

THE STIROLIGHT PROJECT

AG-52 Meeting - Trollhättan

Jeroen De Backer – PhD student

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PROJECT PARTNERS



VOLVO



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STIROLIGHT FACTS

StiRoLight

Partners

Project Facts

Robotic FSW

Workcell

Project tasks

Applications

Results

FSW at SAAB

- Start spring 2009, runs over 3 years
- Funding by Vinnova
 - FFI program - SEK 6.3 million
- Main project partner: Saab Automobile AB
 - project leader Tommy Christensen
- Motivation
 - Sustainable Production Technology
 - Reduce environmental impact in production
 - Decrease fuel consumption by weight reduction
 - Introduce 3D - FSW in Swedish vehicle industry

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FSW at SAAB

- Advantages
 - Flexible
 - Complex geometries (3D)
 - Cheaper
 - Long-time knowledge in automotive
- Disadvantage
 - Robot compliance (deviation)
 - Limited temperature
 - Limited force (Some apps. require 100kN)
- PhD of Dr. Soron at ESAB

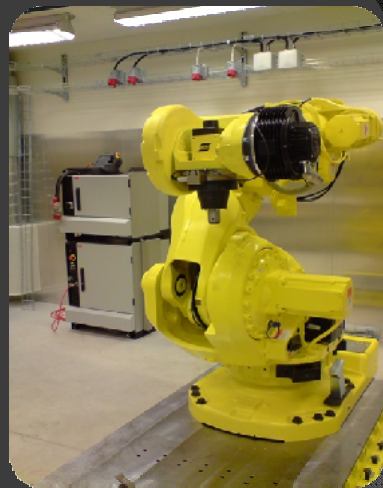
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WORKCELL AT PTC

○ ESAB Rosio

- Modified ABB IRB-7600 robot
- 6th axis replaced
- Thickness up to 10mm in aluminium
- Guess: 5-6mm in titanium and inconel
- Max downforce ca. 10kN
- Welding speed up to 3m/min

WORKCELL AT PTC



TASKS IN STIROLIGHT PROJECT

- Compensation of path deviations
- Surface quality of the backside
- 3D welding with remained contact force
- Robotic FSW of hard materials (e.g. by laser hybrid FSW)
- Licentiate thesis in spring 2012

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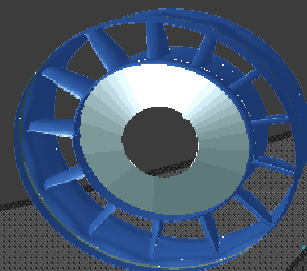
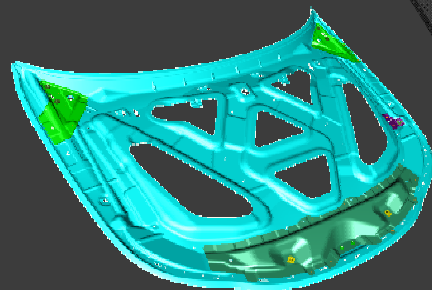
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FSW at SAAB

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APPLICATIONS

- Body parts at Saab
- Turbine structures at Volvo Aero



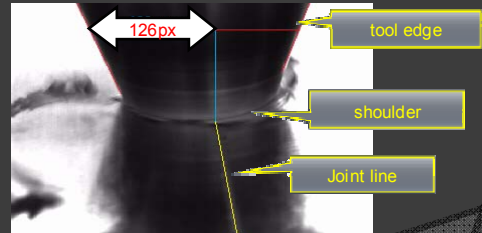
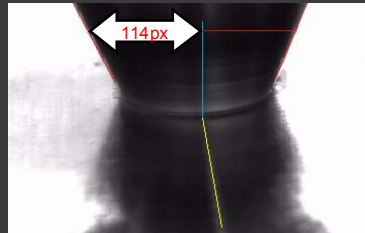
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PRELIMINARY RESULTS

○ Compensation of path deviations

- Deviation versus measured side forces
- Compensation model

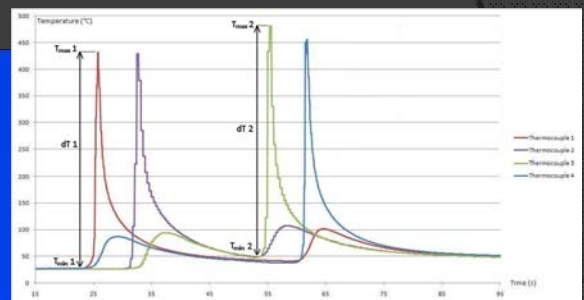
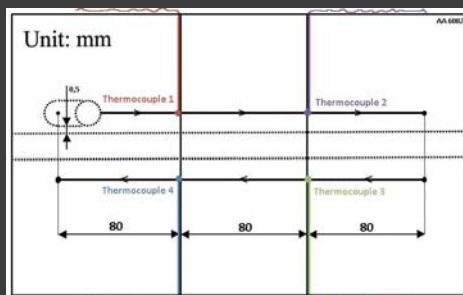


- Max. deviation = 10% pin diameter = 0,4mm
- 1.5 to less than 0.5mm (as presented at FSWP)

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PRELIMINARY RESULTS

○ Temperature in complex seams



Travel direction →

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- Flexibility
- Faster than riveting (in theory: FSW = 6m/min)
- Low operational costs
 - No wire or rivets required
 - Rotating tool costs 1000 SEK, welds 1km
 - Test case 10 x 10cm = 1m/car
 - 1 SEK /m * 1m/car = 1 SEK per car
 - Compared to: 0,3 SEK / rivet
 - 0,3 SEK /rivet 33 rivets/car = 10 SEK per car
 - Cost reduction for 100'000 cars = 900'000 SEK