OpenForm

A New Intuitive Graphical User Interface for Industrial Forming Simulation

GNS mbH

Overview

GNS in brief

Software

Openform: Targets of development
Openform: Moduls

Conclusion

GNS in brief

Founded	1994
Fields of business	Engineering services in fields of FEA Development and support for FEA software
Employees	Around 80 engineers, mathematicians, software developers
Headquarters	Braunschweig
Subsidiaries	Ingolstadt, Flörsheim, Sindelfingen
Customers	Automotive industry, aerospace, consum-goods industry

Software

Animator4	General postprocessor for finite element simulations in fields of crash, statics, dynamics, NVH, durability
Generator2	Preprocessor for the positioning of dummies, impactors for passenger and pedestrian protection,
INDEED	High-end finite element software package for metal forming (deep drawing, hydroforming, roll forming, tube bending, etc.)
OpenForm	Software package for pre- and postprocessing of forming simulation

OpenForm

A New Intuitive Graphical User Interface for Industrial Forming Simulation

Targets of development

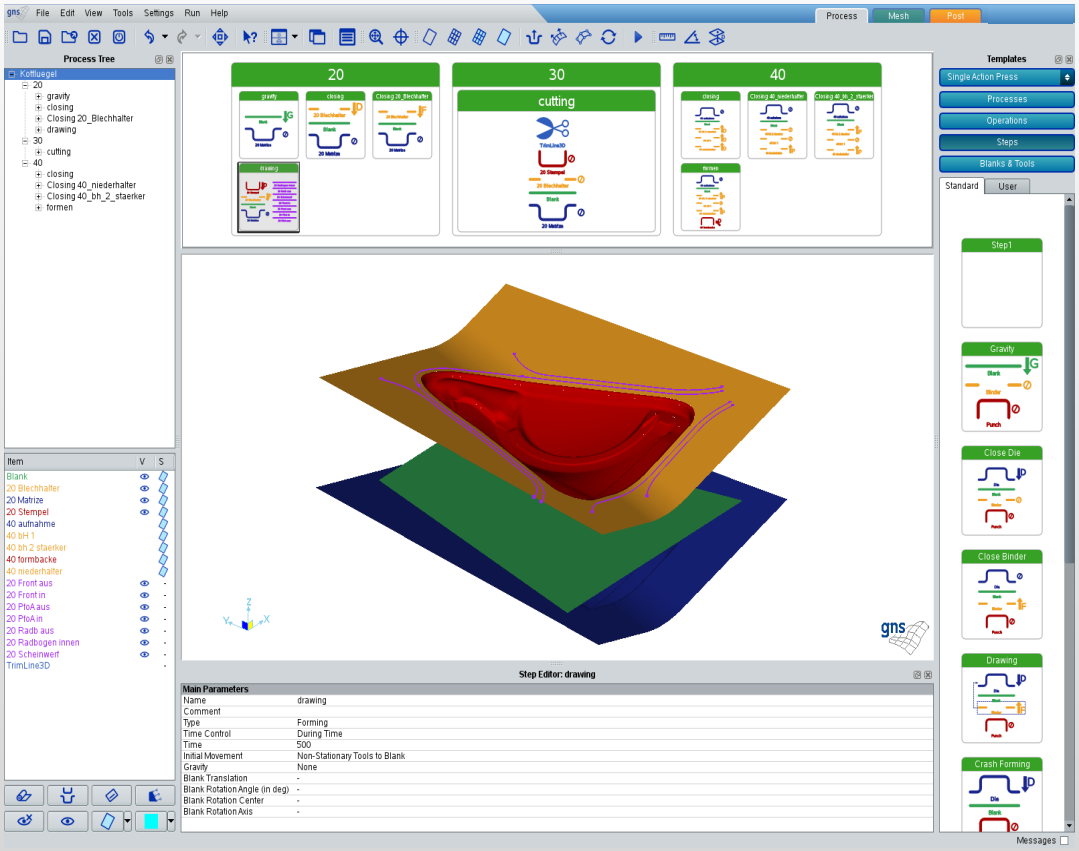
- Die designer should be able to set up a FE analysis
- Automation and standardization of the forming simulation
- Being independent of solver software
- Simple & intuitive GUI
- 'Open' and flexible software concept, for easy extension

