

WAAM demonstration – part for welding fixture

Printed by: Savonia University of Applied Sciences
Design: Uurtamonniemi Ltd

This demonstration is a part for welding fixture.

Part was printed in horizontal orientation. 3D-model: SolidWorks, slicing: Adaxis AdaOne.

Part was printed with infill structure without outer wall. Machining allowance of 3 mm was defined with Adaxis AdaOne.

Material-shielding gas combination worked well with Esab Purus 42. It has the ability to form only a small amount of silicon dioxide which means less disruptions during printing.

Interpass temperature, 325 C°, was measured and controlled with pyrometer at the end of every weld.

Active cooling plate with water flow (25 l/min flowrate).

Stress relief heat treatment: 90 mins at 600 C° with 5 h rise rate from room temperature.

First phase of machining was made with part attached to the build plate. Then parts were cut off from the build plate and second machining phase carried out to finish the part.

Active cooling plate and pyrometer in heat controlling feedback loop was tested out during the demonstration. Active cooling plate allowed approximately **25% faster build speed** compared to the same printing program without active cooling.

Print info

Material: Esab Purus 42 CF
Ø1,2 (G3Si1/ER70S-6)
Gas: Ar + 8% CO₂ + 0,03 % NO (M20)
Dimensions: 125 x 125 x 25
Weight: 0,95 kg
Print time: 37 min
Arc time: 27 min
3D-modeling: Solidworks
Slicing: Adaxis AdoOne
Robot system: Yaskawa DX100/MH50
Welding parameters:
Fronius TPSi CMT/characteristic 3595/WFS 3,9 min

Bead width: 2,4 mm
Layer height: 2.06 mm
Print speed: 12 mm / sec
Interpass temp. 325 C°

