

**UNIVERSITY WEST**

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# University West@PTC / Welding Trollhättan, Sweden

- Introduction to PTC
- StiRoLight

AG52 Finland 2009-10-14  
/Fredrik Tuveßon, Welding engineer.



# University West in Trollhättan

- Established 1990
- About 10 500 students
- 500 employees
- 19 professors
- 49 PhD students



# Production Technology Centre Founders

**VOLVO  
AERO**



INNOVATUM  
TEKNIKPARK

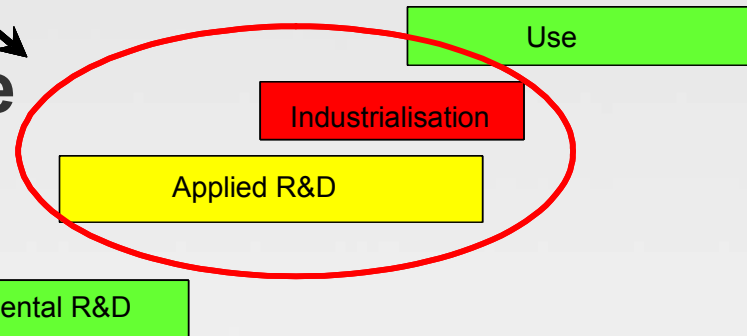




PTC



# Production Technology Centre



## Vision and goals

- An internationally renowned R & D Centre in production technology
- Centre for competence development
- By cooperation create a dynamic environment and competitiveness for industry
- Create an environment with accessible competent people
  - Strong connection between R&D and education
  - R&D in cooperation between academia and business
  - Co-location and co-use of R&D resources