OpenForm

A New Intuitive Graphical User Interface for Industrial Forming Simulation

Modules

- ProcessGenerator
- MeshGenerator
- PostProcessor
- MaterialViewer
- SimulationMonitor



OpenForm: ProcessGenerator

Design concepts

- Method plan oriented structure of the forming process
- Symbolic process definition & schematic diagram of the defined processes
- Strict separation between physical and numerical process description
- Templates for processes, operations, process steps, control parameters
  Both predefined and user-defined
- Process definition independent of solver software
  Input decks could be generated for each solver by implementing the appropriate interfaces

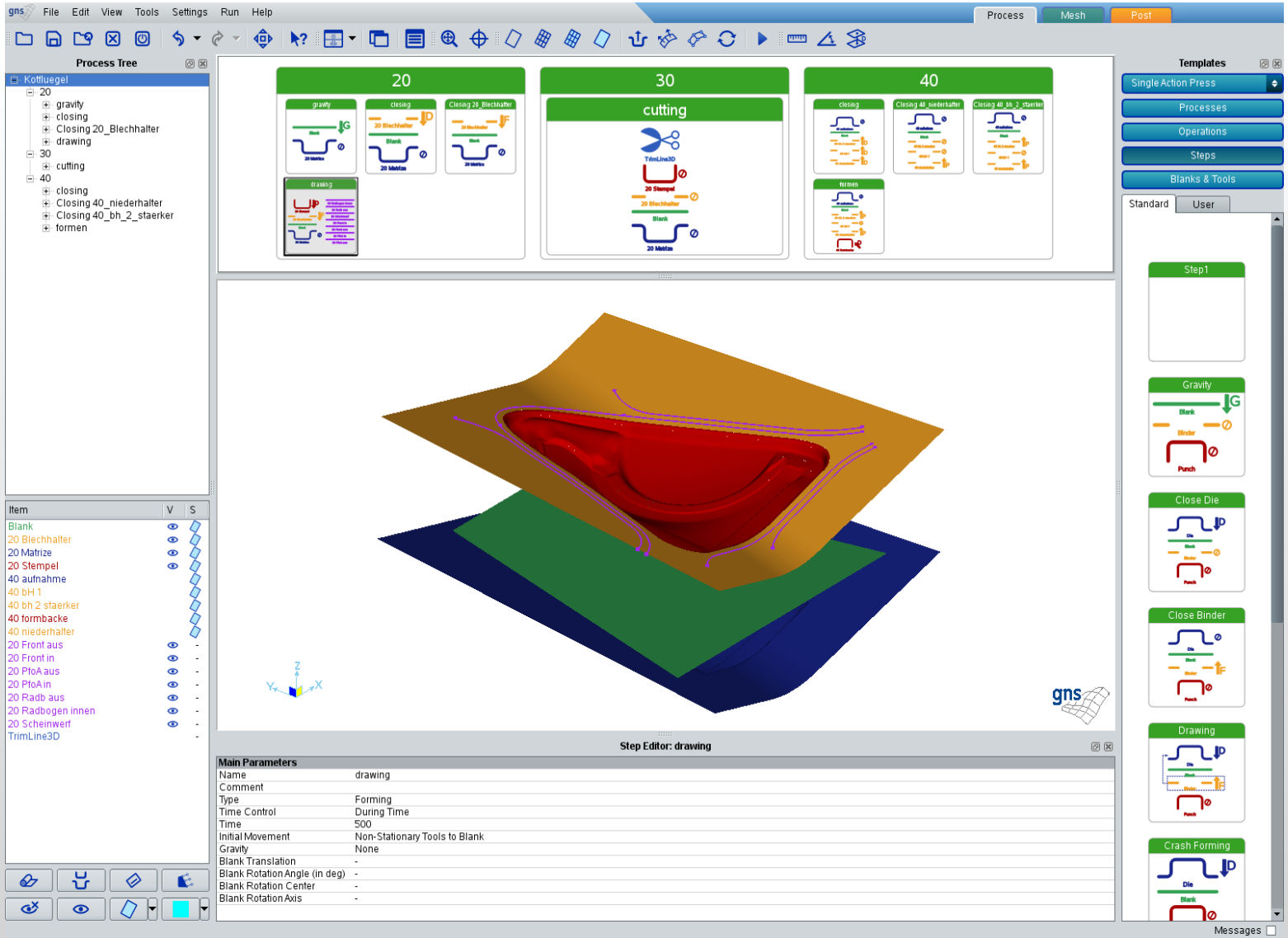
OpenForm: ProcessGenerator

Features

- Simple & intuitive process building by drag & drop
- Setting up multiple processes
- Definition of default Solver Control parameters
- Definition of Solver Control parameters per process step
- Kinematic Check
- RestartGenerator
- MaterialSelector/Viewer
- Context sensitive visualization of tools, blanks and draw beads
- Undo functionality
- Create INDEED Input
- Create LS-DYNA – Input (*)

