

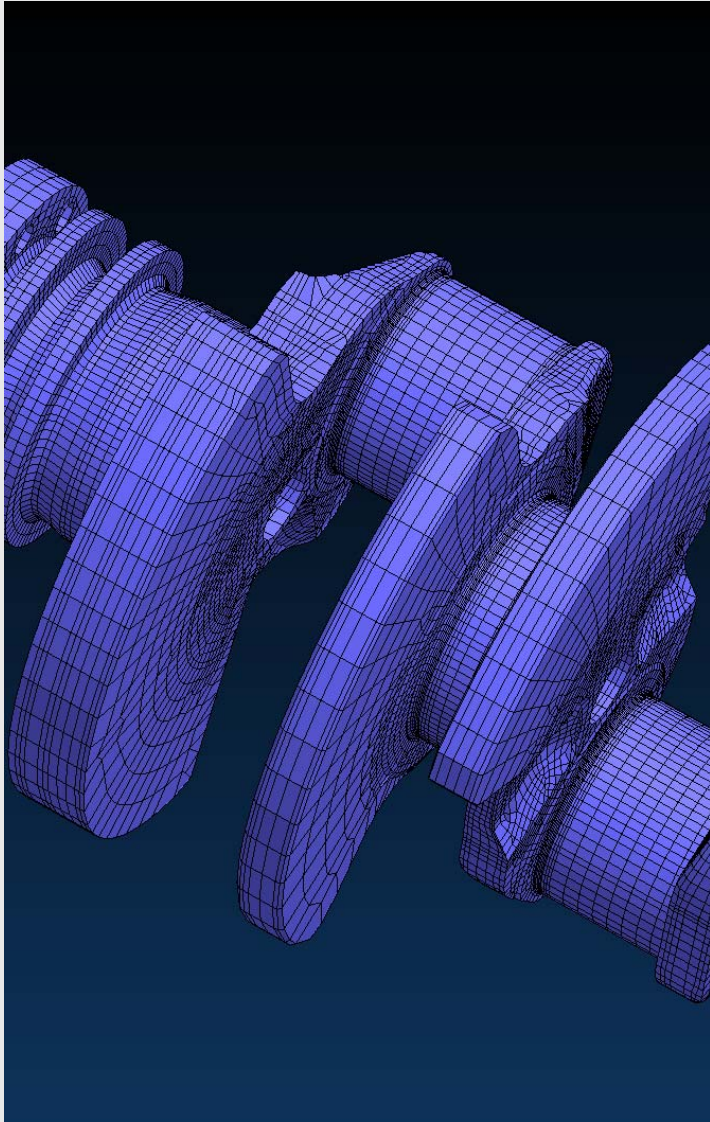
Usermeeting 2005 Workshop Chassis



**ENGINEERING CENTER STEYR
GmbH & Co KG**

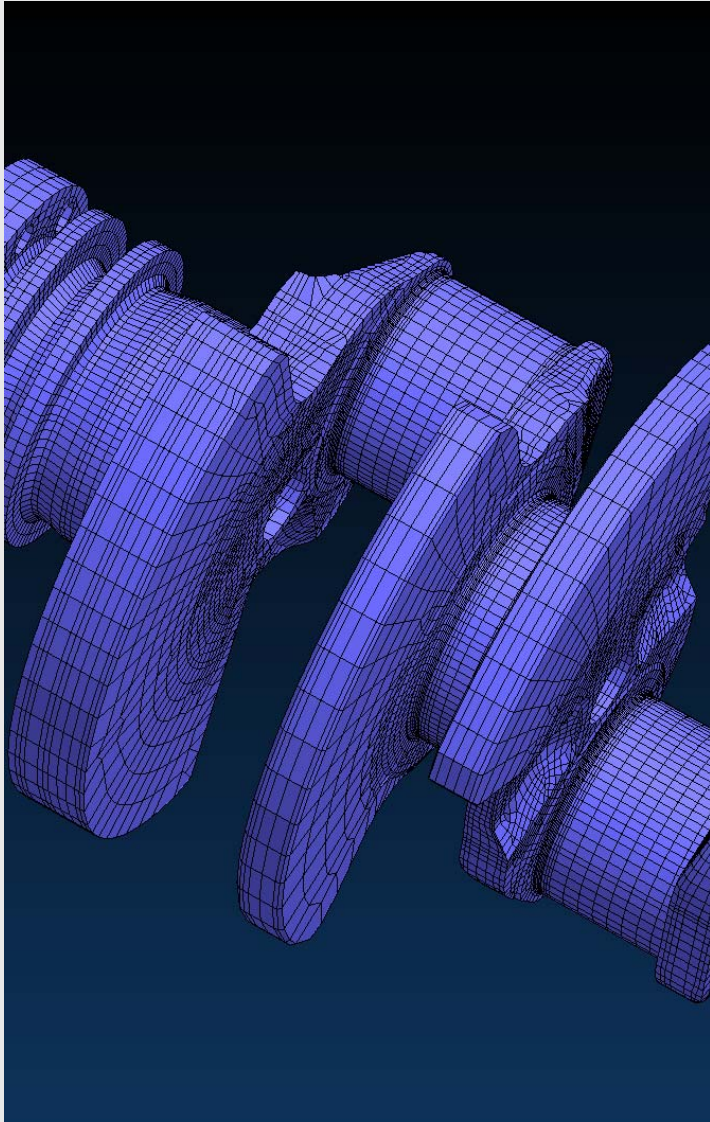
Hofwimmer Klaus / Eberhard Dutzler

New Features 4.6



- Boundary layer model
- Damage equivalent reduction of load histories
- Improvement of analysis filter
- Visualization of cyclic stress/strain curve
- New femfat.ini dialog
- **Extension WELD for laser welds**
- **Extension WELD for Eurocode 3 und BS7608**
- **WELD: Stress correction at weld end/start**
- **WELD: Stress correction in TransMAX**
- New method for plastic strain influence
