

Agenda

- 13:30 Begrüßung
P. Vogel (DYNAmore)
- 13:45 eta/DYNAFORM 5.9.2 – Neue Features
P. Vogel (DYNAmore)
- 14:30 Abstreckziehen – Grenzen und Möglichkeiten
J. Raquet (DYNAmore)
- 15:00 Kaffeepause
- 15:30 Aktuelle Trends in der Umformsimulation
mit LS-DYNA
M. Künzel (DYNAmore)
- 16:00 Tipps und Tricks
M. Künzel (DYNAmore)
- 16:30 Diskussion
- 17:00 Ende



Burg Schnellenberg
HOTEL UND RESTAURANT

DYNAmore – The Company

■ Countries and Main Offices

- Germany – headquarters in Stuttgart
- Sweden – headquarters in Linköping
- Switzerland – headquarters in Zurich
- Italy – headquarters in Torino

■ Further Offices

- Ingolstadt
- Dresden
- Langlingen (Wolfsburg)
- Berlin
- Gothenburg

■ On-site Offices

- Sindelfingen & Untertürkheim (Daimler)
- Weissach (Porsche)
- Ingolstadt (Audi)
- Gothenburg (Volvo)



Stuttgart [Headquarters]

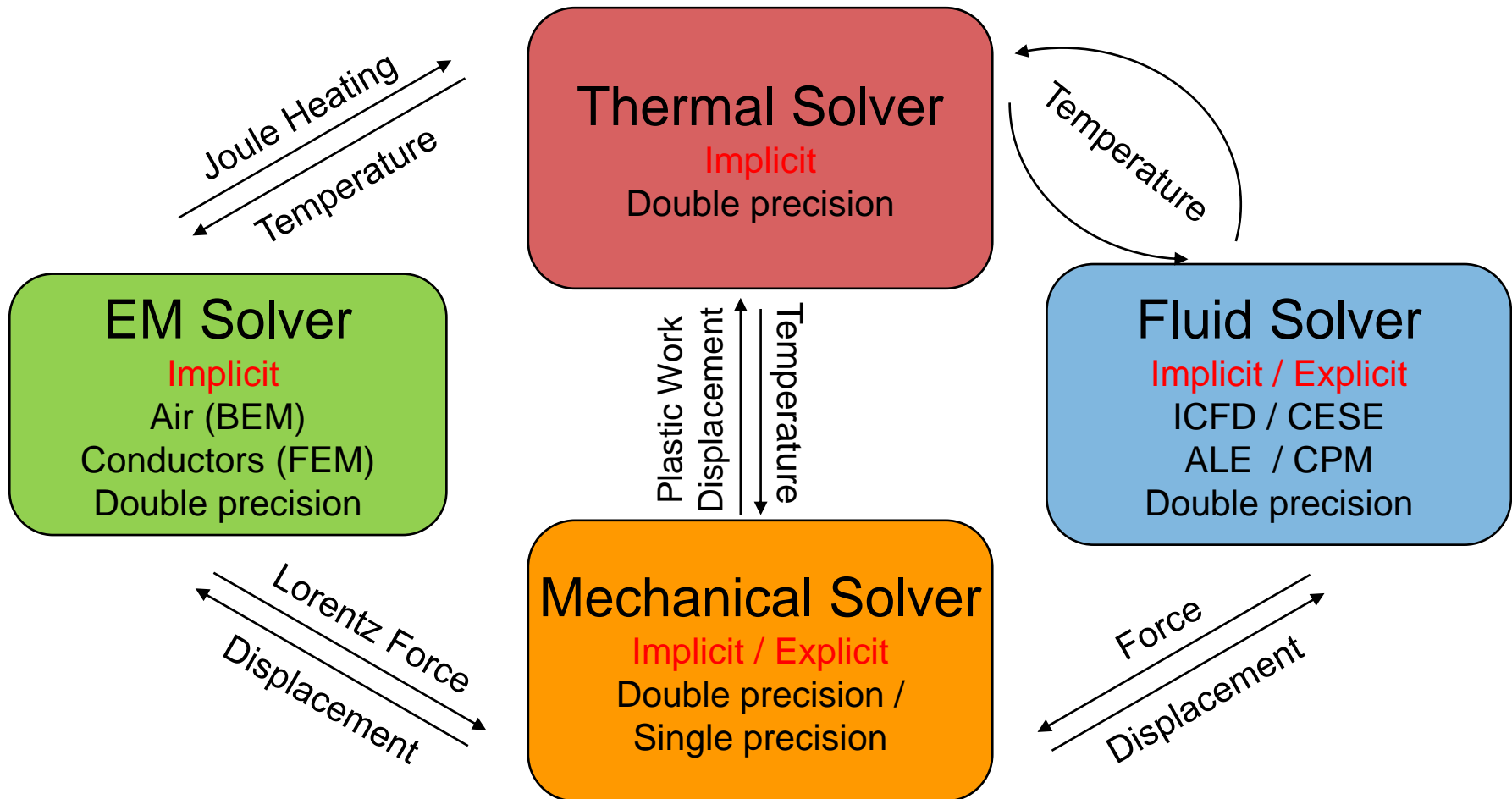
DYNAmore – The People

- Who we are
 - In total 70 people
 - Civil and mechanical engineers, mathematicians, computer scientists,...
 - The employees are from 13 different countries
 - The percentage of female staff is above 25 %
 - The fluctuation of employees is below 2%
 - The company is financially stable since its foundation

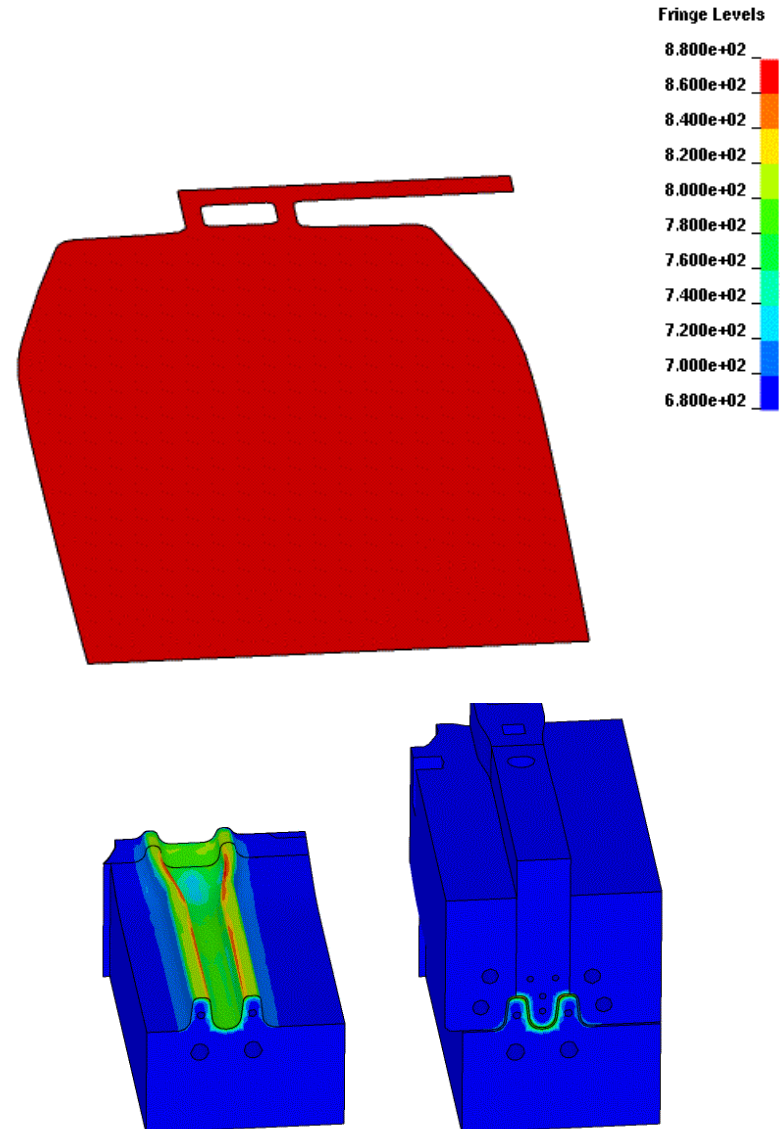


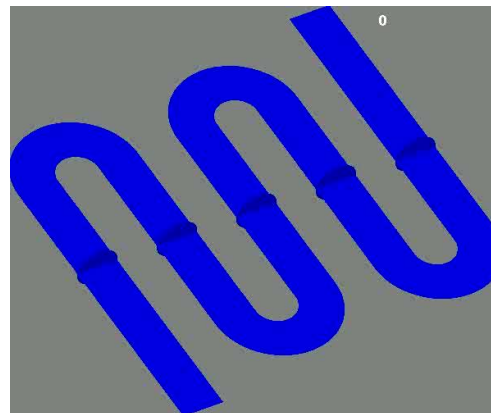
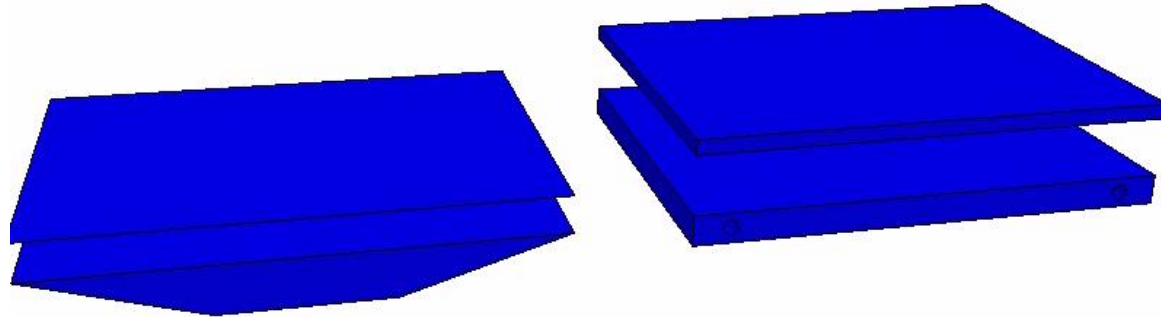
LS-DYNA R7 – The Multiphysics Solver

- No need for co-simulation, as all solvers are included!

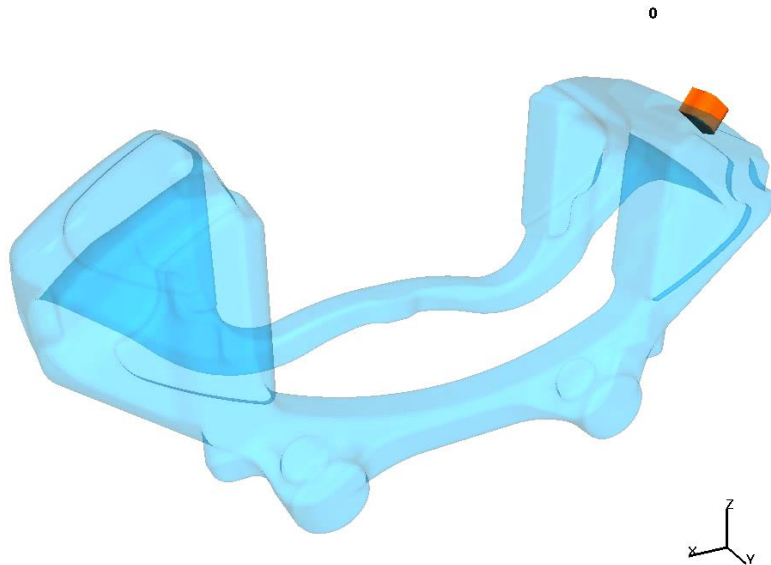


- Thermo-mechanical forming simulation
 - Blank is cooled by the die
 - Different cooling rates possible
- Tailored tempering B-Pillar