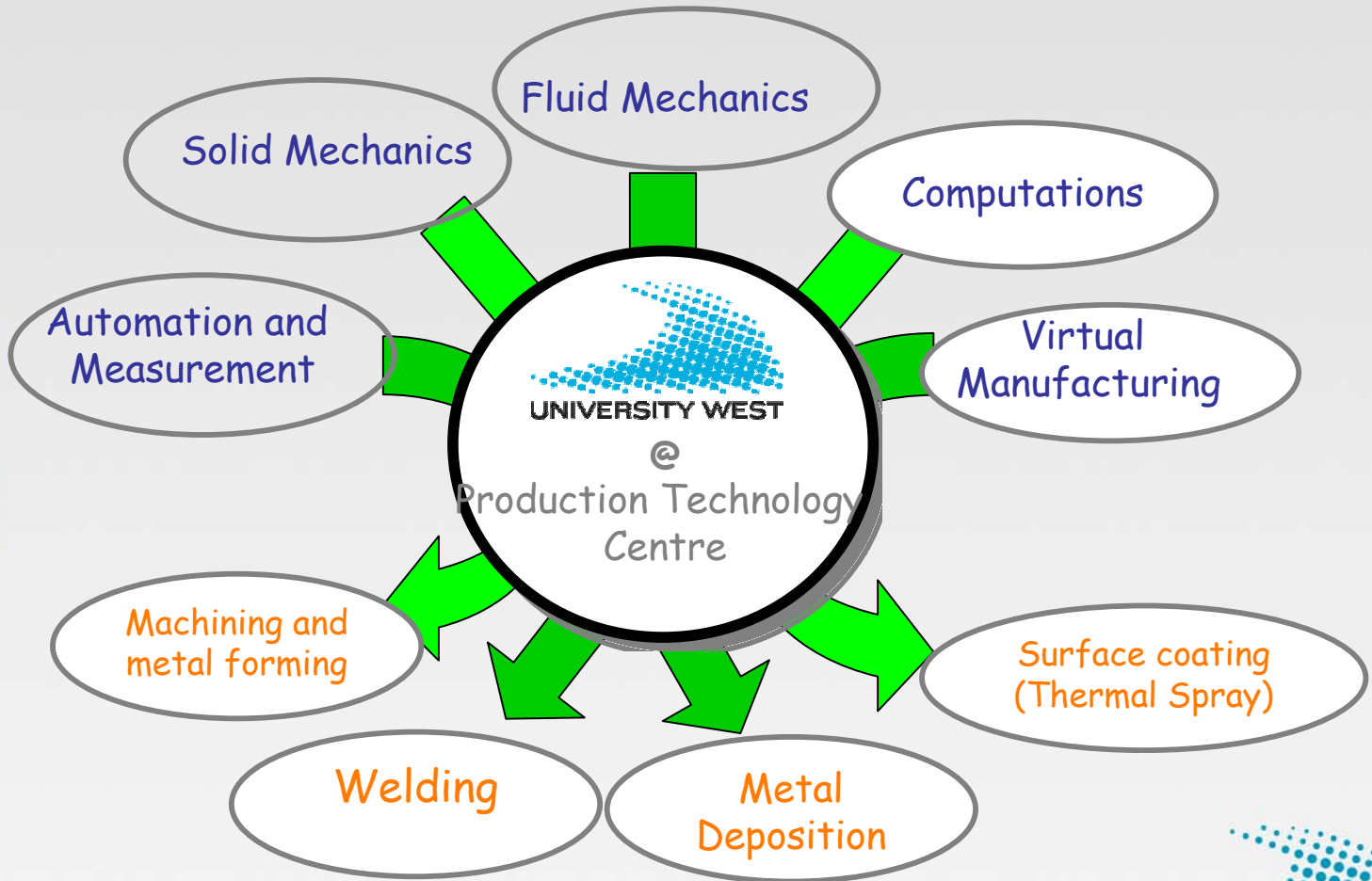
# Production Technology Centre

## Focus R & D areas

- Thermal Spray
- Welding
- Metal cutting
- Metal forming
- Automation, metrology and NDT