- New BASIC and MAX equivalent stresses
- Derivation of Sehitoglu parameters with Maple
- Plotting and Real Time Animation of FE stresses with FEMFAT VISUALIZER

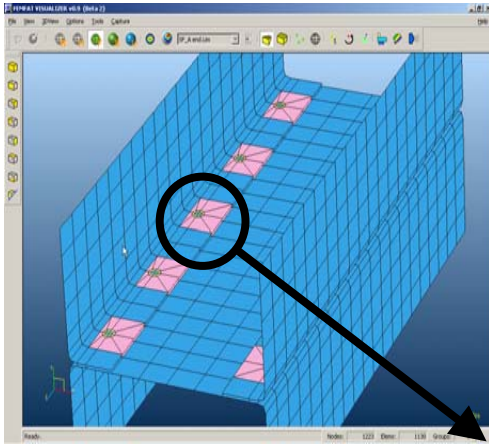
New Features 4.6



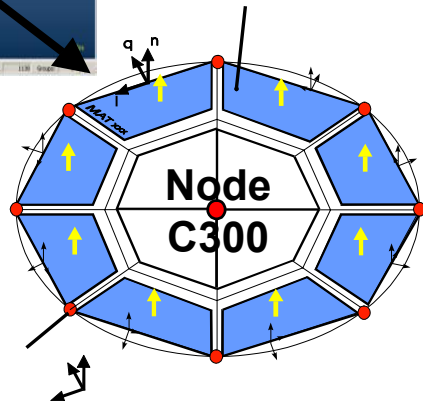
- **MAX: Excel-like channel definition table**
- **F-SPOT: Extension for CWELD and CHEXA**
- ABAQUS ODB 6.5 interface including HP
- Selection of parts from ABAQUS ODB
- ABAQUS ODB interface for effective plastic strain
- ANSYS RST interface for stresses
- LS-DYNA interface for stresses
- nCode DAC interface
- IBM 64bit version

