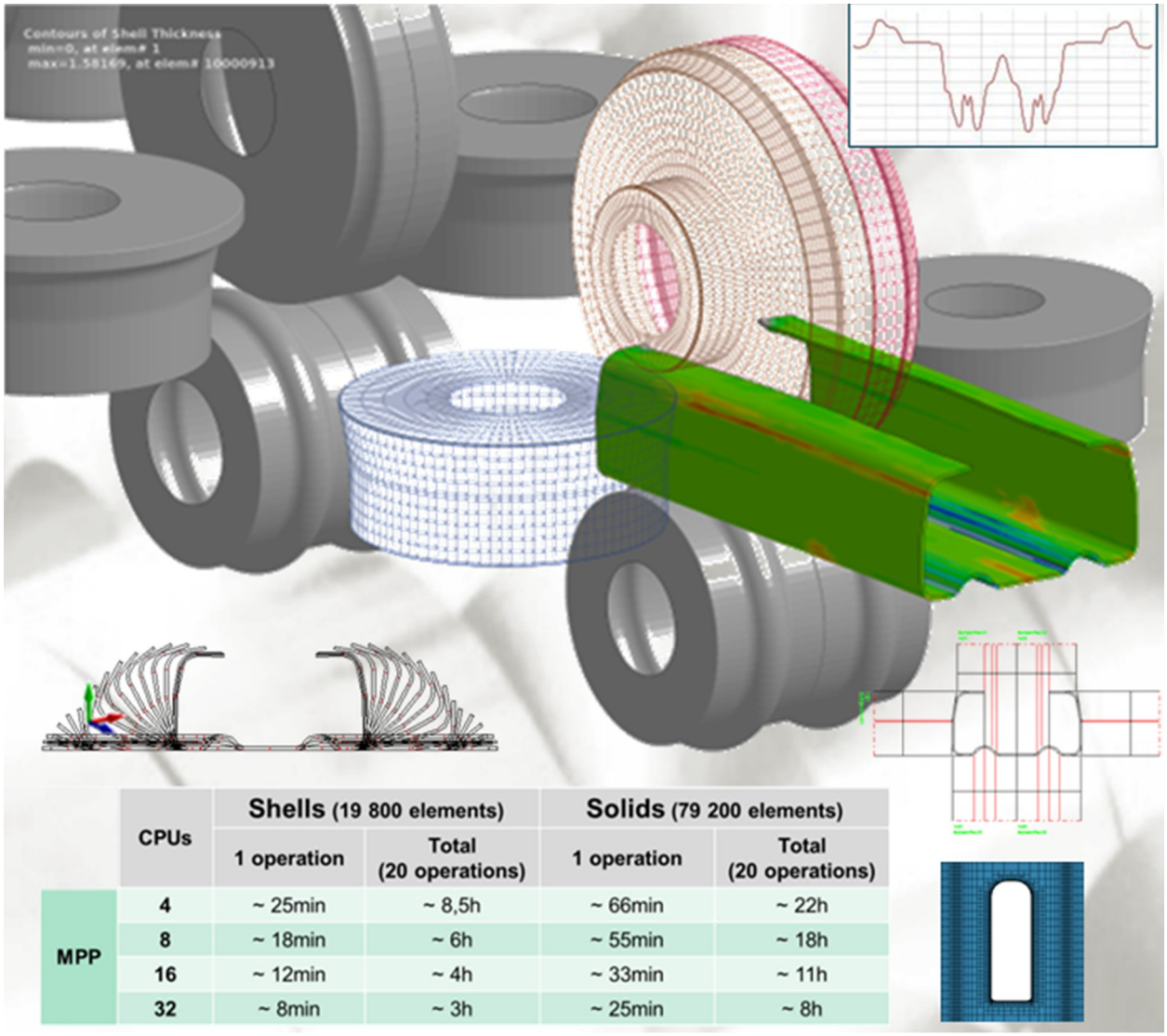


	CPUs	Shells (19 800 elements)		Solids (79 200 elements)	
		1 operation	Total (20 operations)	1 operation	Total (20 operations)
MPP	4	~ 25min	~ 8,5h	~ 66min	~ 22h
	8	~ 18min	~ 6h	~ 55min	~ 18h
	16	~ 12min	~ 4h	~ 33min	~ 11h
	32	~ 8min	~ 3h	~ 25min	~ 8h

The FEA (Finite Element Analysis) simulation needs amazing short computation time if the proper measures are taken

What's New? – Rel. 5. 5

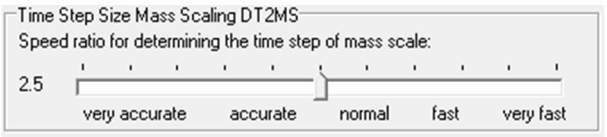
Roll forming simulation with LS-DYNA

The FEA (Finite Element Analysis) simulation of the roll forming process needs amazing short computation time if the proper simulation model (shell or solid) is selected, the proper CPU count is available, and the FEA system is parameterized optimally. The roll forming experts of **UBECO** succeeded in close collaboration with the FEA specialists of **DYNAmore** to optimize the system in order to get short computation time and stable operation.

