

# Preface

In recent years, clinching has rapidly developed into new branches of the manufacturing industry. The clinching process is a cold joining method by local drawing of sheets with a punch and die without a rivet. The technology of clinching is rather old. The first patent for clinching was granted in Germany in 1897. However, pure clinching was not used on an industrial scale until the 1980s of the twentieth century. Shortage of this cold-formed mechanical fastening can be removed by hybrid joint involving clinching and adhesion techniques. It is a modern and an innovative technology allowing connection of different types of materials to create durable and reliable light constructions. However, its practical implementation is still very limited. Aspects associated with the automotive, aeronautical, and aerospace industries which could benefit from this technique are described in this book. The application of clinching together with adhesive joining leads to an improvement (in comparison to a simple joint): of the quality and rigidity standard and the load capacity, dumping of noise and vibration, pressure tightness and corrosion protection. This entails a significant increase of:

- long-term static strength
- amplitude of force under fatigue test
- energy required for rupture of the hybrid joint under static, dynamic and impact loading.

This book aims to describe the basic technological aspects of the creation of purely clinch and clinch-adhesive joints made of different types of adherend materials and different types of joining technology. Basic parameters that need to be taken into account in the designing process are also presented. A comparison of experimental testing of the hybrid joint with simple clinching for a combination of different joining materials underlines the advantages of the application of hybrid joints. In particular, discussion of the strength and stiffness of joints as well as energy absorption up to failure was done.

Moreover, detailed description of the finite element model applied to numerical analysis of the mechanical joints response was included. This complex numerical model incorporates two damage processes developing in:

- plastic adherends,
- adhesive layers

during the loading process of the joints.

The formulated conclusions can be useful for the application of this new fastening technology in practice and should meet the most important industrial needs.

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