
QFORM
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QForm Extrusion

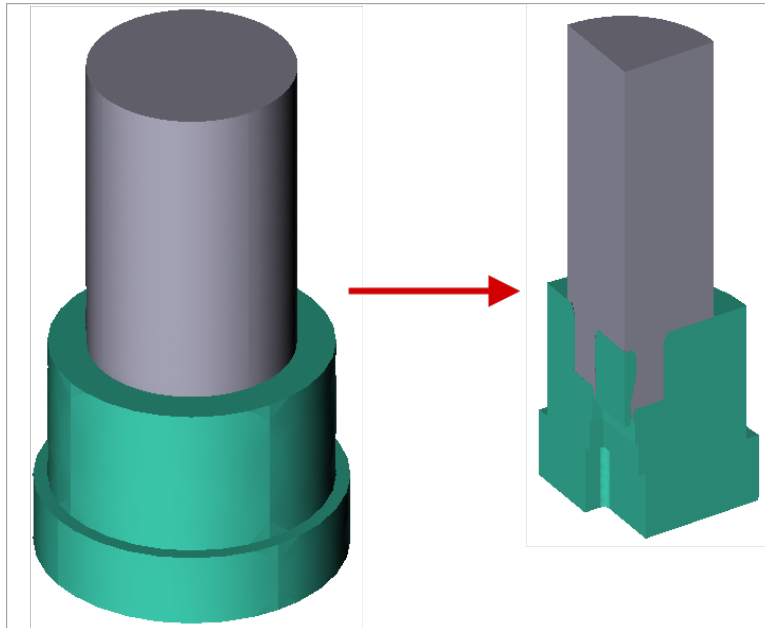
Software for simulation of metal profile extrusion

What's new in QForm 9

What's new in QForm Extrusion 9

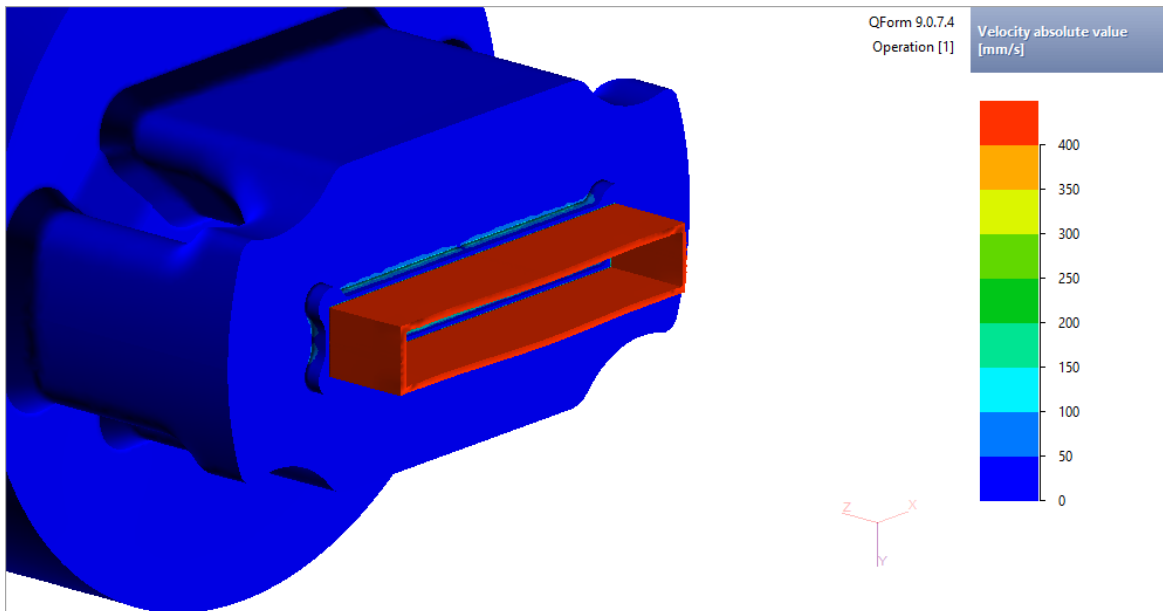
1. Users can now assign symmetry boundary conditions for symmetrical cases^[3]
2. New fields^[3]
3. New standard subroutines^[6]
4. New technology analysis capabilities^[8]
5. Additional initial data and capabilities of simulation^[10]
6. Lua variables^[11]
7. Switching from csv2d (2D plane) cooling task to 3D^[12]
8. Microstructure simulation^[12]
9. Database^[12]
10. QShape for extrusion^[12]