- Virtual Manufacturing
- Ergonomics
- Material handling

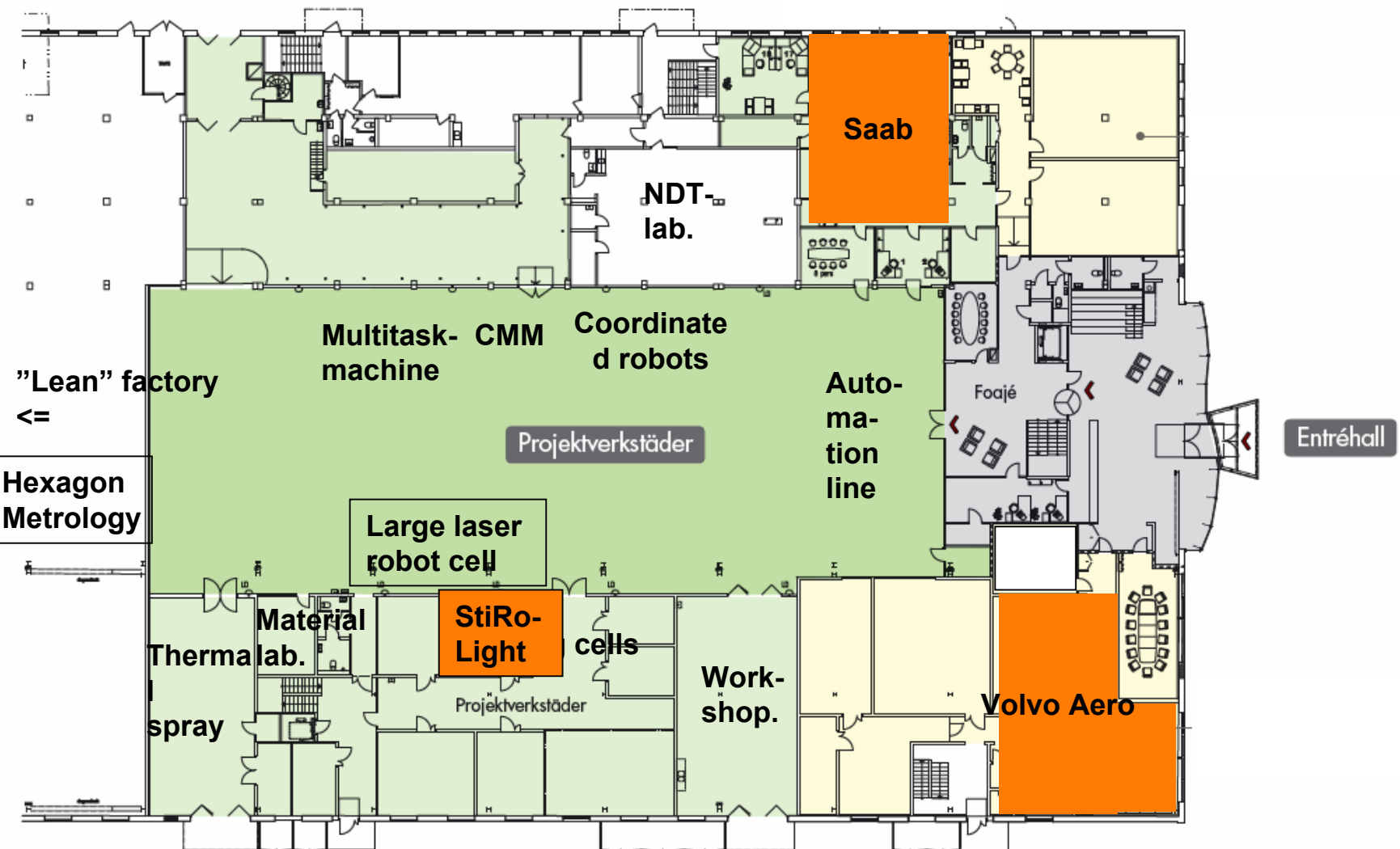
- All areas are supported by
- Lean Production
  - Visualisation and simulation
  - Design