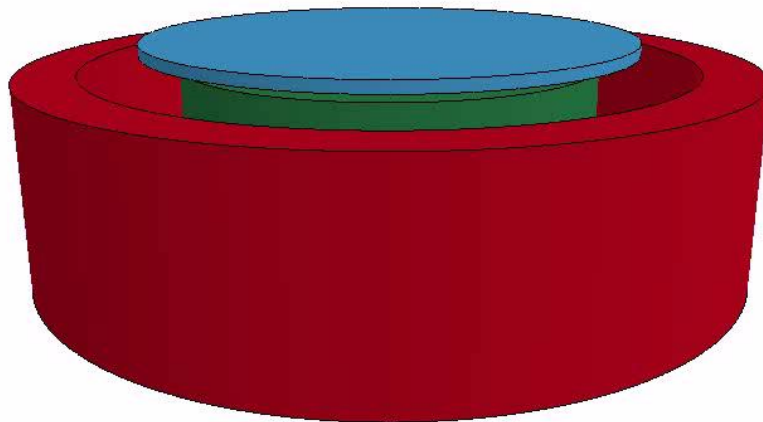
Thermo-Mechanical Coupling



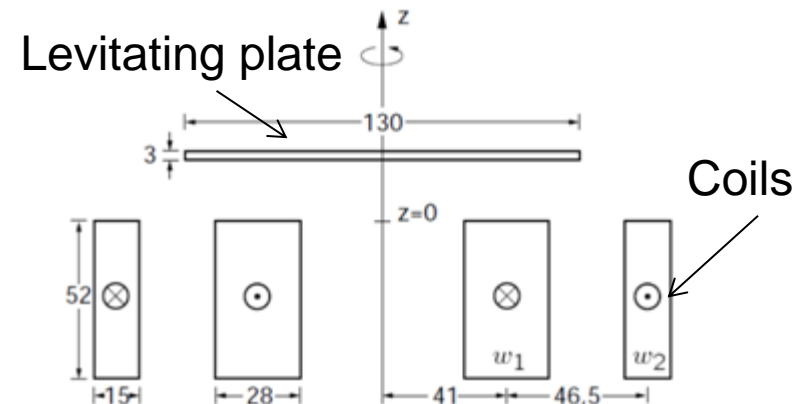
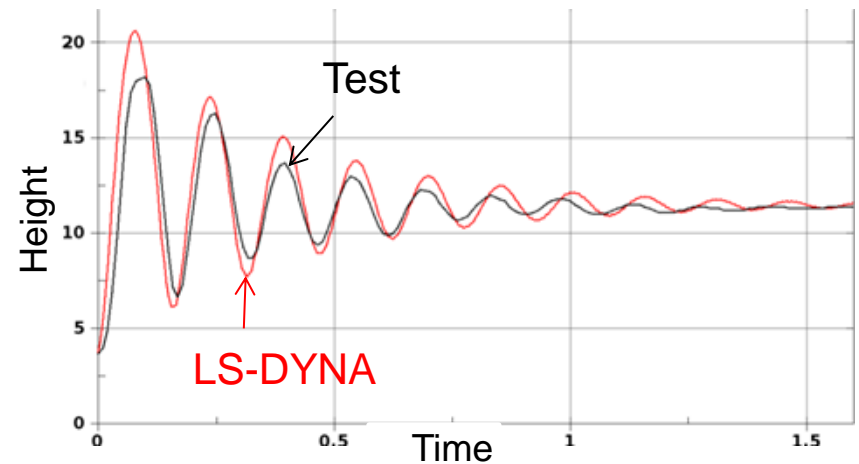
EM solver validation

- Test cases for validation: T.E.A.M. (Testing Electromagnetic Analysis Methods)
- T.E.A.M. 28 : An electrodynamic levitation device [Karl et al., ITE Uni-Stuttgart]
 - Conducting plate levitating over two exciting coils
 - Plate oscillates and progressively reaches an equilibrium position

max displacement factor=2



Electromagnetism



DYNAmore – The Products

■ Software

- LS-DYNA
- LS-OPT und LS-TASC
- LS-PrePost

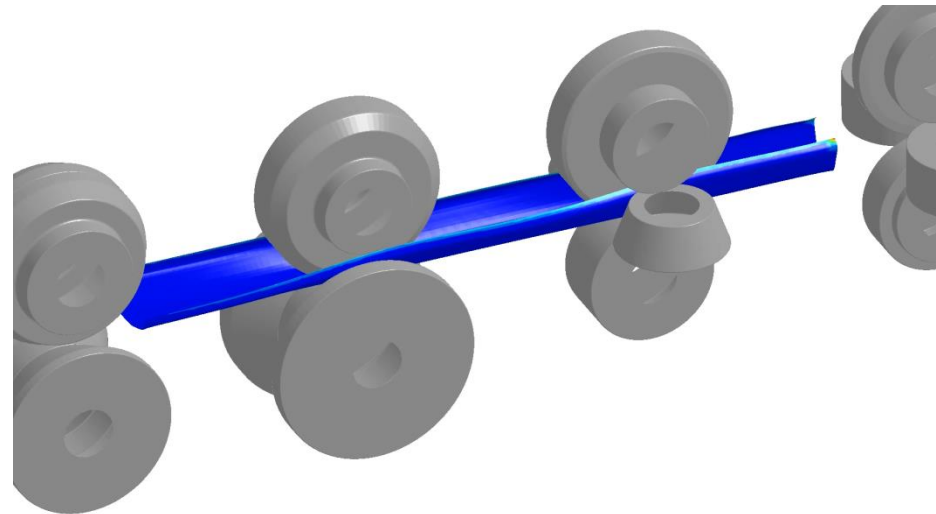
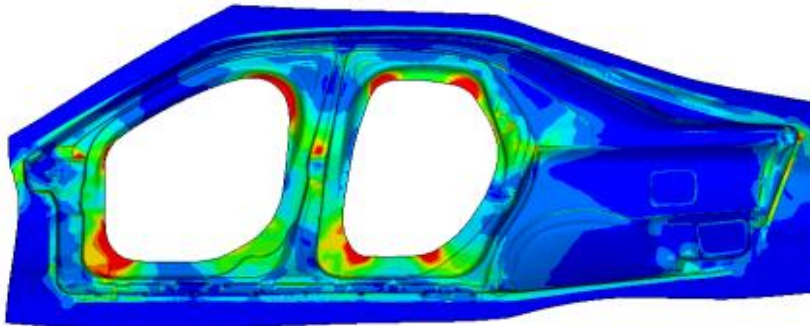


Livermore Software Technology Corporation

- eta/DYNAFORM
- PROFIL



Engineering Technology Associates, Inc
UBECO



eta/DYNAFORM 5.9.2

Neue Features

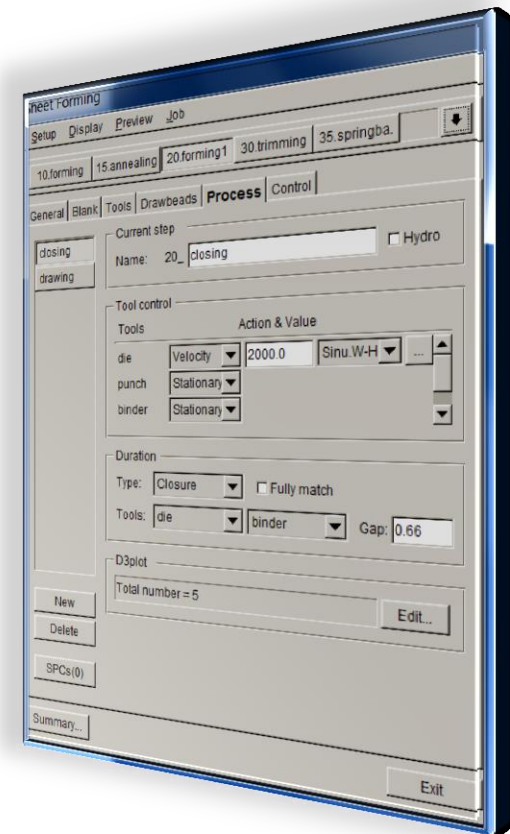
12. März 2014

Peter Vogel

DYNAmore GmbH

Industriestraße 2
D 70565 Stuttgart

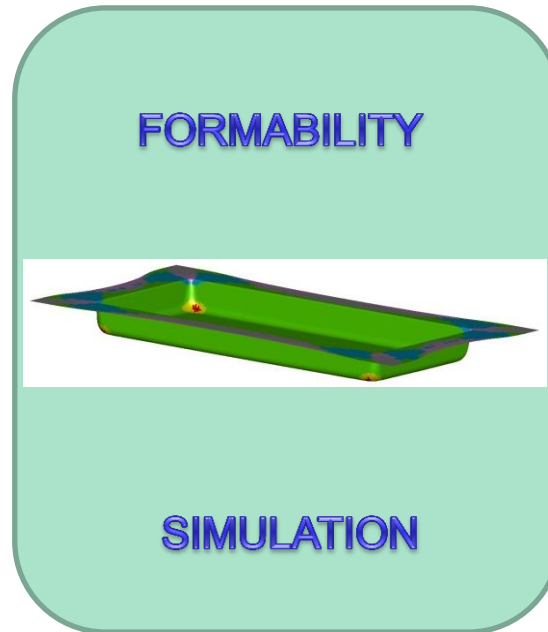
<http://www.dynamore.de>



- Warmumformen / Presshärten
- Hydroumformung mit Prozessvorbereitung und Zwischenglühen
- Rohrbiegen
- Automatische Positionierung



Bild mit freundlicher Genehmigung: Volkswagen AG



Hydroumformung mit Prozessvorbereitung und Zwischenglühen



Modellvorbereitung:



Generate Middle Surface

Ableiten der Mittelflächen eines Volumenmodells



Separate Surface

Ableiten der oberen bzw. unteren Oberflächen eines Volumenmodells



Unfold Flange

Flanschauslegung



Expand

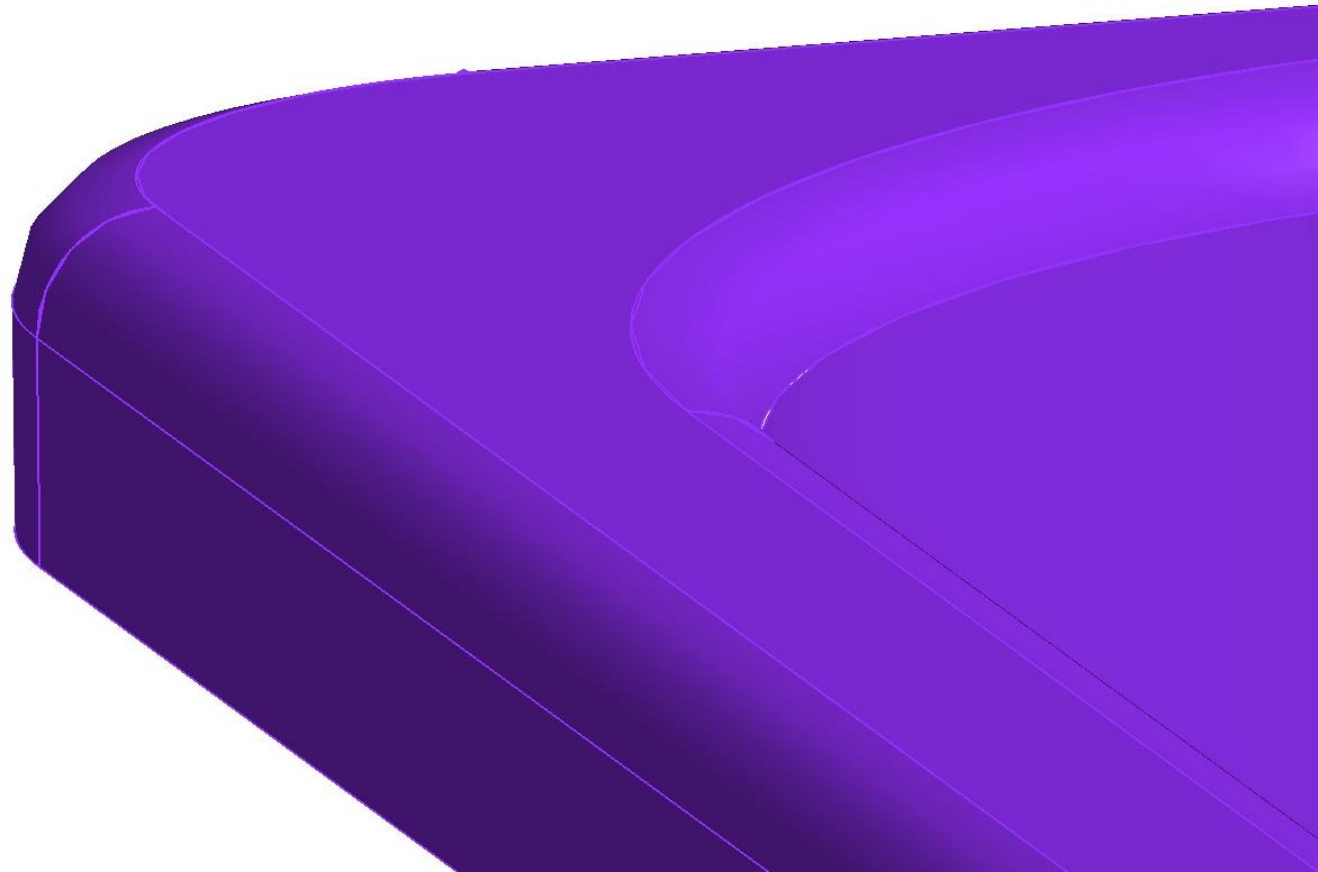
Vergrößerung von Flanschen



Flanschauslegung:



