

Highlight

Aachen,
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2nd generation Intelligent Power Control for Quasi-Simultaneous Laser Welding of thermoplastics to weld complex geometries with smooth heat input.

Quasi-Simultaneous Laser Welding (QSLW) of thermoplastics has been used for many years and it has proven its applicability for industrial use. Complex geometries still have been a challenge for QSLW since an important scanner property is limited speed along sharp corners. Due to this fact, VTT has developed a method how to keep the heat input constant for each point on weld track.

The 2nd generation method is an upgrade to VTT's previous Intelligent Power Control in which pyrometer was used to extract the optimal laser power-vs.-time curve. In this method the material is heated up to a desired temperature as fast as possible and a pyrometer signal is used to limit the weld temperature. During the first run, the pyrometer signal is recorded. Then, using digital acquisition card, the same signal is fed to the laser on the following welds. This enables the QSLW process to keep the material at correct temperature for the needed time interval. The power control upgrade is based on utilizing the digital feedback signals (position and speed) from the scanhead, which are recorded within a first test run. Next step then is to use VTT's Welding Optimizer software to modify the pyrometer recorded curve with the speed data recorded. This then enables to achieve constant heat input at each point on weld. New fiber lasers can adjust power within the μ s regime, which enables this kind of fast power scaling.

This process upgrade enables even more flexible use of QSLW process because scanner slowness in corners is not a limiting factor anymore. The concept also allows usage of short welding times due time and melt can be still kept at needed level compared with conventional QSLW welding.

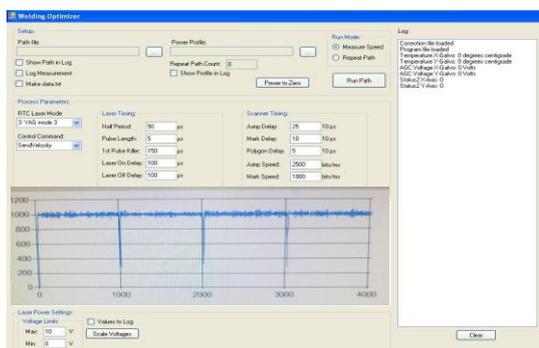


Figure 1: "Welding Optimizer" software screen and tracked speed profile (blue curve)

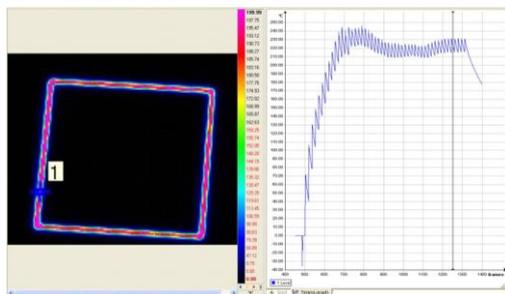


Figure 2
Left: High speed thermal image of quasi-simultaneously welded rectangle
Right: temporally varying temperature at point 1



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For any further questions our experts will be pleased to provide you assistance:

Contacts at VTT Technical Research Centre of Finland

Petri Laakso
VTT Laser Processing Team
Tuotantokatu 2
53850 Lappeenranta, Finland
Phone +358 40 544 5646
Petri.Laakso@vtt.fi
www.vtt.fi/laser

Contacts at Fraunhofer ILT

Dr. Alexander Olowinsky
Phone +49 241 8906-491
alexander.olowinsky@ilt.fraunhofer.de
Dipl.-Phys. Gerhard Otto
Phone +49 241 8906-165
gerhard.otto@ilt.fraunhofer.de

Fraunhofer Institute for Laser Technology ILT
Steinbachstrasse 15
52074 Aachen, Germany
Phone +49 241 8906-0
Fax +49 241 8906-121
www.ilt.fraunhofer.de