# Competences at University West@PTC



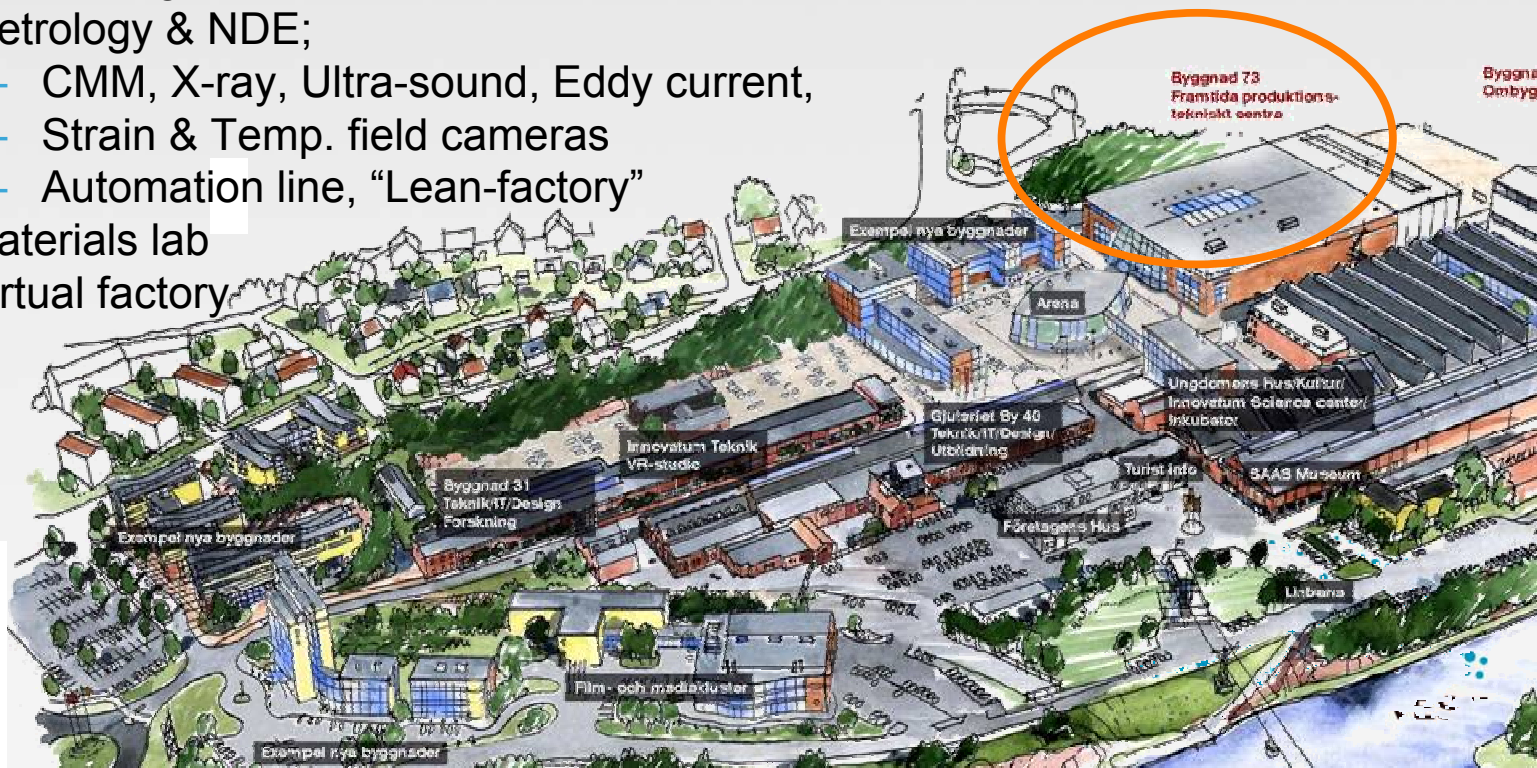
## Processes at University West@PTC

# Layout floor 1



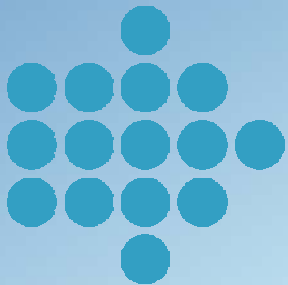
# Resources at Production Technology Centre

- Location: Innovatum area, Trollhättan
- University West research group in strong cooperation with industry
- 75 active personnel, 50 MSEK turnover + industry resources
  - Welding equipment; MIG, MAG, TIG, Laser, Plasma, Spot Weld, FSW
  - Robots
  - Thermal Spray; Plasma, Flame, HVOF, Wire arc
  - Cutting; NC Lathe, Mill., Multi-task
- Metrology & NDE;
  - CMM, X-ray, Ultra-sound, Eddy current,
  - Strain & Temp. field cameras
  - Automation line, “Lean-factory”
- Materials lab
- Virtual factory