(*) planned

OpenForm: ProcessGenerator

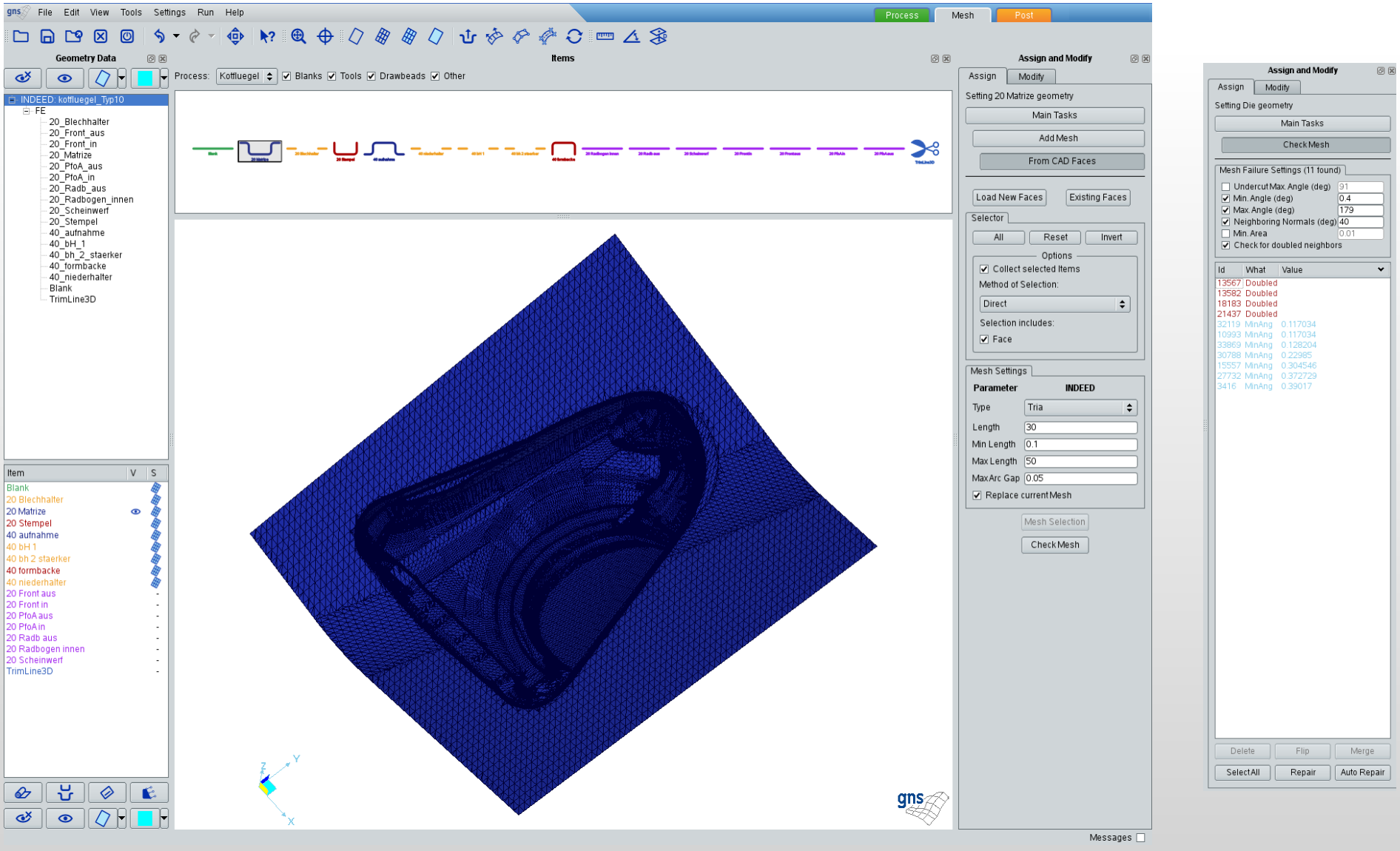


OpenForm: MeshGenerator

Features

- Automatic meshing of tools
- Offsets of tool meshes
- Automatic meshing of blanks, using different element types, based on
  CAD faces CAD curves, polygons, circles, quads
  Remeshing of existing meshes
- Automatic fixing of mesh imperfections
- Integrated functionalities for checking and fixing CAD areas and FE meshes
- Large number of geometry interfaces:
  IGES, VDAFS, STL, Nastran, INDEED
- Undo feature

OpenForm: MeshGenerator



OpenForm: PostProcessor

In general

- Forming specific post processing
- Fast reading of post data (ASCII & BINARY)
- Selection of single increments or post variables
- Visualization of adaptively refined meshes
- Good graphics performance for large models
- Simple and intuitive user interface
- Automated reporting tool available (*)

(*) based on Animator4

OpenForm: PostProcessor

Data formats

- INDEED result files
- LS-DYNA result files
- AutoForm result files (ASCII)
- AutoGrid data

