8th International Forging Conference/Brasil

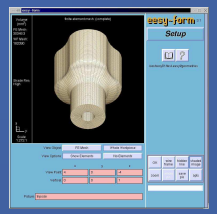
(24th Senafor)

Some ideas about simulation:

The possible gap between what simulation systems could do for you and what you do with simulation systems

G. H. Arfmann, M. Twickler

AE Arfmann Engineering, CPM GmbH, Germany



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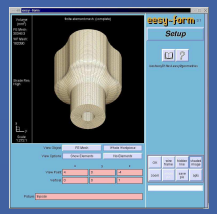
Some ideas about simulation.....

- Availability of reliable data (material, friction, physical properties)
- Designing of cold forming process (process and tool design)
- Avoiding of failures
  - cracking of the part (in two pieces)
  - failure of a punch
  - folding at the part
  - pre-stressing-system design
- Prediction of microstructure
- 3D or 2D ? What is the right choice?
- Administration of data



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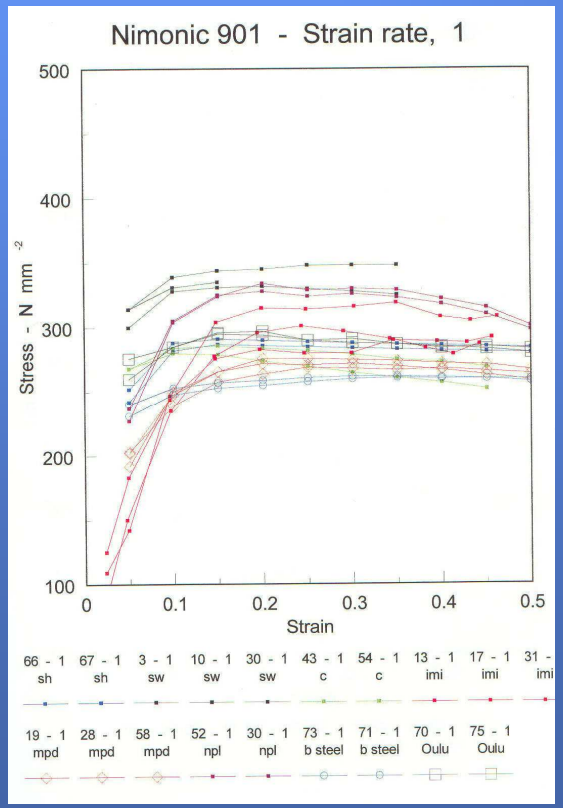
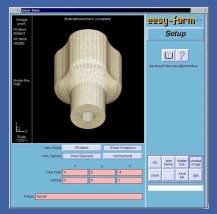


- Correct material data

Yield-Stress-Strain curve
Quality
Source
Documentation



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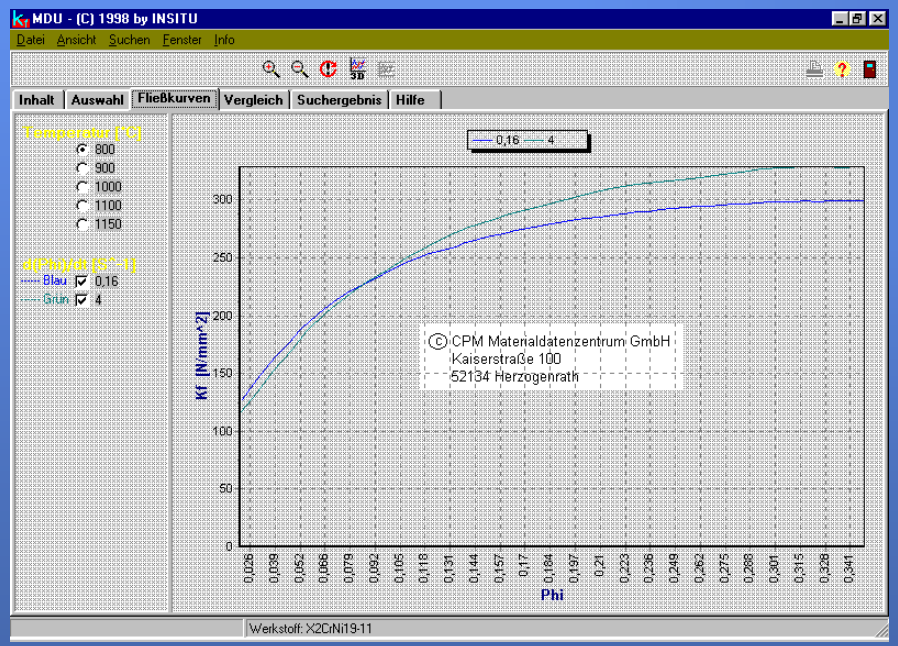

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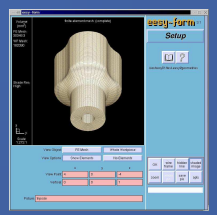

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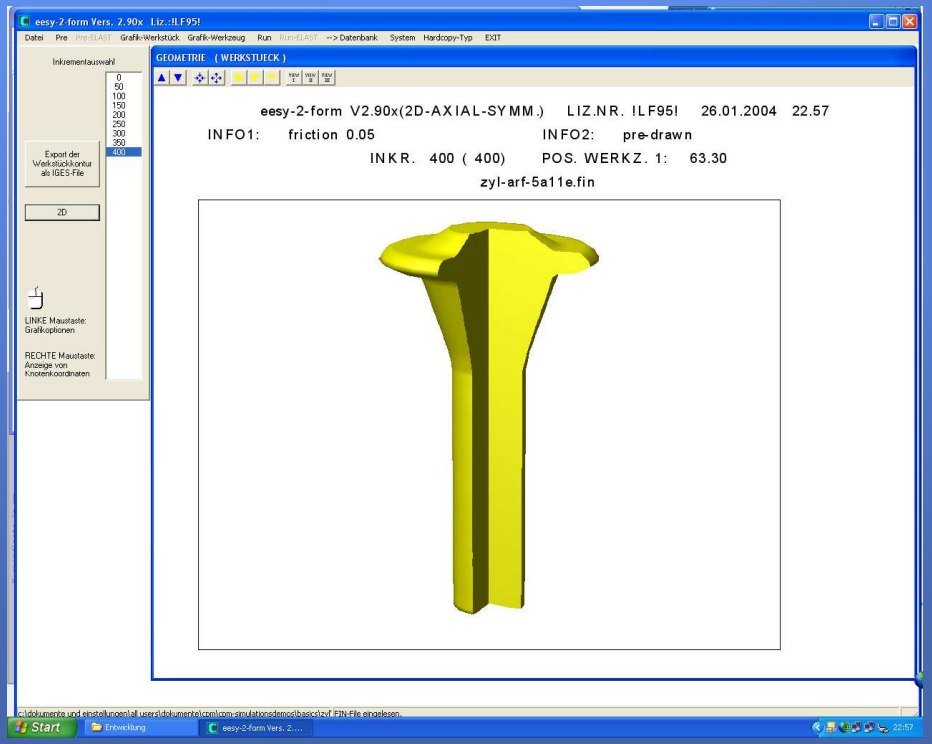
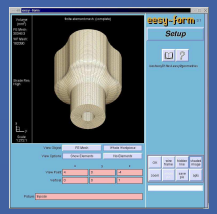


- boundary conditions

Correct friction and temperature?

Influence on
- correct material flow
- correct load

μ=0.05, temp.= 25°C, pre-drawing



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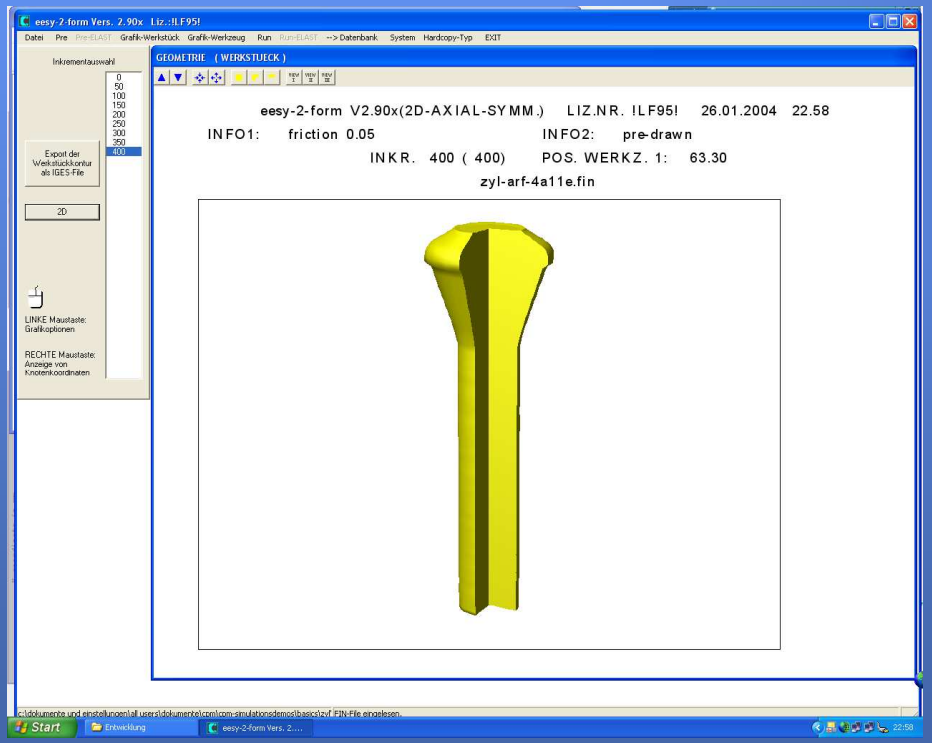
Some ideas about simulation.....



- boundary conditions

Adaptation of friction and temperature

Influence on

- correct material flow
- correct load

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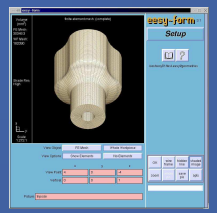

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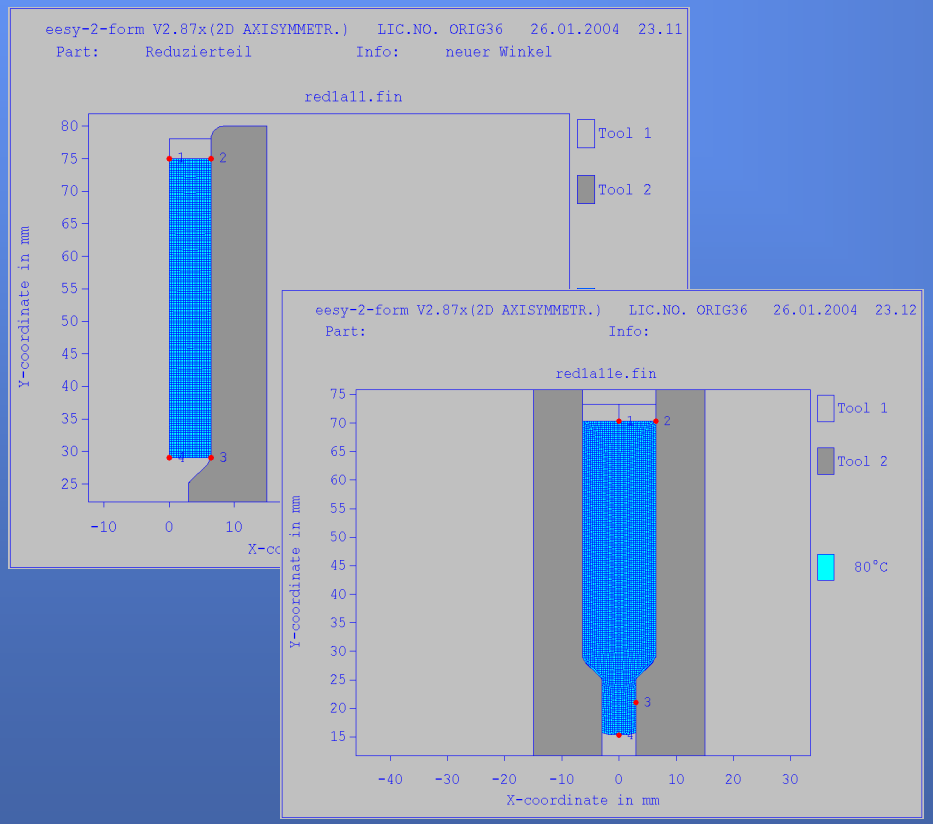
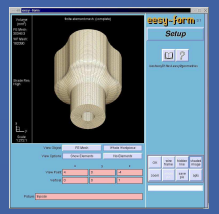


- Design of a cold forming process

Simulation of an extrusion

Material flow



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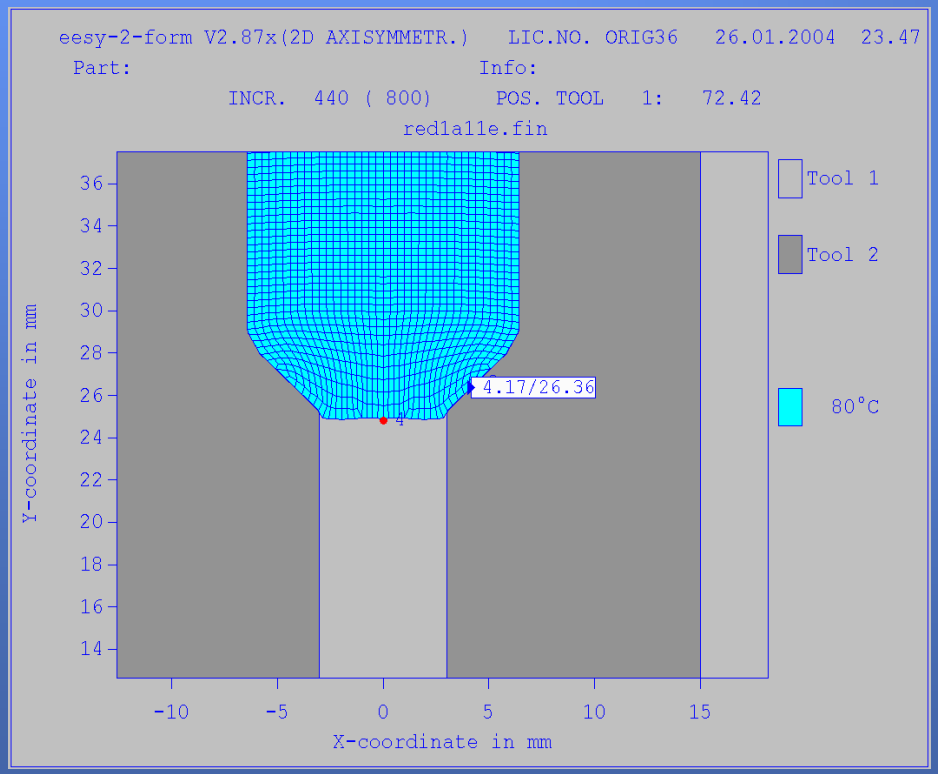
Some ideas about simulation.....