SPOT JOINT

• Stress based concept



Shell Elements for Evaluation

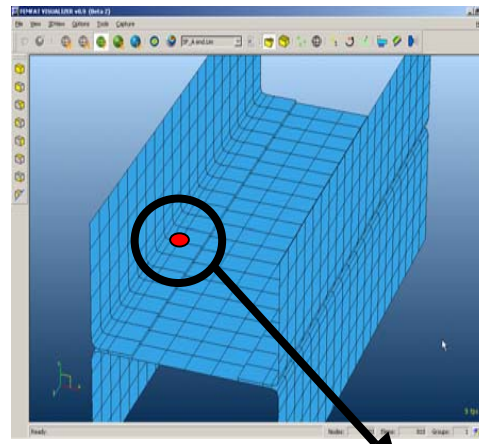


Welding Seam
Node C120

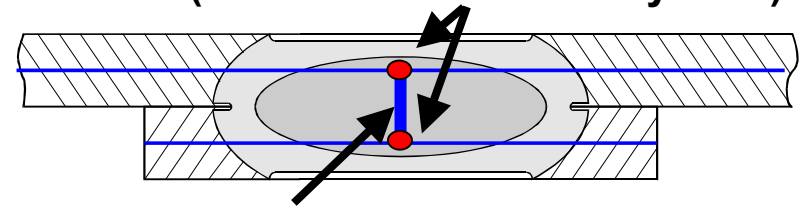
Local Coordinate System

- Re-Meshing with ronden model
- Stress based method

• Force based concept



Node C300
(Color or Coordinate System)



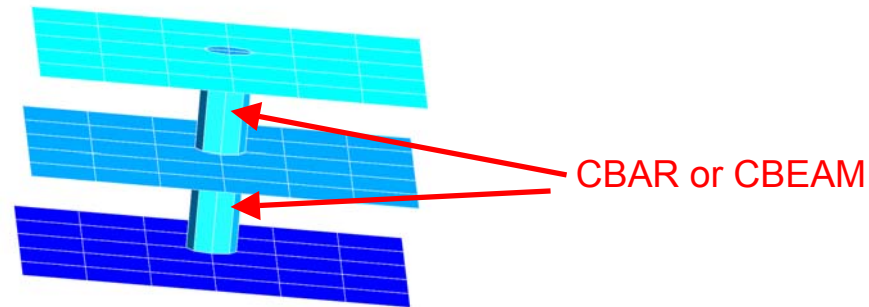
Beam Element

- Without remeshing
- Force based method

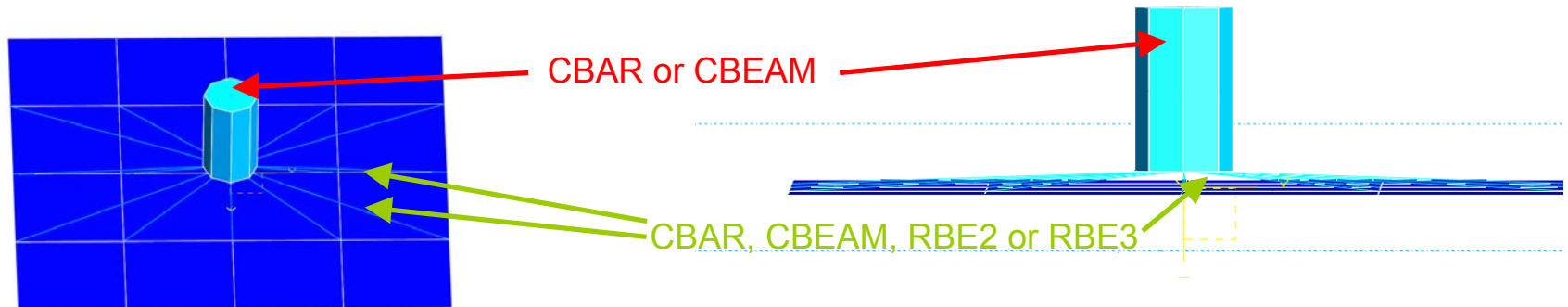
Possible Definitions of Spot Joints

Spot Connections can be represented by:

