

66th International Astronautical Congress 2015

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Technologies (5)

Author: Dr. Markus Kahnert
MT Aerospace AG, Germany, markus.kahnert@mt-aerospace.de

Dr. Johannes Hegels
Germany, johannes.hegels@mt-aerospace.de

Mr. David Knerr
Germany, david.knerr@mt-aerospace.de

Dr. Georg Heinrich
MT Aerospace AG, Germany, georg.heinrich@mt-aerospace.de

Mr. Rudolf Forster
MT Aerospace AG, Germany, rudolf.forster@mt.man.de

Mrs. Isabelle Tessier
MT Aerospace AG, Germany, isabelle.tessier@mt-aerospace.de

Mrs. Elisabeth Wild
MT Aerospace AG, Germany, elisabeth.wild@mt-aerospace.de

Mr. Armin Steinacher
Germany, armin.steinacher@mt.aerospace.de

Mr. Alexander Hoschka
MT Aerospace AG, Germany, alexander.hoschka@mt-aerospace.de

DEVELOPMENT OF NEW AND INNOVATIVE WELDING AND FORMING TECHNOLOGIES AND
THEIR APPLICATION IN THE FRAME OF THE ARIANE PROGRAM

Abstract

To achieve an optimization in the competing objectives of low mass, high process robustness and cost reduction within the production of launcher components, the manufacturing processes must be regarded intensively. In the frame of the development program of Ariane 5 ME (A5ME) especially new and innovative forming and welding processes were carefully examined to integrate their advantages into the new upper stage bare tank of this launcher for an efficient production compared to long term established manufacturing processes.

Different development programs were carried out comprising the relevant aspects of these welding and forming technologies. The investigated forming processes spinforming and shot peenforming provide potentials in the production of net-shape parts which eliminate the mechanical rework after forming and also provide high material properties.

Advantages of the Friction Stir Welding process as a newly developed joining process for the space component manufacturing are also presented. This technology is a solid-state joining process leading to superior material properties compared to the current standard TIG welding process.

This paper will describe aspects of the development programs carried out and will especially focus on the different demonstrators and prototype parts built within these programs. The implementation of the

results into the different series production systems is the main topic. In this regard the results of the different investigations carried out on the produced parts will be presented to underline the advantages of the regarded technologies. As an outlook these results will also be rated in the frame of an Technology Readiness Level (TRL) to assess the forming and welding technologies for the described applications of A5ME and for a future use for the new launcher Ariane6.