Unfold Flange

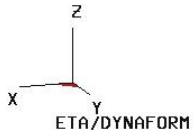
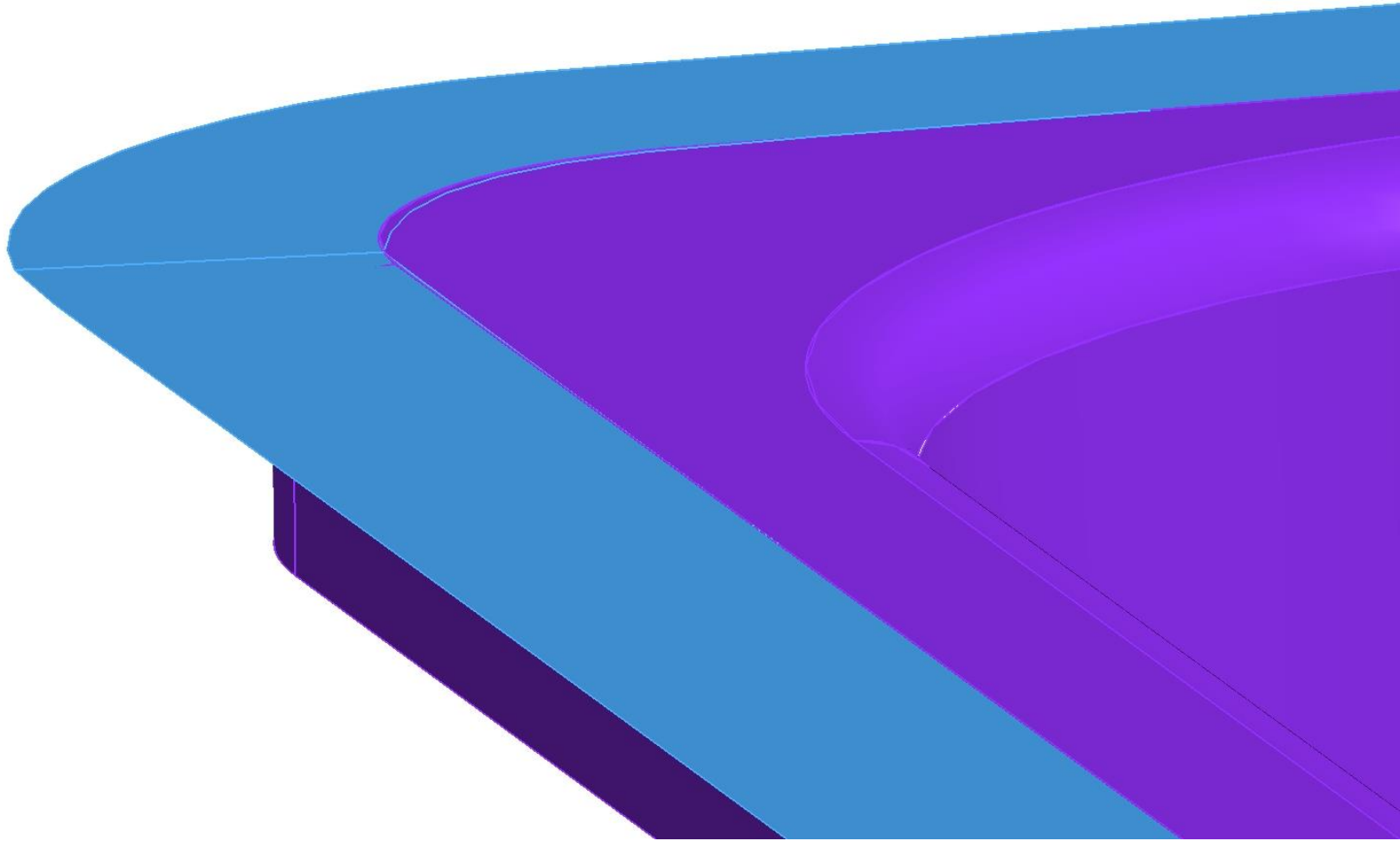




Flanschauslegung (Geometric Unfold):



Unfold Flange

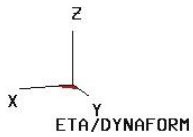
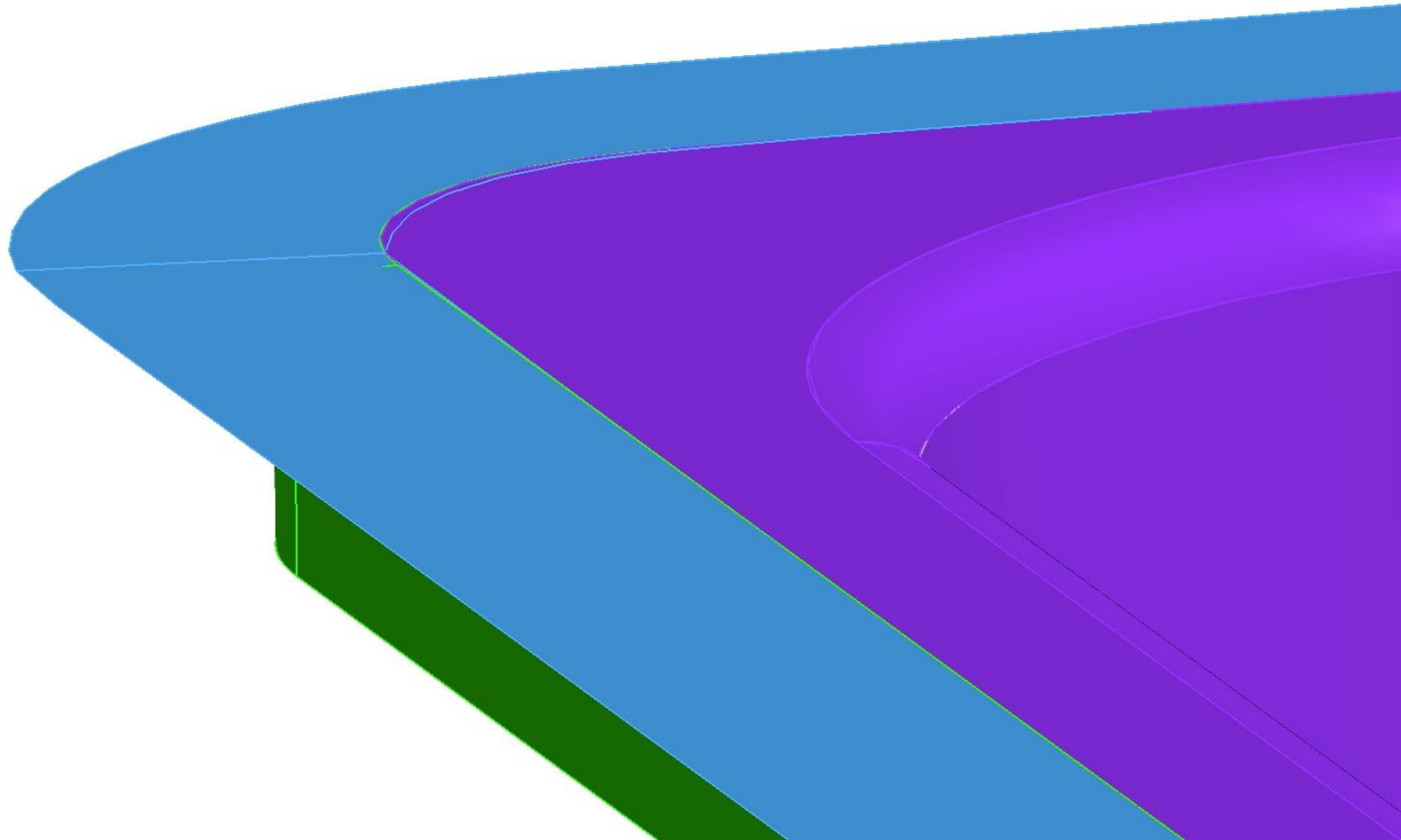




Verschieben der ursprünglichen Flansche in ein neues Part



Unfold Flange

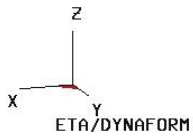
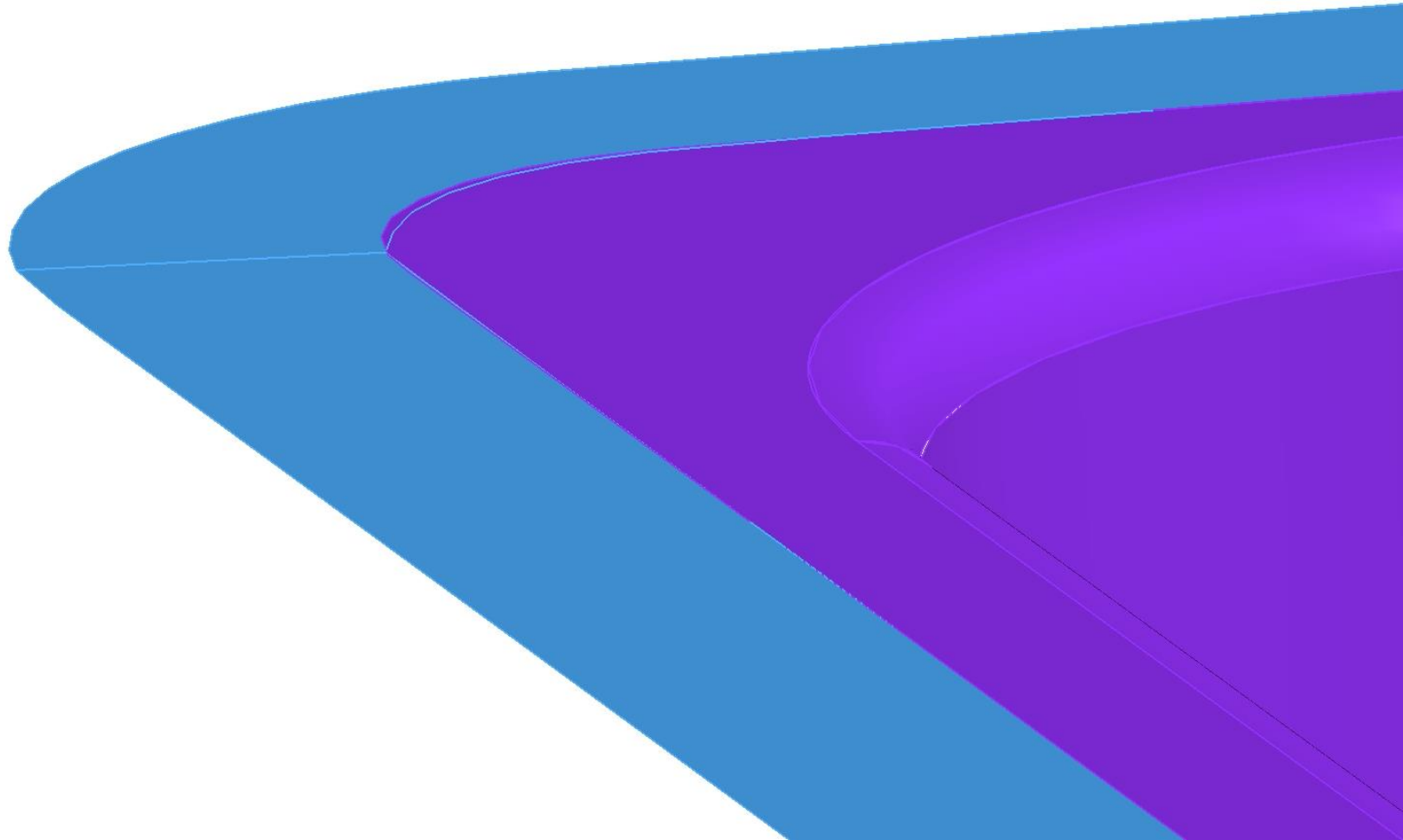




