

SERCOS Fieldbus implementation on FPGA for real-time control of metal laser 3D printing

Master thesis proposal 2019-2020, AVRГ, MECH VUB

The Additive Manufacturing team of the Department of Mechanical Engineering at the Vrije Universiteit Brussel is performing research in online monitoring and control of the melt pool parameters during Laser Metal Deposition (LMD) 3D printing of metals. Dedicated hardware based on a Xilinx FPGA was developed inhouse for the real-time control of melt pool temperature and track width.

Current research involves the commissioning of an inhouse developed 5 axis combined CNC milling and LMD printing machine. The goal of this master thesis is the implementation of a SERCOS Ethernet based fieldbus on the FPGA to allow for communication between the master CNC controller of the CNC machine, and the in-house developed FPGA based laser monitoring hardware.

Profile:

The master thesis candidate should be enrolled in a Master program in (Applied) Engineering of Electronic systems and should have had significant first experiences with the programming of (Xilinx) FPGA's & VHDL. Background knowledge, or at least an interest, in (industrial) networks is required.

Expected outcome:

The final goal of this master thesis is an implementation of the SERCOS Real-time ethernet based fieldbus protocol on the existing Xilinx FPGA such that data can be passed in real-time between the FPGA & Bosch Rexroth CML75 CNC controller. The student shall only consider programming of the FPGA, and not the programming of the Bosch Rexroth PLC. All required hardware is available.

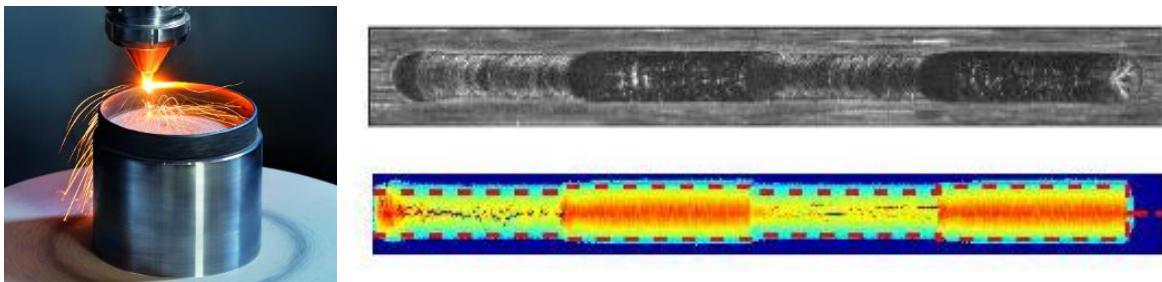


Figure 1: Real-time monitoring of Laser Metal Deposition.



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