

# R&D at University West

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## Robotic FSW

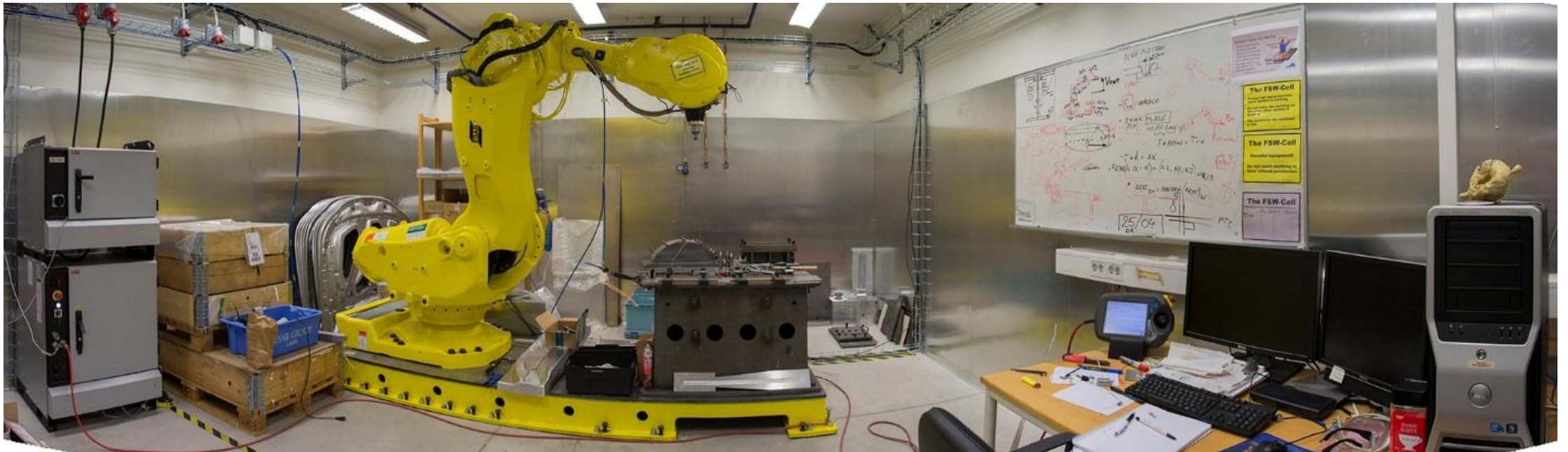
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# Focus

- Robotic Friction Stir Welding
- Mainly aluminum alloys
- Control of process and robot
- Tool development