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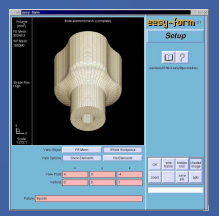

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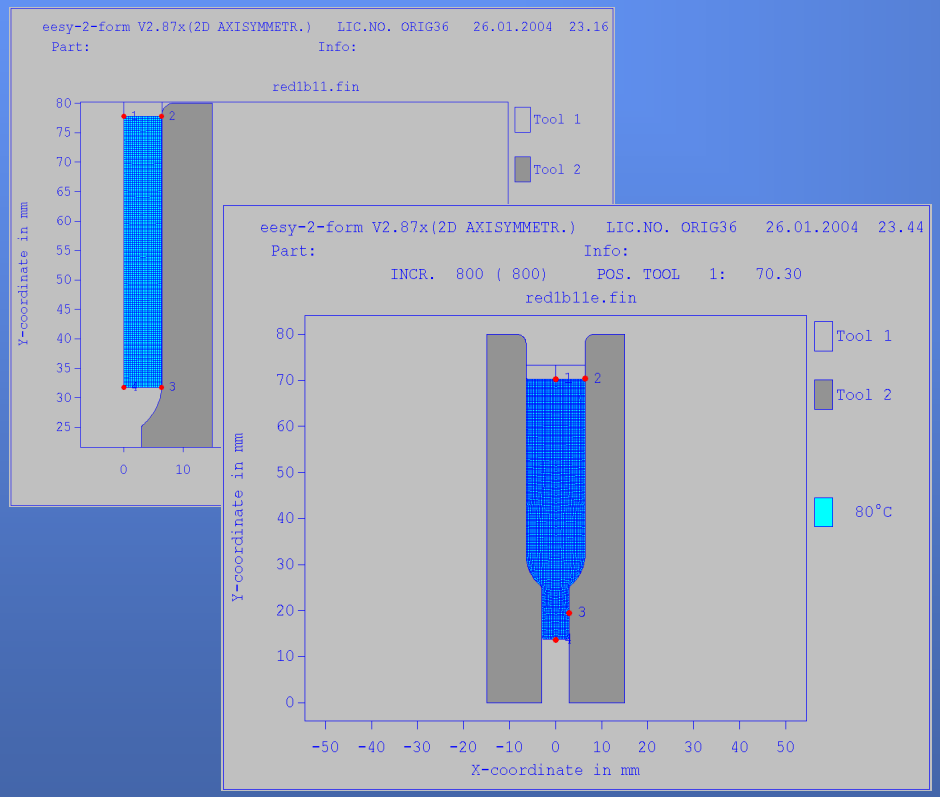

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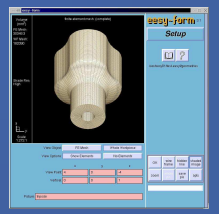

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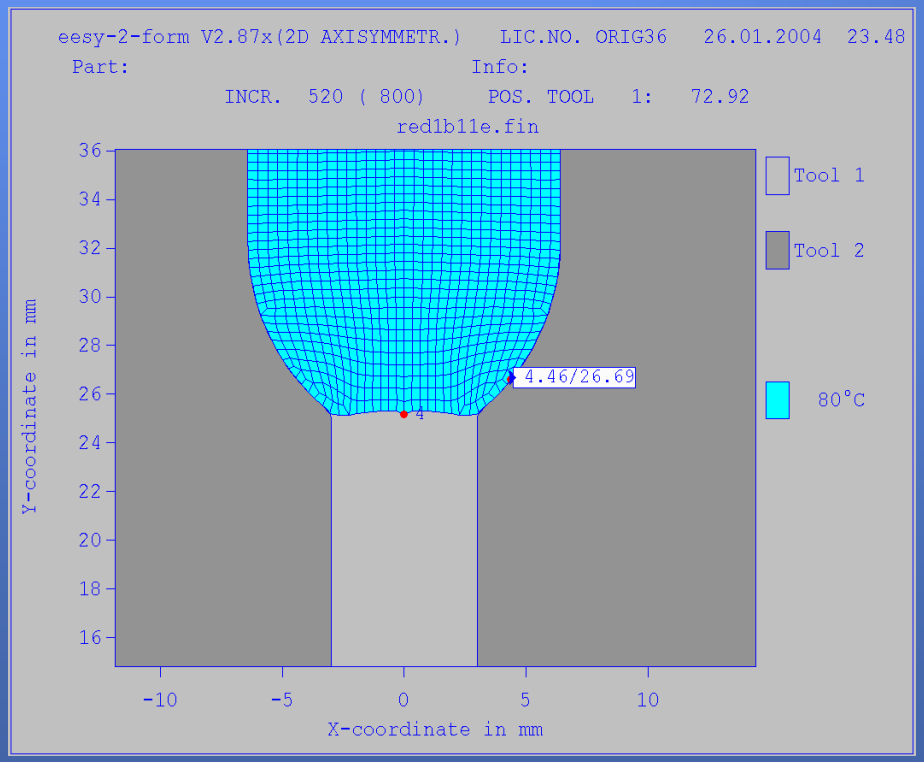

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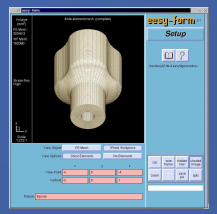

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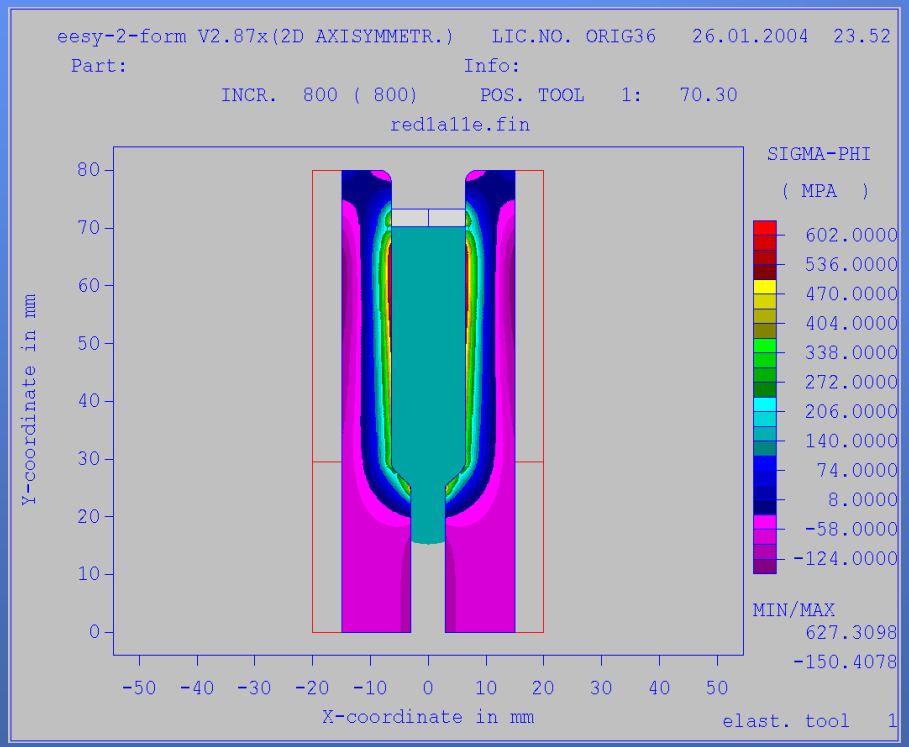
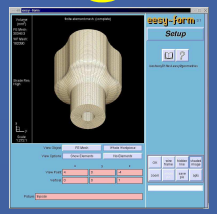


- Design of a cold forming process

Tool design

Stress in the die without pre-stressing



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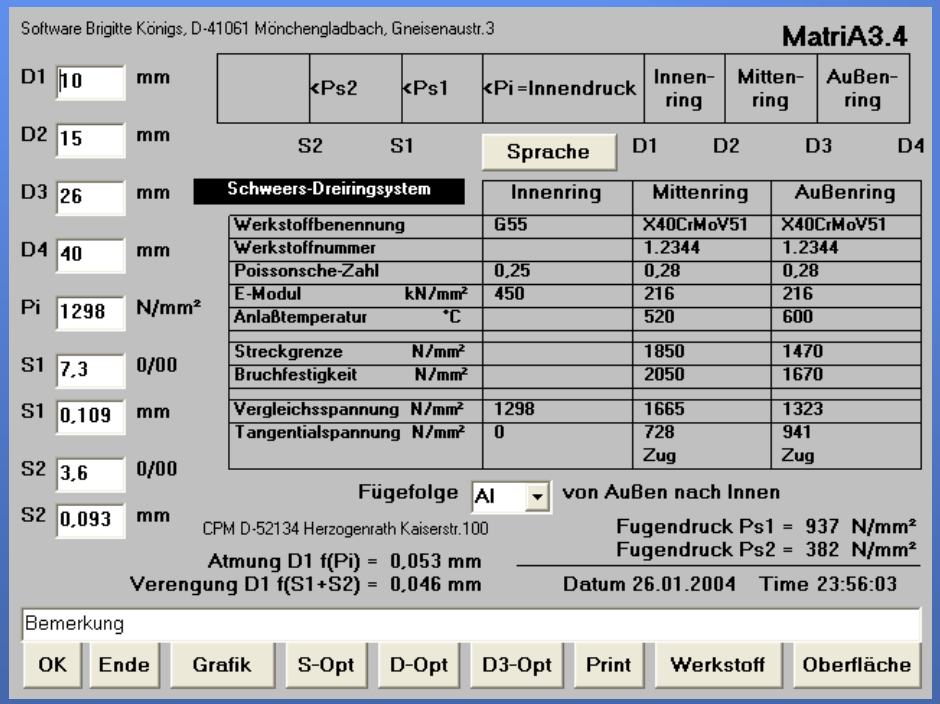
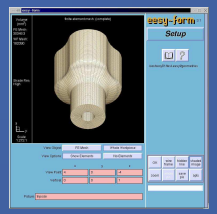


- Design of a cold forming process

Tool design

Design of a multi-ring pre-stressing-system



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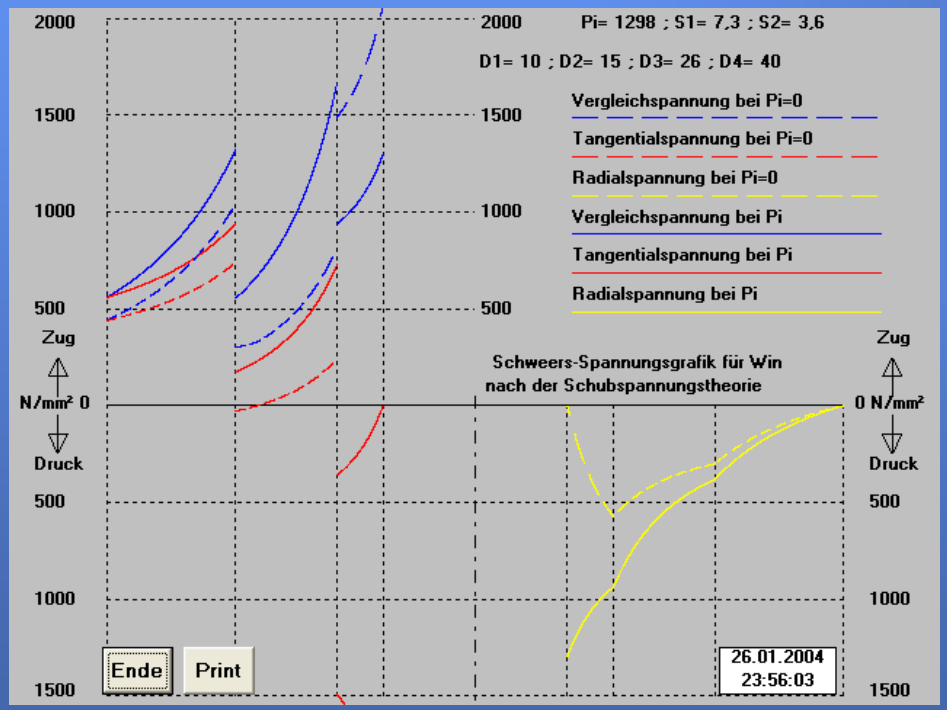

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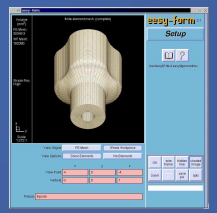

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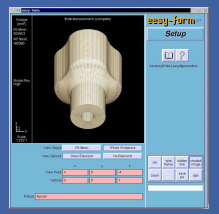
Some ideas about simulation.....

