

Laser Welding of the CMS FPIX Phase 1 Upgrade Cooling Pipes

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The CO₂ cooling system for the CMS Phase 1 FPIX Forward Pixel Upgrade uses thin walled stainless steel tubing fused by autogenous laser welding. The metallurgy, joint design, and welding process must all work in harmony to produce a reliable joint. We summarize the significance of alloy composition, impurities, and other problems specific to laser welding of austenitic stainless steels. Fully internal weld defects such as cracks or pores in the micron range necessitate precise inspection methods. We present our experience with several diagnostic methods such as micro-hardness measurements, metallographic inspection and 3D micro-CT scanning of welds.

Summary

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