1. Users can now assign symmetry boundary conditions for symmetrical cases

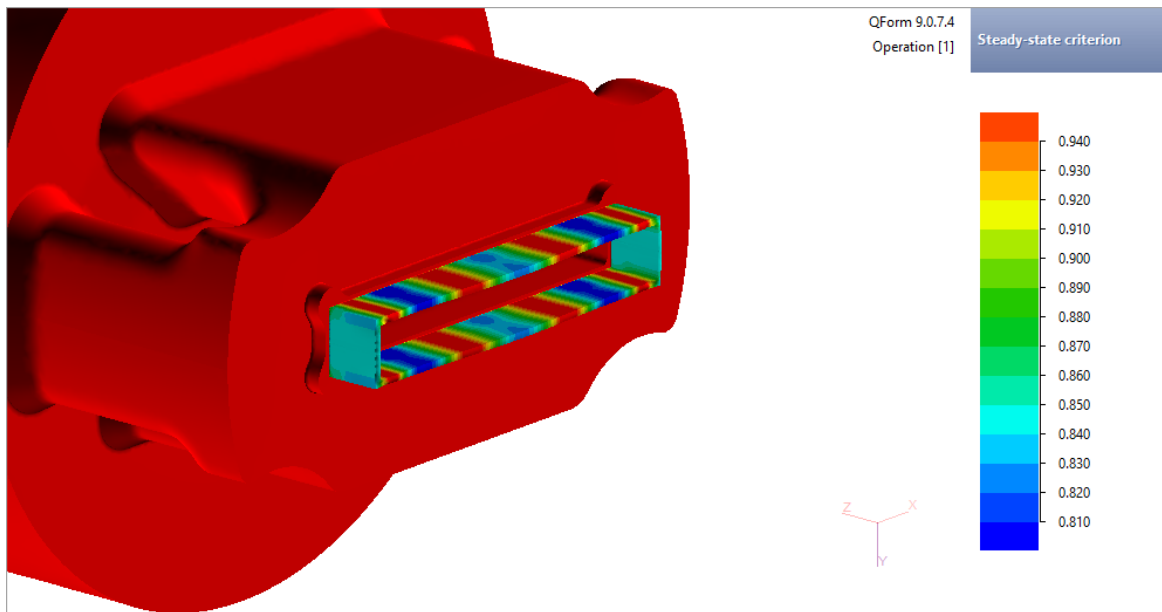


2. New fields:

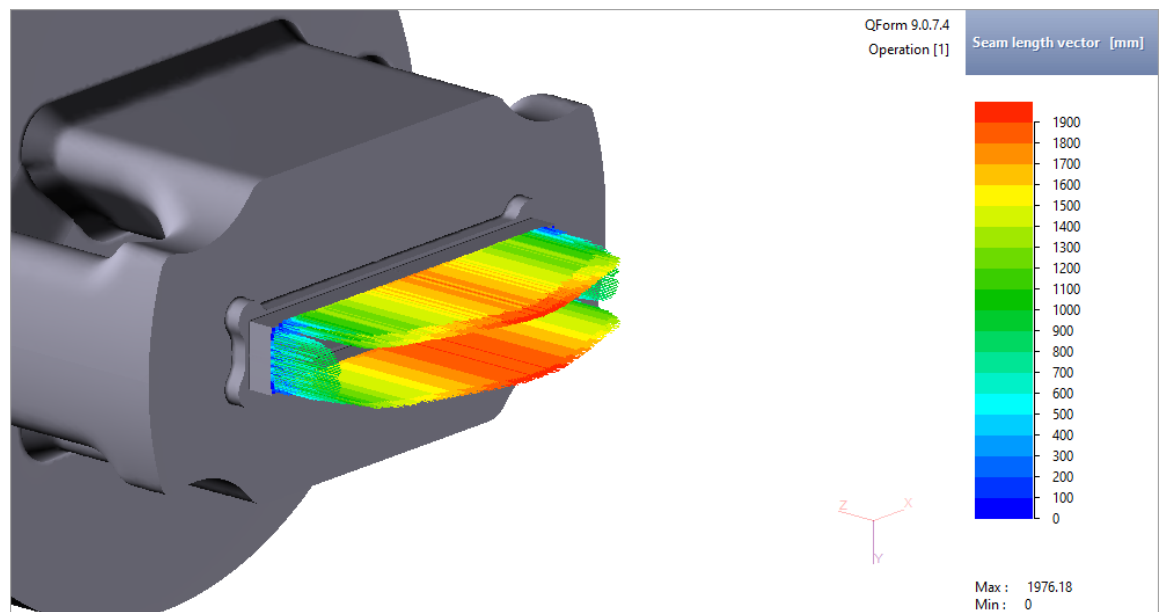
2.1. Absolute profile velocity

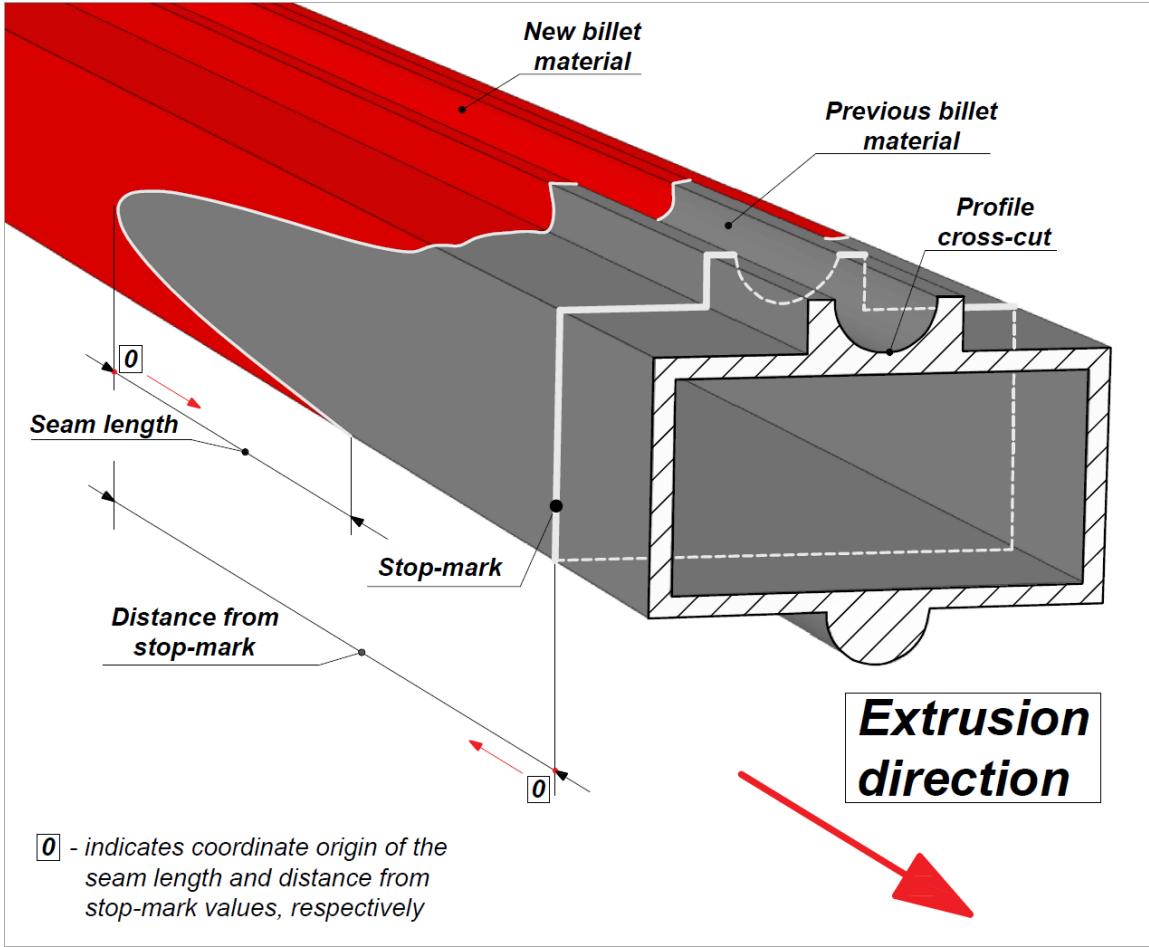


2.2. Steady-state criterion

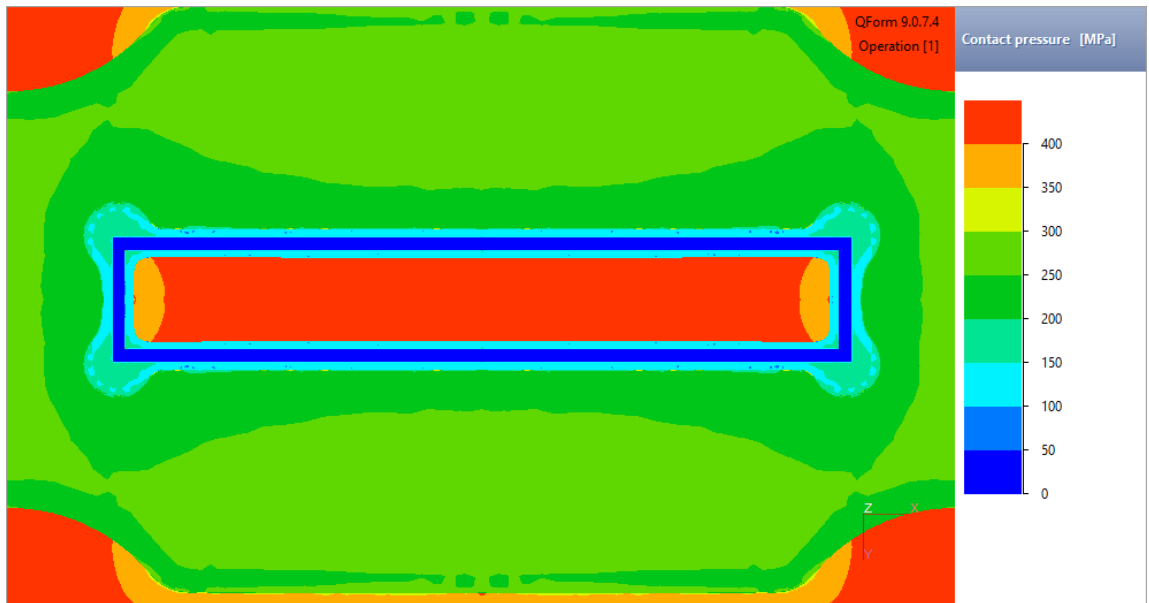


2.3. Seam length vector (billet-to-billet seam)

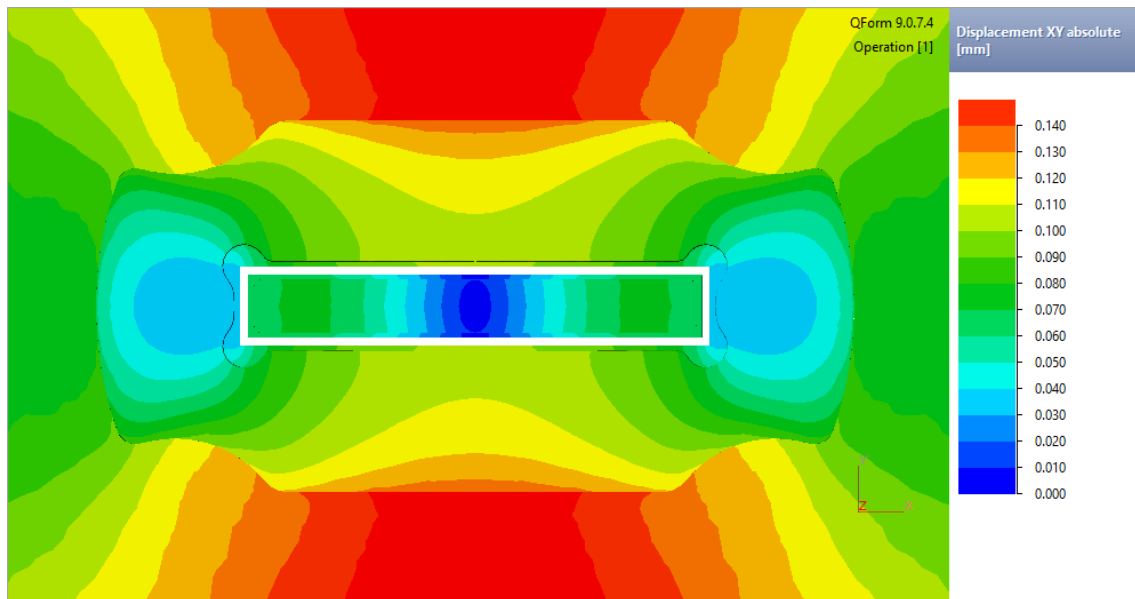




2.4. Contact pressure on workpiece and tool

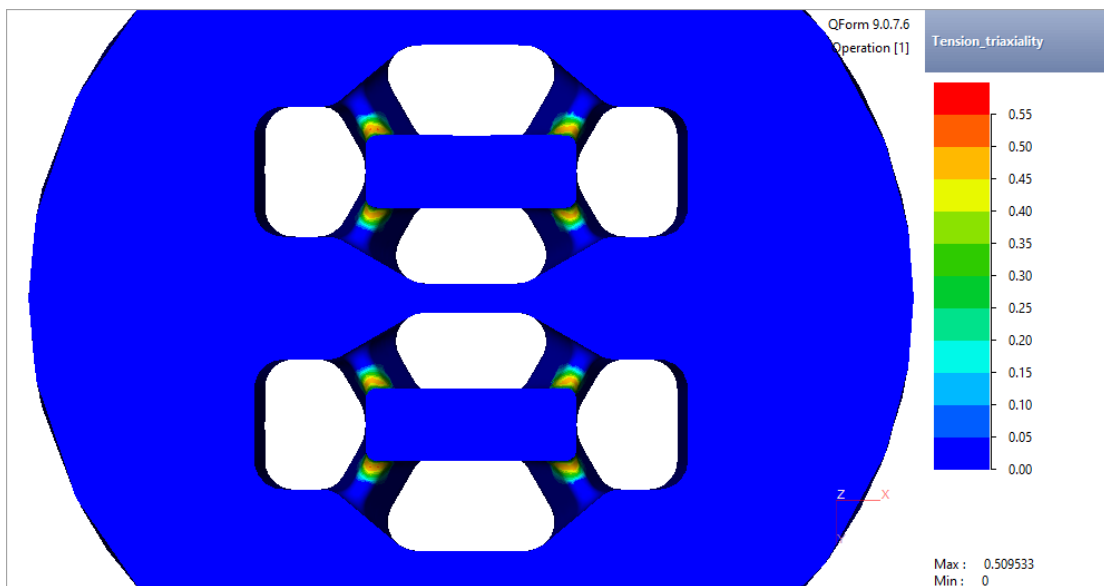


2.5. Absolute tool displacement in the XY plane