- Avoiding of failures

Production of a spark plug



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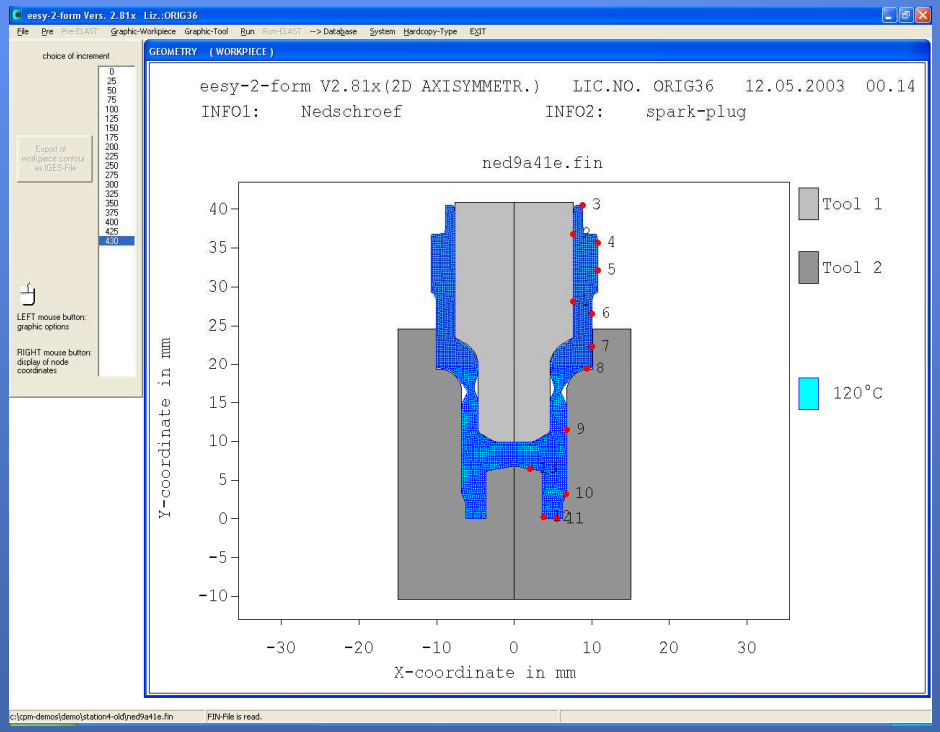
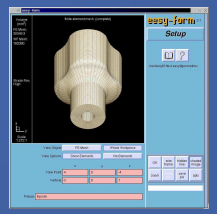


- Avoiding of failures

Production of a spark plug

Cracking of the part (in two pieces) because of wrong adjustment



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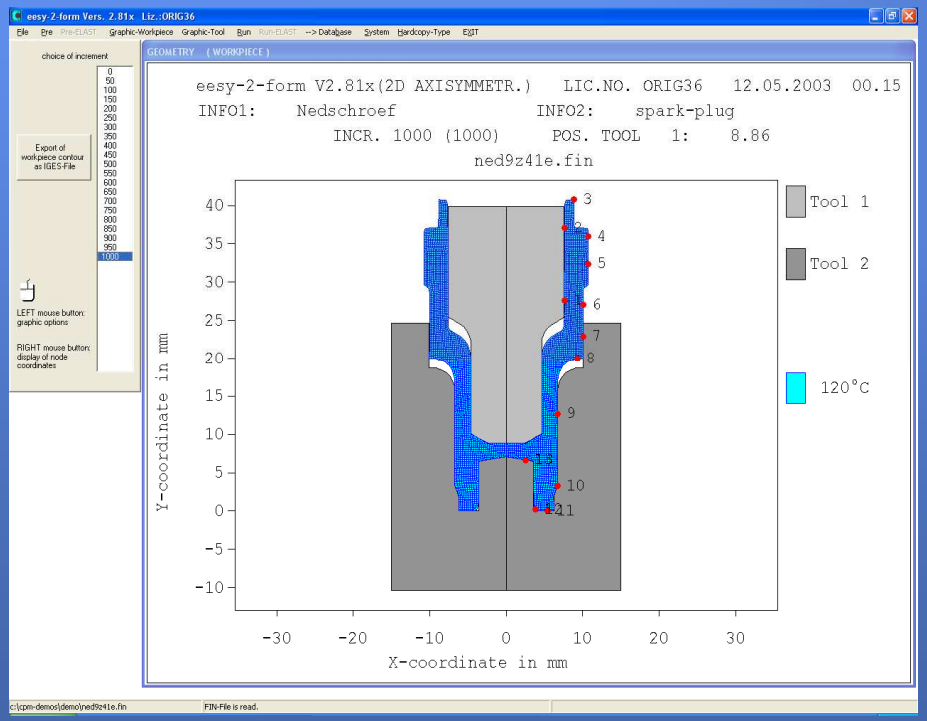
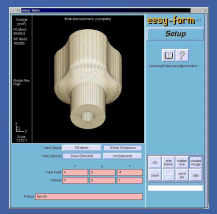


- Avoiding of failures

Production of a spark plug

Correct adjustment



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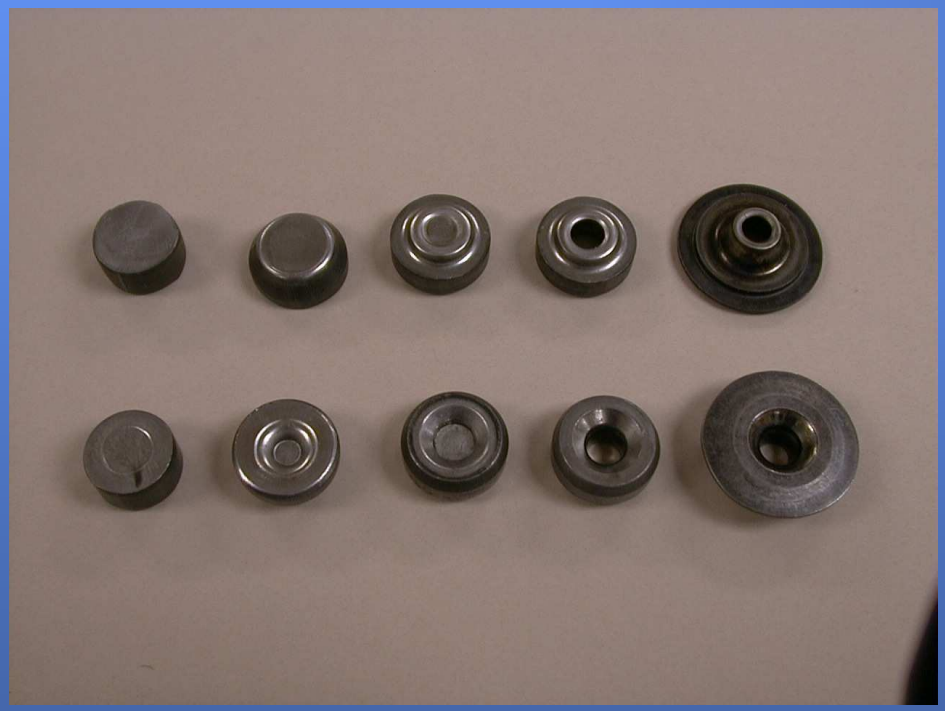
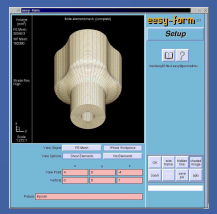


- Avoiding of failures

Failure of a punch

Bad pre-form design



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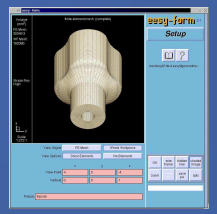

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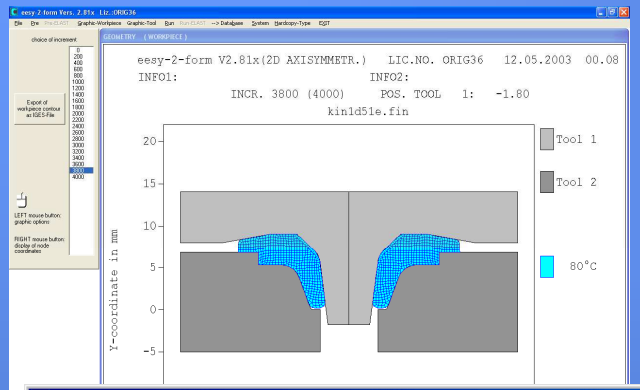

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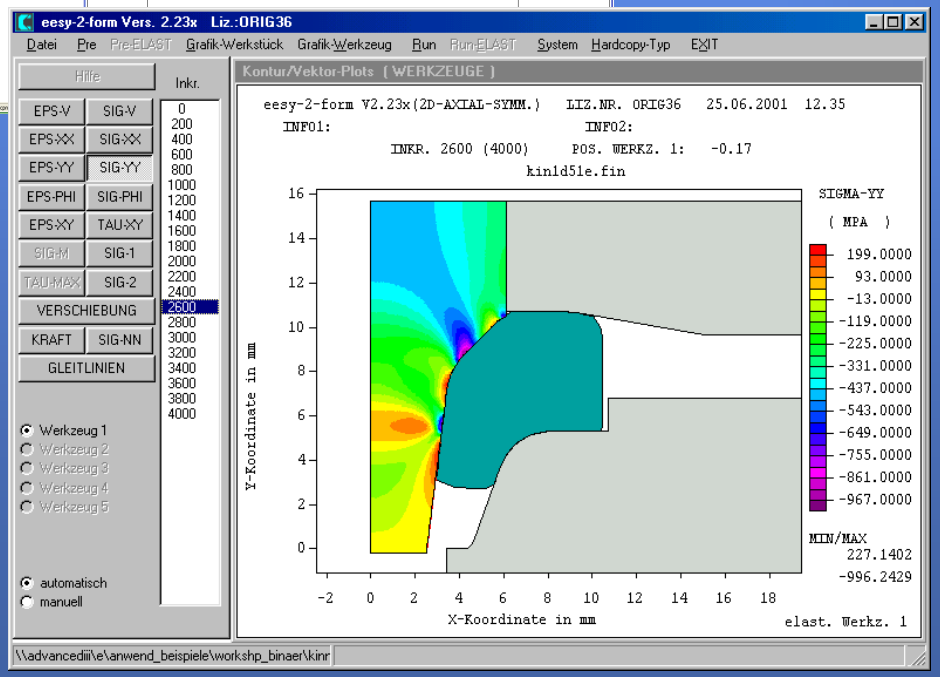

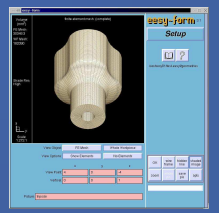

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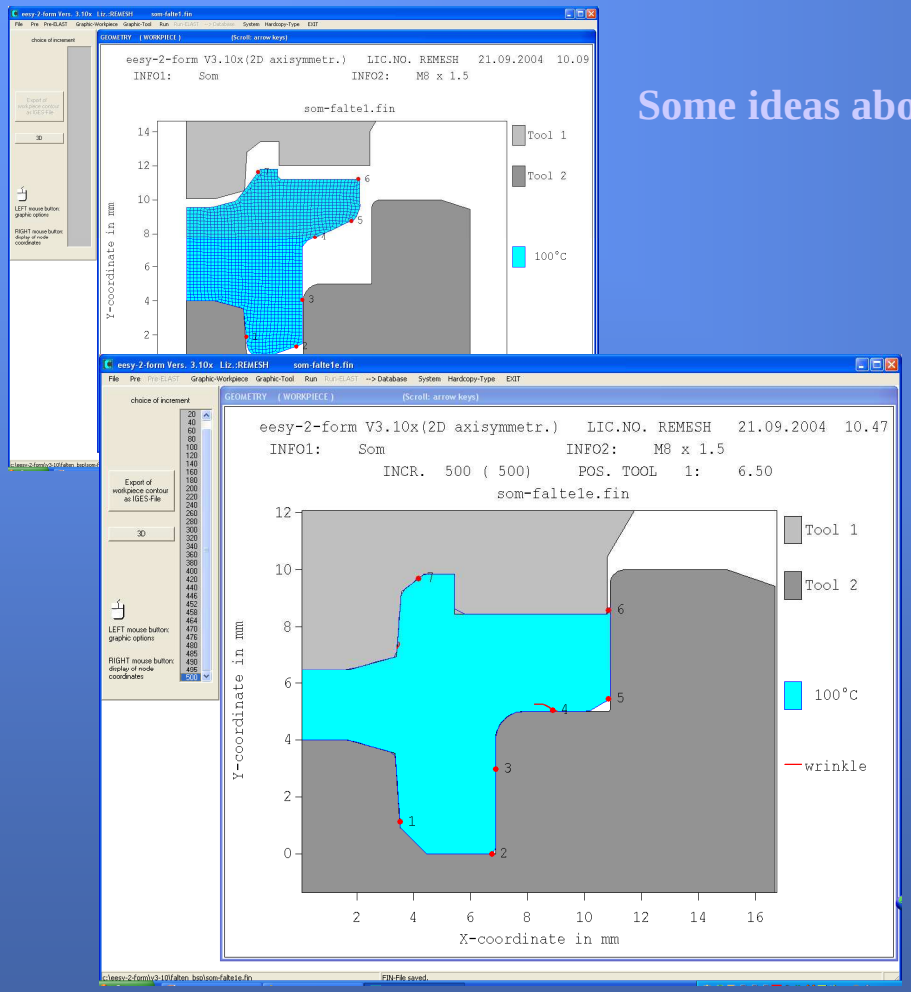
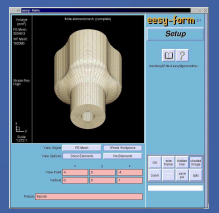


Some ideas about simulation.....

