

Fully automated laser welding process in industrial seating component manufacturing by means of OCT for in-situ weld depth measurement and closed loop control

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The introduction of inline coherent imaging technology as a sensor principle in various laser materials processing applications has hit the headlines since 2014. One of the groundbreaking applications is the measurement of the vapor capillary depth in laser welding, now allowing to keep record of this essential quality parameter with an accuracy of micrometers and a sub millisecond temporal resolution.

In a joint cooperation between Sitech, Volkswagen and Precitec qualified the Precitec IDM (In-Process Depth Meter) based on the latest OCT technology for weld depth measurement and closed-loop control based on the application recliner welding for seating systems.

How to evaluate the quality of a laser weld of the safety-relevant recliner component? So far, this has usually only been done by destruction: cut the component and examine it by microscope. This costs time and money - and so far not every part can be examined. With the IDM system it is possible to measure the welding depth precisely and in real time. The functionality of the system was verified by the laser experts of Sitech and Volkswagen in Wolfsburg. Detailed results will be shown during the presentation at EALA 2018.

The first installation in industrial serial production of the IDM system for in-situ welding depth measurement was realized in the Sitech plant in Polkowice. The laser welding process is performed by fully integrated Precitec ScanTracker, including the IDM system which is attached coaxially above the scanning mirror.

Sitech now benefits from a constantly higher welding quality of the safety-relevant recliner component, every single produced part is checked. Furthermore the Precitec IDM allows Sitech to cut down on conventional offline quality control, finally resulting in reduced time and costs in production

Next step:

Consequentially the next step is the closed-loop control of the welding depth which was not available in industrial environments until now due to the lack of an efficient sensor. Different disturbances can result in a non-constant welding depth over the entire machining time. With the exact measurement of the keyhole depth and the integrated controller of the Precitec IDM, it is now possible to control the welding depth via real time adjustment of the laser power.