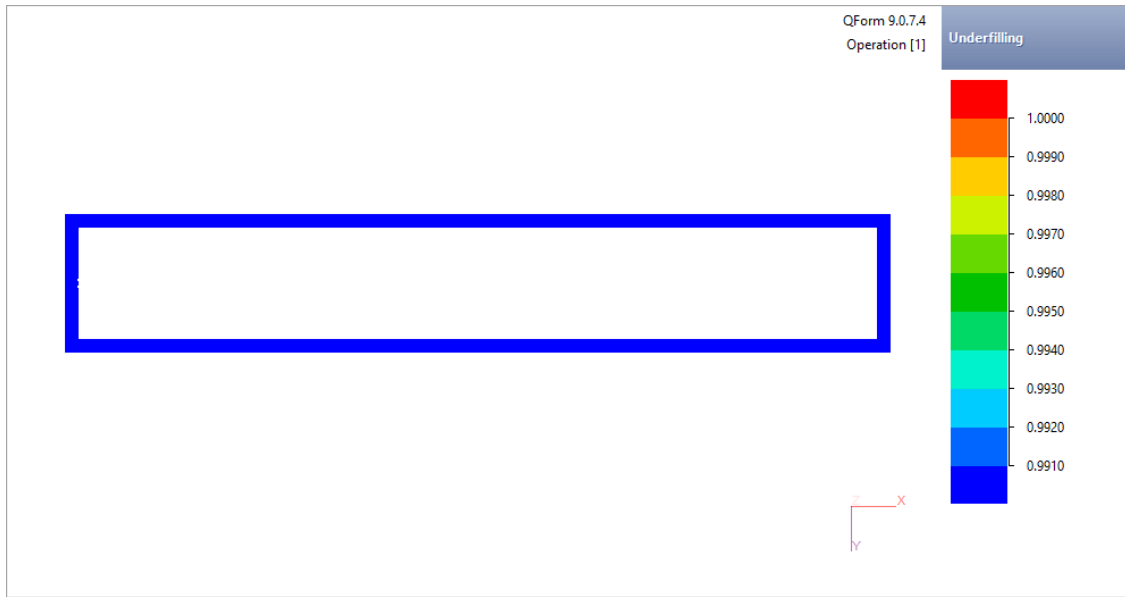


3. New standard subroutines:

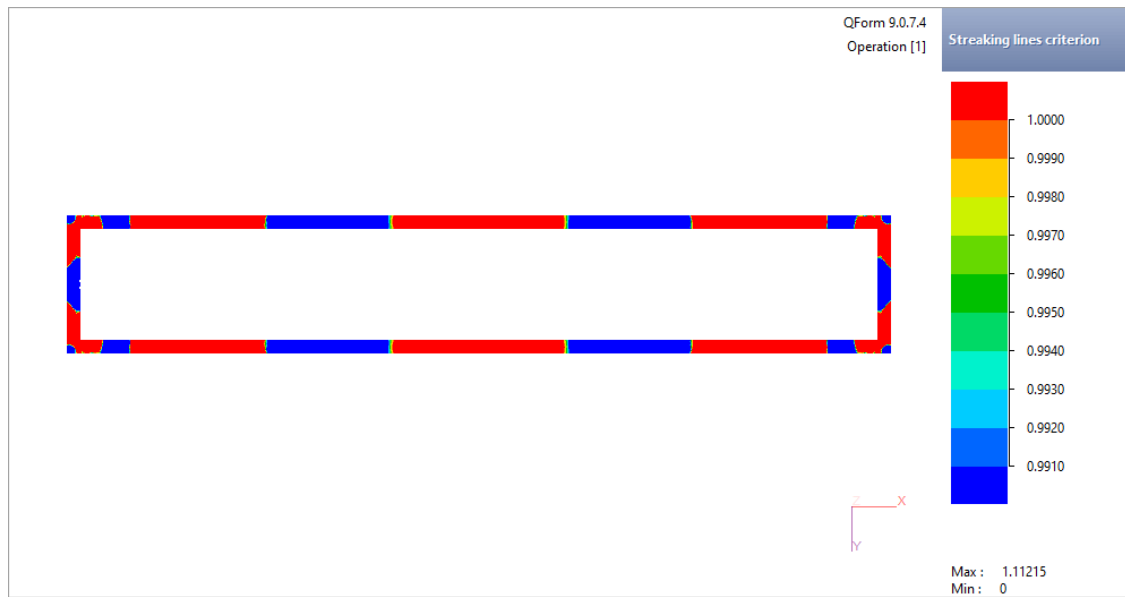
3.1. Advanced tool stress analysis



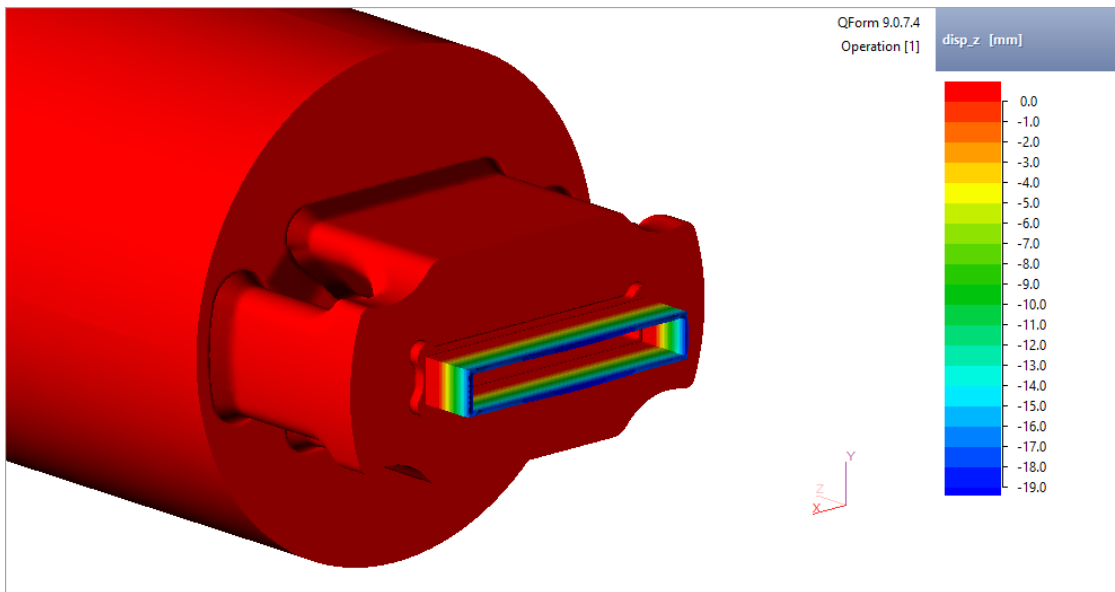
3.2. Profile filling



3.3. Streaking lines analysis

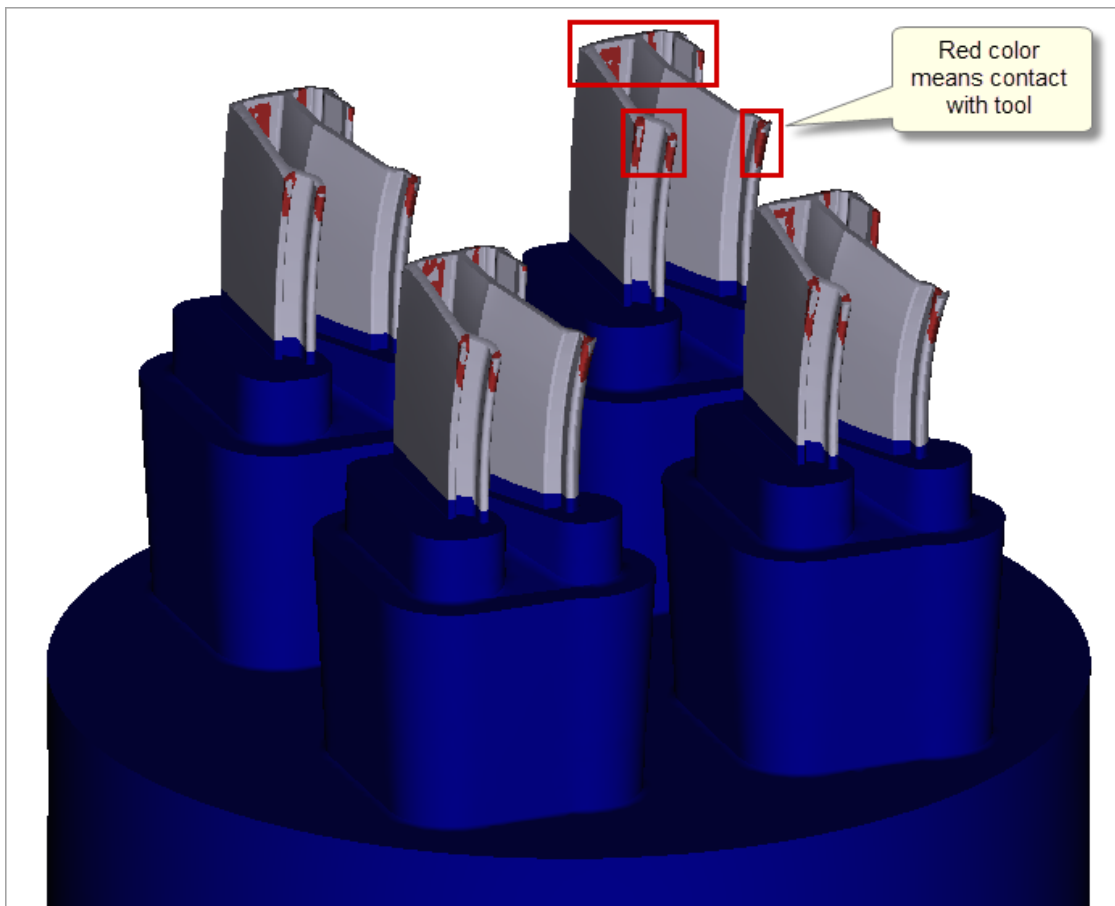


3.4. Displacement (length of the extruded profile tip)

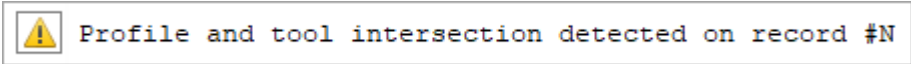


4. New technology analysis capabilities:

4.1. Display of profile intersection with the tool in the mode «Show contact areas»