OpenForm: PostProcessor

Visualization

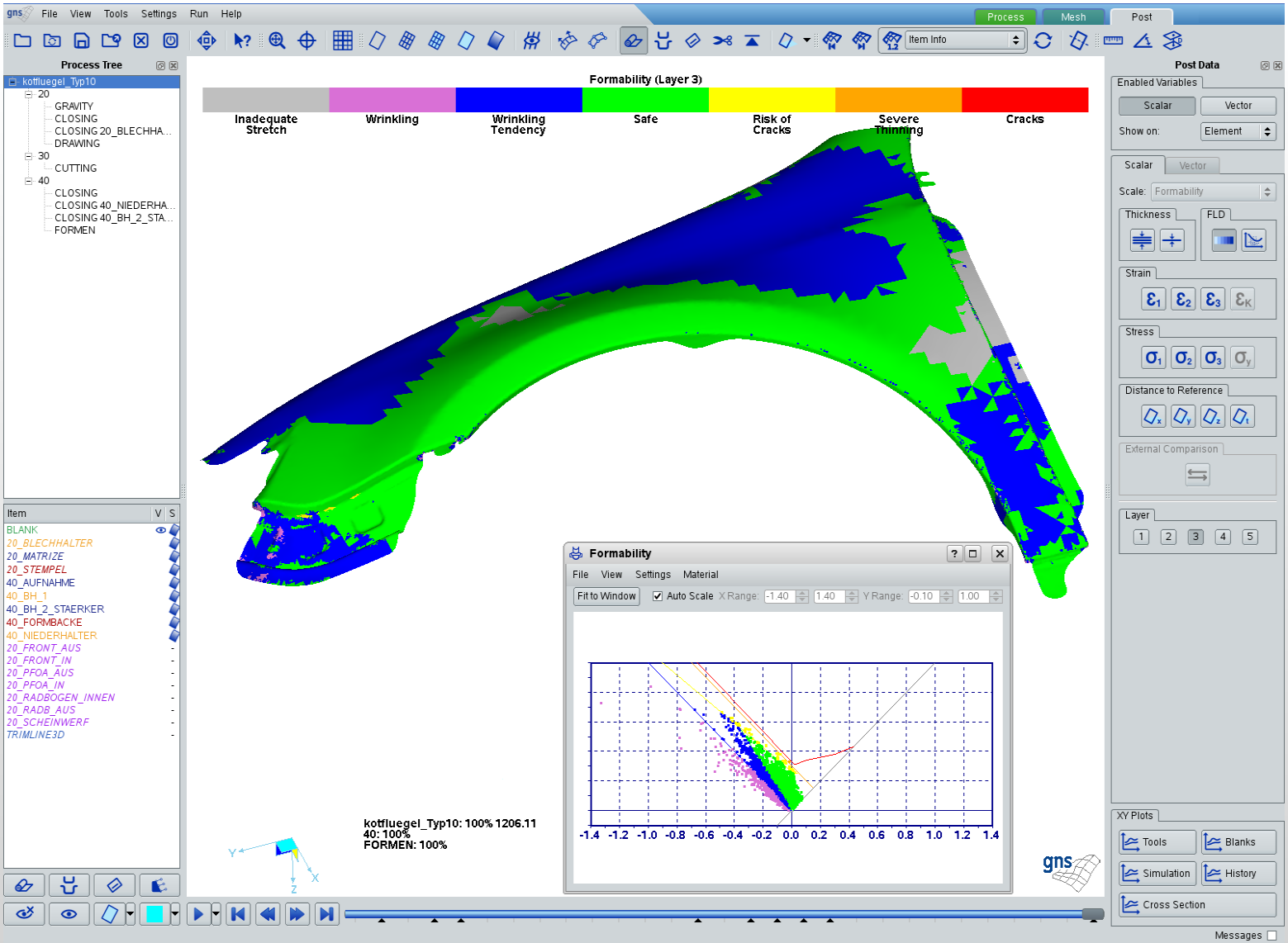
- Scalar and vector variables:
  thinning, thickness, strains, stresses, reaction and contact forces, ...
- Formability
- Skid / Scratch Lines
- Springback
- Animation
  Separately for individual process steps or operations
- Tools and their movement as a function of process step
  Automatically display only the currently active tool, draw beads, ...
- Dynamic Section
- Reference configuration
- Various display modes for blanks and tools:
  Boundary, Wire, Shaded, Shaded Smooth

