

# Current status at HBS Engineering

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## Status

- 2010: HBS Engineering invest in High Performing Computing
- 2011: Change legal status to HBS Engineering ApS
- 2011: Joins the SignaStir project as SME partner
- 2011: Conversion of CNC machine into FSW machine
- Writing the chapter "Modelling of Friction Stir Welding" book entitled "Friction Stir Welding" edited by Lohwasser and Chen
- Further development of the pseudo-frictional flow model
- Planned courses in simulation of FSW in August/September 2012 in Glostrup, Copenhagen

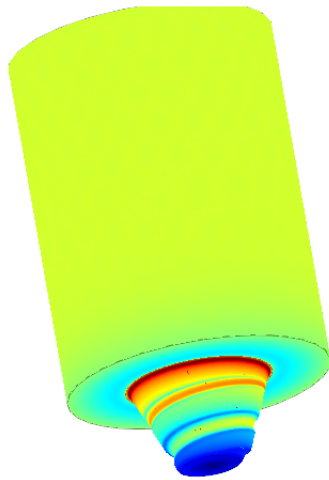


Figure 1: Stress field in threaded tool during FSW

## Modelling examples

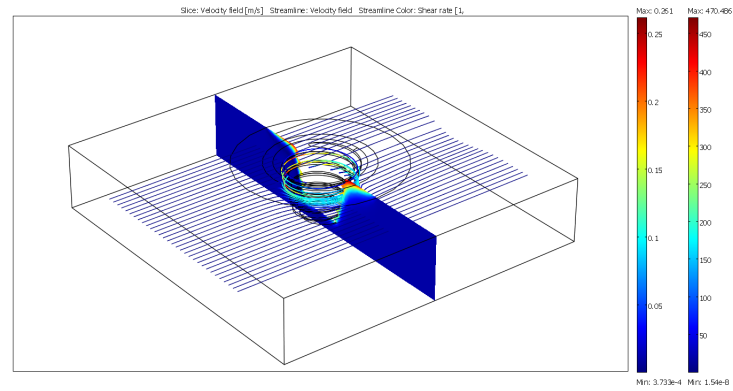


Figure 2: Material flow around a threaded tool during FSW

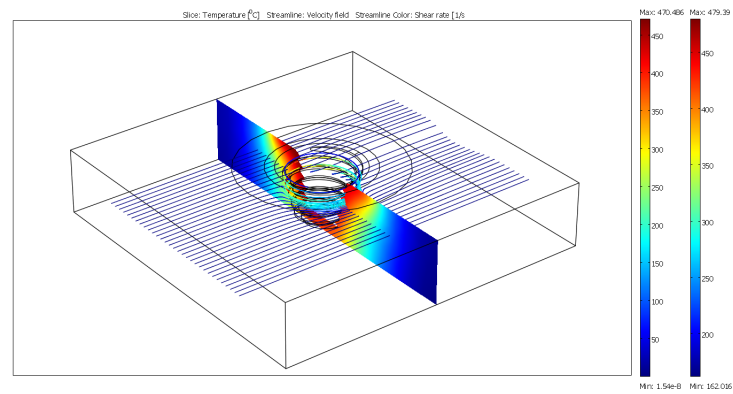


Figure 3: Thermal field around a threaded tool during FSW

## Pseudo-Frictional Flow model

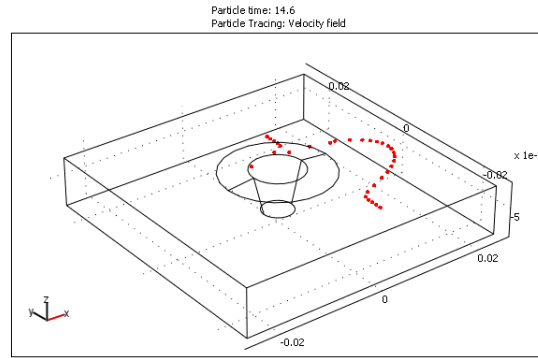


Figure 4: Tracer particle for  $\delta = 1.00$

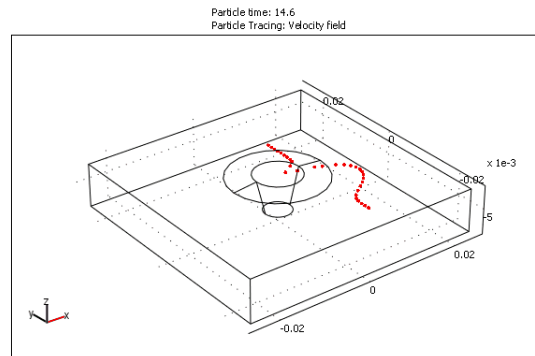


Figure 5: Tracer particle for  $\delta = 0.05$

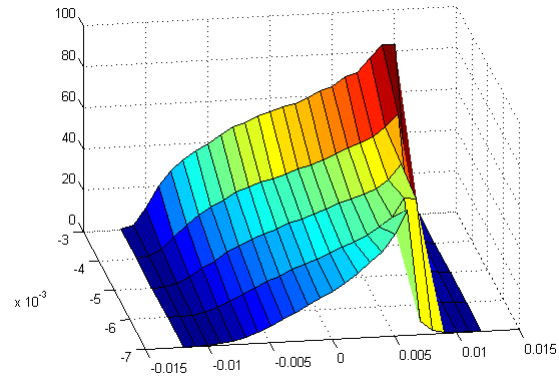


Figure 6: Strain map in transverse cross section for  $\delta = 1.00$

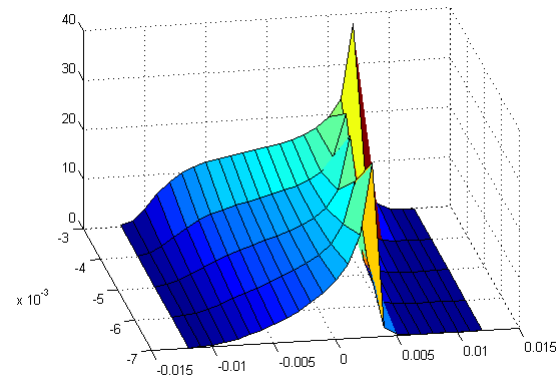


Figure 7: Strain map in transverse cross section for  $\delta = 0.05$

## SignaStir project partners

- Rubitech
- BCT
- Inspectrahire Instruments
- HBS Engineering
- TWI
- ISPL (INSTYTUT SPAWALNICTWA)
- Swerea KIMAB
- SAPA

## Description of the system

- Laser Ultrasonic Testing (LUT)
- NDT method
- Designed to detect voids typical for FSW
- Possibility for online detection
- Possibility for feed back control for changing welding parameters
- Linear and 2D pattern
- Numerical simulation

SignaStir Consortium is planning to take the product to market during the 3-5 years. HBSE will take contact to machine builders to discuss implementation etc.