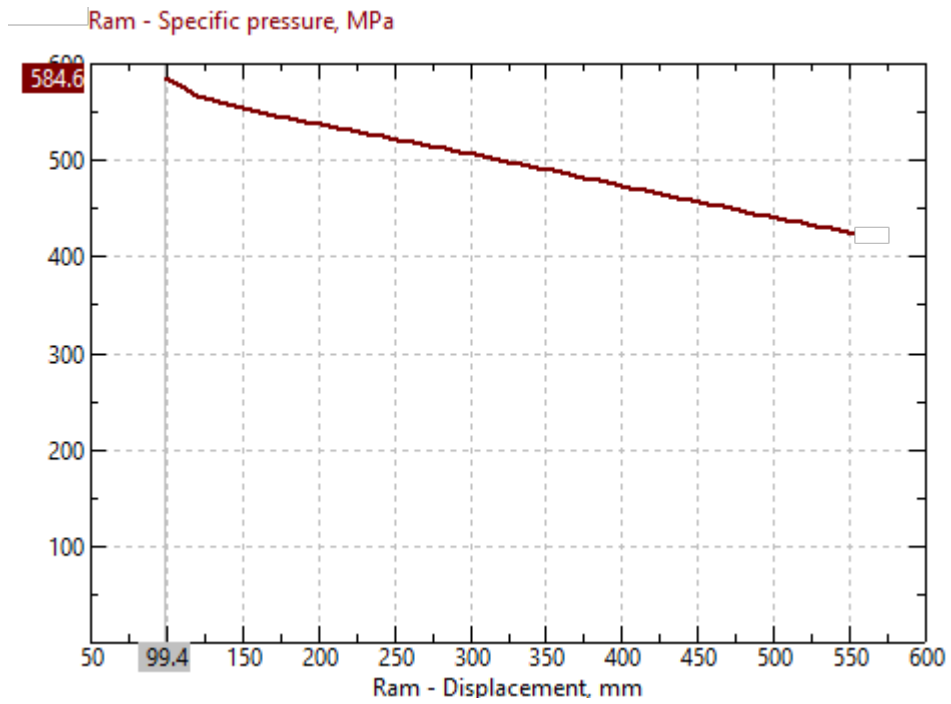


4.2. Notification in the log about profile penetration to a tool (relief, backer, bolster)



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


Simulation state	
[-] Process parameters	
Extrusion ratio	15.9651
Container diameter [mm]	120
Filling time [s]	28.8592
Extrusion load [MN]	5.43443
Specific pressure [MPa]	480.519
Coupled task status	Calculated
Total simulation time	1 hr 6 min 15 s




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

Simulation state	