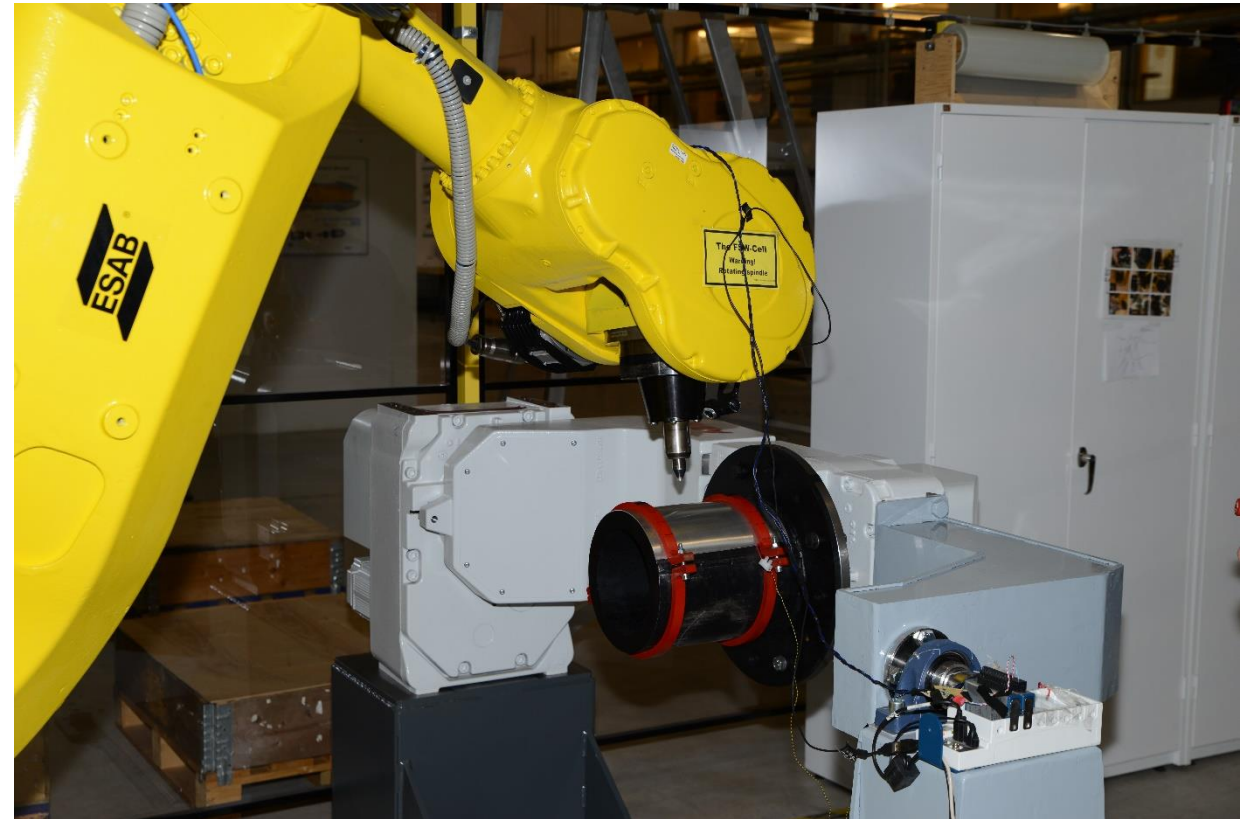


# Projects and collaboration

- MAPLAB project supporting work by Ana Magalhães
- Collaboration and partnership with Nordic FSW Centre (Lars Cederqvist)
- Open for collaboration with any dedicated companies and organizations in the field
  - SAPA Technologies, ESAB, AETech, SKB, Sandvik, SAAB, GKN, TWI, ...

# Upgrade of equipment

- Added a 2-axes positioner to the existing robot system
- Added support to the positioner to minimize deflection
- Better workspace around the robot system for experiments
- Positioner will allow studies and experiments similar to real production condition



# Ongoing and planned studies

- TWT – temperature controlled FSW
  - Robust operation, establish operating limits and opportunities
- Tool design studies
  - Stationary shoulder, lap joint, butt joint
- Complex geometries – challenges and opportunities
- Proper control of robot – positioner for FSW
  - Forces – avoid moving through zero force
  - Minimize deflection
  - Understanding how to produce programs to achieve robust performance
- Optimize control of robotic FSW
  - Cycle time, tool life, weld quality, ... (priority of one of these)

# Demonstrator facility and collaboration

- Open up for test cases
  - Simple cases can be made
  - Complex requires collaboration with industrial partner(s)
- Finding new applications
- Design for FSW
- Build up experience
  - What works?
  - What needs to be developed?
  - How to design a work piece, how to design a robotic cell
- Networking in Sweden and abroad (Nordic, Europe)
  - Sharing experience; teaming up in projects

# The next step

- Robot types (PKM)
- Develop methods for model based welding procedures
  - Specification of result
  - Control
  - Motion specification and generation
  - Robust execution
- Established as a feasible and reliable joining method

# Need

- Support from industry via collaboration in projects
- Support from funding organizations
  - Vinnova
  - KK foundation
  - VGR + Tillväxtverket
  - EU
  - Others?