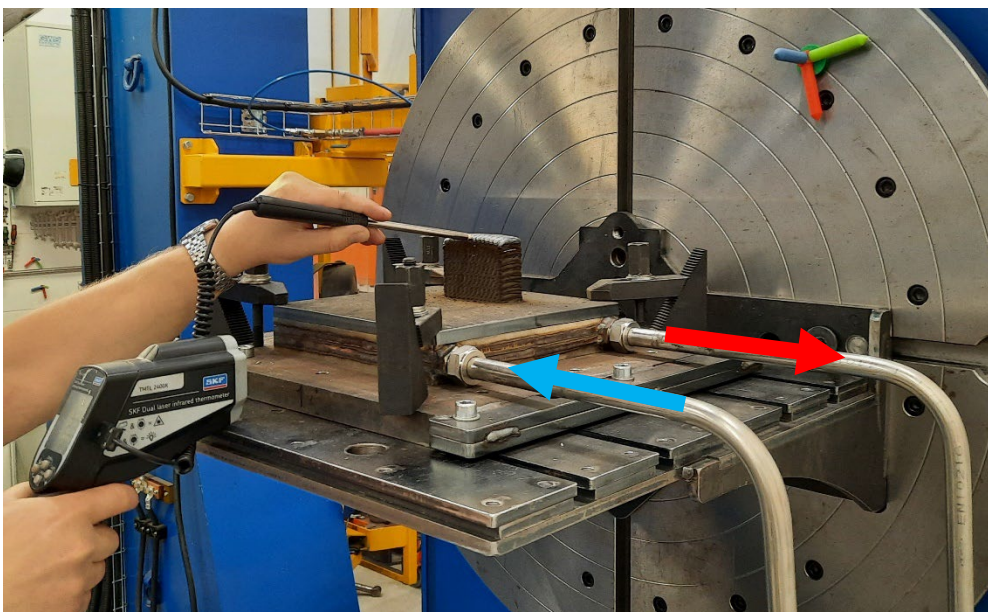


Figure 1. Water cooled printing plate

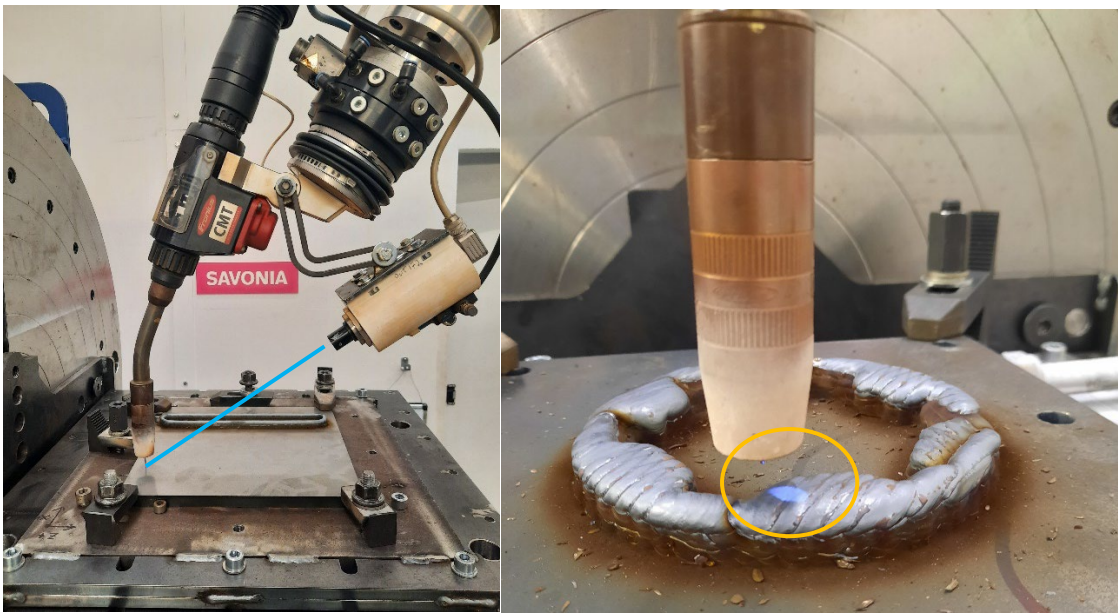


Figure 2. Tool setup with pyrometer and guide pointer of the pyrometer

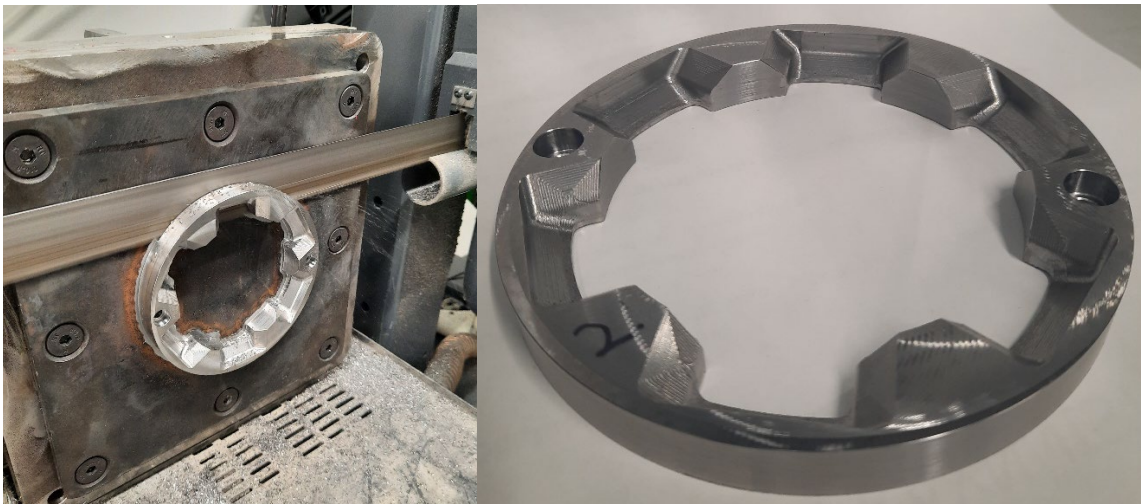


Figure 3. Sawing part off from build plate after 1st machining cycle and finished part after 2nd machining cycle