

## New IGF project launched: Manufacturing of fasteners from tailored particle-reinforced aluminum alloys

Neue Materialien Fürth GmbH (NMF) has initiated a new IGF project in cooperation with the University of Paderborn, Laboratory for Materials and Joining Technology (LWF), in which solutions for the production and application of fasteners made of tailored particle-reinforced (PR) aluminium alloys are to be developed.

Industrial Collective Research (IGF) is an open-topic and pre-competitive funding program of the Federal Ministry of Economics and Climate Protection (BMWK), which provides small and medium-sized enterprises (SMEs) with easy access to practice-oriented research. A large number of companies support our research project (Figure 1):



Figure 1: Partners of the IGF project "Development of solutions for the production and use of fasteners made of tailored particle-reinforced aluminum alloys"

The use of aluminum materials in structural and bodywork applications has proven to be a promising approach for lightweight construction. Mechanical joining methods are established for assembly of the corresponding components. Compared to steel fasteners, rivets, screws, and functional elements made from aluminum offer several advantages. The production of material-homogeneous structures avoids temperature-related stress increases and improves the recycling potential. Other advantageous properties of aluminum are its low density and corrosion resistance. However, the advantages of aluminum fasteners can often not be exploited due to insufficient strength of the fastener materials in relation to the material of the joining parts. In order to exploit the potential of aluminum as a fastener material, it is therefore essential to develop innovative material solutions. Promising in this regard are high-strength, particle-reinforced aluminum alloys.

NMF and LWF are working closely together using their respective core competencies to develop novel connection elements from particle-reinforced aluminum (Figure 2).

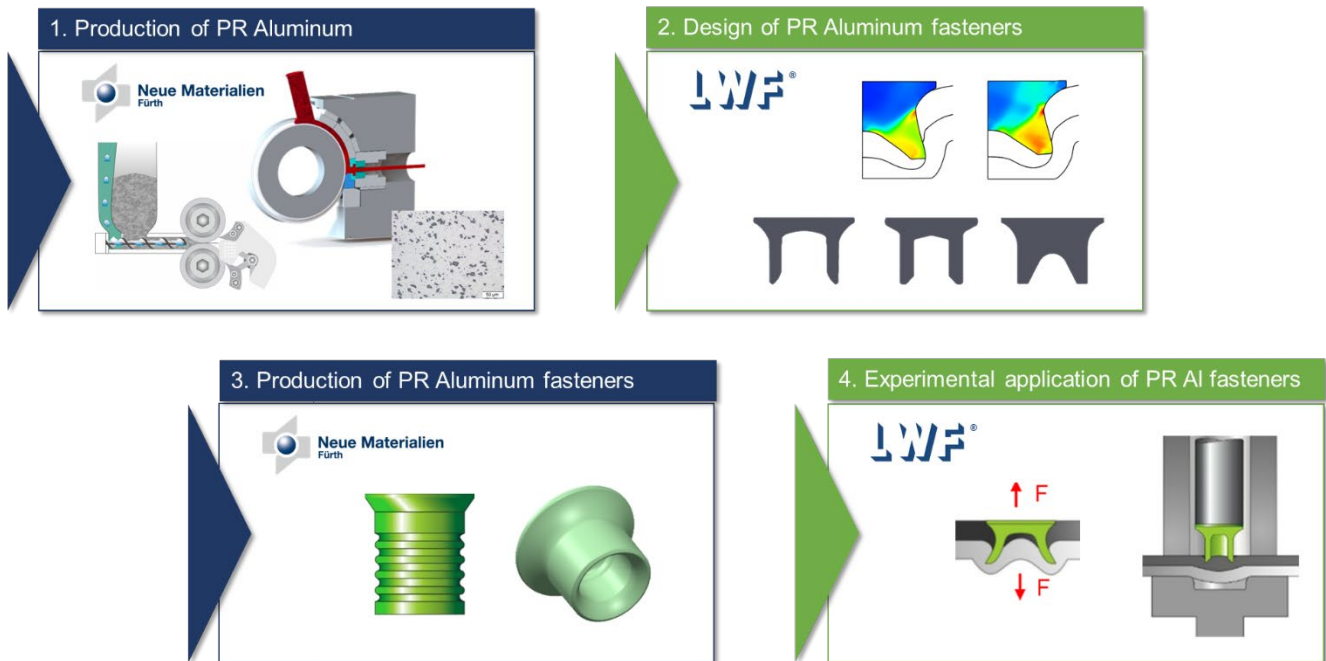


Figure 2: Development steps in the implementation of the IGF project by NMF and LWF

The alloy and particle selection is based on the required property profile of the fasteners. To produce the material, the powder mixture is granulated in a first step using a roller compactor and extruded cost-efficiently into a rod with homogeneously distributed particles using the continuous Temconex® process at NMF. Data from subsequent material characterization are used at LWF to design the necessary geometric parameters of the newly conceived fasteners. Subsequently, at NMF the machining and forming processes are developed for the production of the fasteners. The experimental application of the new connection elements is examined at the LWF by means of relevant practical tests and the fastener properties are evaluated.

The main objectives of this research project are the development of suitable materials and the qualification of connection elements made from these materials. SMEs such as wire drawing companies, toolmakers and fastener manufacturers will benefit in particular from the comprehensive experimental and numerical investigations into the production and processing of such innovative materials. The knowledge obtained contributes to the promotion of lightweight construction and, above all, to improving the recycling of aluminum component structures, which makes an important contribution to climate protection and the competitiveness of SMEs.