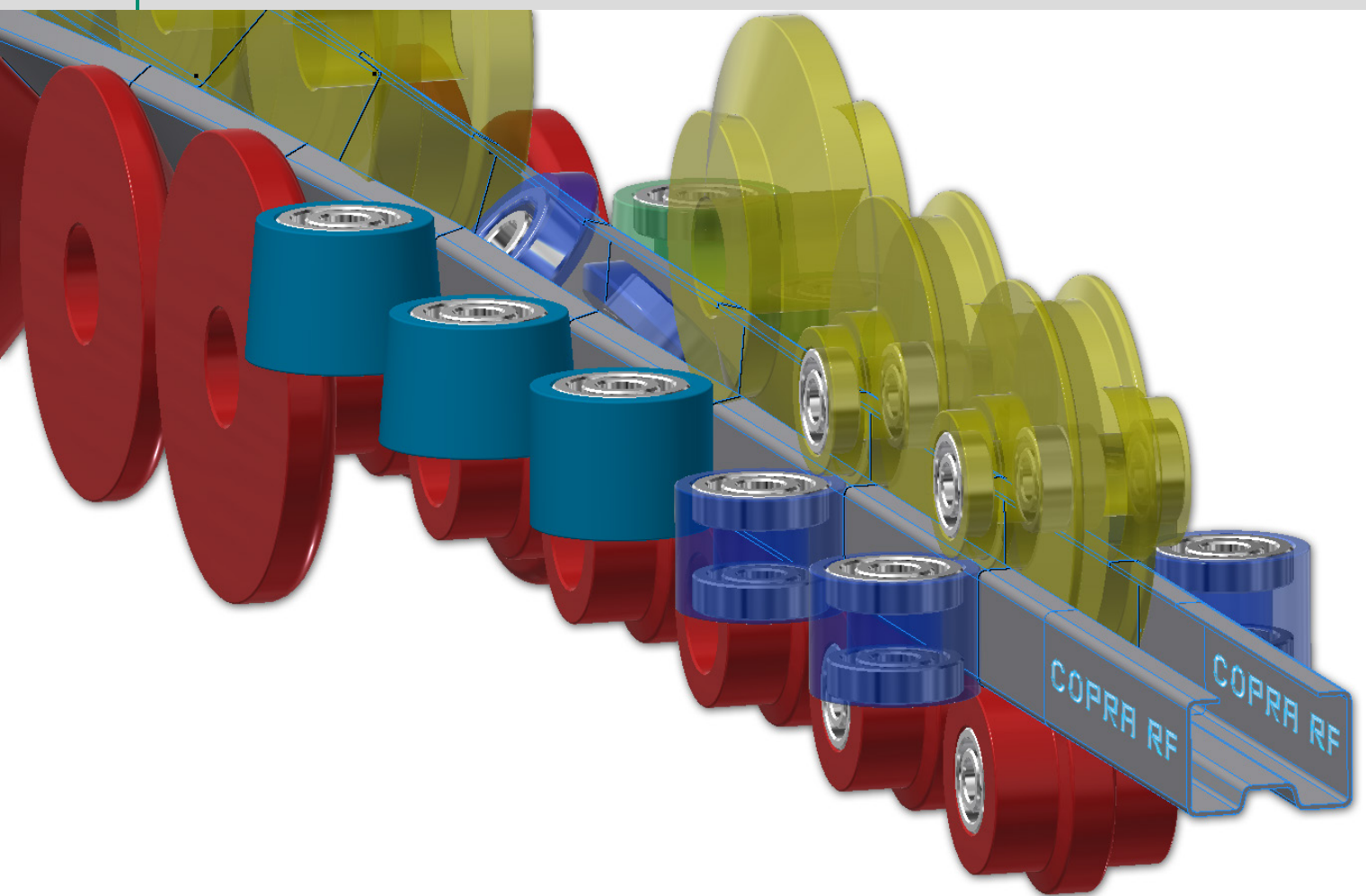


COPRA® RF Sections

Our software module COPRA® RF Sections is tailor-made for the design and development of open as well as closed profile cross sections. It's equally suited for simple as well as complex profiles. Together with the optional analysis modules and COPRA® RF Roll Design, roll formers have everything they need for consistent processing of high quality roll formed sections.



data M
Sheet Metal
Solutions

Section design with COPRA® RF Sections

COPRA® RF Sections provides several convenient possibilities for the design of the final profile. The user either draws the contour, extracts geometry from a 2D customer drawing, uses a 3D CAD model or generates elements from predefined section components. If it's a punched section, even the punch hole pattern from the 3D model will be adapted. The position of the punch holes on a flat strip will be automatically adjusted, with the calculated material neutral line considered.