Ausblenden der ursprünglichen Flansche

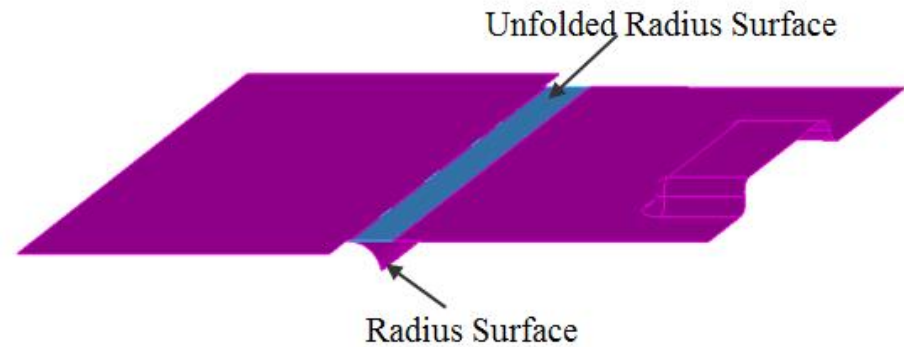
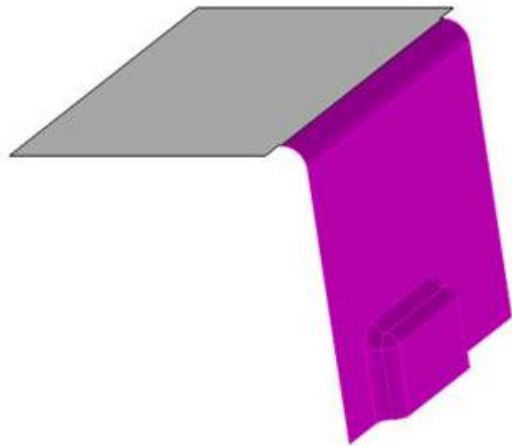


Unfold Flange



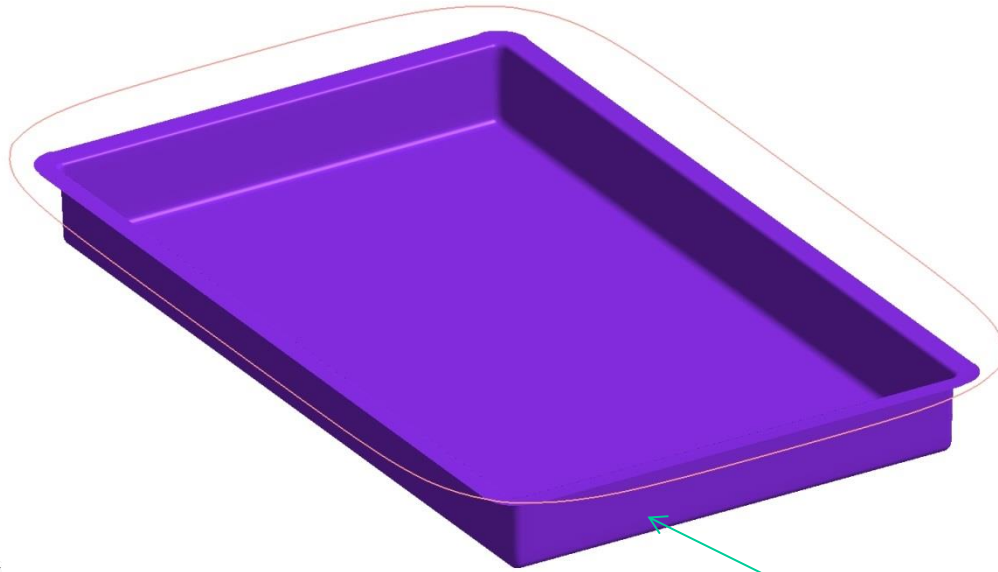


Optionale Methode zur Flanschauslegung (Box Unfold):

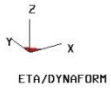
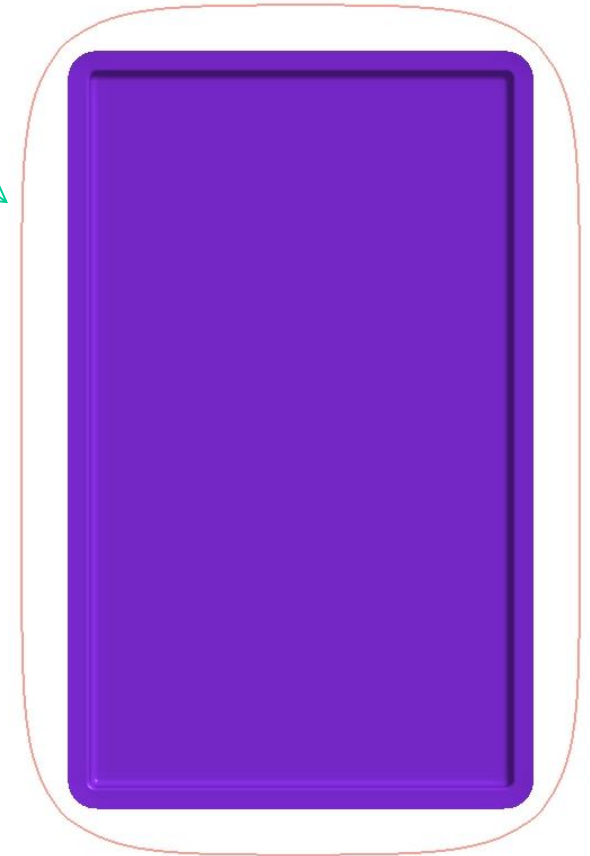




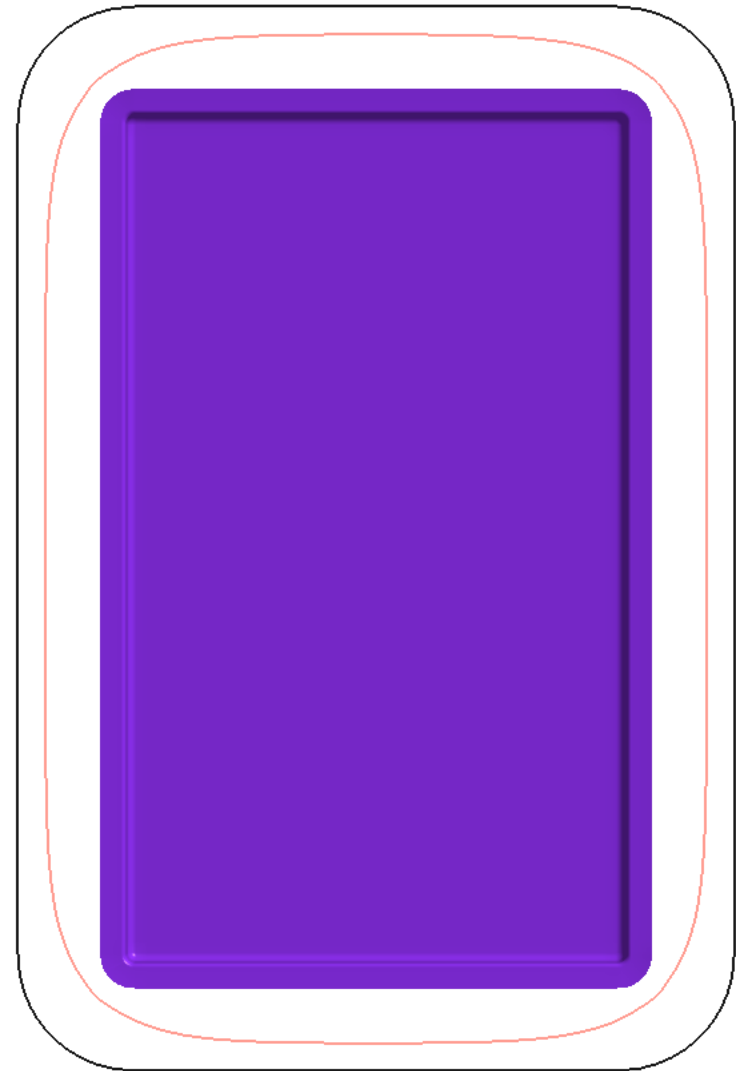
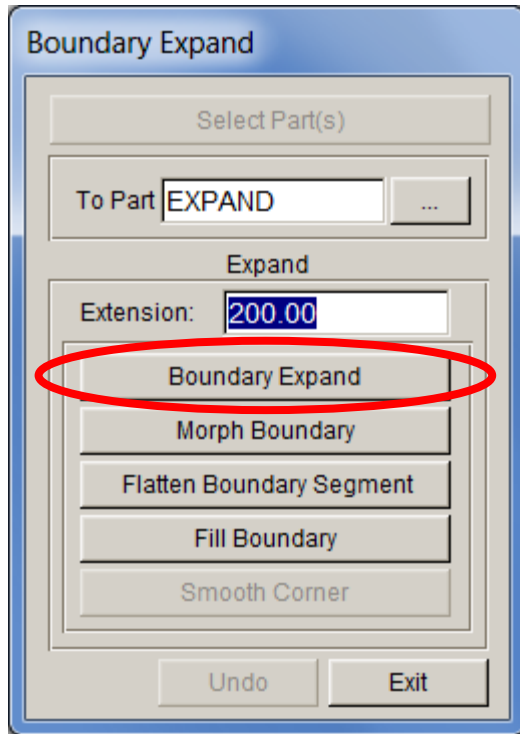
Platinenzuschnitt



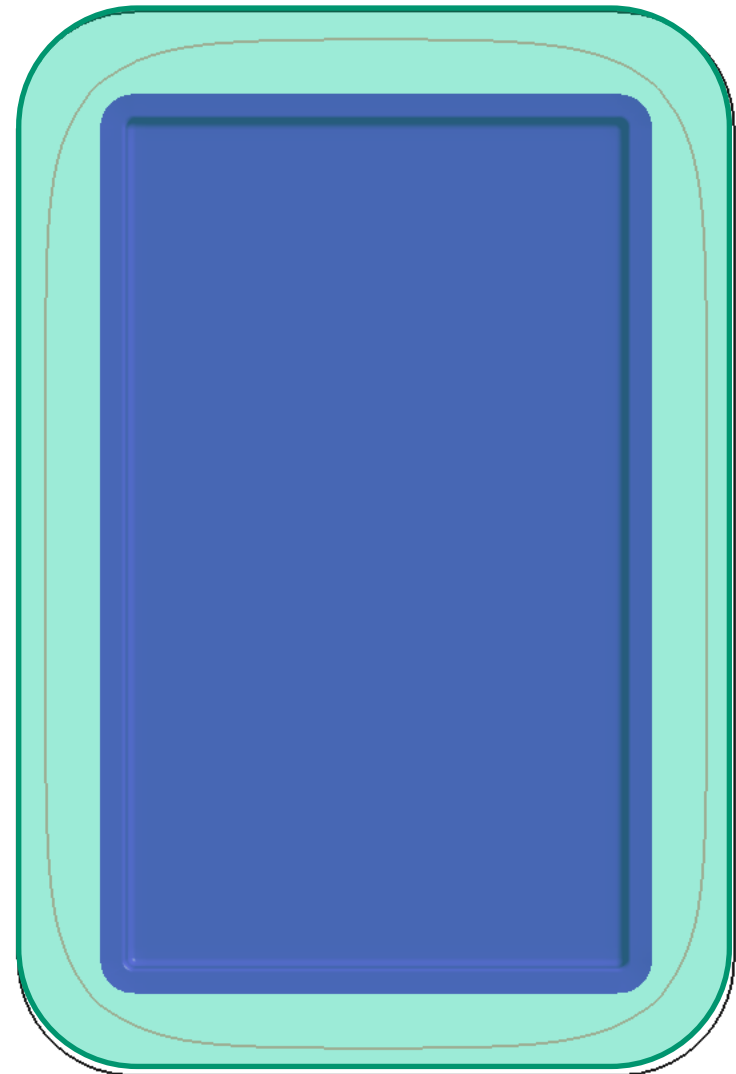
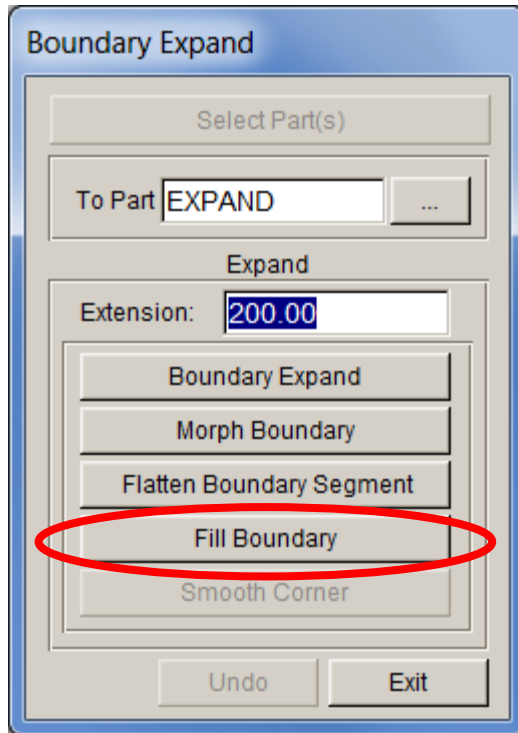
Werkzeug



