Manufacturing High Strength Aluminum Matrix Composites by Friction Stir Processing: an Innovative Approach ***Nelson Netto*** *(UClouvain), Lv Zhao (UClouvain), Lipeng Ding (UClouvain; University of Antwerp), Jeroen Soete (KU Leuven), Hosni Idrissi (UClouvain; University of Antwerp), Aude Simar (UClouvain)*

Aluminum matrix composites (AMCs) are promising and alternative materials for the aerospace and automotive industry due to their superior mechanical properties. Shape memory alloys (SMA), e.g., nitinol, can be used as reinforcement agent to enhance the mechanical properties of the aluminum alloys. In literature, friction stir processing (FSP) was found to be the optimum manufacturing process for particulate metal matrix composites due to the absence or minimal presence of intermetallic formation at the particle-matrix interface. However, previous work on AMCs, involving FSP on high strength alloys, especially 7xxx series, have all shown the formation of severe defects, such as clusters and cavities, due to very low material flow. In this work, we present an innovative strategy to manufacture a nearly defect free Al7075/NiTi composite, using FSP. The reasonable particle dispersion, the bonded Al/NiTi interface, as confirmed by experimental examination, ensure the tailoring of the material's mechanical properties through the shape memory performance of the embedded NiTi particles.