

# Highlight

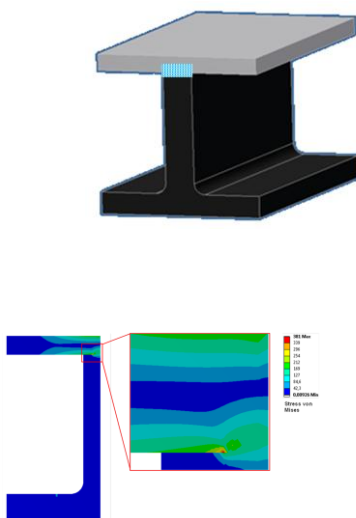
Aachen,  
September 27, 2012

## S/N curves and strength values for laser welded polymer specimen

In high-cycle fatigue situations, materials performance is commonly characterized by a S/N curve (Wöhler curve), a graph of the magnitude of cyclic stress (S) against the logarithmic scale of cycles to failure (N). Work package 6 of the collaborative EU "PolyBright" project covers the analysis of laser welded polymer samples.

Figure 1 top: T-shaped specimen for uni-axial fatigue testing

bottom: Local maximum stress  $\sigma_{max}$  in the weld seam of a T-shaped specimen



For different laser welded polymers, process windows are determined. Based on these results selected materials were undergone fatigue testing, results see Figure 2.

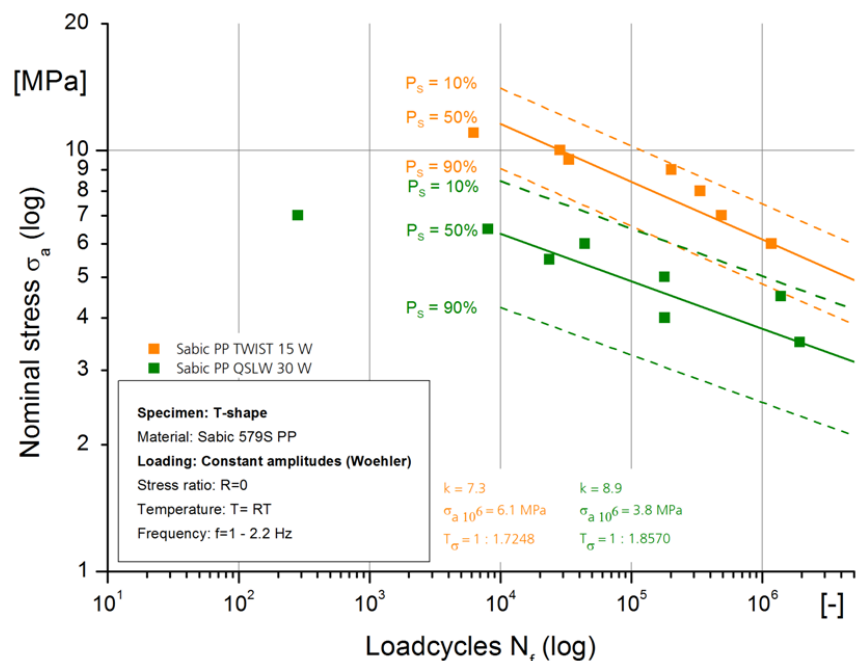


Figure 2: S/N curves (Wöhler curves) and comparison of TWIST and QSLW welded T-shaped PP samples

Additionally to the fatigue tests, numerical investigations were carried out by Finite Element calculation to study the stress and strain concentration in the weld line and in the specimen (Figure 1, bottom). Due to the stress concentration in the weld line, it is possible to transfer these information to an imaginary notch factor of the weld line.



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