# New options and features of QForm VX (8.1.2)

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## Interface

1. A new structure for the simulation project has been developed. Now there are 3 elements in it: process, chain and operation. This new structure has many advantages:
   1.1. Convenient navigation when modifying the initial source data and results view in different operations (operation chains).
   1.2. Batch mode is available for specific chains of operations.
   1.3. More convenient tracking of lines and points.
   1.4. A single process or a single chain of operations in a complex chain can be saved in a stand-alone file.
   1.5. More convenient renaming of operations and processes.
   1.6. More convenient recording animations of simulation results.
   1.7. The chain can be set as an active and then simulated from the first operation.
2. Add or delete an intermediate operation in a chain.
3. Copying of all initial data from the previous operation to a new one.
4. More convenient switching between simulated blows when multi-blow operation is simulated.
5. Mode of changing the light source position has been added.
6. Possibility to measure distance between workpiece and tool as well as between different tools has been added.
7. Several measurements can be set and hidden.
8. New possibilities of graph window:
   8.1. Creating of a several graphs with different tabs.
   8.2. Possibility to select custom range of the argument.
   8.3. It is possible to change units from MN to kN and tons-force for a specific graph.
9. Japanese, Portuguese and Spanish interface languages have been added.
10. A new interface for setting boundary conditions.
11. Total simulation time parameter has been added to **Simulation state** tab.
12. New diagnostic messages have been added for better control of source data.
13. Extended validation of initial data before running the simulation.
14. When the same QForm project is opened in different windows a warning message appears.
15. Several modes for saving an operation to a stand-alone file have been added: save results only for the current record, results from the current record to the end of the simulation, results up to the current record.
16. Exporting of the fields in tracking points.
17. Unused simulation parameters can be hidden if they are not needed.
18. When images and videos are saved the name of the active field is added to the video or image name for clarity.
19. Maximum and minimum values of arguments are saved when flow stress data is set as a function in material database.
20. Inner planes are hidden when symmetry object is shown as a full.

21. Improved zooming by frame.
22. The computer can be shut down when the batch simulation is finished.
23. The project directory can be opened in the Explorer by F12 button.
24. The velocity vectors are not shown on the hidden part of the billet when using crosscut mode.
25. The FE mesh can be exported to the file together with the calculated fields (the temperature, strain, density) and then imported back to the program.

## New Simulation possibilities

1. One more advanced coupled elastic-plastic model of workpiece and tool deformation has been realized.
2. New object "Pusher" has been added for simulation of a rolling processes.
3. Improved forging manipulator model.
4. Friction factor can be set as a function of time or temperature.
5. Melting temperature has been deleted from material data.
6. One more Henzel-Spittel flow stress data formula with 9 coefficients has been added
7. Functionality of dual mesh method have been expanded:
   7.1 Tracking of points and lines has been added.
   7.2 Possibility to use flow stress curves programmed as a LUA function in the simulations where dual mesh is used.
   7.3 More flexible control of geometric and simulation meshes has been added.
8. Elastic-plastic deformation model has been improved. Elastic unloading simulation can be done immediately after the deformation operation or before the next operation.
9. FE mesh adaptation parameters control has been extended:
   9.1 The adaptation box in the billet can follow the tool motion.
   9.2 Possibility to choose a specific tool or workpiece to which the box is to be assigned.
   9.3 Minimum adaptation parameter has been added.
10. New standard subroutine "Displacement" has been added to be used in deformed workpiece.
11. New module for electric upsetting simulation.
12. Improved model for spring loaded tools simulation.
13. When the workpiece is inherited from thermo-elastic-plastic simulation operation, the displacement of the nodes is added to their coordinates to get the deformed shape.
14. All fields are available in tracked points, including heat treatment simulation fields.
15. The User's defined subroutines can be tracked through the whole chain.
16. Post-processor User's defined subroutines can be run during the simulation.
17. There is the option to stop the simulation in case on non-convergence.
18. LUA coding facilities have been extended.

### Geometry preparation

1. Implemented the ability to import layers from dxf-file directly to QForm for 2D-simulation: in a CAD-system the workpiece, tools and clipping surfaces can be defined by the respective layer names.
2. Implemented the import of dxf-files with so-called "blocks".
3. The geometry import facilities in QShape have been improved.

## Simulation of rings and wheels rolling

1. Implemented the ability to take into account the dependence of the mandrel speed on the load on it.
2. Added the ability to set dependence of horizontal displacement of axial rolls on the diameter of the ring.
3. Implemented automatic mesh generation in the simulation of "closed" ring rolling when the mandrel is inside the main roll.
4. Implemented tracking flow lines and points.
5. Implemented rolling simulation in which the mandrel rotates eccentrically around the main roll.
6. Significantly improved methods for simulation of the rolling processes.
7. The model for simulation of wheel rolling was developed.

## Extrusion profiles simulation

QForm Extrusion module is implemented within a single interface of QForm VX. The following features have been implemented in the simulation of extrusion:

1. Coupled simulation of the material flow and die deformation.
2. Simulation of the full length of the billet extrusion.
3. Specific interface for the extrusion simulation.
4. Tracking points through the container to the extruded profile.
5. Simulation of longitudinal welding seams.
6. Simulation of transverse welding seams.
7. Calculation of user subroutines in the tracked points.
8. Velocity gradients tensor was added to the parameters of user defined subroutines.
9. The palettes of the temperature and Z-velocity fields scales can be toggled.
10. Improved model for simulation of the temperature in the die. The temperature is calculated at every step of the tool simulation.
11. No SHL format for extrusion anymore. Now only QSHAPE format is used for geometry import.
12. Improved mesh density control in the volume.
13. Interface for setting of the die holder, bolster, case and pressure ring temperatures.
14. Simple interface for indirect extrusion simulation.
15. An option to specify the upset velocity has been added.
16. New graph for transversal seam weld propagation analysis, i.e the new material share versus the distance from the stop-mark.