Erweitern der Flanschkontur

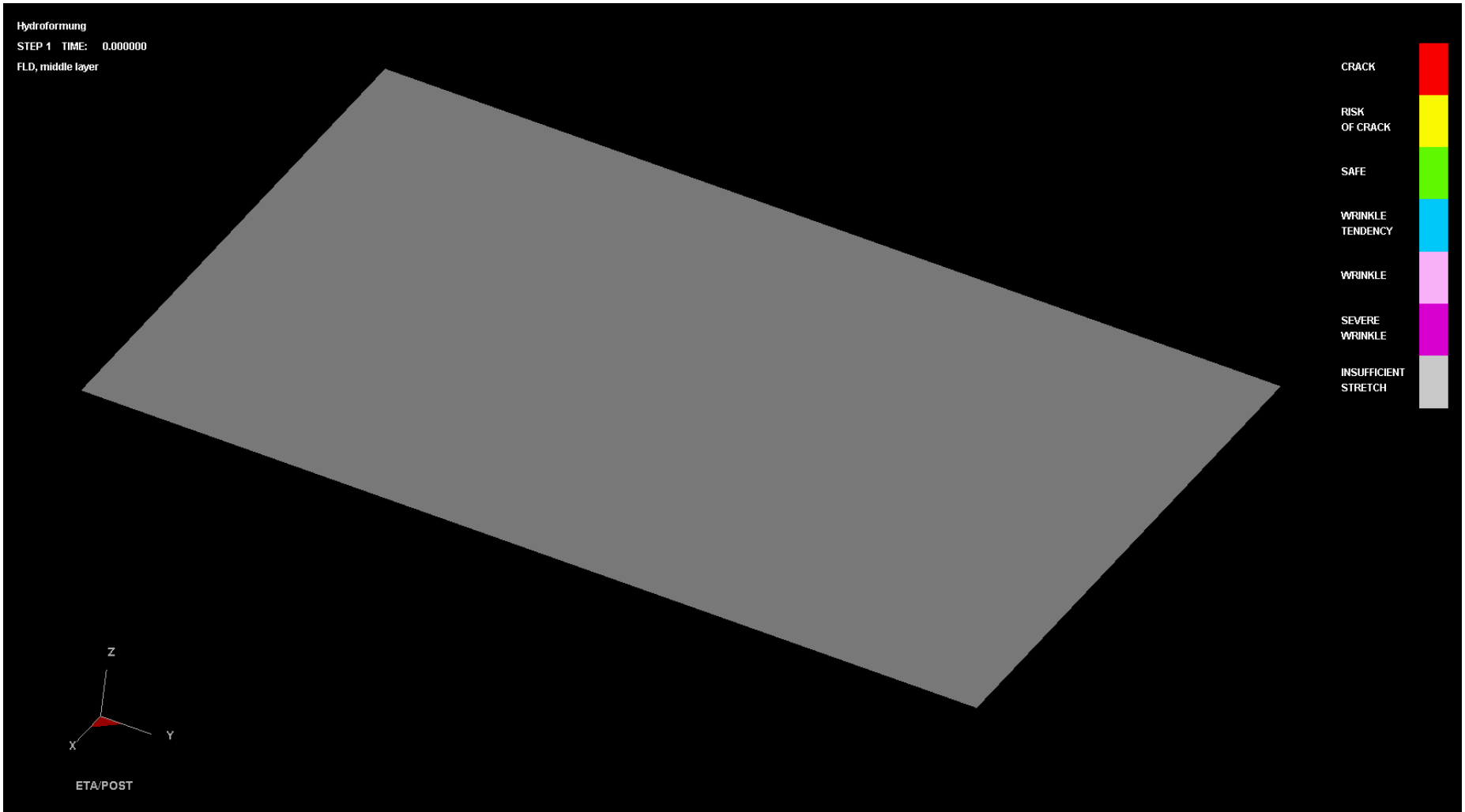


Füllen der Flanschkontur



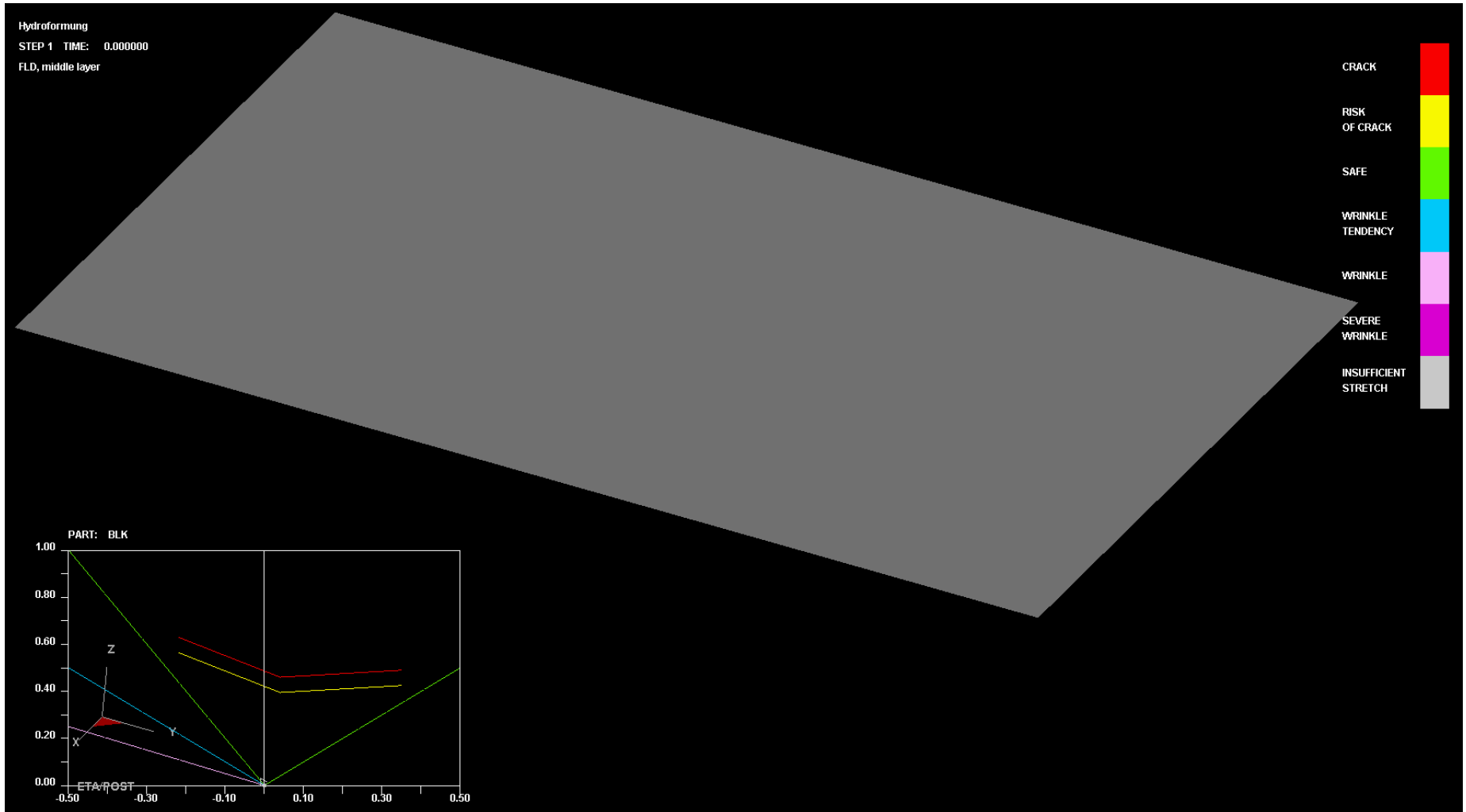


1. Ausformen des Bauteils



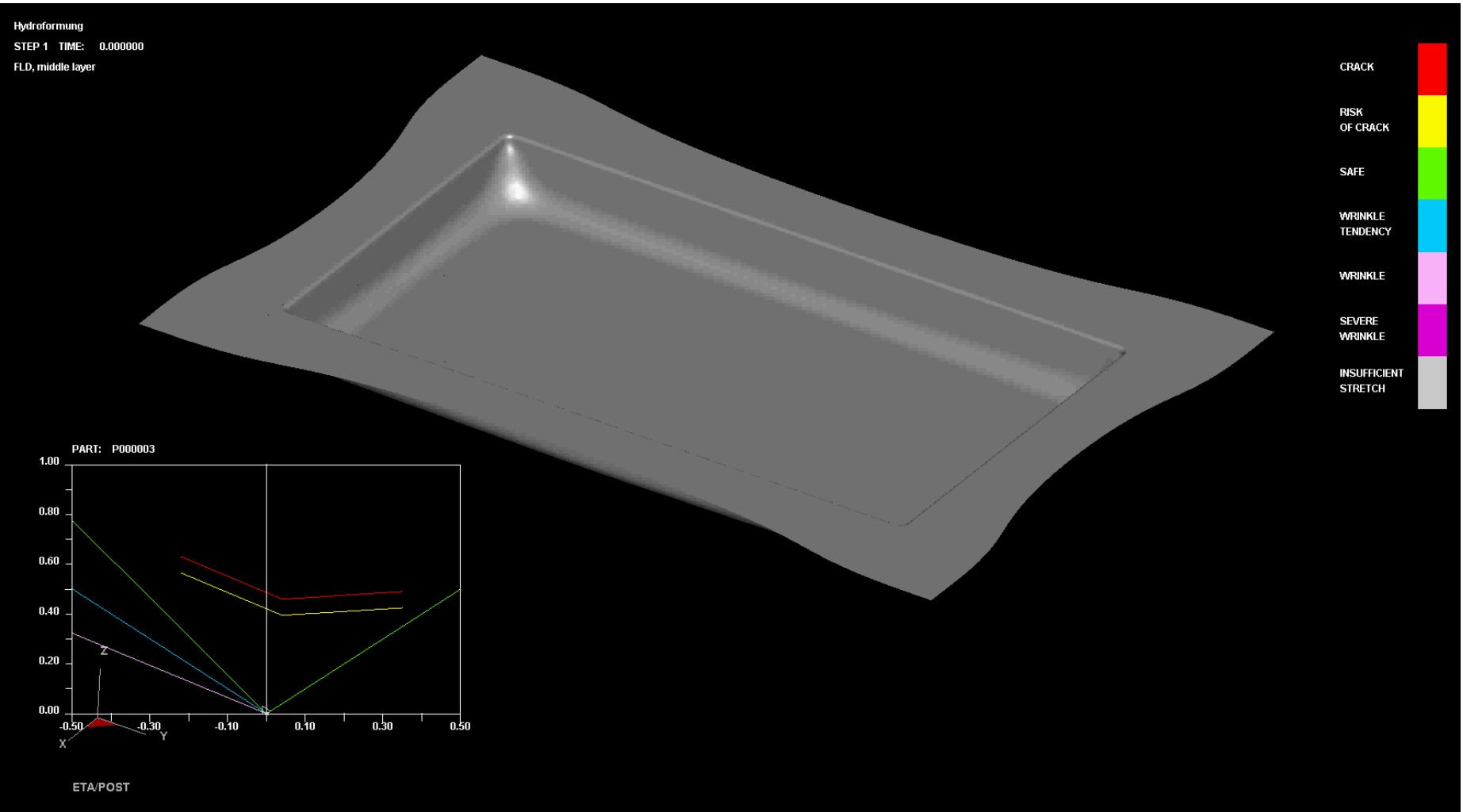


2. Simulation bis zur FLD:





3. Zwischenglühen und Fertigformen:



Prozesskette:

The image displays three overlapping screenshots of the 'Sheet Forming' software interface, illustrating the configuration of a process chain. Red circles highlight the stage selection in each window.

- Leftmost window:** Shows the 'Process' tab. The stage list at the top contains '10.Vorforme.', '15.annealing', and '20.Fertigfor.'. The 'Stage' dropdown is set to '10', and the 'Action & Value' section shows 'matrize' set to 'Stationary' and 'blechhal.' set to 'Force'.
- Middle window:** Shows the 'Process' tab. The stage list is the same. The 'Stage' dropdown is set to '15', and the 'Annealing' section shows an 'Annealing coefficient' of '1.0'.
- Rightmost window:** Shows the 'Process' tab. The stage list is the same. The 'Stage' dropdown is set to '20', and the 'Action & Value' section shows 'binder' set to 'Stationary'.

