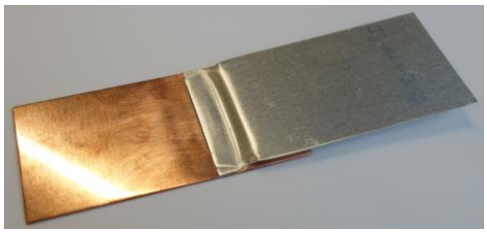
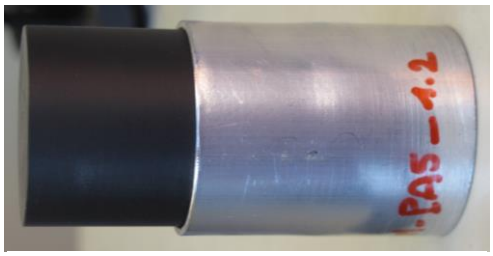
Co-funded by the European Union

METAL MORPHOSIS

Joining of dissimilar materials



Electromagnetic pulse weld of copper to aluminium



Electromagnetic pulse connection of aluminium and glass reinforced polyamide

Copper-steel weld interface

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The Context

Global trends are forcing industry to manufacture lighter, safer, more environmentally friendly, more performant and cheaper products: the manufacturing systems engineering sector is aiming at better performing machine components; increased integration of functionalities provides a competitive advantage and, in the transport sector, weight reduction is pursued.

As a consequence, all industrial branches are continuously seeking innovative approaches in the fields of materials development, manufacturing systems engineering and processing technologies. Scientific research as well as successful industrial case studies show that the high performance requirements of innovative products can only be met if the material properties are ideally adapted to the requirements, the load profile, and the function of each individual component.

Multi-material design is however hindered by challenges in the field of joining technology. The prerequisite for the production of such multi-material components is the availability of suitable joining technologies.

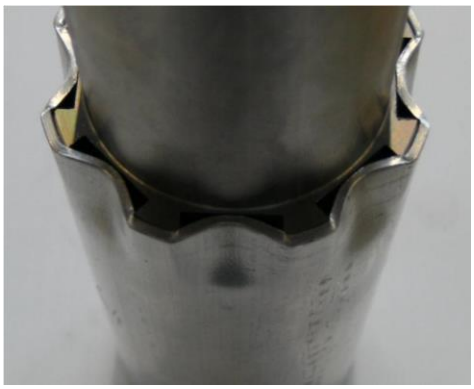
Our Solution

New developments at the Belgian Welding Institute for a range of welding processes has however provided the possibility to join dissimilar materials. The focus of the research projects was initially joining of dissimilar metals, but within the MetalMorphosis project, new joining processes for composites and metals has been developed, for sheet as well as for tubular applications.

The MetalMorphosis project developed a new range of novel metal-composite hybrid products for the automotive industry, based on the electromagnetic pulse joining process and taking advantage of new developed composites.

BWI cooperates actively in several national and international projects, as well as in bilateral projects for companies and internal research (strategic research) projects, concerning traditional welding methods, novel techniques like for example electromagnetic pulse welding, friction welding, mechanical joining methods and hybrid techniques.

BWI has extensive recognised expertise in testing of materials and worldwide reputation in testing of welds. It is a fully independent non-profit organisation, combining the functions of research and development, education, training and transferring knowledge and all service relevant research for welding and related technologies, weldability of various materials and the behaviour of welded components and structures in service.



Aluminium-steel torque joint by electromagnetic pulse crimping

Cross section of an aluminium-steel friction weld