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Titanium orbital welding: 3D printed parts to bulk

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Additive Manufacturing (AM) is an incredibly interesting solution for high energy physics due to its design flexibility and to its lightweighting opportunities. As this technology is spreading in physics experiments, several new issues have to be solved. The integration of parts produced by AM is one of the open questions. This study described the tests done on orbital welding of Ti6Al4V Grade 5 pipes produced with AM and standard bulk Ti6AL4V Grade 2 pipes. Welding procedure was optimized, and the finished parts were then verified according to ISO 15614-5 regulation. Computed micro-tomography (CT), leak test, pressure test up to MDP (Maximum Design Pressure), leak test after pressurization and destructive tests such as metallographic examination and tensile test are presented in this work.

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