

Technology/Process: **Robotic drilling with X-Laser scanning**

Responsible: **X-Laser Systems**

Partners: **Saab, ÅF Industry, Linköping University**

Work package: **4.2 – "Automated assembly"**



Description of Technology/Process:

By using a new rotating 2D-laser scanner (X-Laser) integrated together with a robot control, the robot work envelope can be established in seconds by scanning reference points like holes and edges. The laser can also find center point of rivet heads and measuring surface orientations in one operation for accurate correcting a local drilling pattern.

Before:

The application of robotic drilling with support of laser scanners has been implemented before in different styles, but mostly with fixed scanners and camera based solutions.

Illustration:



Robotic drilling with X-laser installed on top of end-effector.

Keywords:

Robotic,
drilling,
assembly,
automation,
laser,
scanning,
sensor

Benefits:

- The use of the X-Laser sensor enhance and reducing time in the robotic measuring process since complicated and expensive fixtures can be eliminated and end-effector mechanisms can be simplified. The solution makes it possible to quickly apply accurate robot work frames for drilling or other operations. Even if the off-line programmed position is not corresponding, the laser finds and corrects position and orientation of the actual surface area. The solution can substantially reduce the cost and process time for the robotic drilling application.

Work performed:

An existing robot ABB 6640 including option force-control together with a new end-effector have been used. A new laser scanning system have been developed and integrated with the robot controller to support and optimize the drilling process.

The goal was to replace the former laser scanner technique by letting the laser unit itself performing the movement to scan instead of moving the robot. By the fact that the robot itself doesn't need to move under the measuring process will enhance accuracy and reduce process time. The laser system design also open up for more advanced measuring strategies, due to the rotation of the 2D-laser scanner with higher accuracy because the use of the more precise triangulation technique. A smart calibration routine is behind the output of an accurate 3D surface scan which is processed by the laser computer and present to the robot controller as offset values for drilling position corrections.



Future developments & exploitation:

The results gives confidence to future industrialization of robotic drilling applications using new advanced laser scanning technique supplied by Swedish suppliers of robotic solutions.