- Avoiding of failures

Folding at the part surface



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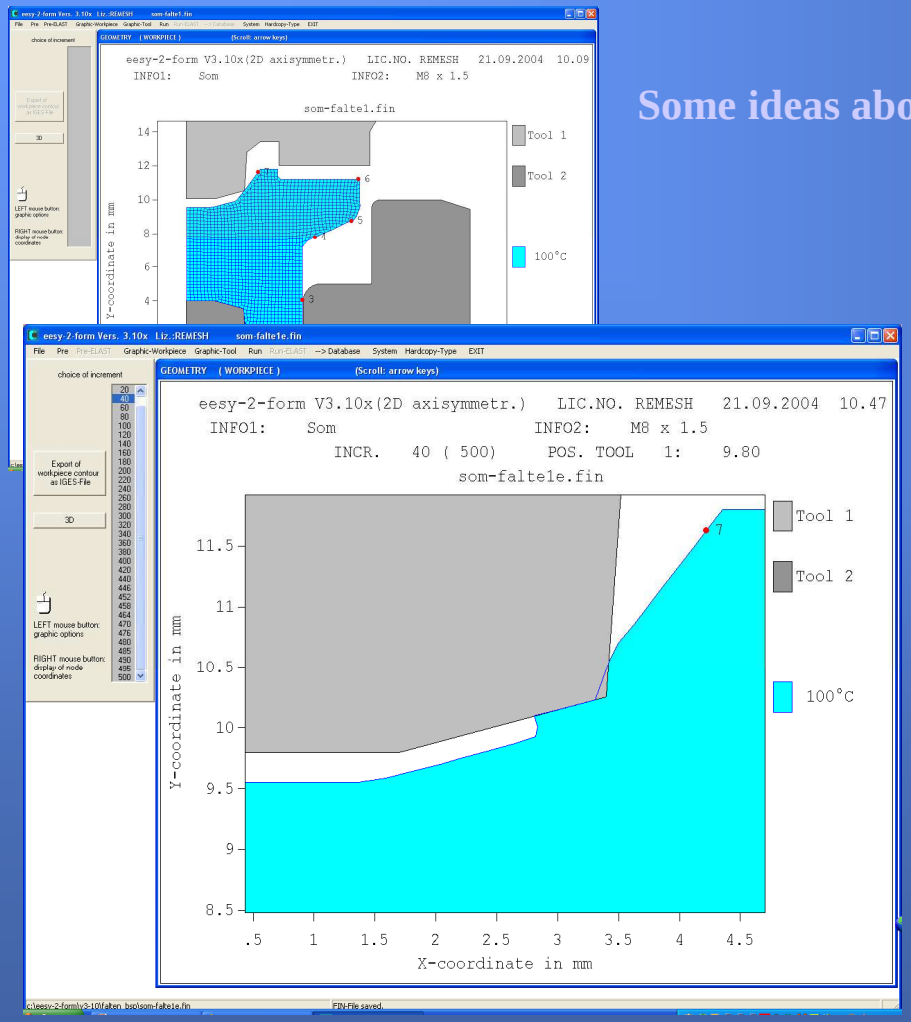
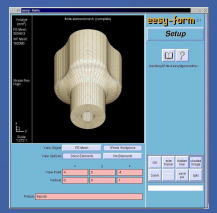


Some ideas about simulation.....

- Avoiding of failures

Folding at the part surface

Generation



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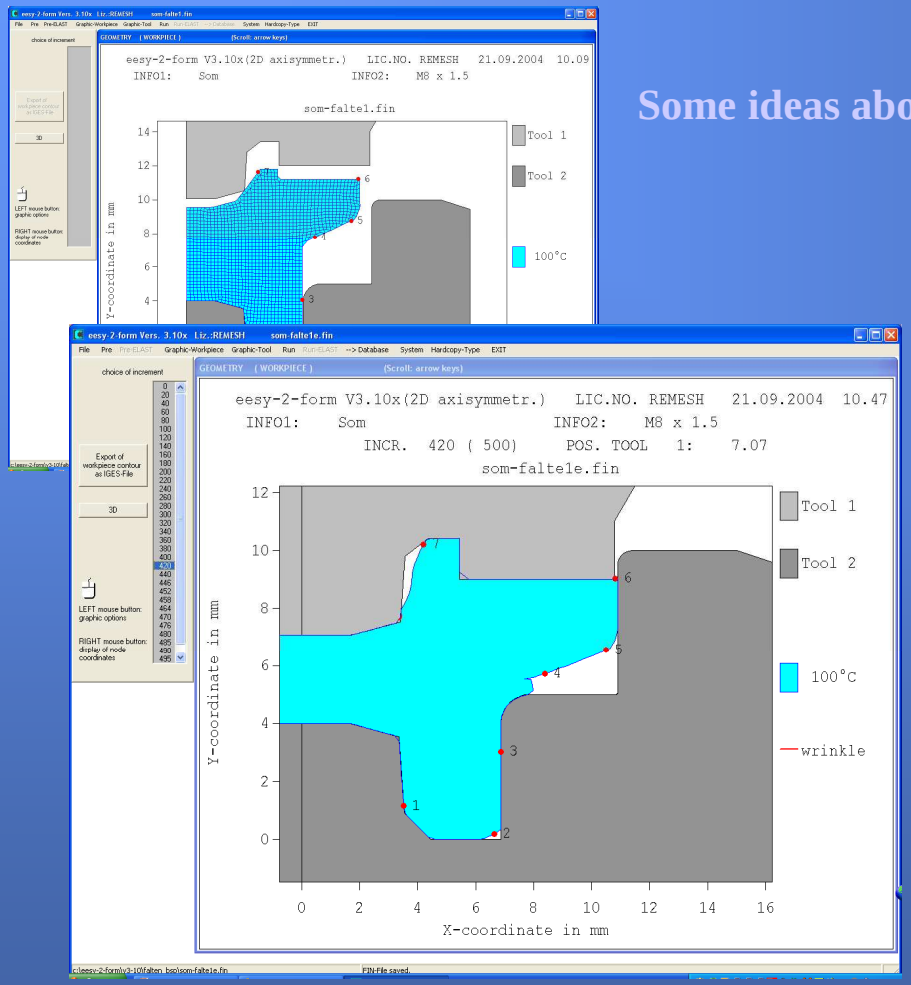

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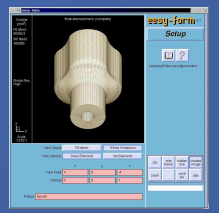

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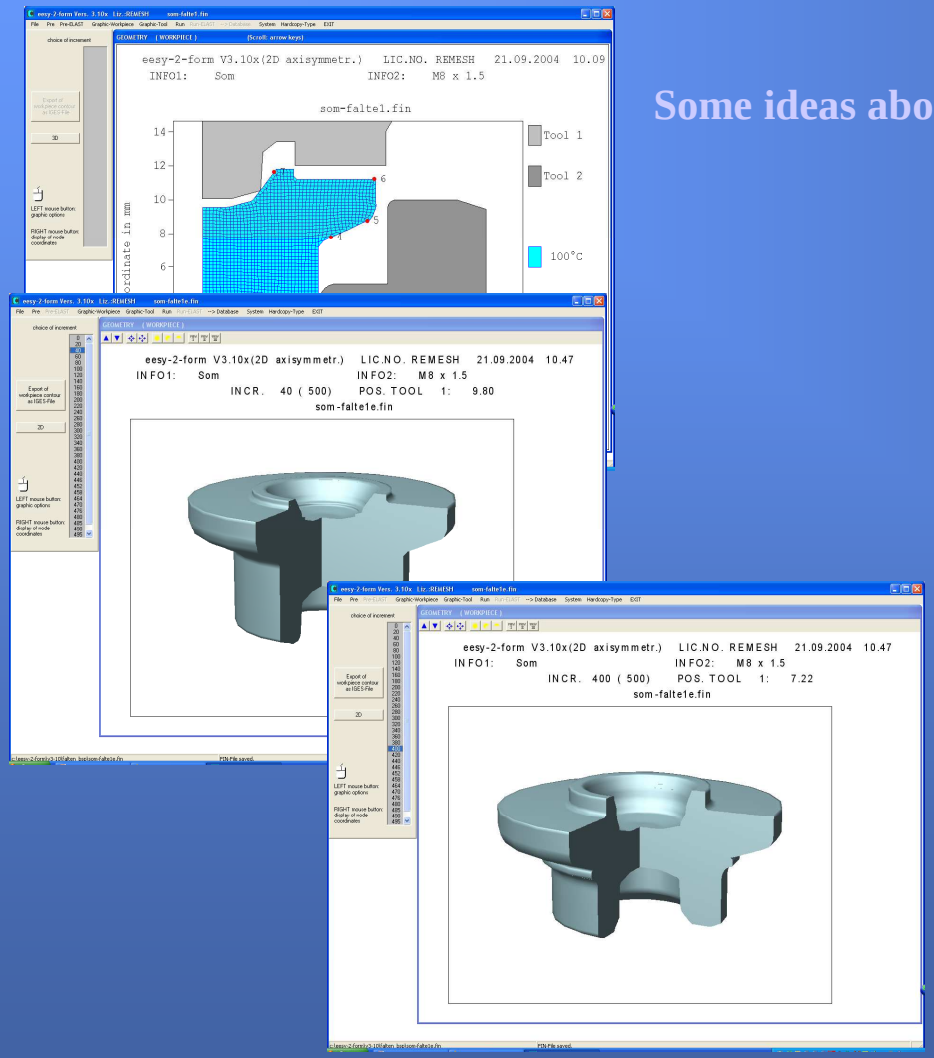

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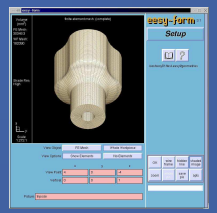

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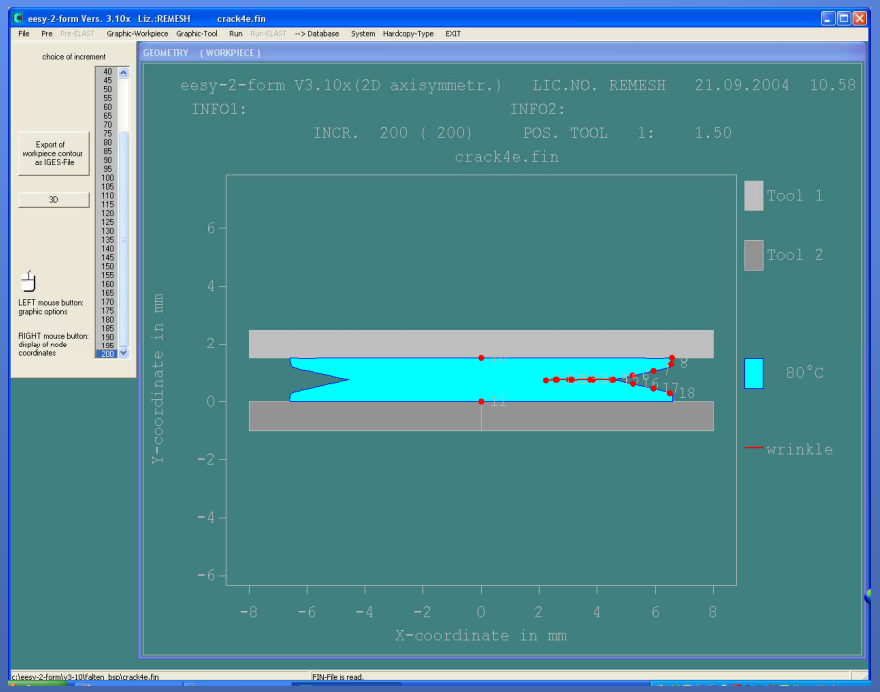
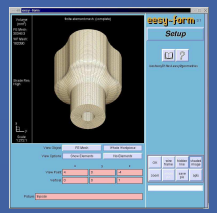


- Avoiding of failures

Generation of a fold



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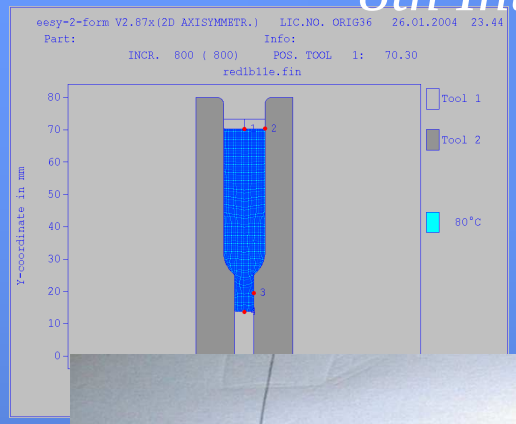
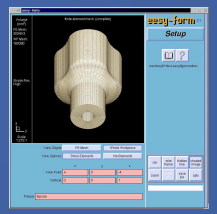


Some ideas about simulation.....