# Some ongoing projects 2009

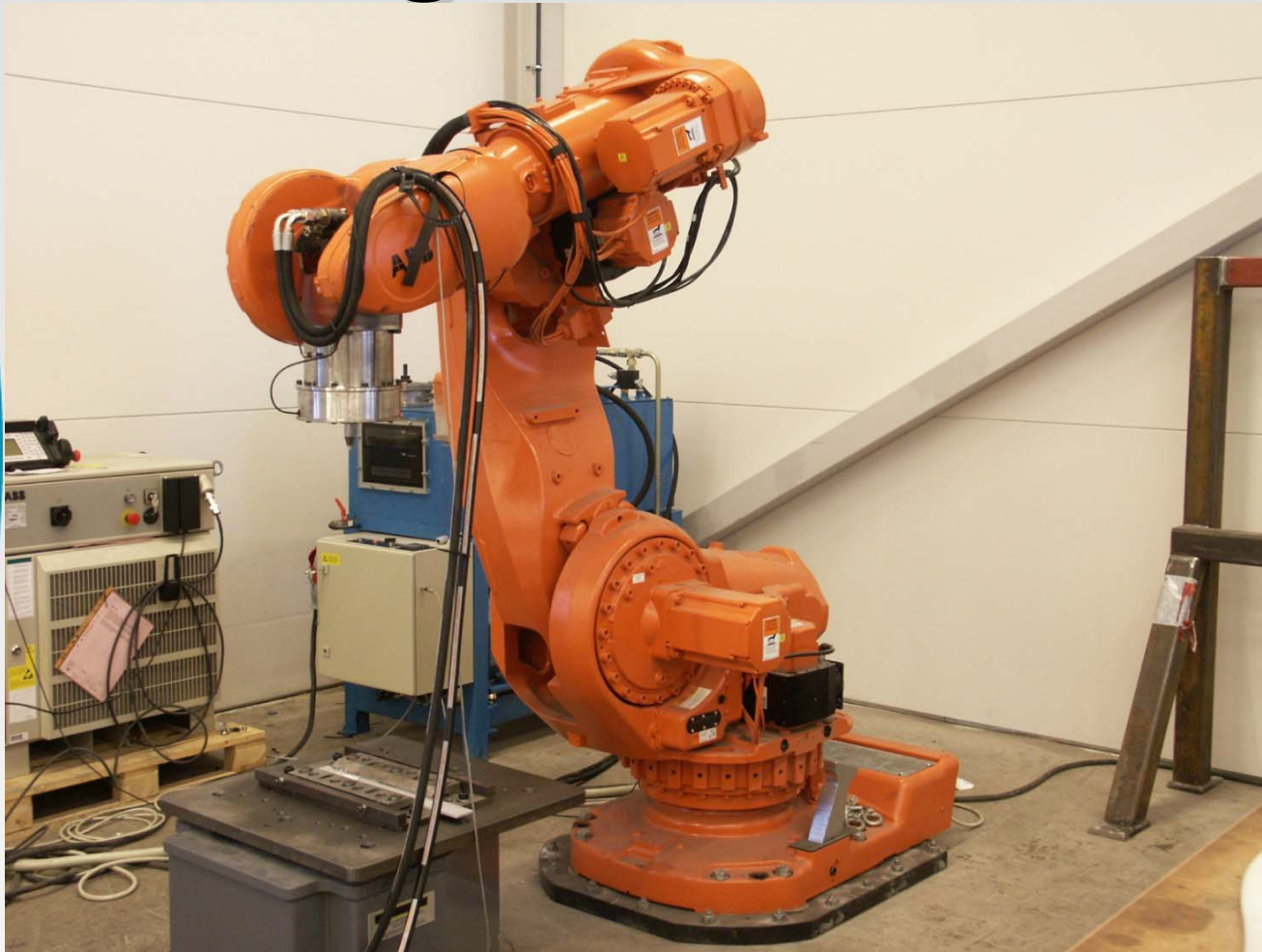
- **VITAL** – EnVironmenTALly friendly aero engines - Flexible fixtures and metal deposition; EU-FP6; VAC
- **AFFIX** – Aligning, fixing and holding difficult to handle components
  - Simulation, vision technology for welding; EU-FP6; VAC
- **RMS** – Robotised Metal Deposition using Laser - RLMwD
  - Process development, OLP, automation; Vinnova; VAC, Saab,...
- **Lost/Kost** – Cost efficient lightweight welded constructions
  - Increasing weld quality; Vinnova; VCE
- **My-Laser** – miniaturisation of laser welding tool
  - VGR; Permanova, VAC, ...
- **INNside** – Innovativ lasersvetsning; VGR; VAC, Chalmers,...
- **FLEXA** – Flexible Automation, 2008; EU-FP7; VAC, Chalmers,...
- **ANDTE** – Automation of NDT-methods, 2009-2012; KK; VAC, ÅF, FORCE, ....
- **StiRoLight**



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# StiRoLight



# StiRoLight

StiRoLight =

Robotized friction Stir welding in  
Light weight materials

# StiRoLight

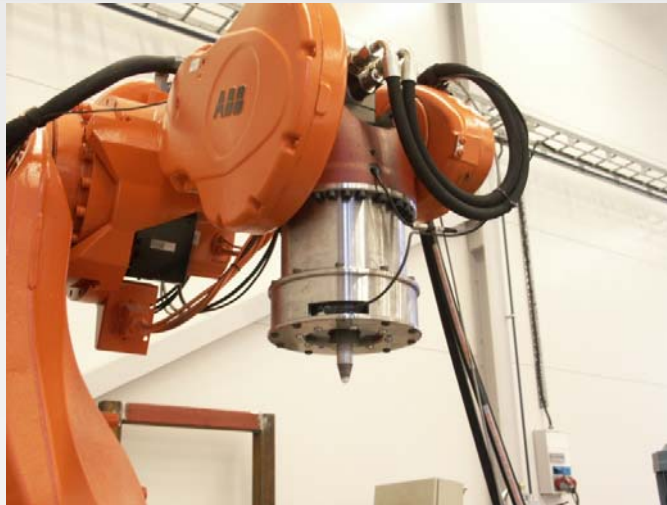
- Just started – running until end of 2011
- 6 main project partners
- The overall aim of the project is to contribute to reduced vehicle fuel consumption through increased use of light weight materials in vehicle design using robotised FSW technology.

