Fraunhofer IGP

Fraunhofer Institute for Large Structures in Production Engineering IGP

Contact

M.Sc Pascal Froitzheim
Joining and Forming by
Plastic Deformation
Tel. +49 381 49682 - 228
pascal.froitzheim@igp.fraunhofer.de

Fraunhofer Institute for
Large Structures in
Production Engineering IGP
Albert-Einstein-Str. 30
18059 Rostock

Overview of services

Joining and Forming by Plastic Deformation

Joining and Forming by Plastic Deformation

The focus of the research in joining by deformation is on questions relating to the joining of lightweight construction materials, such as fibre reinforced plastics or wrought aluminium alloys both as joints using purely deformation and in combination with adhesive bonding. The main fields of application for the joining methods in question are within the mobility sector (aircraft, rail and automotive industries).

The research covers both the initial qualification of the deformation or setting process of the joint and the analysis of the load-bearing capacity of the joint under static and cyclic loading and in the event of a crash. A particular focus here is on the fracture-mechanical evaluation of the joints with respect to crack initiation, crack propagation and fracture behaviour. Furthermore, the properties of the joints are analysed over the service life, and topics such as corrosion resistance, leak tightness, electrical conductivity or the possibilities of (non-destructive) testing (NDT) are examined.

The focus of the research into forming by plastic deformation centres on fundamental questions of forming and deformation of component structures.

The main emphasis here is on the development of prediction models and the derivation of process control concepts for cold and hot plastic forming, predominantly for the forming of large steel plates with material thicknesses of more than 5 mm. These have to be evaluated and optimised with respect to their real-time capability for integration into machine control systems.

Our Services

- Application-specific development and optimisation of deformation joining processes of lightweight construction materials
- Process integration of joining by deformation through joint sampling, innovative setting device concepts and ergonomic workplace design
- Establishment of quality assurance procedures, for example by monitoring the setting process or by NDT methods
- Material and joining testing under mechanical load (static, cyclic, mechanical cracking)
- Transformation of heavy plates and development of simplified
- predictive models for technical control integration
- Development of self-learning systems for joining and forming by plastic deformation processes (AI)
- Process simulation during joining and forming by means of numerical FEM (ANSYS, LS-Dyna, etc.)
- Analysis methods for sensitivity and damage analysis during joining and forming (material and metallography)