- Avoiding of failures

Splitting of a die due to high stresses



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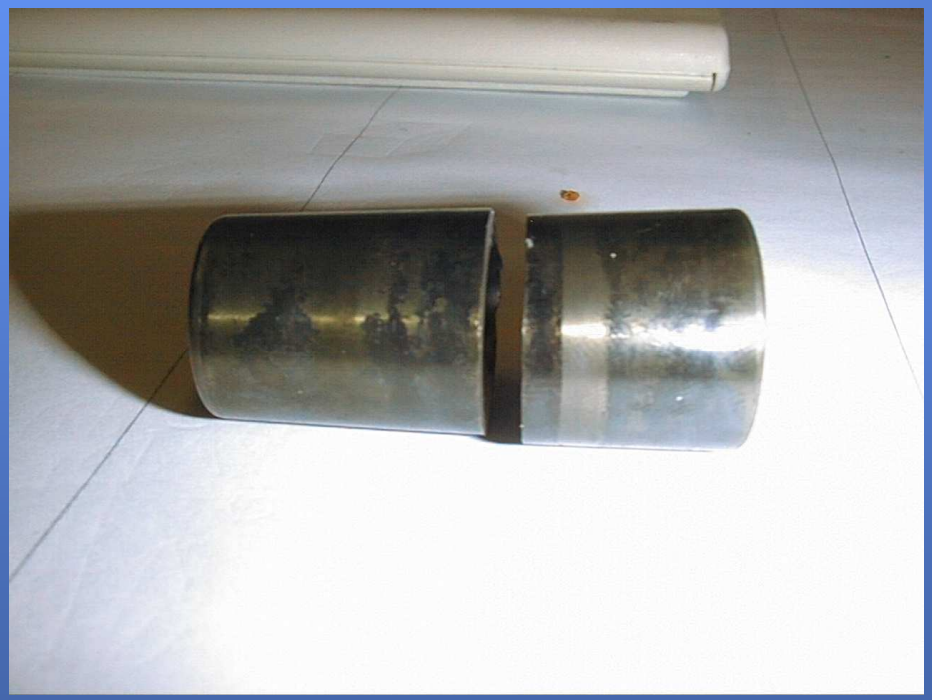
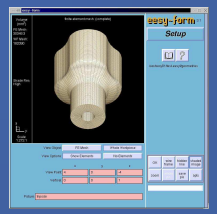


- Avoiding of failures

Splitting of a die due to high stresses



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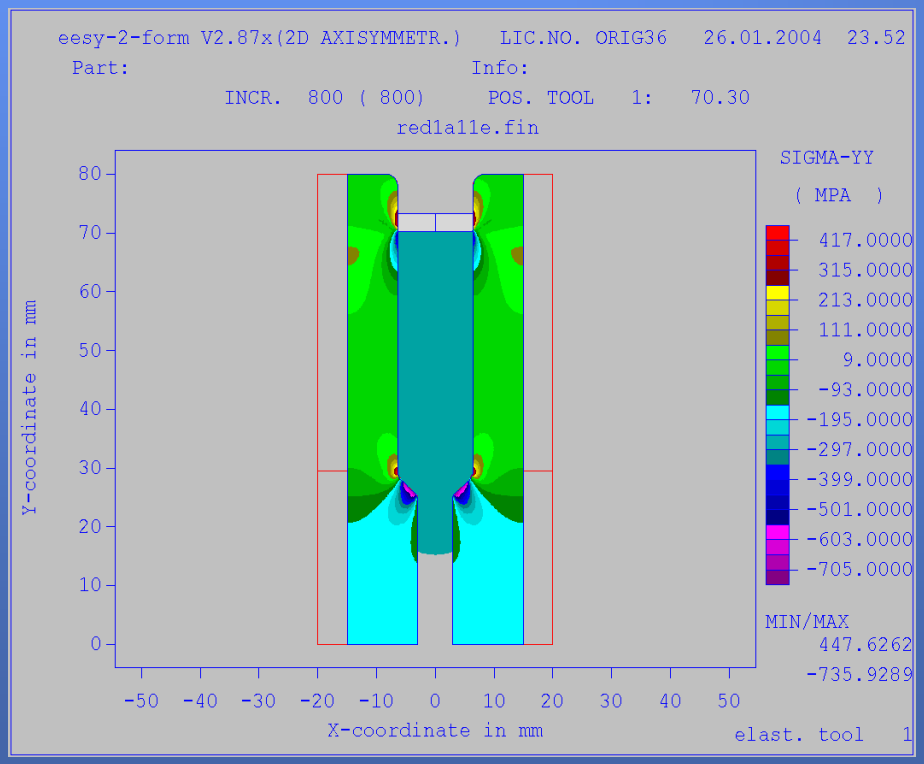
Some ideas about simulation.....



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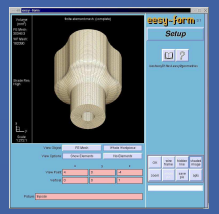

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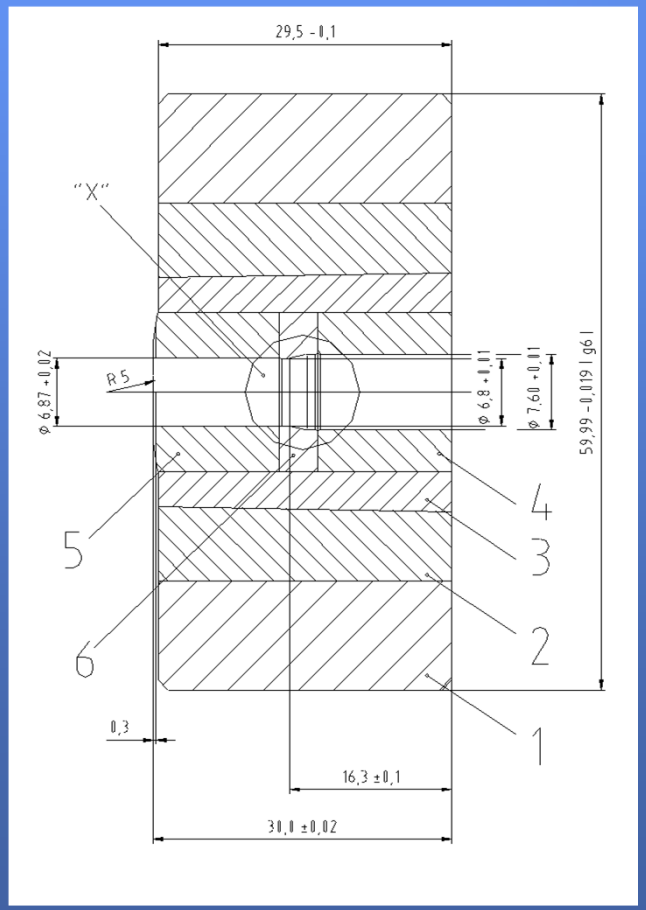

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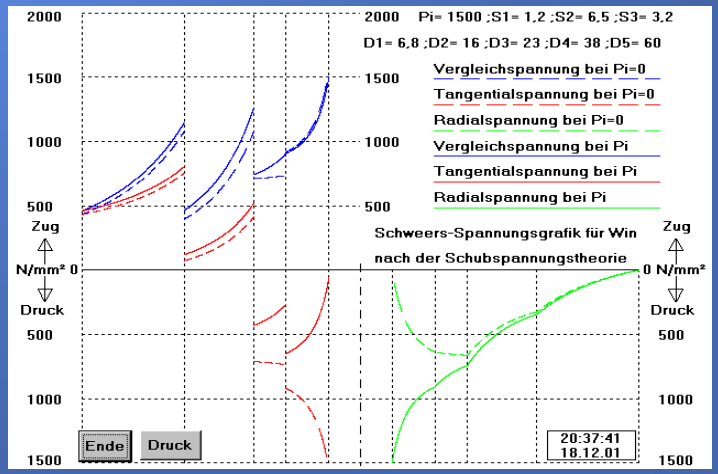

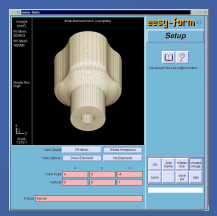

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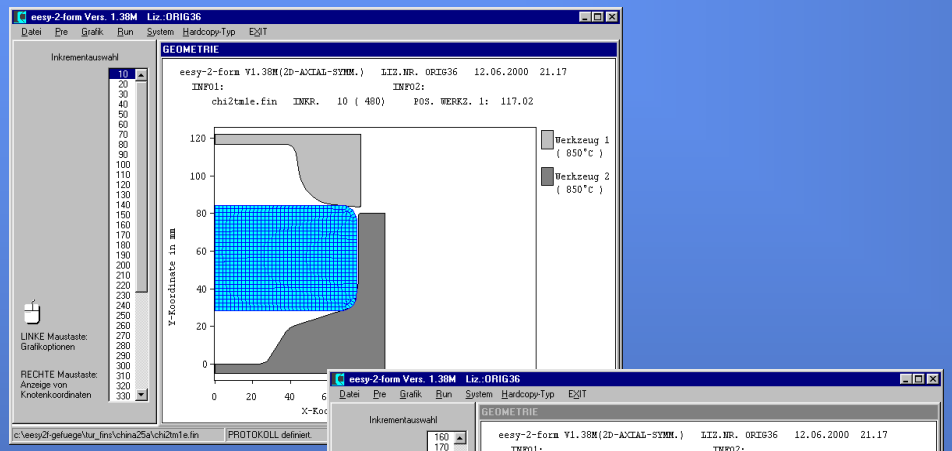
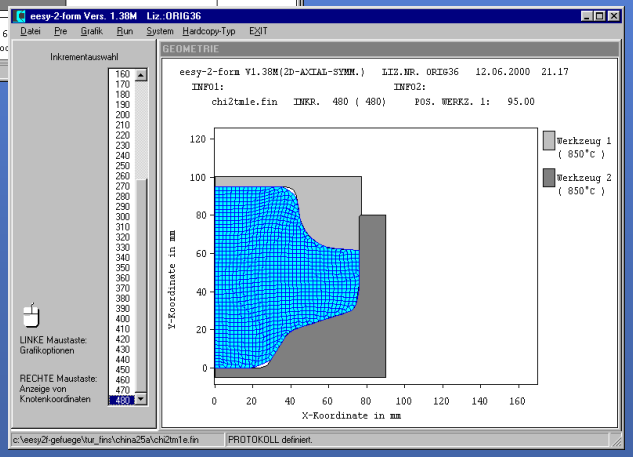
Some ideas about simulation.....

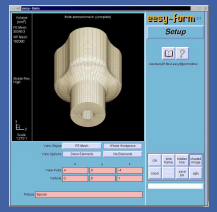




- Prediction of microstructure

Correct consideration of boundary conditions:

- Temperature
- Machine
- Material
- ……..



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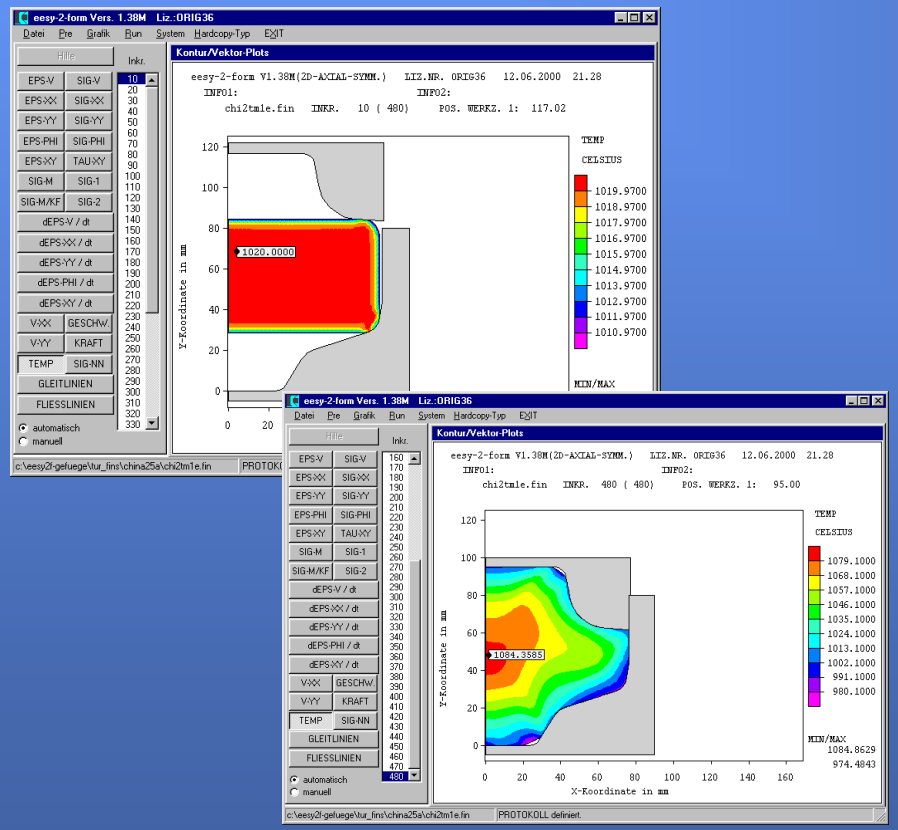
Some ideas about simulation.....



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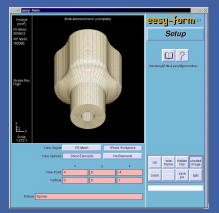

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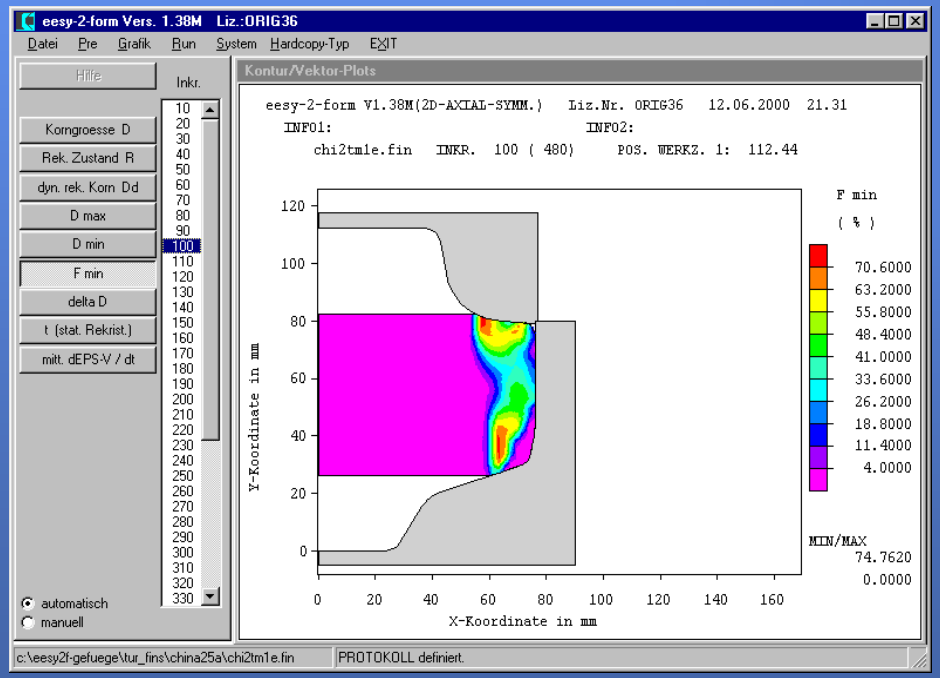
Some ideas about simulation.....