As an example a bumper profile was used for comparison: The profile was roll formed on a 20 stands roll forming machine by pure bending. Because no massive forming occurs, shell as element model is the number one choice. The table shows the result: Dependent on the count of CPU's (4, 8, 16, or 32) total computation times between 8.5 and 3 hours are achieved. For comparison: If solids are taken as element model and 4 elements are chosen in sheet thickness direction, the total computation time takes between 22 and 8 hours.

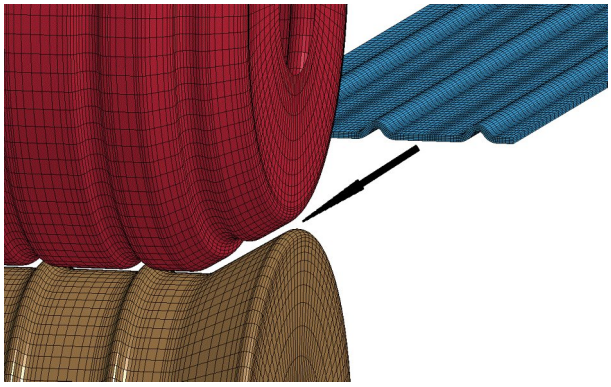
Compared with the past, today's times are amazing short. Now it is possible to modify a roll tool set several times, to repeat the FEA simulation by using the time-saving restart at the modified stand, and to optimize the result. Thus the roll tool designer gets the roll tools set that produces the proper profile with the required allowances.

Time Step Size Mass Scaling



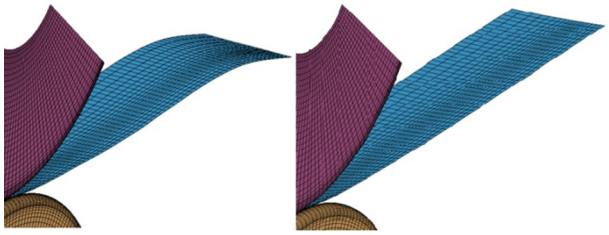
The best time step size is dependent on the used material and the smallest element size and has great influence on robustness and precision of the simulation. Determining needs experience. In order to relieve the user from unnecessary decision, the best time step size is calculated by **PROFIL**. By using the slider the recommended value can be fine-tuned from very accurate until very fast.

Start with preformed profile



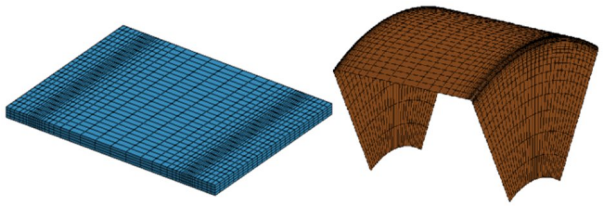
For saving time or other special needing, starting the simulation with a preformed profile instead of the flat sheet may be necessary. Simply select the pass of the flower pattern for the initial cross-section.

Avoiding waves at the tail end



Waves can occur in case guiding is not selected while simulating thin sheet. In reality, this is normal when the coil end is reached. It however has interfering influence on the simulation result. A switch is provided to prevent oscillation.

Automatic profile and roll meshing



The sheet meshing must be small at the position of later narrow bend zones and can be wider in the straight parts or zones of less bend. However, the finite element simulation works most robust if the length deviation of neighboring elements is not too large. The built-in automatic profile and roll meshing considers this by creating smooth changes.

Further new features

FEA Finite element analysis:

- Overdrive speed factor for speed-up the sheet motion between the stands can be preset by the user.
- Spring back calculation by using the implicit solver is supported.
- Continuous treatment of thickness and plastic strain (IRCQ).
- FEA file names are built from project name + explorer pass name.
- $ variables for the FEA project name are supported.
- Roll name can be assembled by new $ variables.
- Material files from the LS-PrePost MatLib (.k files) can be imported.
- Lankford coefficients of the plastic anisotropy of the rolled precursor sheet metal can be considered.
- Holes/Cut-Outs for solids can be parametrized via circles and closed polylines in a DXF file.

Roll stock management:

- Improved roll searching and replacing in the project by rolls from the stock management.
- Automatic check of existing similar rolls before saving a roll to the roll stock management

Roll design:

- Scan a profile contour and read contour from CAD: Context menu with snap points also for the start and end point.
- Split roll at the quad point of an arc and at any arc point by angle input.

Machine:

- Copy stand to the clipboard and replace stand by the clipboard content.
- When removing a pass, also the corresponding stand is removed after user query.
- When appending/inserting a pass, a new stand will be created after user query. The data are taken from the previous stand, the next stand, or the stand in the clipboard.

General:

- View flower separated: In addition to automatic vertical distance also constant distance, preset in Options, Drawing.
- Mouse cursor drag and drop of a project file on the **PROFIL** desktop icon.

More info: www.ubeco.com