the knitting process, yarn bobbins need to be replaced regularly. The new bobbins are tied by hand to the existing bobbins. The tying process is labour intensive and must be automated. In this study, new solutions are investigated for tying 2 yarns together.

Approach: Literature research and state of the art to tie yarns together have been performed. In addition, new tying concepts have been proposed. The elongation at break and the flexibility of each type of connections have been tested and evaluated. The tying concepts were evaluated according to technical and economic criteria. For the most promising solution, a Minimum Viable Product (MVP) has been developed with which the feasibility of the process was tested in laboratory. Important process parameters such as welding time, temperature and pressure force have been investigated.

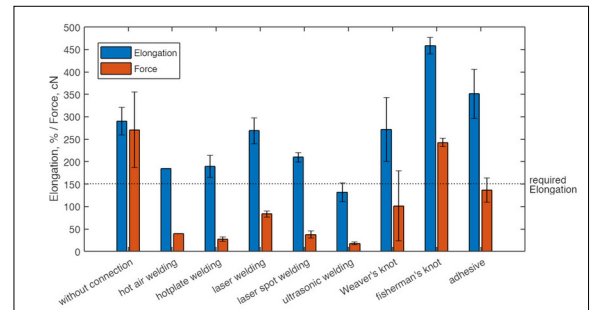
Result: Preliminary tests have shown that the desired elongation at break can be achieved with different tying methods. Hot plate welding has shown the best potential in terms of process costs and simplicity and was developed further.

4 out of 6 types of yarns could be sufficiently welded with the MVP. Elongation at break and flexibility met the specifications. With one of the yarn, the specified elongation at break could not be achieved, but the strength was still sufficient for the knitting process. Problems occur for yarns covered with cotton: The required elongation at break could be achieved for individual samples, but the process was not reproducible in that case.

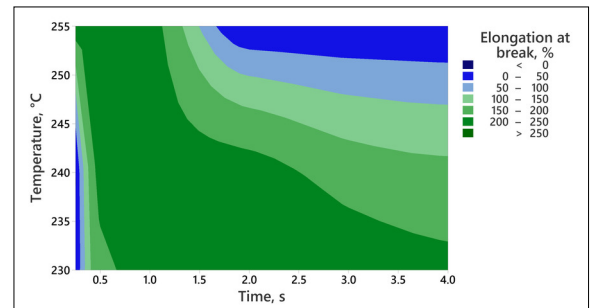
The feasibility of the process has been demonstrated. Further improvements were proposed, and can be performed after having tested the developed MVP

directly on the knitting machine.

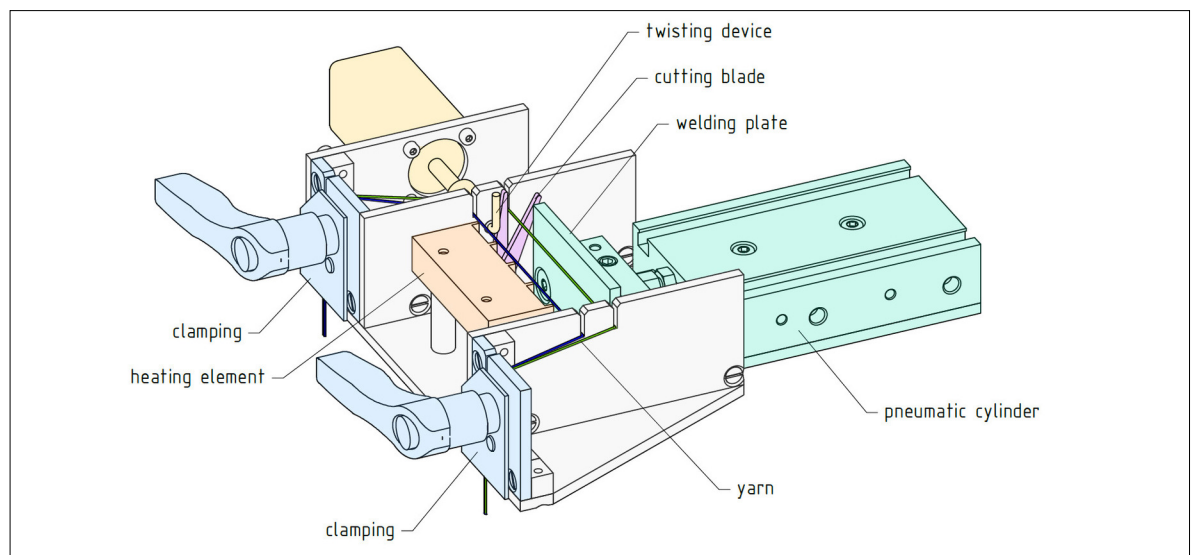
Preliminary tests: Maximum force and elongation at break.
Own presentation



Elongation at break as a function of welding time and temperature.
Own presentation



Sketch of the MVP developed to weld yarns together.
Own presentation



Advisor
Prof. Dr. Pierre Jousset

Co-Examiner
Prof. Dr. Michael Niedermeier,
Hochschule Ravensburg-Weingarten, BW

Subject Area
Plastics Technology,
Product Development