Job Submitter:

The screenshot shows the 'Job Submitter 2013 R1' window. In the 'Solver' section, the following solvers are listed:

- LS-DYNA (S) C:\Users\peter\Downloads\LS-DYNA\ls-dyna_smp_s_R612_winx64_ifort101.exe
- LS-DYNA (D) C:\Users\peter\Downloads\LS-DYNA\ls-dyna_smp_d_R612_winx64_ifort101.exe
- UTILITYBATCH** \Downloads\ETA\DF5.9.2\Dynaform592_x64_test_20140225\Dynaform592_x64_test_20140225\UtilityBatch.exe
- MSTEP \Downloads\ETA\DF5.9.2\Dynaform592_x64_test_20140225\Dynaform592_x64_test_20140225\MStep.exe
- INC Solver \Downloads\ETA\DF5.9.2\Dynaform592_x64_test_20140225\Dynaform592_x64_test_20140225\DEMS_SC.EXE

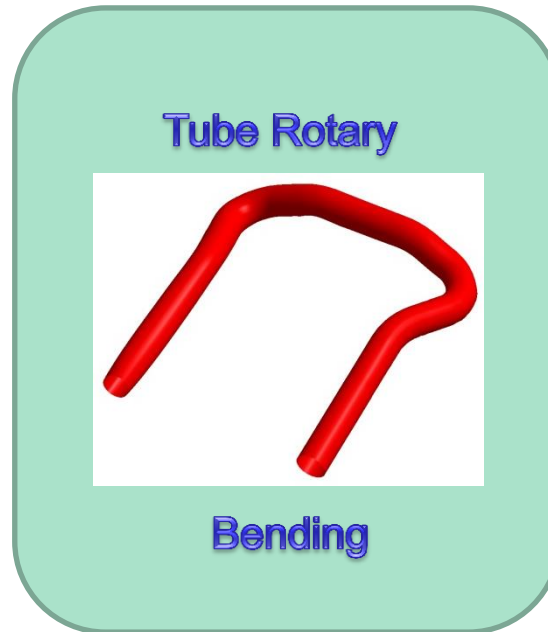
The 'LS-DYNA (D)' and 'UTILITYBATCH' entries are circled in red. The 'LS-DYNA (D)' entry is also highlighted in blue. The 'LS-DYNA (S)' entry is highlighted in light blue.

Below the solver list, there is a table of job submissions:

| Job Name | In Folder | Solver | MStages | Memory | Status | Message | Summary | I Force | Other Param |
|----------|-------------------------------|-------------|---------|--------|----------|---------|---------|-------------------------------------|-------------|
| oox.dyn | C:\Users\peter\DOCUME~1\UMFOR | LS-DYNA (S) | Yes... | 4000 | Finished | View... | View... | <input type="checkbox"/> | |
| yyy.dyn | C:\Users\peter\DOCUME~1\UMFOR | LS-DYNA (S) | Yes... | 4000 | Finished | View... | View... | <input type="checkbox"/> | |
| zzz.dyn | C:\Users\peter\DOCUME~1\UMFOR | LS-DYNA (S) | Yes... | 4000 | Finished | View... | View... | <input type="checkbox"/> | |
| zzz.dyn | C:\Users\peter\DOCUME~1\UMFOR | LS-DYNA (S) | Yes... | 4000 | Finished | View... | View... | <input checked="" type="checkbox"/> | |

The 'zzz.dyn' job is highlighted in blue. The 'I Force' column has a checked checkbox for the selected job.

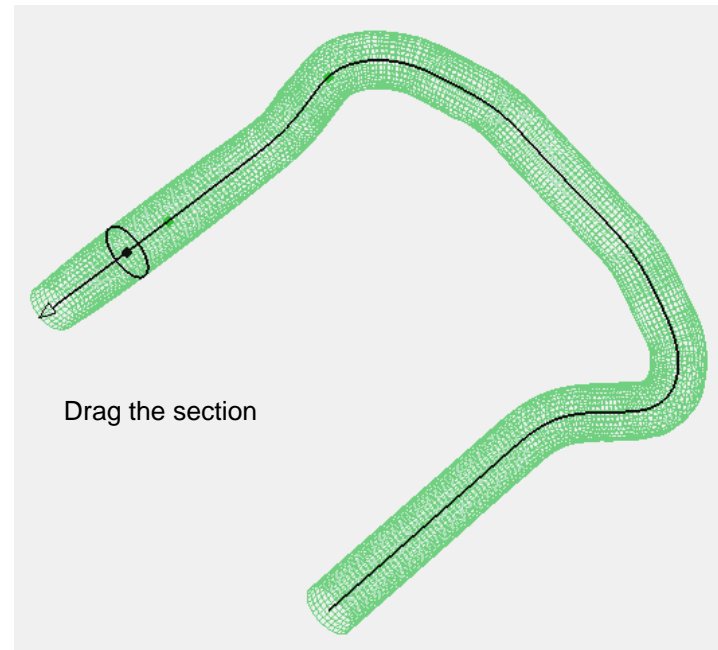
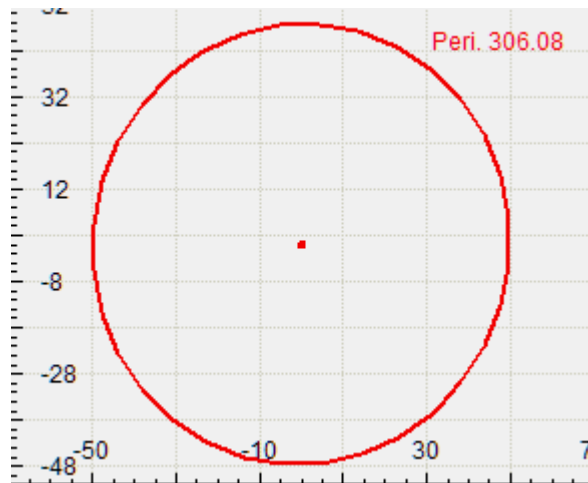
At the bottom of the window, the 'Command' field contains the text: "Current job is a multi-stage job, Please view details in the Multiple Stages dialog."



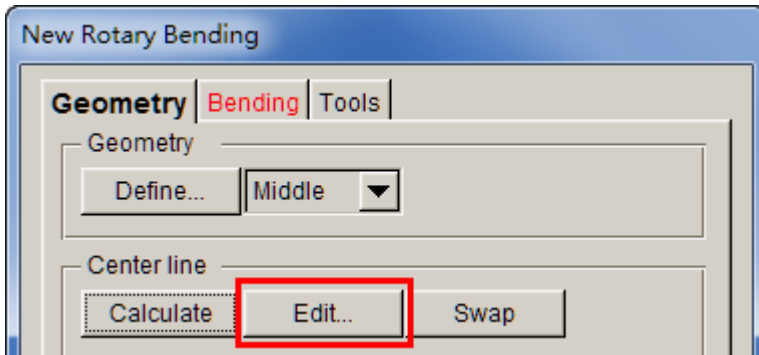
Rohrbiegen

New Features of Tube Bending

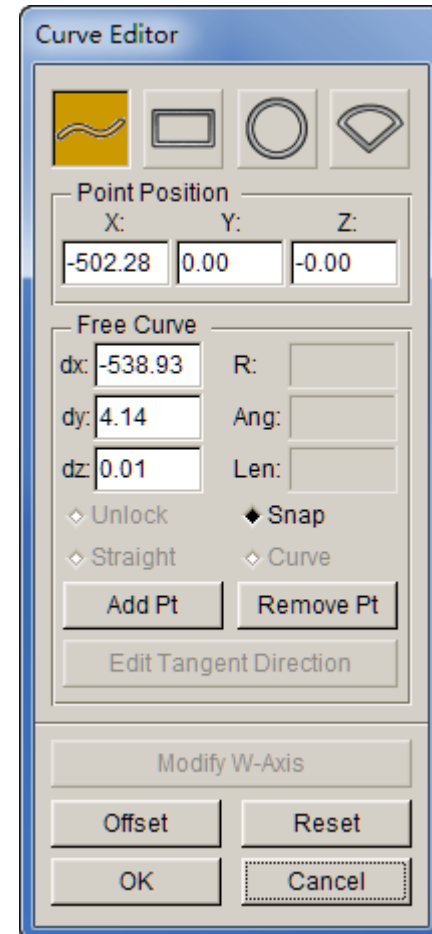
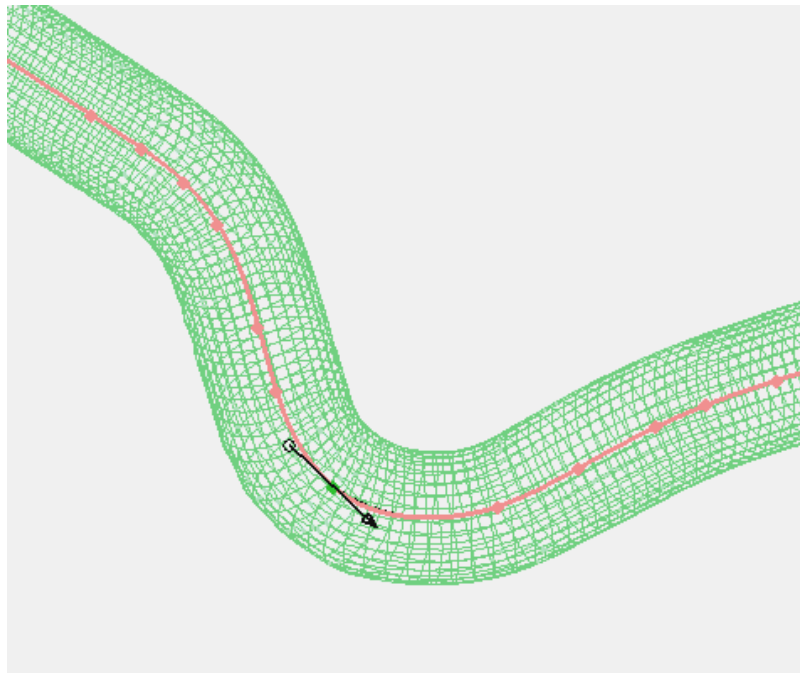
- Calculate the tube (product) center line;
- Generate the bending process automatically;
- Allow the user to edit the bending process;
- Preview the tube bending process;
- Preview the tools movement.



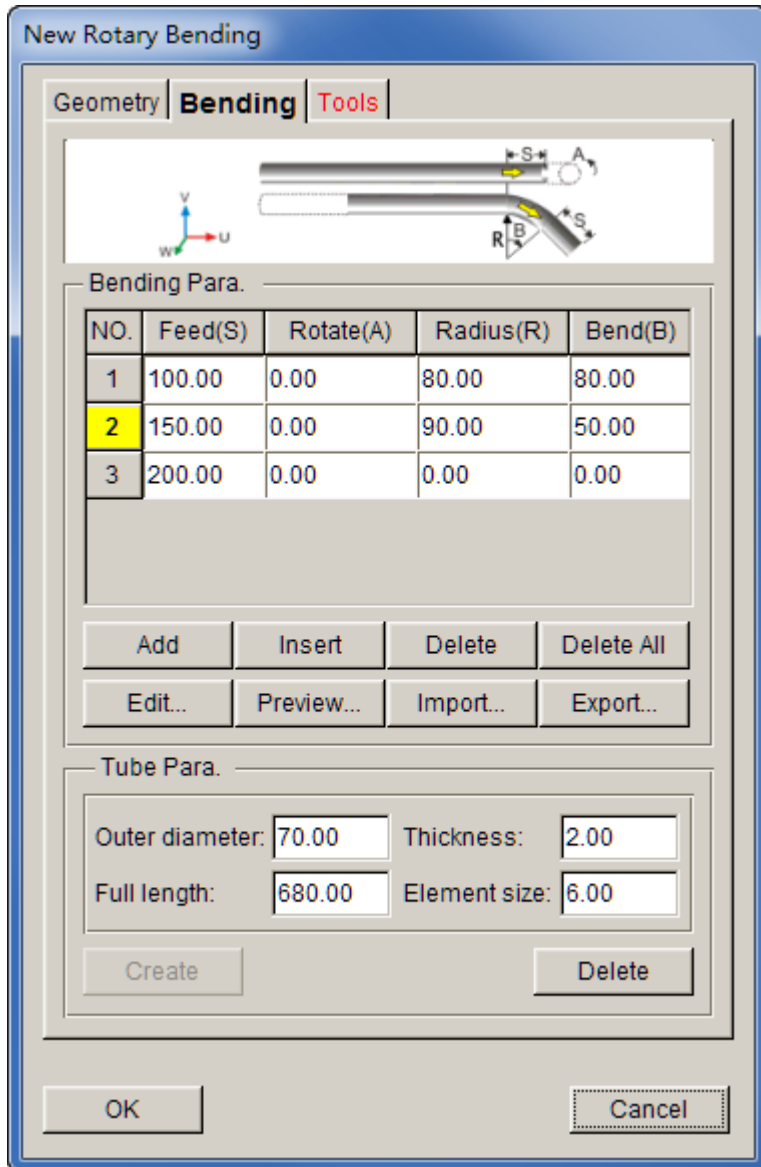
Edit the Tube Center Line



Edit the center line with *Curve Editor*.



