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STIR4STEEL

Friction stir welding for improving joinability of high-performance steels for automotive components to boost green road mobility

Deliverable D2.2 (D6)

Tool lifetime assessment

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Publishable Summary

The development of a cost-effective and durable tool which will consistently deliver high integrity welds for steel was a key milestone for this technology. A suitable tool material for FSW of steel must have a high compressive strength, sufficient fracture toughness and shock strength at room and process temperature. Furthermore, good wear resistance and the avoidance of chemical reactions with the welded material and the ambient medium is necessary. With the required properties of potential tool materials, a systematic material selection was carried out using internal and external databases like Cambridge Engineering Selector (CES). In the next step, the properties of candidate tool materials were evaluated by the weighted property index method. Three different potential tool materials were selected for further studies. Tools for welding tests were manufactured and tested on friction stir welding of high strength steels up to 12,5mm welding depth thickness. The tool wear and lifetime of each tool was analysed and two tool concepts were selected for further tests. With the final tool concept, sound welds were made for high strength steels and the wear behavior was acceptable.