[-] Process parameters	
Extrusion ratio	78.8884
Container diameter [mm]	
Filling time [s]	0.826942
Extrusion load [MN]	3.81524
Specific pressure [MPa]	485.044
Coupled task status	Calculated

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:

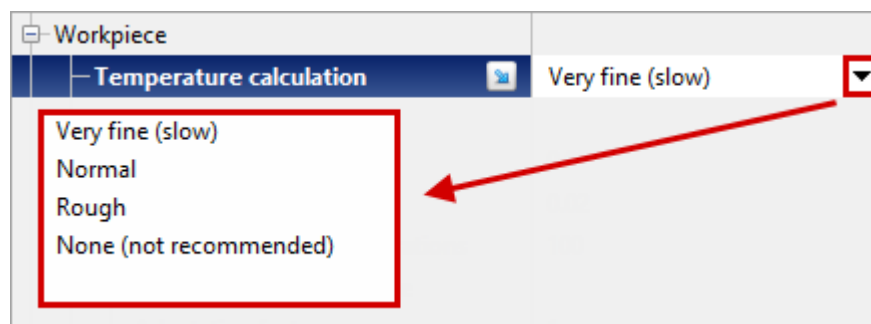
5.1. Velocity of the profile in m/min instead of mm/s

Process	
<input type="radio"/> Velocity of ram [mm/s]	6.6
<input checked="" type="radio"/> Velocity of profile [m/min]	27.3
Indirect extrusion	<input type="checkbox"/>