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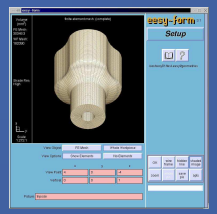

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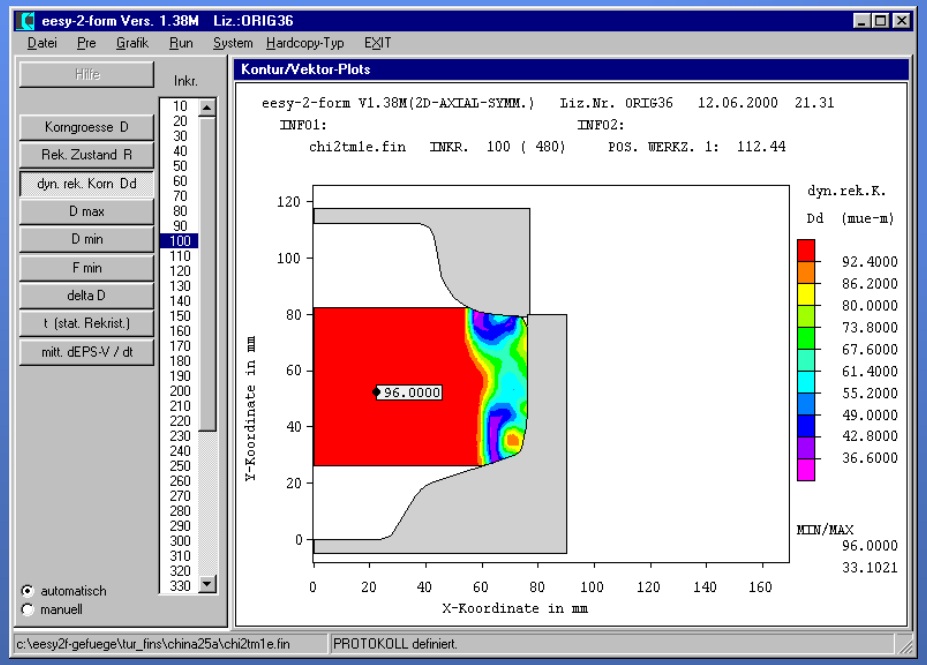

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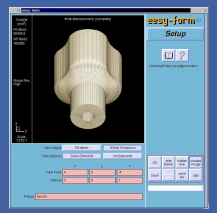

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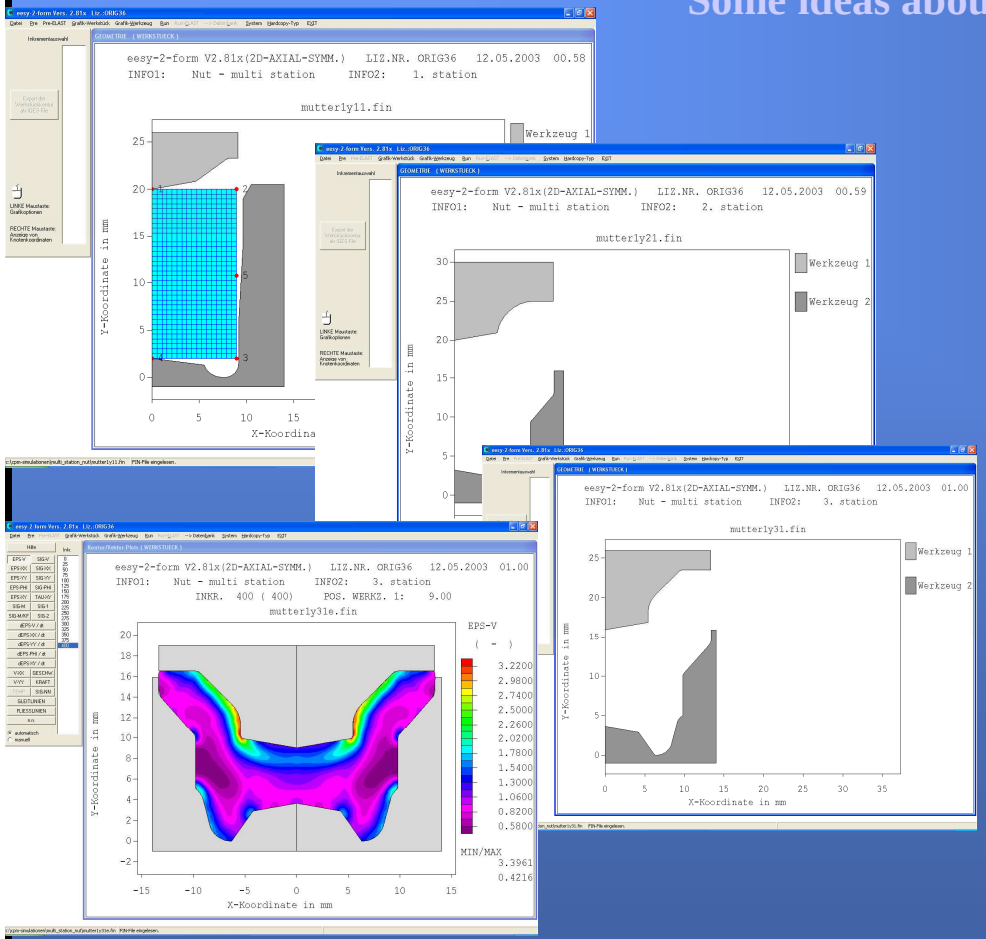
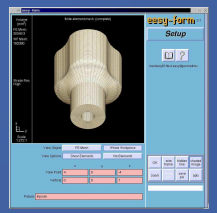
Some ideas about simulation.....



- 3D or 2D ? What is the right choice?

Production of a nut

Automatic simulation of the multi-station process



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Some ideas about simulation.....

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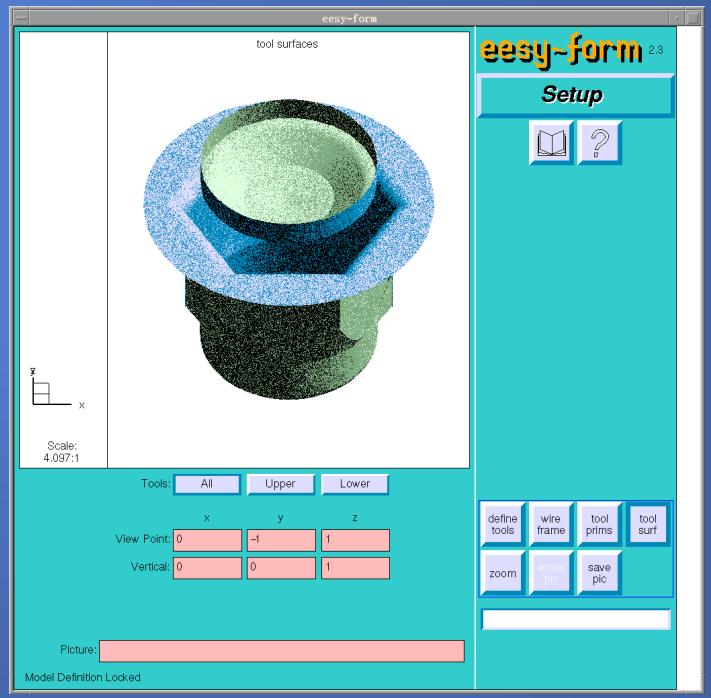
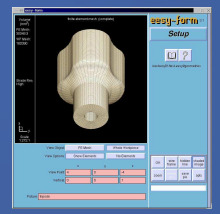
Production of a nut

Tooling model in 3D





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Some ideas about simulation.....

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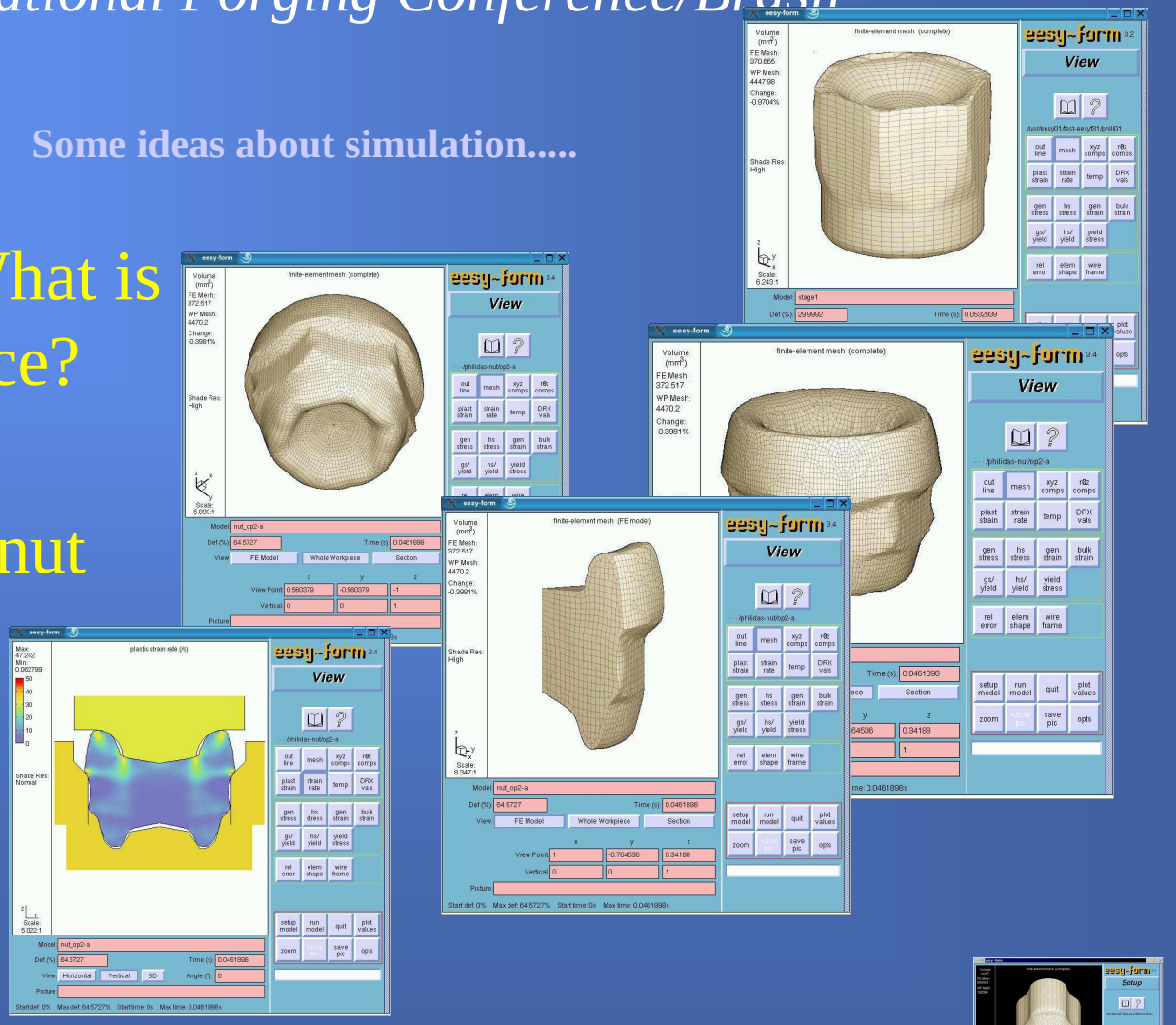
Simulation result 3D



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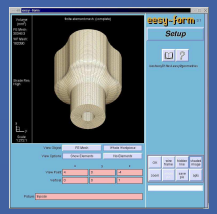

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Some ideas about simulation.....

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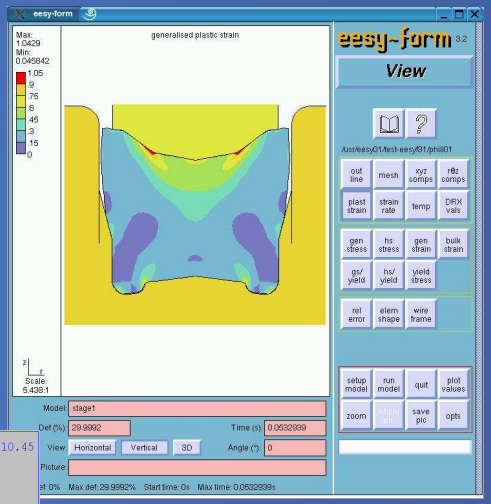
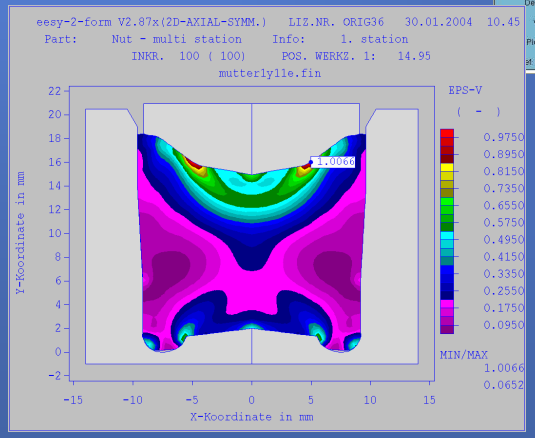
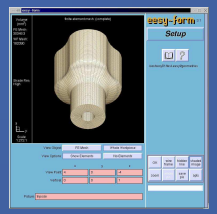
Production of a nut

Interpretation in cross sections

2D-3D







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Some ideas about simulation.....

