QForm Extrusion
Software for simulation of metal profile extrusion

What’s new in QForm 9

21 January 2020
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1. Users can now assign symmetry boundary conditions for symmetrical cases.
2. New fields.
3. New standard subroutines.
4. New technology analysis capabilities.
5. Additional initial data and capabilities of simulation.
6. Lua variables.
7. Switching from csv2d (2D plane) cooling task to 3D.
9. Database.
10. QShape for extrusion.
1. Users can now assign symmetry boundary conditions for symmetrical cases

2. New fields:

   2.1. Absolute profile velocity
2.2. Steady-state criterion

2.3. Seam length vector (billet-to-billet seam)
2.4. Contact pressure on workpiece and tool

![Diagram showing contact pressure on workpiece and tool](image)
2.5. Absolute tool displacement in the XY plane

3. New standard subroutines:

3.1. Advanced tool stress analysis
3.2. Profile filling

![Profile filling diagram]

3.3. Streaking lines analysis

![Streaking lines analysis diagram]
3.4. Displacement (length of the extruded profile tip)

4. New technology analysis capabilities:

4.1. Display of profile intersection with the tool in the mode «Show contact areas»
4.2. Notification in the log about profile penetration to a tool (relief, backer, bolster)

![Profile and tool intersection detected on record #N]

4.3. Specific pressure in the “Simulation state” tab and graphs for ram

![Simulation state table]

4.4. Coupled task status indication in the “Simulation state” tab

![Simulation state table]
4.5. Notification when circular bearing faces are detected

![Closed bearing face detected - it may lead to program crash]

4.6. Notification that no convergence has been achieved if the maximum number of iterations of the tool was exceeded

![Incomplete convergence at step #N]

5. Additional initial data and capabilities of simulation:

5.1. Velocity of the profile in m/min instead of mm/s

![Velocity of profile [m/min]]

5.2. Possibility to assign filling stage duration

![Filling duration [s]]

5.3. New accuracy mode for temperature calculation with the option of switching it off with a warning of low accuracy when it is turned off

![Temperature calculation]

5.4. Checkbox for calculation of thermal process in the “Operation” tab now operates with “Extrusion operation”
5.5. The user can choose to calculate strain at every step of the simulation task when the whole billet length is simulated.

5.6. Possibility of considering the effect of gravity on material flow in the XOY plane.

5.7. Several billets simulation:

<table>
<thead>
<tr>
<th>Billets count</th>
<th>Billet</th>
<th>Temp. [°C]</th>
<th>Taper [°C]</th>
<th>Ram velocity [mm/s]</th>
<th>Length [mm]</th>
<th>Pause [s]</th>
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<td>480</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

6. Lua variables:

6.1. `bearing_z` - z-coordinate of the bearing starting point.

6.2. `stream_id` - streams numbers.
6.3. `stream_border` - the border between streams.

6.4. `extr_pressure` - contact pressure on the workpiece.

6.5. `extr_pressure` - contact pressure on the tool.

7. Switching from csv2d (2D plane) cooling task to 3D

8. Microstructure simulation

9. Database:

9.1. Four new tool materials (TQ 1, QRO 90, Dievar, Inconel 718)

9.2. For H11 and H13 tool materials the limits of the dependence of the yield stress from the temperature have been extended

10. QShape for extrusion:

10.1. A new algorithm for detection of the preliminary profile by taking symmetry planes into account

10.2. Possibility to prepare models with symmetry planes for extrusion simulation

10.3. The bearing editor’s qstrip file and qshape templates now keep chokes and reliefs on the bearings

10.4. Algorithm of surface mesh adaptation of material flow domain and tool has been improved

10.5. Triangulation errors on the preliminary mesh generation stage now are saved in the Folder “Meshing problem faces” allowing for Undo to the previous step of geometry preparation

10.6. Automatic correction of possible geometry defects by clicking the “Correct” button is looped until there are no corrections left to make

10.7. Pointed faces which were corrected in the automatic mode are not subject to automatic re-correction after returning to triangulation