5.2. Possibility to assign filling stage duration

Filling stage	
<input type="radio"/> Equal to main stage	
<input type="radio"/> Ram velocity [mm/s]	
<input checked="" type="radio"/> Filling duration [s]	 35

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



5.4. Checkbox for calculation of thermal process in the “Operation” tab now operates with “Extrusion operation”

Additional parameters
 With thermal process

5.5. The user can choose to calculate strain at every step of the simulation task when the whole billet length is simulated

Mesh adaptation in workpiece	
Adaptation factor	1
Acceleration coefficient	1.4
Weight consideration	<input type="checkbox"/>
<u>Recalculate strain at every step</u>	<input type="checkbox"/>

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

Mesh adaptation in workpiece	
Adaptation factor	1
Acceleration coefficient	1.4
<u>Weight consideration</u>	<input type="checkbox"/>
Recalculate strain at every step	<input type="checkbox"/>

5.7. Several billets simulation

Project	Import table of billets Export table of billets					
	Billets					
Operation	Billets count <input type="text" value="3"/> - +					
	Billet	Temp. [°C]	Taper [°C]	Ram velocity [mm/s]	Length [mm]	Pause [s]
Geometry	*		0			
	1	490	0	2	400	0
	2	485	0	2	410	10
	3	480	0	0	0	0
Extrusion						
Boundary conditions						
Billets						

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:

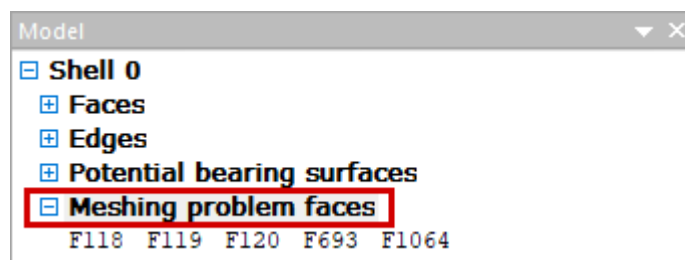
10.1. A new algorithm for detection of the preliminary profile by taking symmetry planes into account

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