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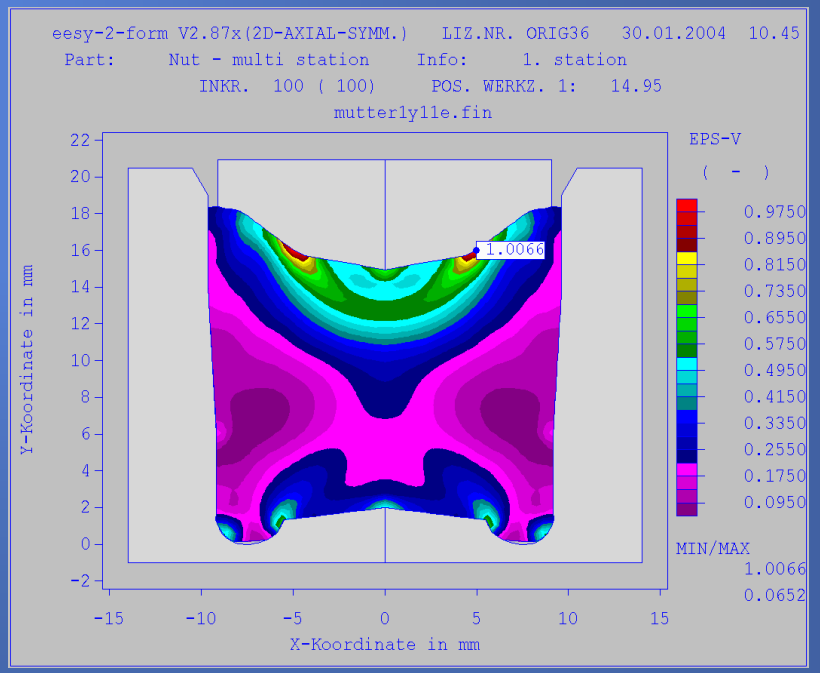
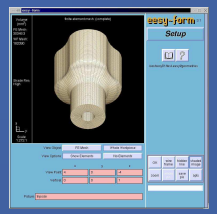
Production of a nut

2D Interpretation of strain





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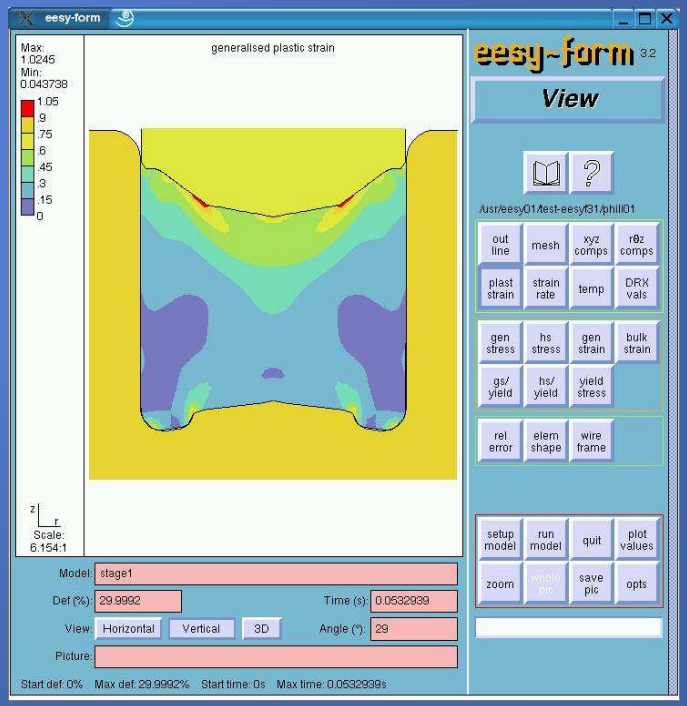
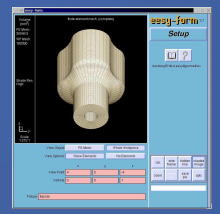
3D interpretation of strain in cross sections





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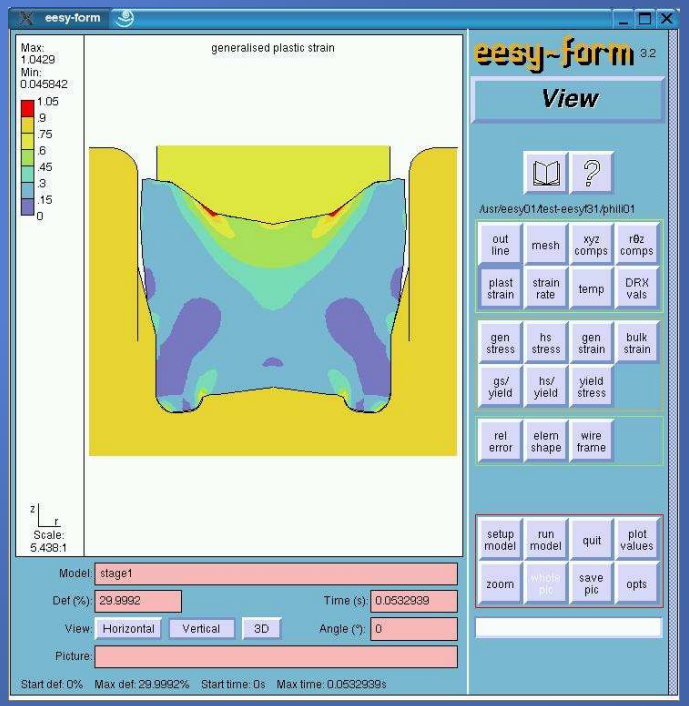

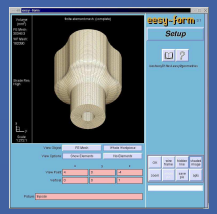

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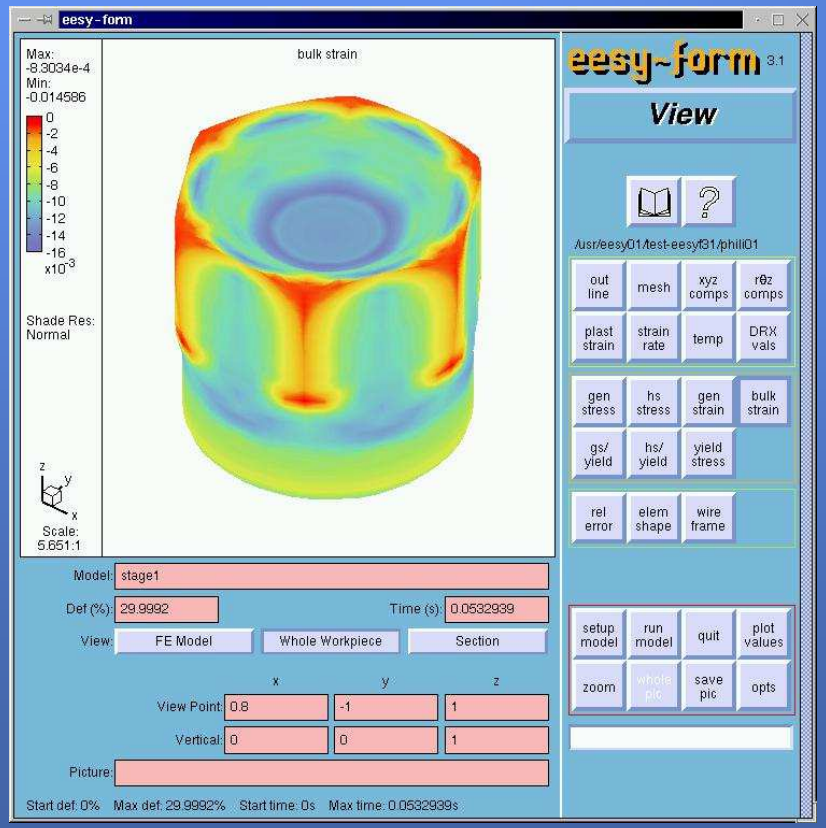

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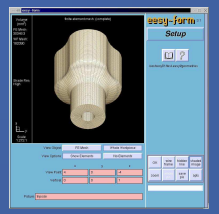
Production of a nut

3 D interpretation of strain on the surface



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Some ideas about simulation.....

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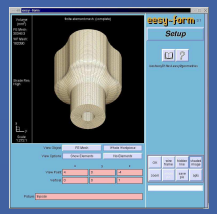
3 D geometry



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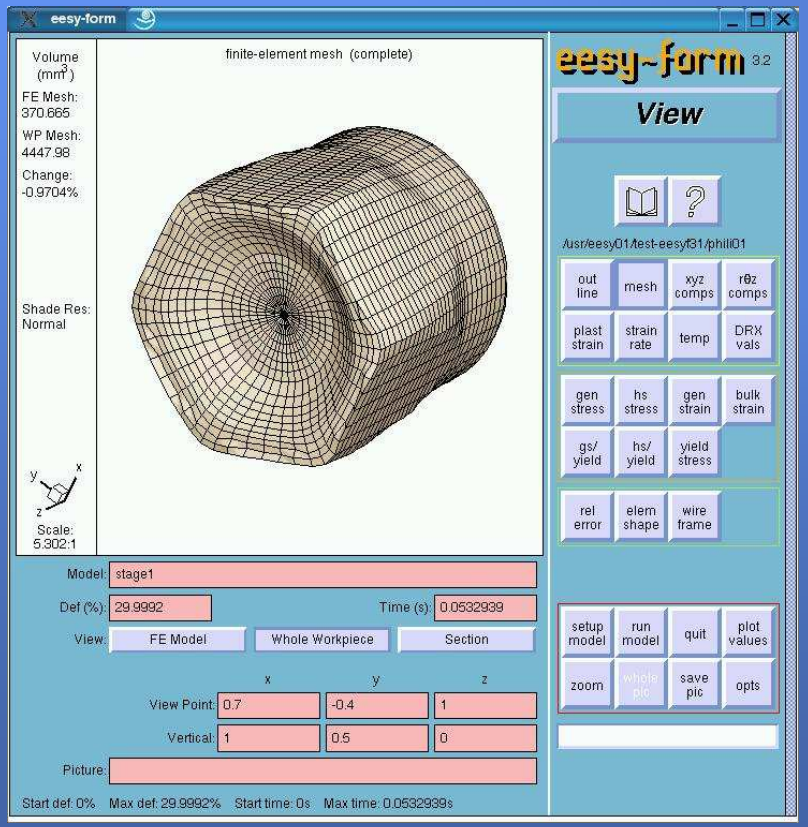

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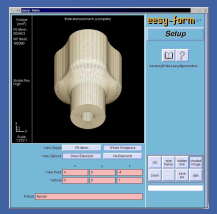
3 D geometry in simulation



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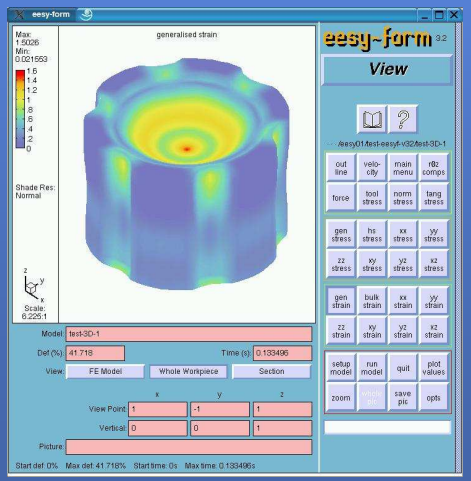
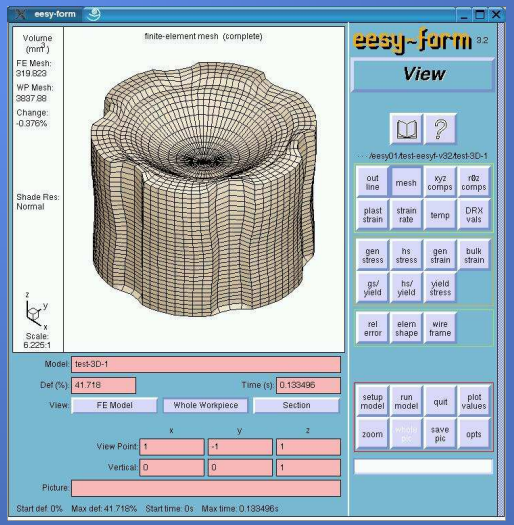
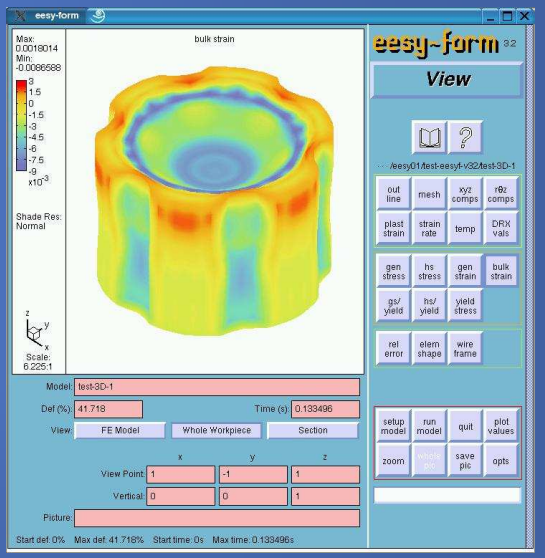
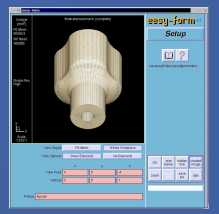
Some ideas about simulation.....

