

# SMF FLYG / SME Aeronautics

The goal is to help SME:s to be approved subcontractors to the aerospace industry.

## Activities:

- R&D projects (Level 1: 125 KSEK, Level 2: 325 KSEK)
- Seminars
- Student thesis
- Gap-analysis AS9100

Ongoing activities within the PTC arena in Trollhättan (Focus on Metal)

### ITE Fabriks:

Hot sheet metal forming of Inner Duct

### Tre D Mekaniska, Speedtool,

Sand och Vattenbläst i Tyringe, Exova:

Cutting, blasting and etching of Inner Duct

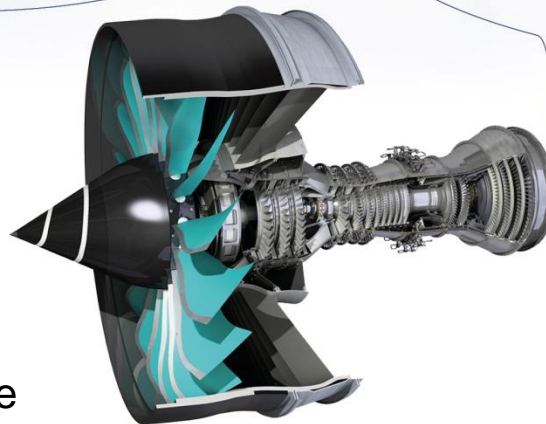
### Tooltec:

Residual deformations after machining

**Hydroforming design Light:** Hydroforming of Vane

**Brogren Industries:** Simulation of sheet metal forming + laserwelding

**AH-Automation:** Exchange of cutting tools with support of collaborative robots



Rolls-Royce Ultrafan™

## Planned activities:

**Jobro, Brogrens, HDL:** Simulation of forming + laserwelding

**AH-Automation, Trestad Laser, Brogrens, Tooltec:** Automation of deburring, grinding and welding etc.

**Bror Tonsjö:** Automatic balancing of propellers and fans

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# Aeronautics SME Cluster – Focus Metal



swerea|IVF

INNOVATUM  
TEKNIKPARK

TRESTAD  
LASER AB

  
HYDROFORMING  
DESIGN LIGHT



***SPEEDTOOL AB***



JOBRO



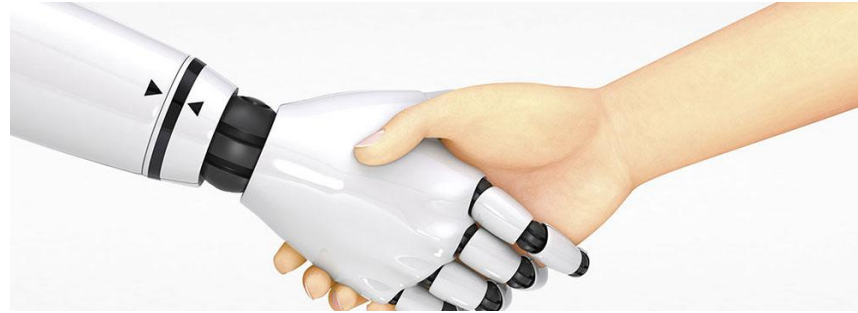
# Tooltec Level 2 - Residual deformations after machining



- **Aim** Predict residual deformations after machining of a forged component in nickel based alloy
- **Activities** Residual stress measurements using XRD, Geometry measurements using GOM and CMM, FE-simulations
- **Results** Methods for reducing geometric distortions
- **Proceeding activities**
  - Regional project funded by Västra Götaland
  - Project in cooperation with Swedish Automotive industry

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# AH-Automation Level 1 - Exchange of cutting tools with Collaborative Robots



- **Aim** Analyse possibilities with Collaborative robots
- **Activities**
  - Student project at Högskolan Väst
  - Seminar at Innovatum in Trollhättan
- **Results** Need to combine collaborative robots with complementary automation solutions for the selected case
- **Proceeding activities**
  - Establish Automation with AH-Automation, Trestad laser, Tooltec and Brogren Industries

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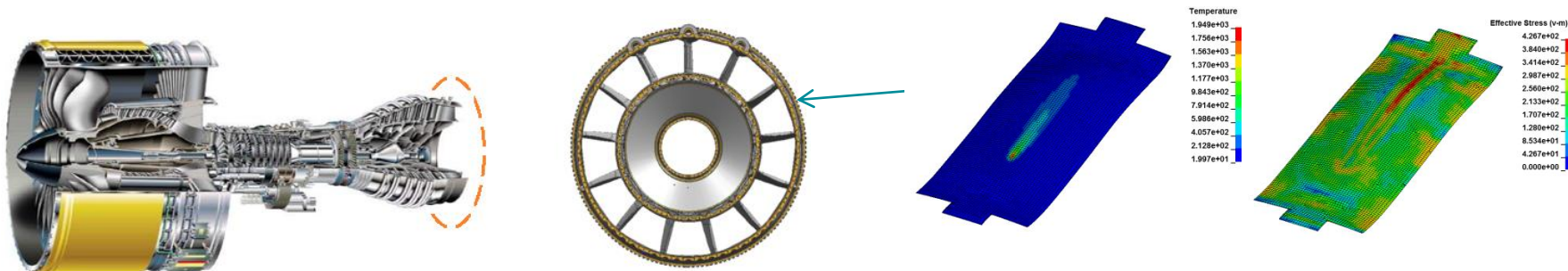
# HDL Level 2 - Hydroforming of Vane