OpenForm: PostProcessor

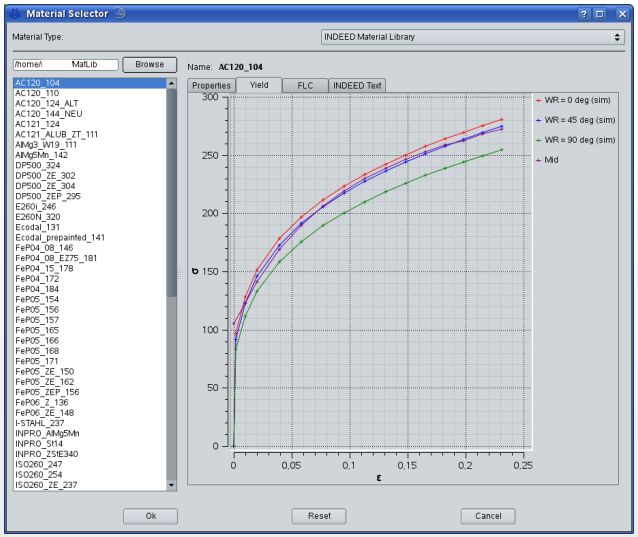
Graphical Presentations

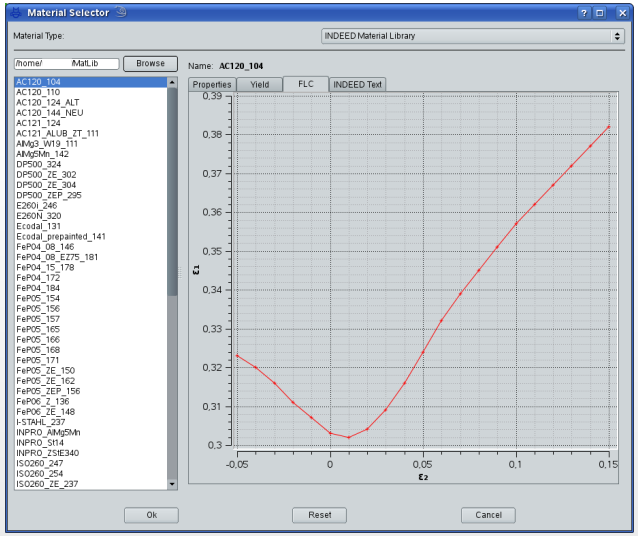
- FLD, Live FLD
- Tool forces and displacements
- Blank forces
- Section Plots: p*ost variable along a cutting plane*
- History Plots: *time history plots of selected nodes on the blank*
- Simulation Plots: *number of nodes, elements, increments, ...*