1. **CBARs** or **CBEAMs** (direct connections, mesh dependent)

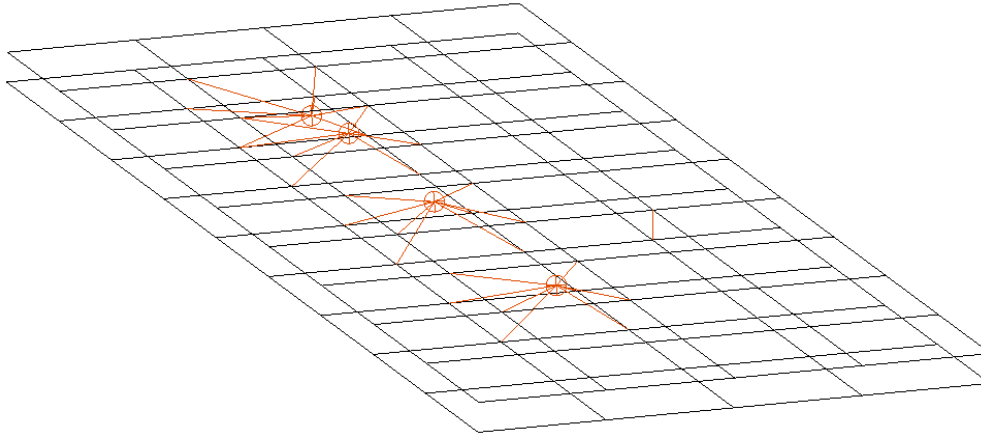


2. **CBARs** or **CBEAMs** connected by **RBE2**, **RBE3**, **CBAR** or **CBEAM** elements (indirect connection, mesh independent)



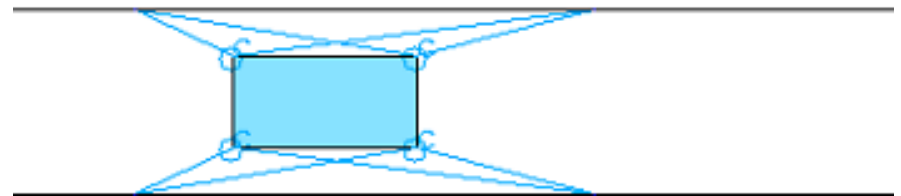
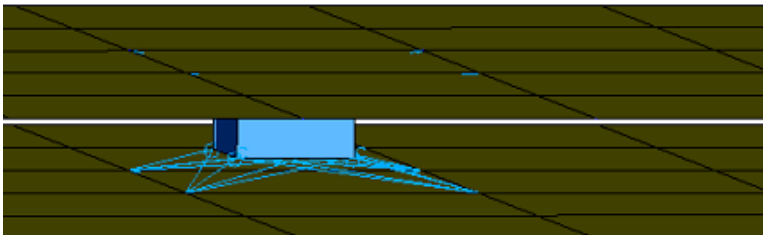
Possible Definitions of Spot Joints

Spot Connections with CWELD Elements (mesh dependent and independent)