# StiRoLight

- The technical and scientific goals are:
  - to introduce robotized FSW-technology in Swedish vehicle industry
  - develop the process for more complex geometries
  - to industrialize robotized FSW
  - to develop design methodology to fully utilize FSW-joints for complex geometries
  - a licentiate degree in robotized FSW
  - a robotized FSW-cell demonstrator

# StiRoLight

- A large ABB IRB 7600
  - forces of up to 1300 kg in the robot
  - Last axis is taken away
  - A hybrid force/position control system



# StiRoLight

- Robot installation during 2 days w43
- The footing of the robot and fixture ready
- PhD student will start 15<sup>th</sup> of October
- Find out which parameters and measurements needed



# StiRoLight

October

- Installation
- Get process knowledge and State of the Art

November

- Find the demands of the fixture
- Get the right fixture

December

- Planning the experiments
- Find the process windows

2010

- Paper for the FSWP 2010 in Lille, France
- Expand the process window and add new materials
- Draft construction handbook for FSW
- ...

# StiRoLight

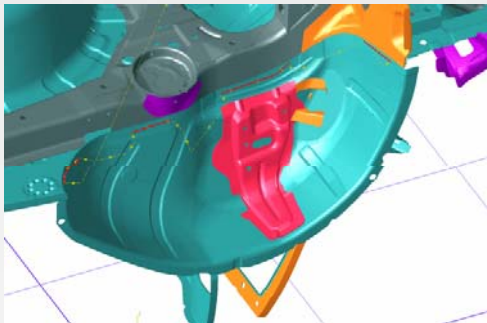
- Materials
  - Aluminium 5182, 6016, 7xxx
  - Plate thickness of <1mm to 5mm
  - Butt and lap joints
  - Titanium – Volvo Aero
    - *Higher tool demands*
- Process speed
  - 2 m/min , Start time < 2 sec