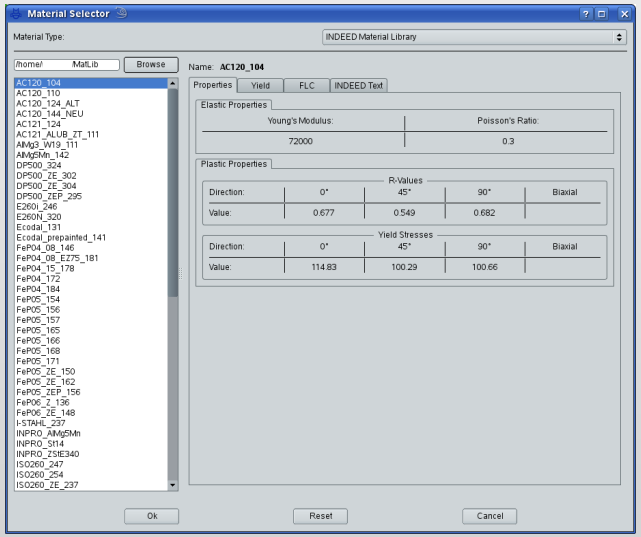
OpenForm: PostProcessor

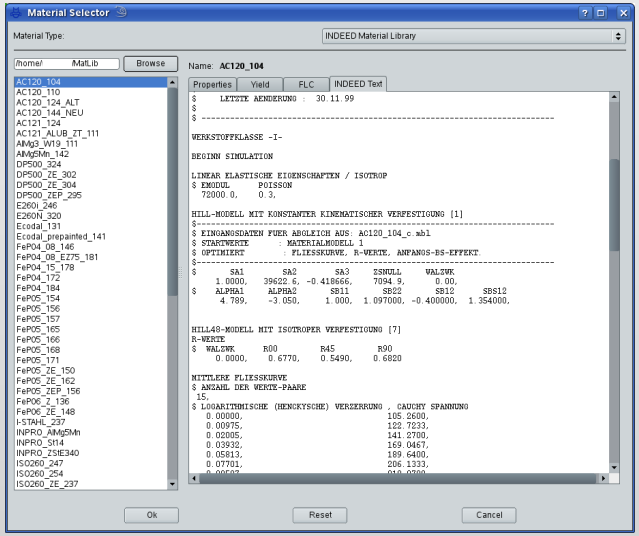


OpenForm: MaterialViewer

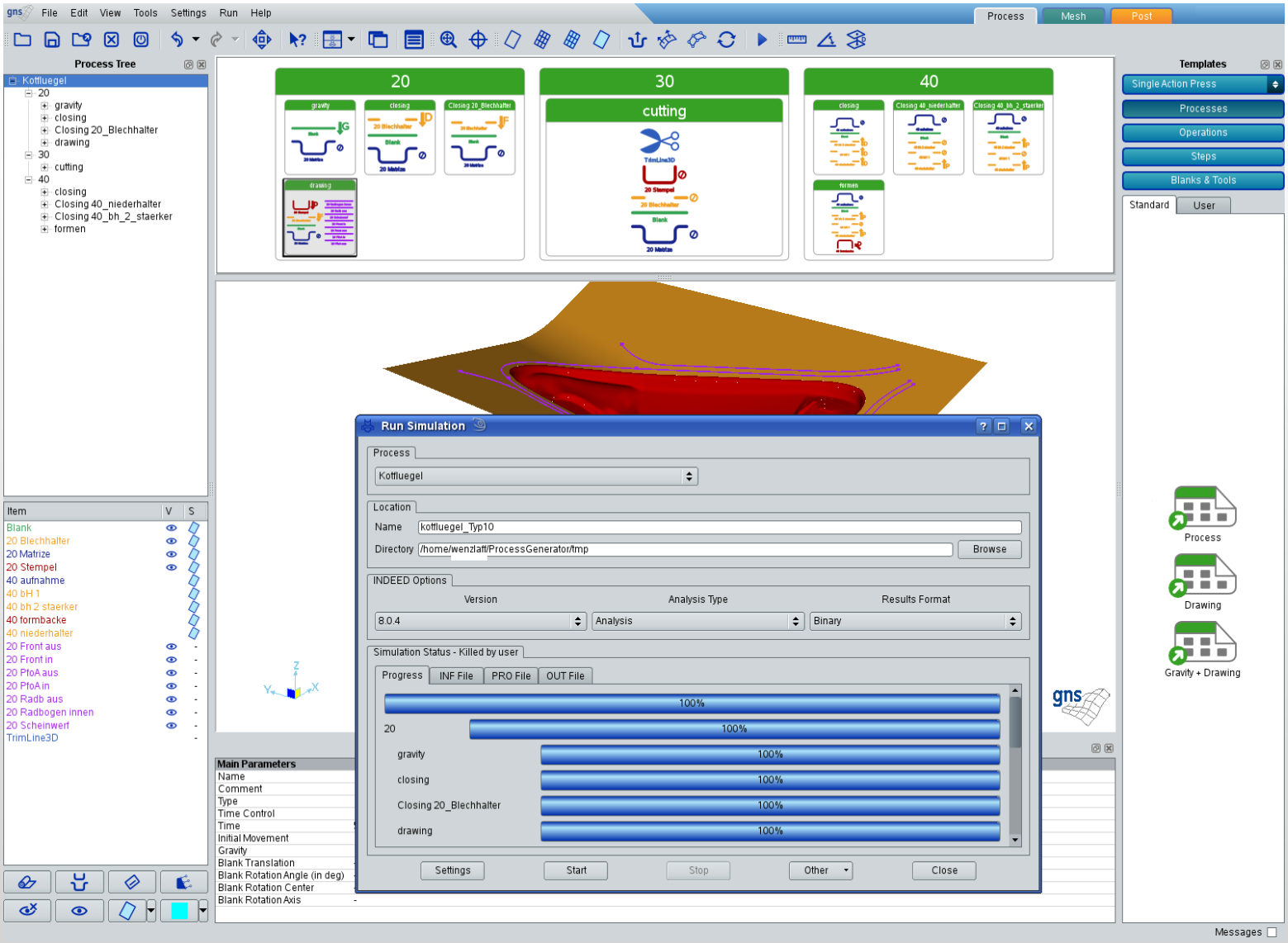








OpenForm: SimulationMonitor



Conclusion

- Solver-independent pre- and postprocessor specifically designed for sheet metal forming
- Easy access to high end forming simulation software for die designers
- Open concept allows simple switching of different solvers
- Firm separation of physical and numerical process
- Easy way of defining templates for processes and parameter settings

Thank you for your attention, questions can be answered here or at our booth in the exhibition