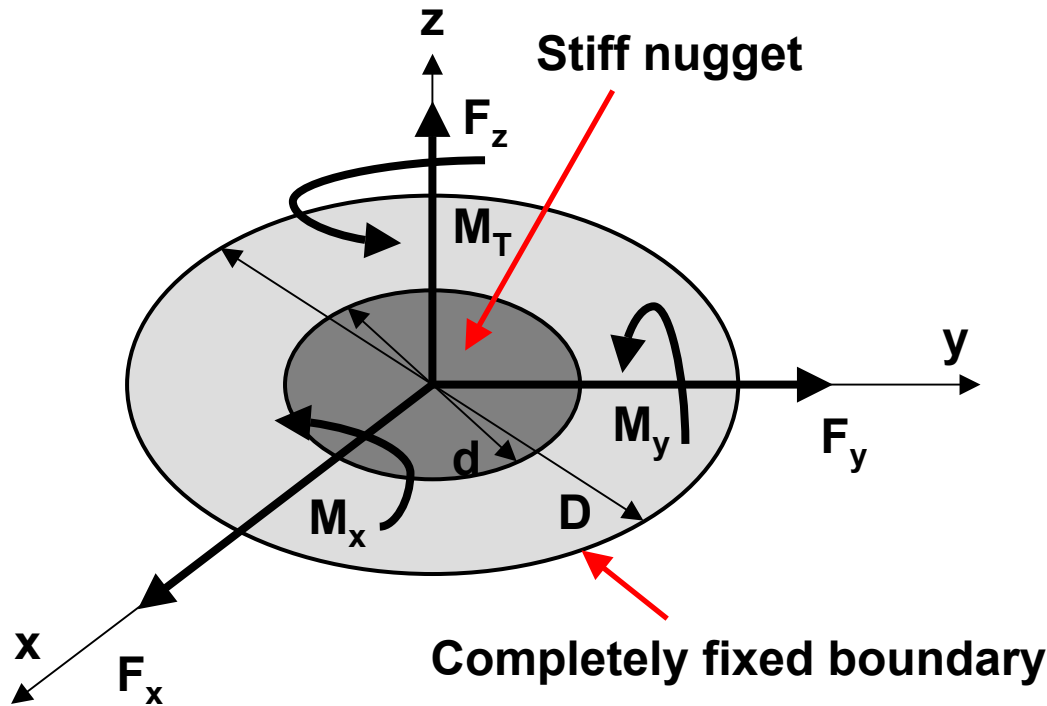
- based on Result from Element Forces

Spot Connections with CHEXA- and RBE3-Elements (mesh independent)



- only for Connection with RBE3 – Elements !
- based on Result from Grid Point Forces

Analytical SPOT Joint Model JSAE



$$C_B = \left\{ \frac{1 - \left(\frac{d}{D}\right)^2}{1 + \left(\frac{d}{D}\right)^2} \right\} \frac{6}{\pi \cdot d \cdot t^2} \quad C_T = \frac{2}{\pi \cdot d^2 \cdot t}$$