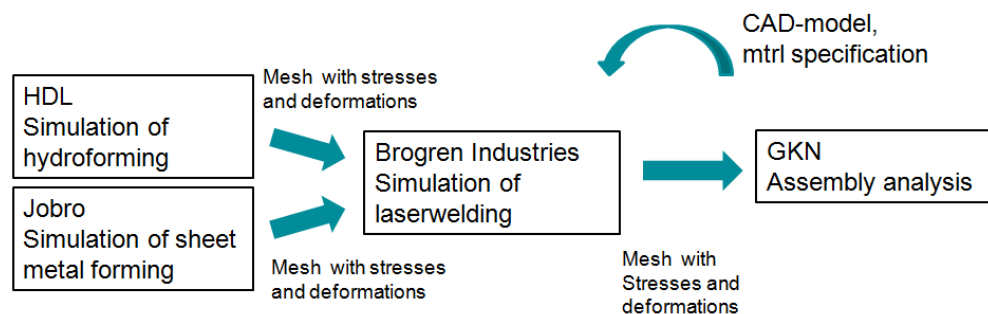
- **Aim** Explore possibilities to form a component with small internal radius without folds, cracks and thinning in an inconel based alloy
- **Activities**
  - Material characterisation, simulation, manufacturing, validation
- **Results**
  - Simulation introduced as support in component design and process planning
- **Proceeding activities**
  - Establish new project with HDL, Jobro, Borgren Industries and GKN

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# Brogrens Level 1 - Simulation of sheet metal forming + laserwelding

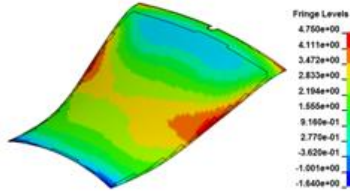


- **Aim** Introduce process simulation as SME collaboration tool
- **Activities**
  - Practical tests with simulation of forming + laserwelding using LS-Dyna and Autoform
- **Results** Methodology introduced at Brogren Industries
- **Proceeding activities**
  - Establish process simulation cluster



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# ITE Fabriks Level 2 - Hot sheet metal forming of Inner Duct



- **Aim** Production of hot formed components in titanium, study of repeatability, develop documentation for quality assurance.
- **Activities** Modification of hot forming tools, hot forming tests with method developed by support from simulation in NFFP6 project. Measuring of geometry results, development of documents for quality assurance.
- **Results** Details manufactured within required shape tolerances for serial production, documentation sent to GKN
- **Proceeding activities**
  - Discussions with GKN concerning new forming and welding project

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# SpeedTool Level 2 - Production of pre-series of titanium details



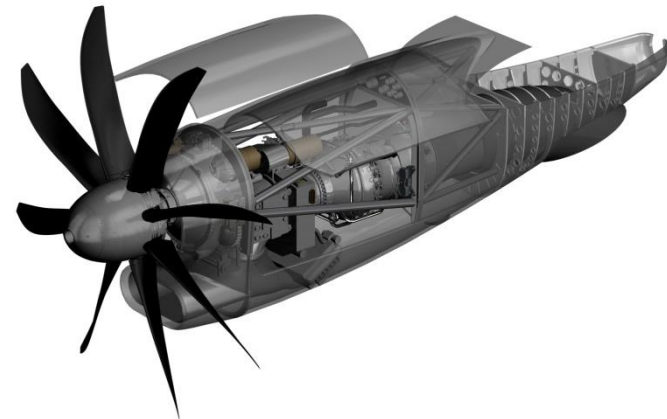
- **Aim** Create a cluster of SME:s that can perform succeeding manufacturing processes after hotforming of titanium detail. Develop documentation for quality assurance (FAIR).
- **Activities** Performance of milling, wetblasting, etching (Exova), id-markning of hotformed titanium details. Forming tool from ITE Fabriks in previous SME Aeronautics project. Development of quality assurance documents for each individual detail.
- **Result** Details manufactured within required geometric tolerances for serial production. Documentation sent to GKN.
- **Proceeding activities** Meeting with Procurement/Quality departments at GKN together with participating SME:s.

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# Bror Tonsjö Level 1 – Automatic balancing of propellers and fans

- **Aim** - Automatic balancing of aircraft propellers and fans
- **Activities**
  - Development of demonstration test rig with engine like rotordynamic properties
  - Manufacturing of prototype balance ring
  - Evaluation of performance
- **Results**
  - Demonstrator that proves the balancing concept under realistic conditions
- **Proceeding activities**
  - Contact with propeller manufacturers
  - Further development of balance rings with rotational speed triggered locking mechanism



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