- further 3D applications









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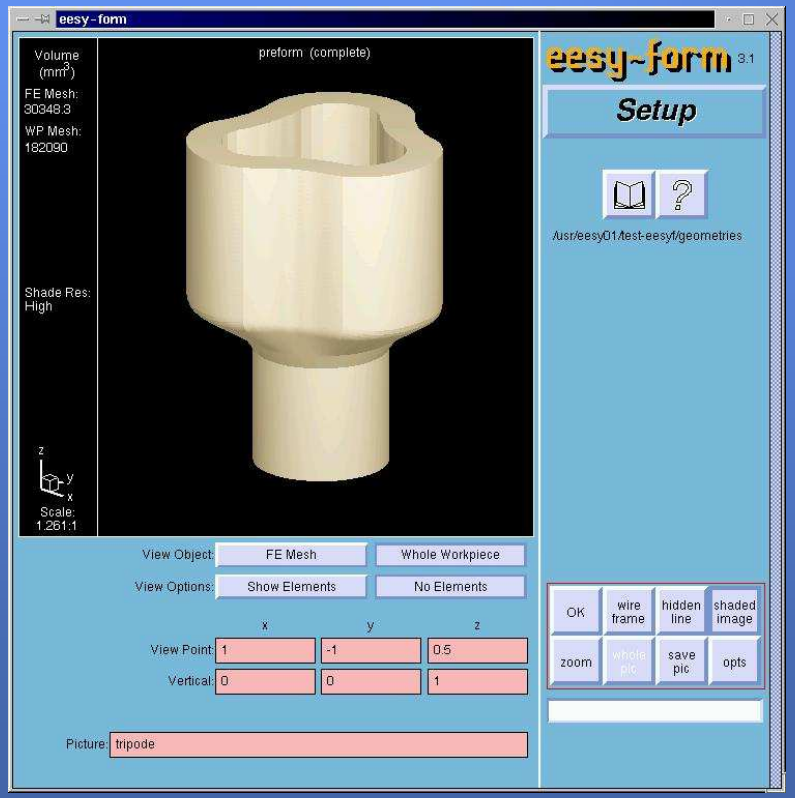

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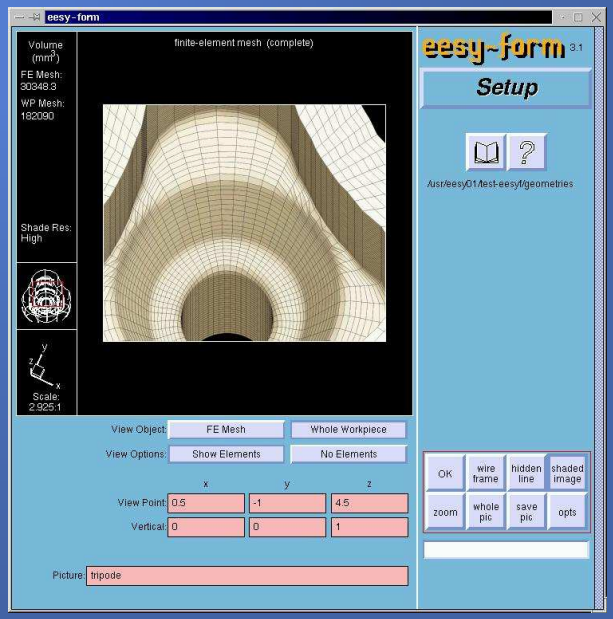

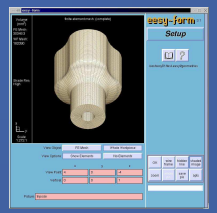

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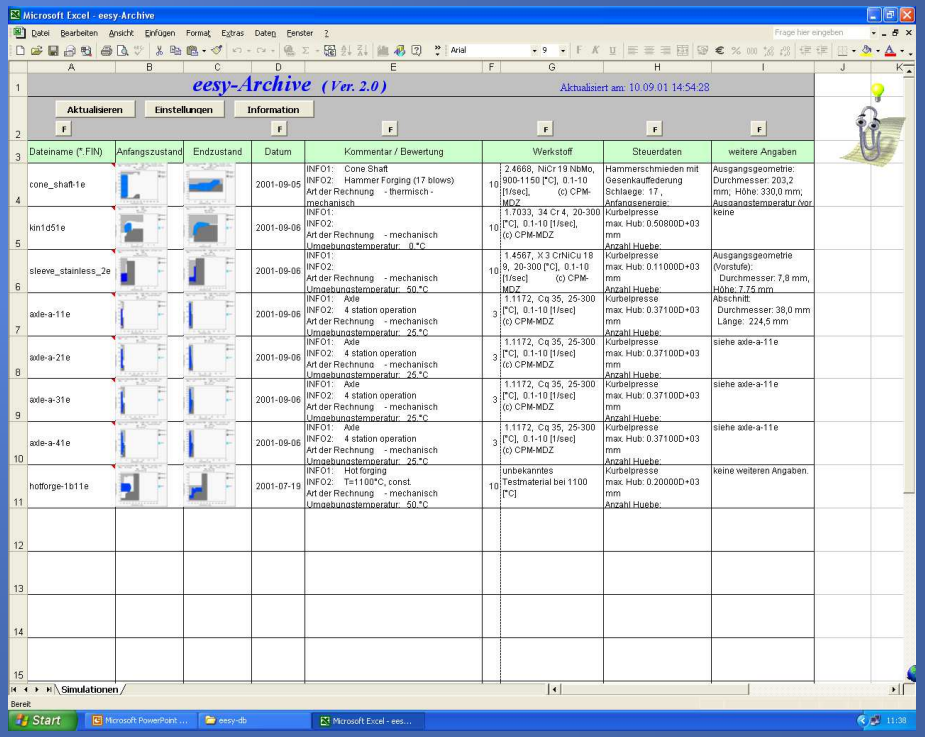
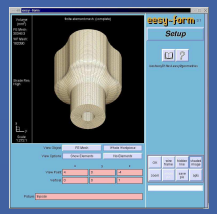
Some ideas about simulation.....

- Administration of data

EXCEL application
eesy-archiv





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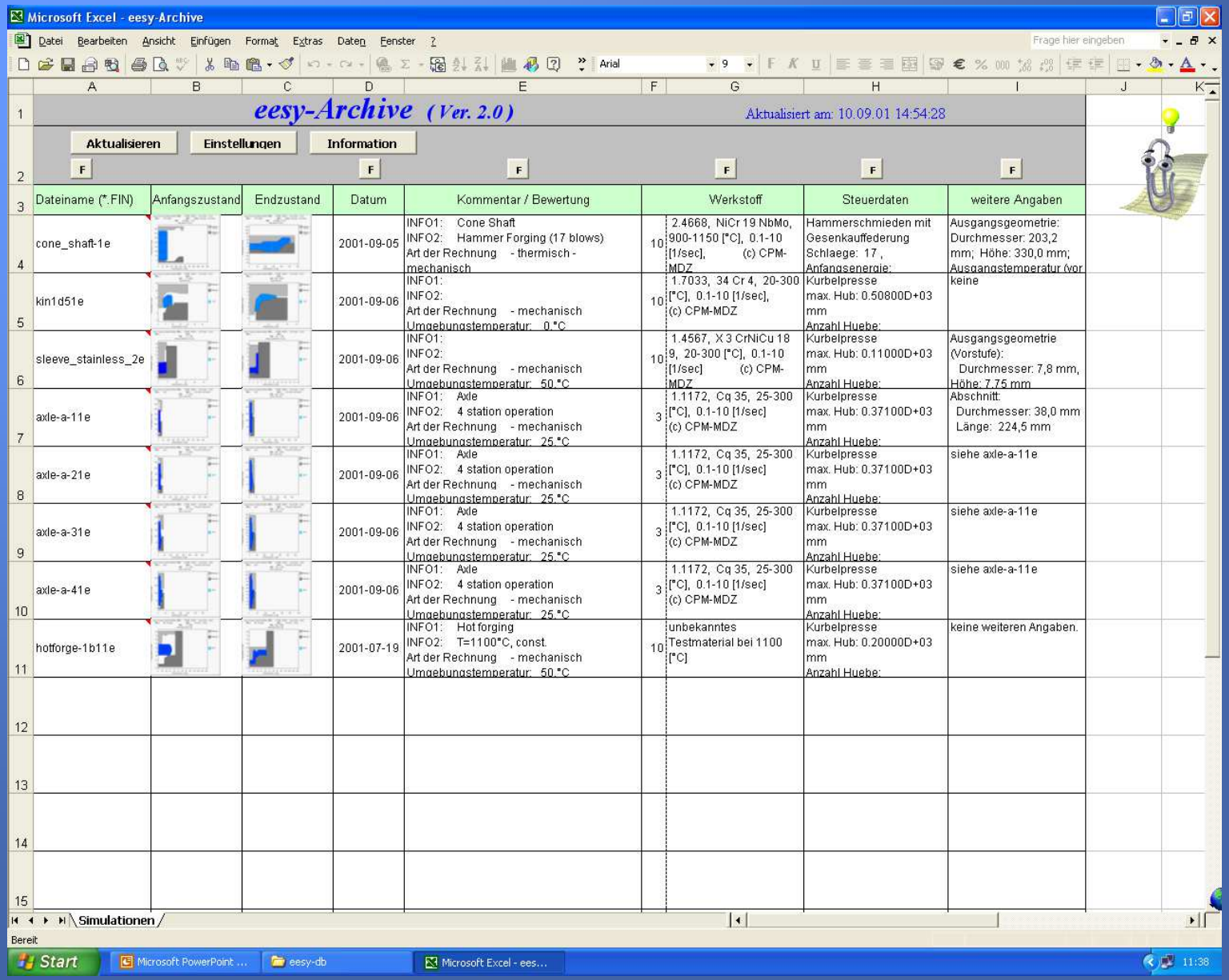

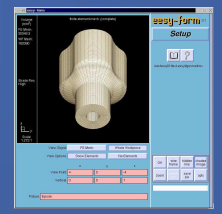

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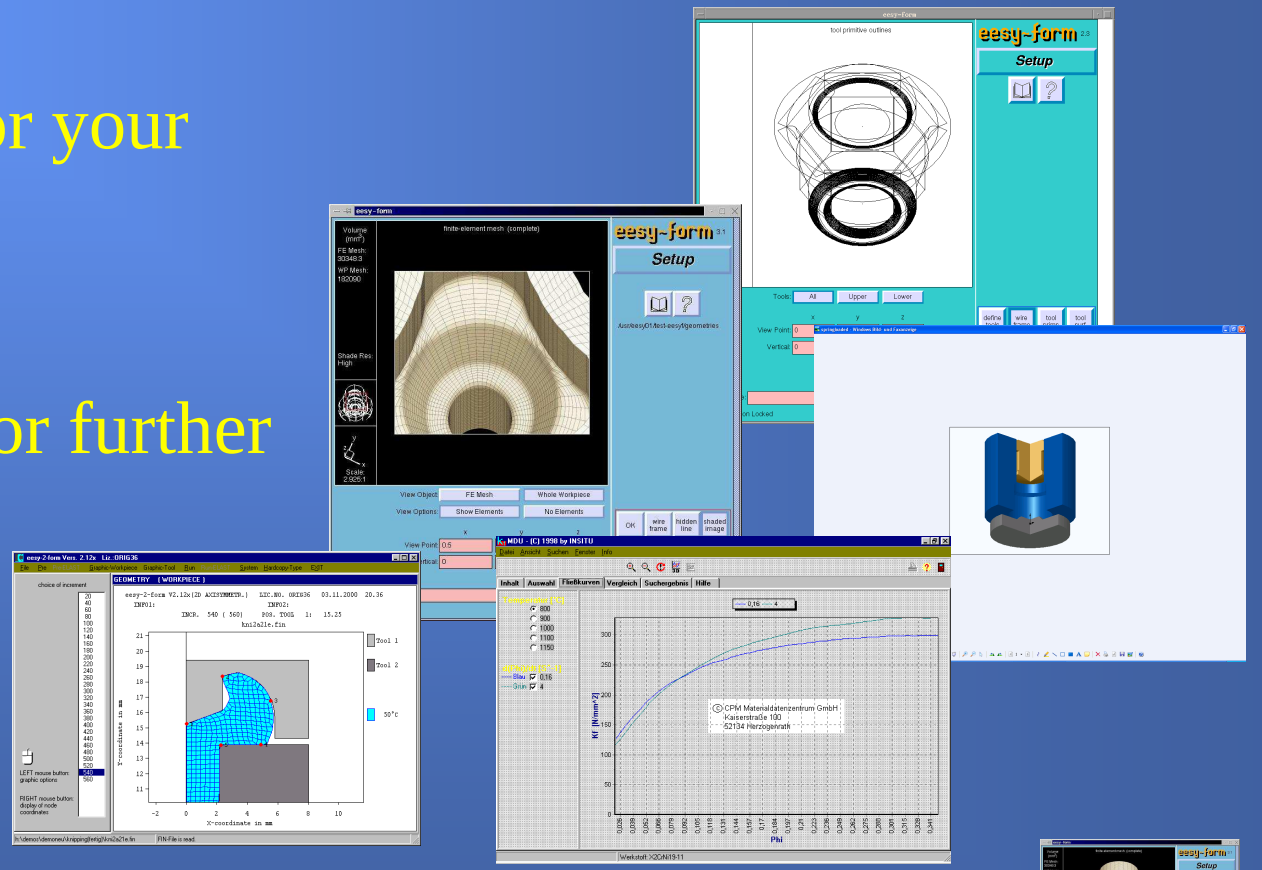
Some ideas about simulation.....

- Thank you for your interest

Pls contact us for further information



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