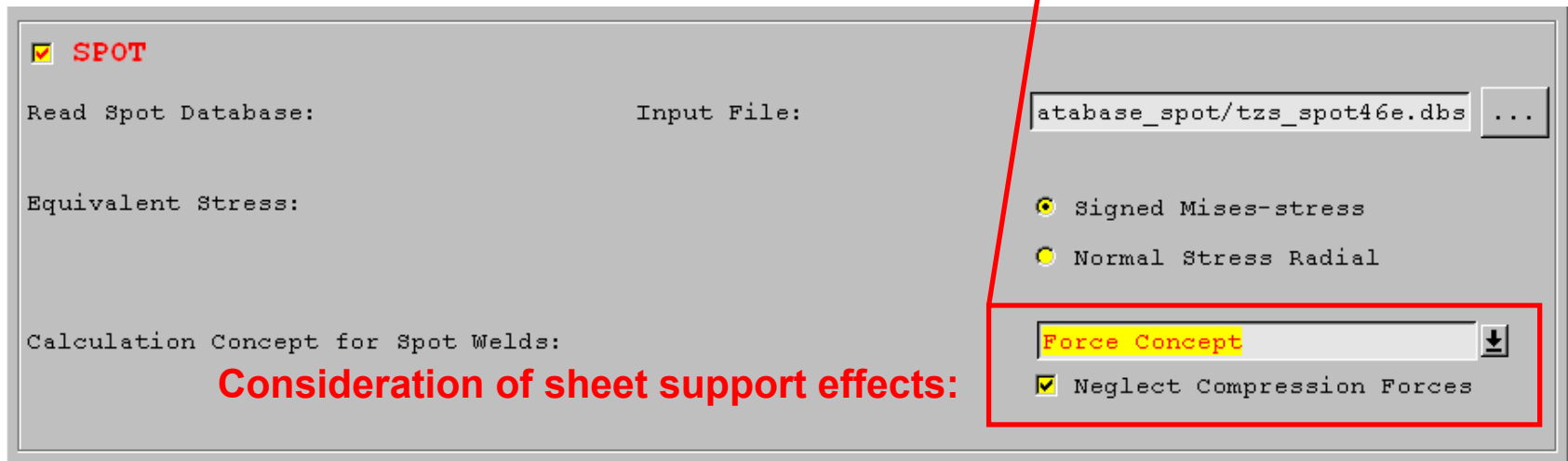
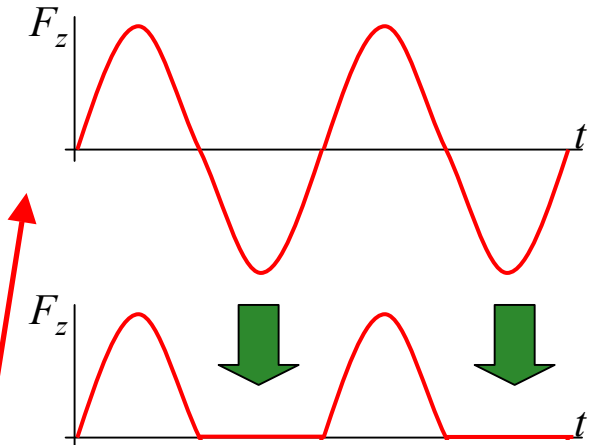
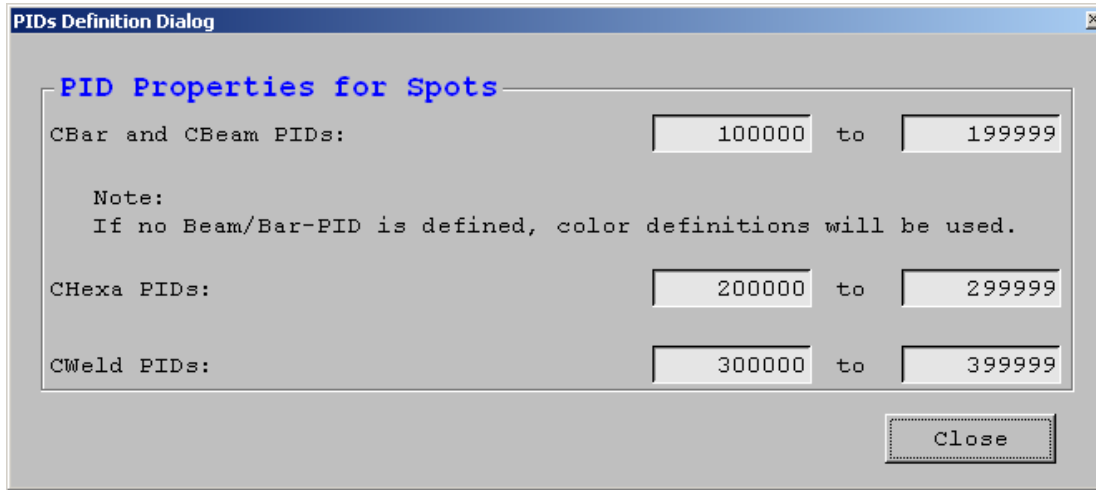
$$C_P = \left\{ \frac{\ln\left(\frac{D}{d}\right)}{1 - \left(\frac{d}{D}\right)^2} - \frac{1}{2} \right\} \frac{3}{\pi \cdot t^2} \quad C_S = \frac{1}{\pi \cdot d \cdot t}$$

$$\sigma_{rsum} = C_P \cdot F_z + C_B \cdot (-M_y \cdot \cos \theta + M_x \cdot \sin \theta) - C_S \cdot (F_x \cdot \cos \theta + F_y \cdot \sin \theta)$$

$$\sigma_{\theta sum} = \nu \cdot \sigma_{rsum}$$

$$\tau_{r\theta sum} = C_S \cdot (F_x \cdot \sin \theta - F_y \cdot \cos \theta) - C_T \cdot M_T$$

Spot Definition via PIDs, Consider Sheet Support Effects



Example Spot Force Concept with CBEAMS

