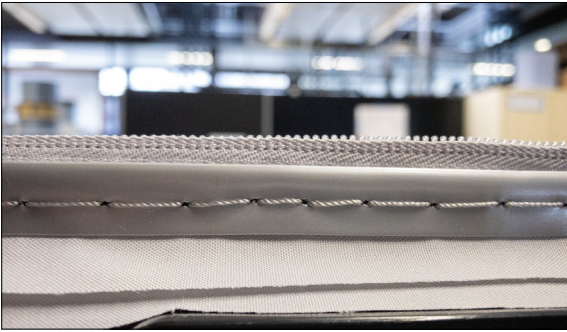
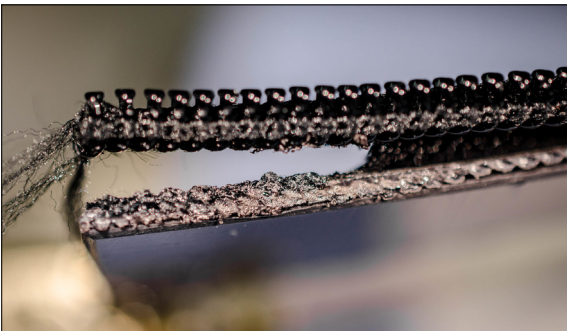


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Subject Area	Plastics Technology
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## Connection of suitcase-shells with a zipper



Existing stitched connection and additional layers.  
Own presentment



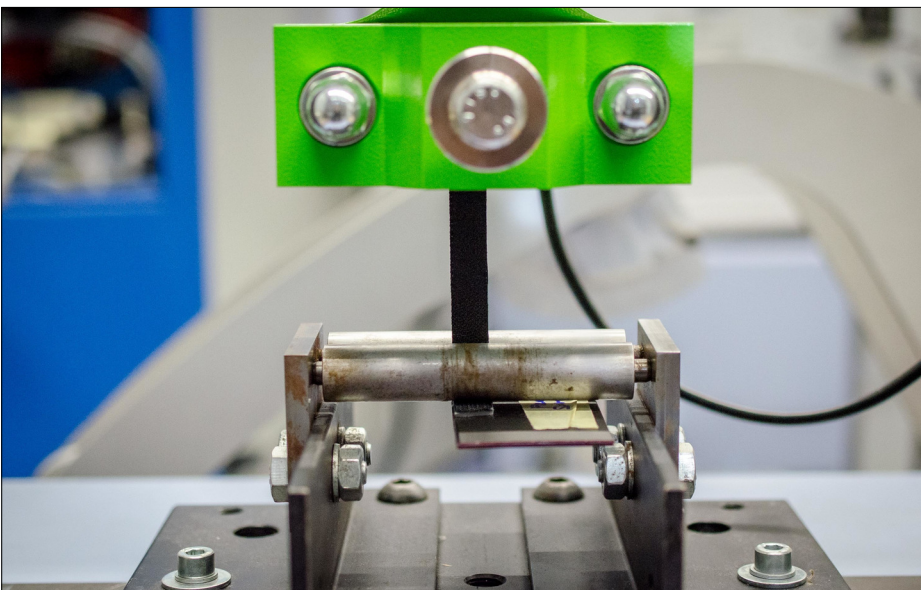
Failure into the zipper after the lap shear test with an ultrasonic welded sample.  
Own presentment

**Problem:** In addition to the Swiss army knife, Victorinox produces suitcases. In all products, the zipper textile is stitched to the polycarbonate suitcase-shells. This method affects the strength of the PC-shell negatively and additional material has to be used to cover the stitching for visual and protective reasons. This additional material adds a significant weight to the suitcase.

**Definition of Task:** The aim is to find a new connection that can hold up to similar or higher forces in comparison to the existing stitched connection. The new process of manufacturing needs to be as fast as possible in order to keep the costs low. This aim has to be achieved with ultrasonic-welding or adhesive bonding concept. The following individual steps have been completed during the project:

- Literature research to identify suitable joining processes
- Defining a concept to construct the bonding and ultrasonic welding areas
- Testing the mechanical behaviour of existing and new connections
- Evaluating time and costs required to join parts with new connections

**Conclusion:** The new ultrasonic welding concept provides the highest force using lap-shear tests. The solution with adhesive tapes reaches lower maximal forces but is recommended for further investigation because of its ease of use. The peel tests provides a load case which is closer to reality. The existing stitched version reaches the highest force since the thread does not fail. The ultrasonic welding connection performs very well too and failure occur into the zipper. This mechanical behavior does validate the potential of the new joining concept investigated in this study. Selected joining processes can be automated, ensuring to keep production costs as low as possible.



Peel test of a Zipper-PC shell connection with a universal testing machine.  
Own presentment