

abstract

Self-pierce riveting (SPR) technology is a relatively new fastening technique increasingly used in the automotive body manufacturing, specially for aluminium alloy structures. However, only small amount of experimental data is available to make possible predictions about the fatigue behaviour of this joints under service loads

In the present thesis, based on experimental as well as numerical investigations, new findings about the fatigue behaviour of self-piercing-riveted aluminium joints are presented.

The relevant fatigue influencing factors were explored experimentally or by evaluating existing literature. Furthermore, detailed finite element simulations were carried out to investigate the deformation behaviour of this joint as well as the stress distribution in their different components.

Computed distributions of local stresses and joints displacement were interpreted in terms of experimental observations of damage und crack initiation.

Using these findings a practical concept for fatigue assessment of self-piercing-riveted aluminium structures and possible improvements of their fatigue strength are presented.