GUI of Rotary Bending



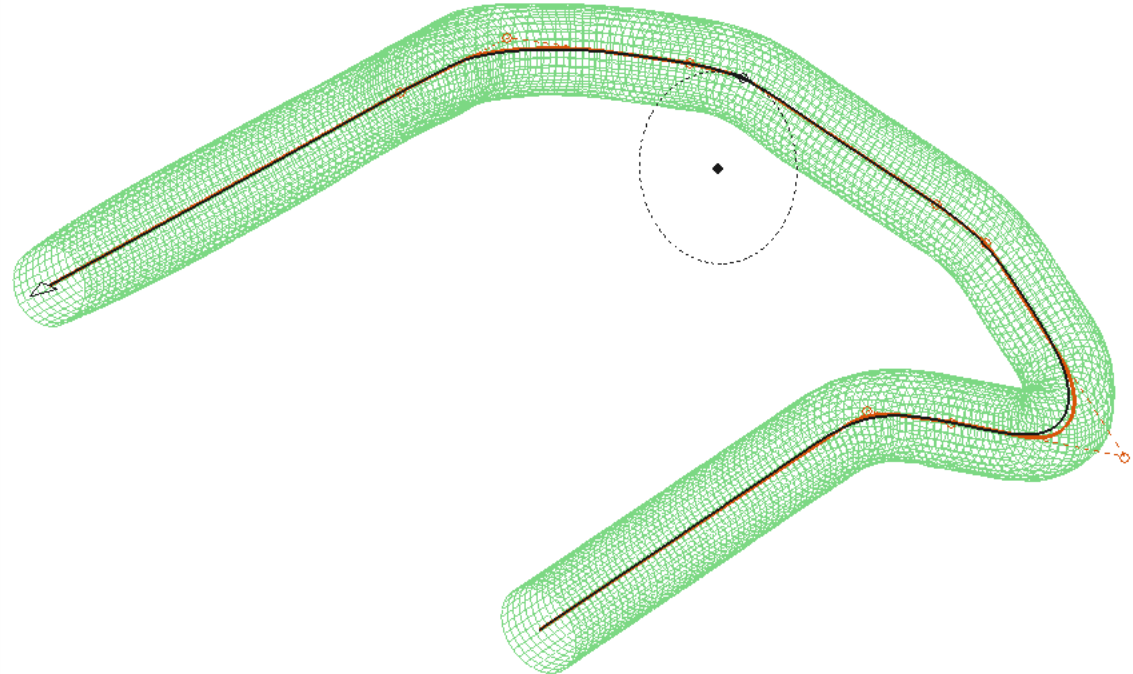
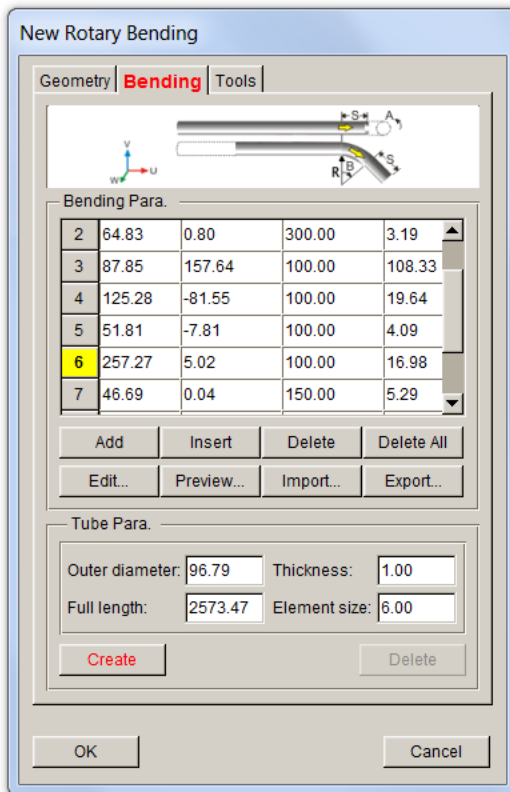
→ Illustration of Tube Bending

→ Process of Tube Bending

→ Operation of Tube Bending

→ Tube Parameters

GUI of Rotary Bending



GUI of Rotary Bending

Parameters for Tools of Tube Rotary Bending

The screenshot shows the 'New Rotary Bending' dialog box with the 'Tools' tab selected. The dialog contains several checked options and input fields for defining the tools and their parameters.

| Tool | Length | Gap |
|--|--------|------|
| <input checked="" type="checkbox"/> Bend die | | 0.10 |
| <input checked="" type="checkbox"/> Clamp die | 291.86 | 0.10 |
| <input checked="" type="checkbox"/> Die insert | 291.86 | 0.10 |
| <input checked="" type="checkbox"/> Pressure die | 291.86 | 0.10 |
| <input checked="" type="checkbox"/> Wiper die | 291.86 | 0.10 |
| <input checked="" type="checkbox"/> Mandrel assembly | | 0.60 |

Additional parameters:

- Ball number: 3
- Ball width: 10.00
- Shaft length: 291.86
- Ball interval: 10.00
- Gap of ball: 0.70

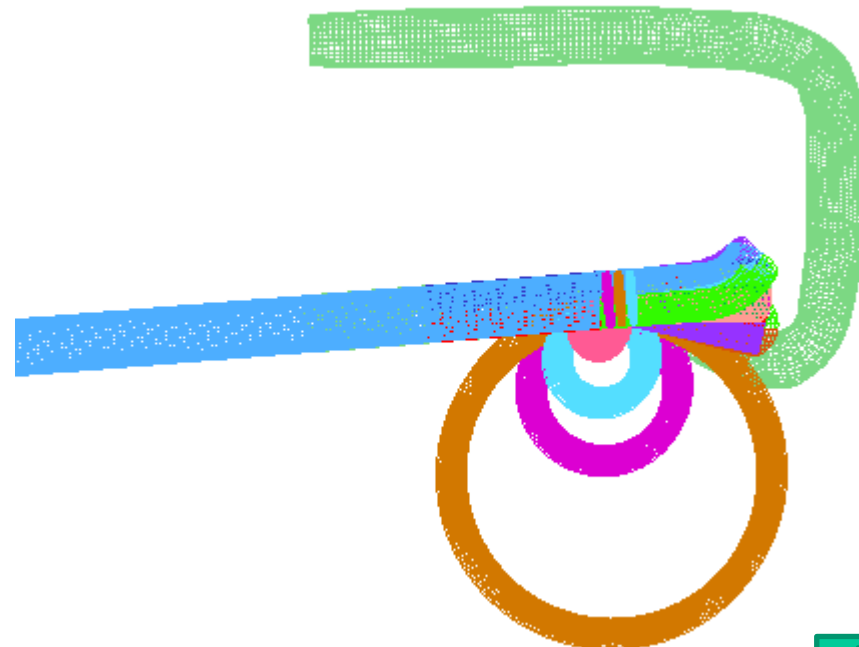
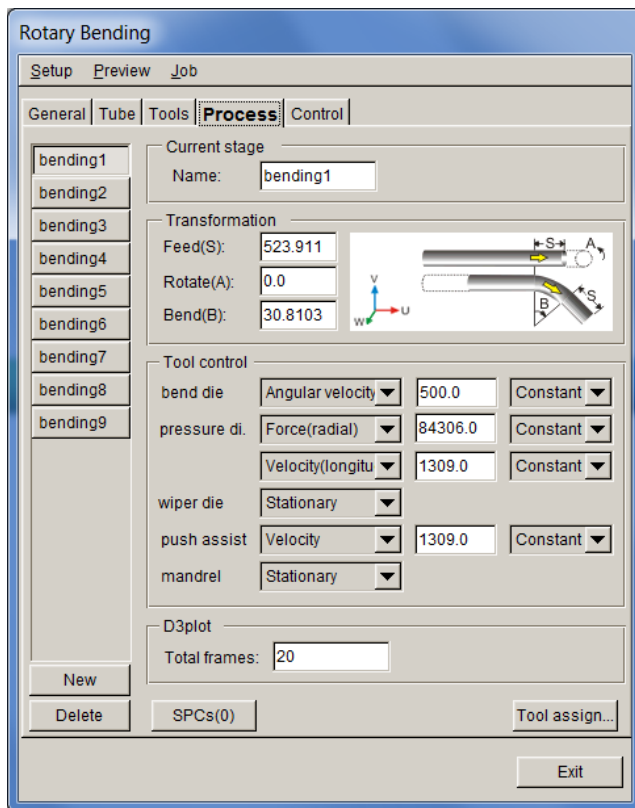
Other options:

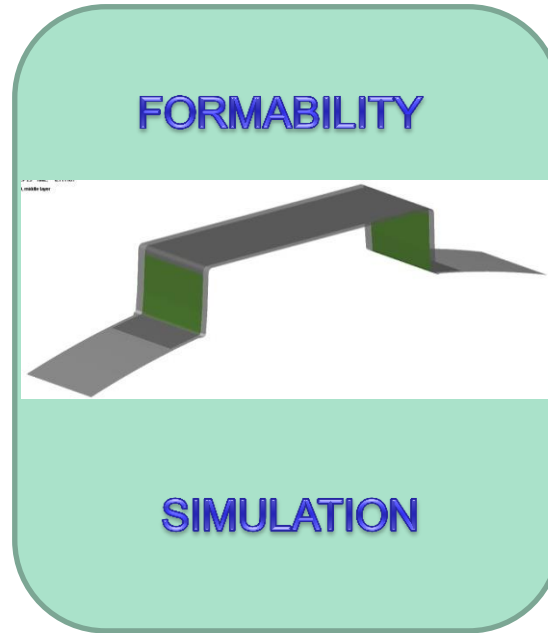
- Push Assist

Buttons: Create, Delete, OK, Cancel

Setup Definition

- The tube blank, tools and process are generated automatically;
- The user can change the tube blank material, tool process control and other parameters.

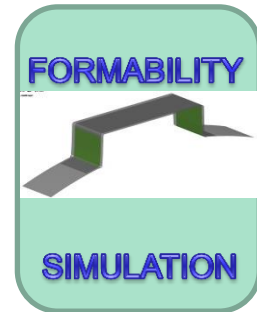
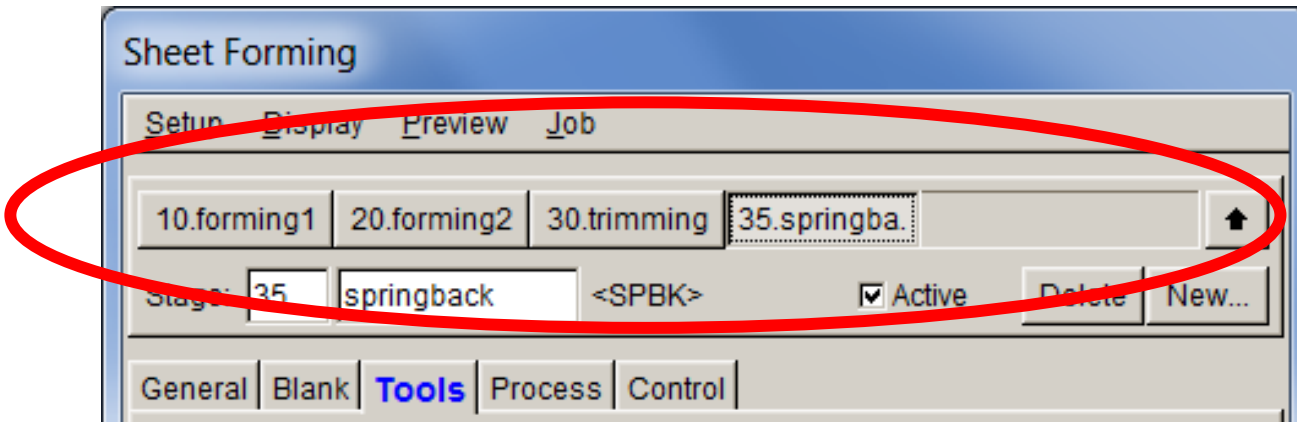