# StiRoLight

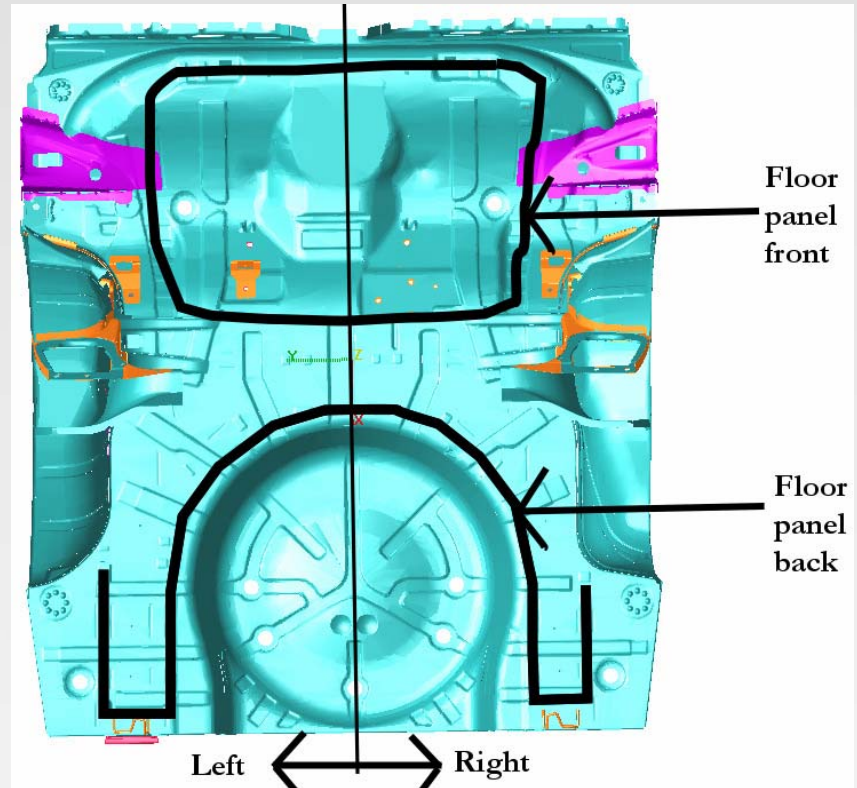
- Some applications



VAC engine detail



Left Wheel hood

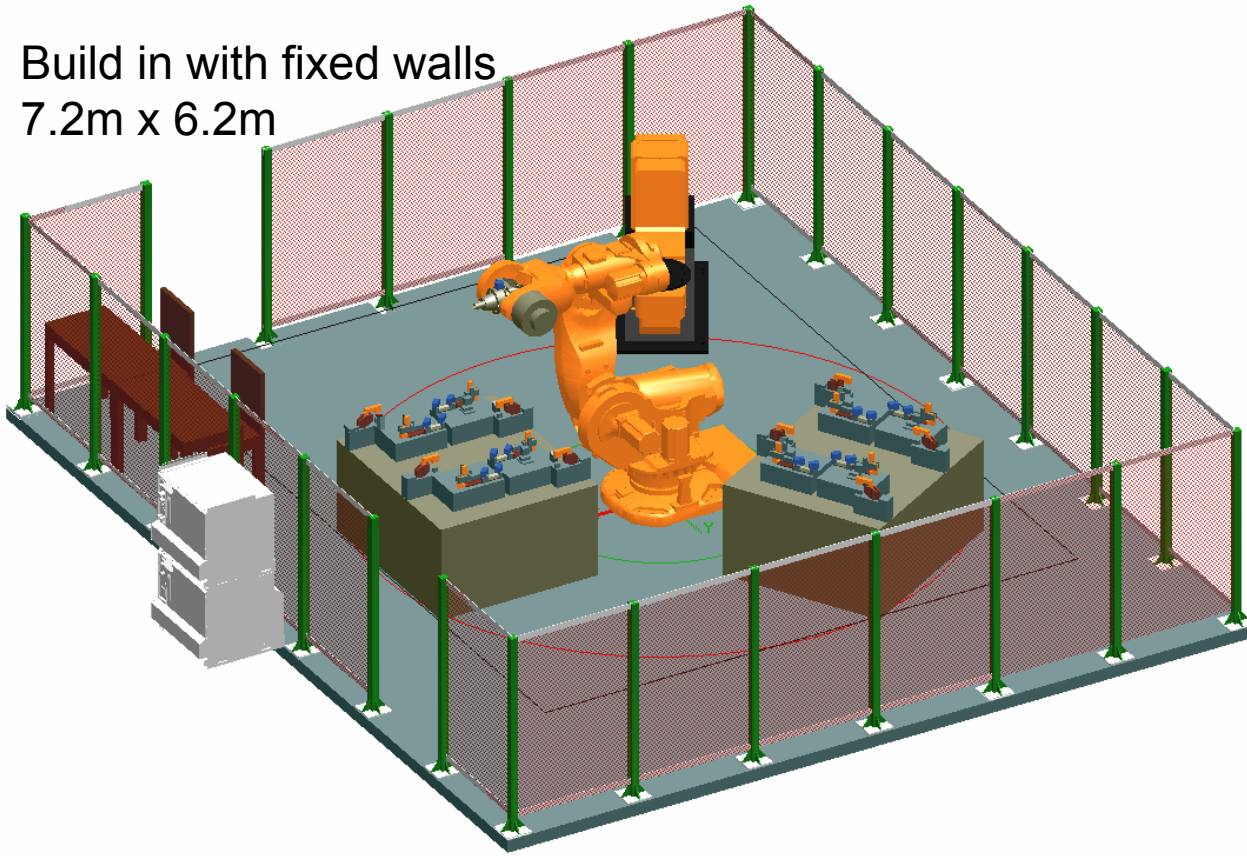


Indication of the welds

# StiRoLight

- The welding cell at PTC

Build in with fixed walls  
7.2m x 6.2m



# StiRoLight

- Thanks for your attention
- Questions?

## **Project management group**

Saab, Tommy Christensen, PL  
Volvo, Mathias Fremäng  
ESAB, Dr. Mikael Soron  
PTC, Kent Andersson  
HV, Dr. Torbjörn Ilar  
ABB, Torbjörn Albertsson

## **Reference group**

KIMAB, Joakim Hedegård  
SAPA, nn  
Lunds Tekniska Högskola, Prof. Gunnar Bolmsjö  
Volvo Car Corporation, Lars-Ola Larsson

## To summarise:

University West @PTC has focus on...

- Industrial problems and close cooperation with industry,  
i.e. **industrial solutions**
- Modelling – and modell validation
- Simulation
- Measurements and sensors
- Feedback and automation

for **welding**, thermal spray, machining, ....