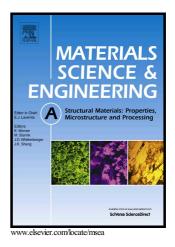
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 PII:
 S0921-5093(17)30504-X

 DOI:
 http://dx.doi.org/10.1016/j.msea.2017.04.052

 Reference:
 MSA34953

To appear in: Materials Science & Engineering A

Received date:8 February 2017Revised date:11 April 2017Accepted date:12 April 2017

Cite this article as: Sebastian Herbst, Hendrik Aengeneyndt, Hans Jürgen Maie and Florian Nürnberger, Microstructure and Mechanical Properties of Friction Welded Steel-Aluminum Hybrid Components after T6 Heat Treatment *Materials* Science & Engineering A http://dx.doi.org/10.1016/j.msea.2017.04.052

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ACCEPTED MANUSCRIPT

Microstructure and Mechanical Properties of Friction Welded Steel-Aluminum Hybrid Components after T6 Heat Treatment

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[Abstract]

In the present study, friction welded rods made of AW6082 aluminum alloy and 20MnCr5 steel were subjected to different T6 heat treatments of solution annealing and aging. The bond strength of the joints was determined using tensile tests and the intermetallic compound (IMC) layer thickness along the bond zone was measured by scanning electron microscopy (SEM) analyses. It is shown that bond strength strongly depended on the annealing temperature and duration. For an annealing temperature of 500 °C, a process window could be established that led to an increase in bond strength compared to the as-weld condition. The IMC-layer thickness was found to be distributed inhomogeneously along the bond zone and the mean IMC-layer thickness showed parabolic growth behavior. With increasing mean IMC-layer thickness, the bond strength decreased linearly. The fracture surfaces of tensile test specimens were analyzed by SEM and are discussed with respect to the corresponding

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