Automatische Positionierung



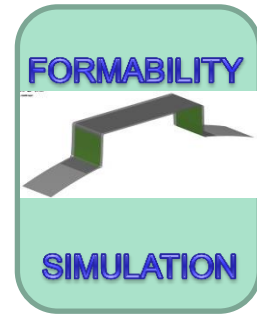
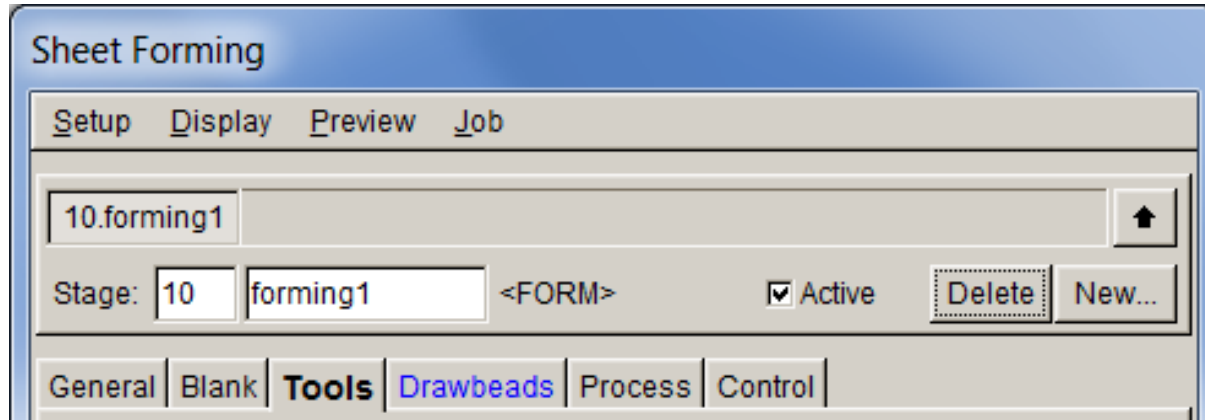
Bisher:



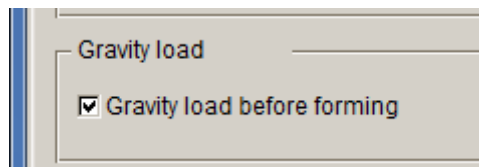
Manuelle Positionierung der Werkzeuge der Folgestufe an das Ergebnis der Vorstufe



Neu in DF 5.9.2:

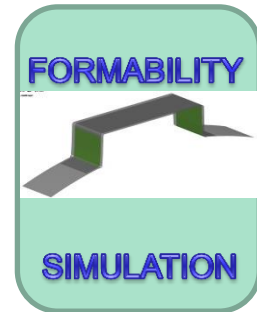
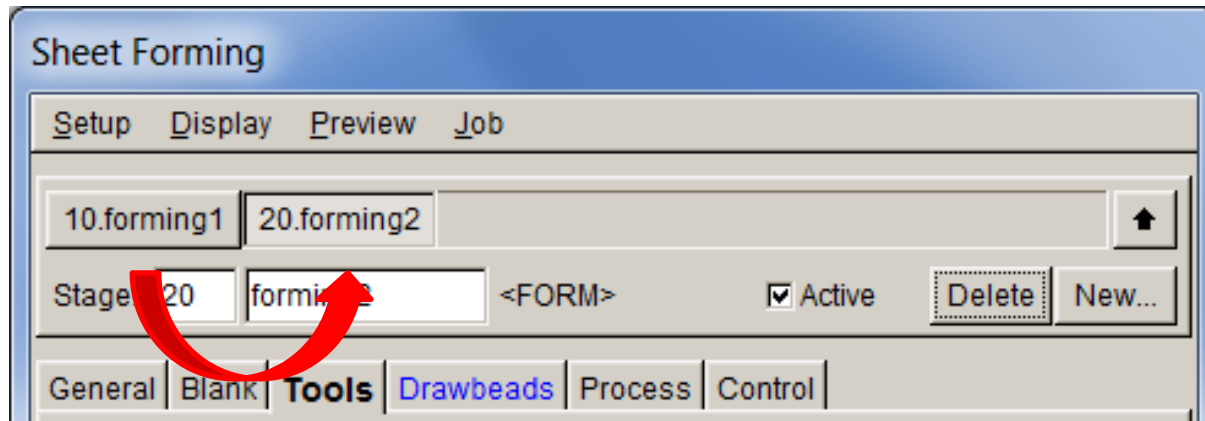


Automatisches Einlegen der Platine mit
Positionierung der Werkzeuge





Neu in DF 5.9.2:



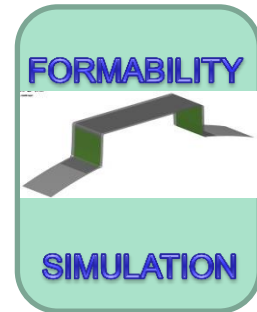
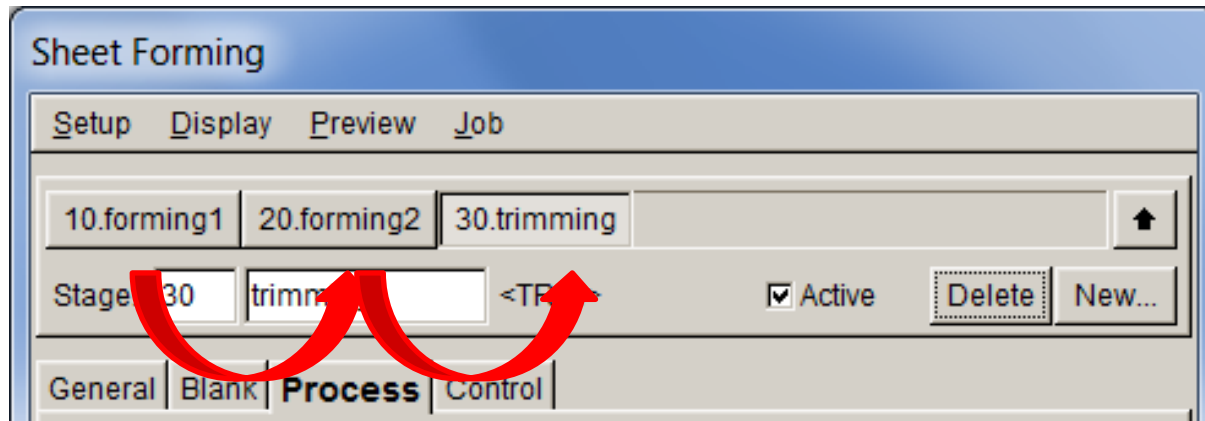
Automatische

→ Weitergabe der Ergebnisse

→ Positionierung der Werkzeuge der Folgestufe



Neu in DF 5.9.2:



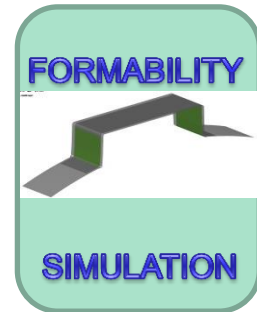
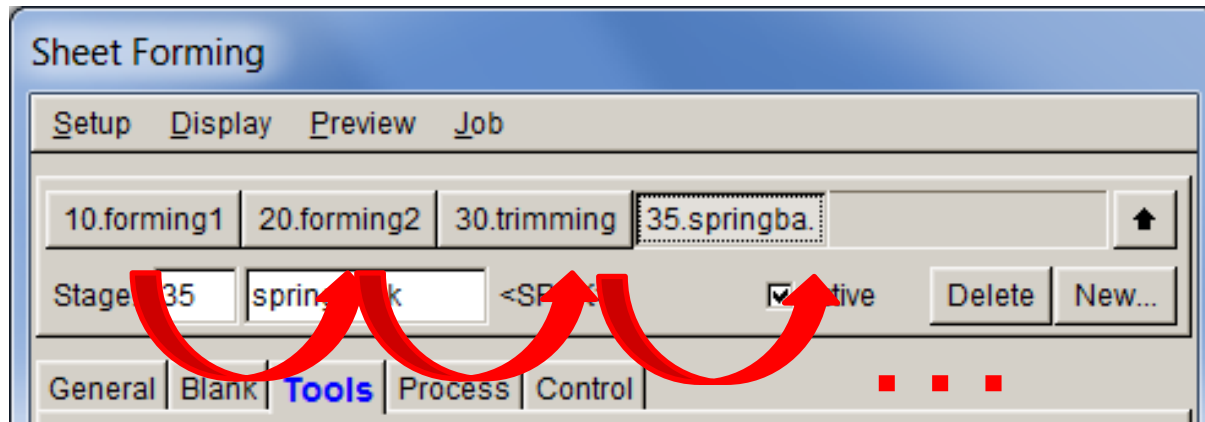
Automatische

→ Weitergabe der Ergebnisse

→ Positionierung der Werkzeuge der Folgestufe



Neu in DF 5.9.2:



Automatische

→ Weitergabe der Ergebnisse

→ Positionierung der Werkzeuge der Folgestufe



Sheet Forming

Setup Display Preview Job

10.OP 20.OP2

Stage: 20 OP2 <FORM> Active Delete New...

General Blank **Tools** Drawbeads Process Control

die punch binder pad

Current tool
Name: 20_binder

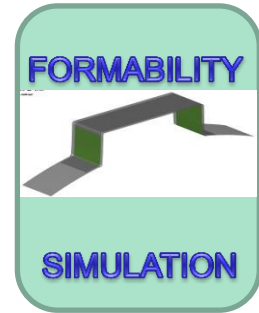
Geometry
BINDER02 24 Show
Position: 0.0 0.0 0.0

Working direction
Direction: +Z Movement: 0.0

Contact
Offset: 0.0 <None>
Frictional coef.: 0.125 Steel Std Advanced...

Association
 Contact
 Springs

New Delete DFE Assign Auto Assign **Positioning...** Summary... Exit



Positioning

Blank
Position: -326.0 O... On: punch

Tools

| Name | Movement | On |
|--------|----------|--------|
| die | 0.0 | Blank |
| punch | 0.0 | |
| binder | 0.0 C | <None> |
| pad | 359.0 | Blank |

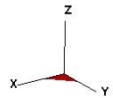
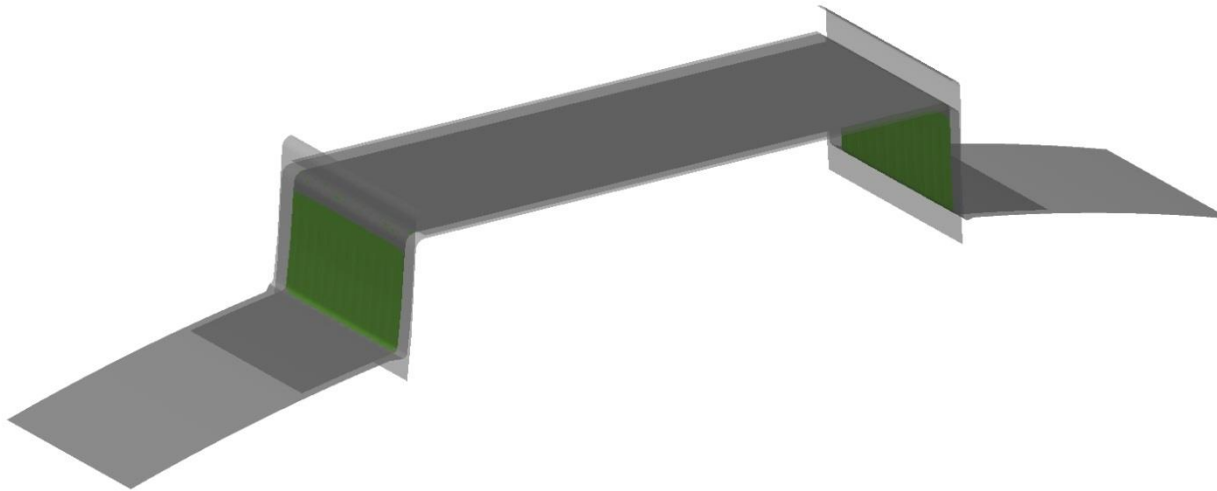
Preference
Gap between blank and tool: 0.6 Default
Gap between tools: 0.0
 In the normal direction of tool surface
 Round off Auto position

Reset OK Cancel

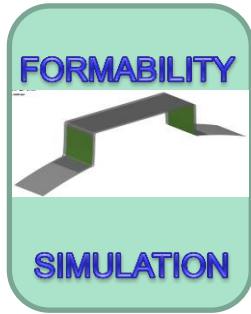




forming1 / untitled
STAGE 3 LOCAL STEP 13
STEP 22 TIME: 0.067264
FLD, middle layer



ETA/POST



LS-DYNA Forum 2014

6. - 8. Oktober 2014, Bamberg



TRIMMING8 / UNTITLED
STAGE 9 LOCAL STEP 1
STEP 9 TIME: 0.008001