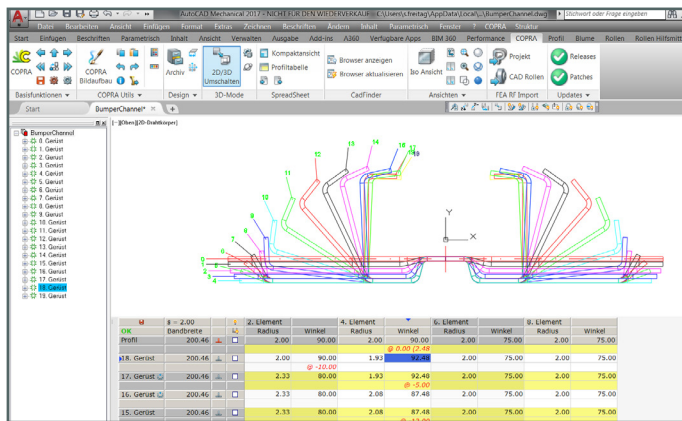


Fig. 1: Easy and quick section design with COPRA® RF Sections

COPRA® RF SpreadSheet and COPRA® RF Trapeze/Corrugated

COPRA® RF Spreadsheet is a very powerful tool for quick and easy parametric flower design in table form. The program automatically updates any changes across the whole flower pattern, without additional input from the user. You can not only modify any geometric data of the final cross section, but even the type of strip width calculation or the calibration method. COPRA® RF SpreadSheet calculates the new flower and also automatically adjusts the bending angles in case a station has been modified in the meantime.

COPRA® RF Trapeze / Corrugated is another technology module that provides special functions for trapezoidal- or corrugated sheet metal. It calculates the optimal bending pattern for trapeze-like sections by (dependent on the bending angle) making sure a constant transverse material flow for a minimum necking in the bends.

Furthermore, there is also the option for automatic roll design, whereby the feature "clone rolls" will be applied efficiently.

COPRA® RF Flower Technology and COPRA® RF DTM – Simulation- and analytics modules for the optimal flower

In addition to the basic functionality of COPRA® RF Sections, data M offers other optional program components for analysing and optimizing the roll forming process.

COPRA® RF Flower Technology incorporates technical calculations like the determination of the theoretical elastic recovery or down-hill-forming with minimal elongations. It also allows the sequential depiction of the individual bending pattern after input of the necessary parameters. Furthermore, different forming curves can be selected for the calculation of the strains.

Unwanted plastic longitudinal elongations across the strip edges are an unavoidable side effect in roll forming. Usual consequences are various defects across the profile like twist, bow or end flare. To prevent this, the module COPRA® RF DTM provides calculation of the theoretical elongations. Because a three dimensional visualization of the forming process not only exposes the path of the strip edge from different perspectives, but also other parts of the section that more importantly are quickly calculated and visualized.

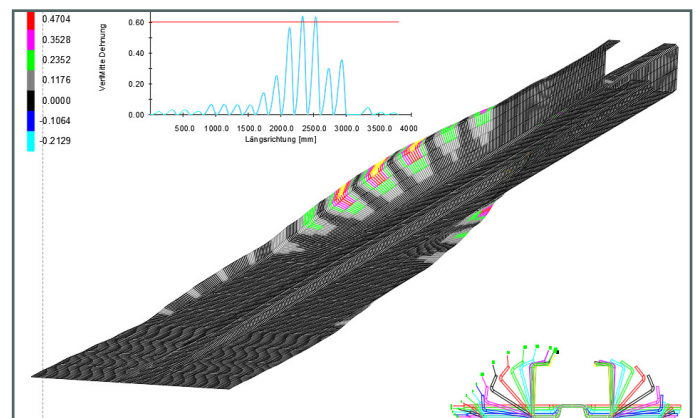


Fig. 2: COPRA® RF shows values and positions of longitudinal elongations

COPRA® RF DTM uses a plain geometric approach based on the theory of thin shells. The module determines the highest occurring values of longitudinal deformations. Due to a minimum of processing time, it is particularly helpful for initial evaluation of the feasibility of a project. With COPRA® RF DTM, you can pre-optimize an entire roll set prior to conducting a subsequent FEA simulation.

Essentially all that is required is data such as roll diameter and horizontal centers as well as the section flower. Until today, COPRA® RF DTM is the only software solution available worldwide that can calculate the strip strain that is inherent to roll forming. By doing so, it considers the important influence of the forming roll tool diameter. Above that, the module calculates the influence of further factors like material thickness and shows the distribution of longitudinal deformations in areas of compression as well as the occurring material curvatures in the forming areas.

COPRA® RF Roll Design

After completion of the flower design, the associated roll tools must be designed. An accurate roll design is eminent for the quality and the manufacturing cost for the final product. COPRA® RF Roll Design provides several section specific functionalities that no other software solution can offer. Particularly noteworthy is the „SmartRolls“ functionality. It allows the accomplishment of the whole roll design without further construction lines. The number of required clicks can thus be reduced to a minimum. Following profile and flower optimization, the first roll contour will be generated. The available contours of the flower pattern itself serve as respective starting points. Also, the designed cross sections can be layed out automatically as a rough draft and will be ready for completion with targeted graphical functions quickly and safely. Following completion of the roll design, both the individual roll as well as the assembly plan dimensioning will be conducted automatically by COPRA® RF.

Additionally, your engineers can rely on pre-made roll design functions for many standard sections like U-, C-channel or top hat profiles. For this, the software calculates the roll contours including all details and not only the rough contours. In order to conduct a precise cost calculation, COPRA® RF Roll Design furthermore works out the weights of the finished tools, reduced by the mass of the boreholes.

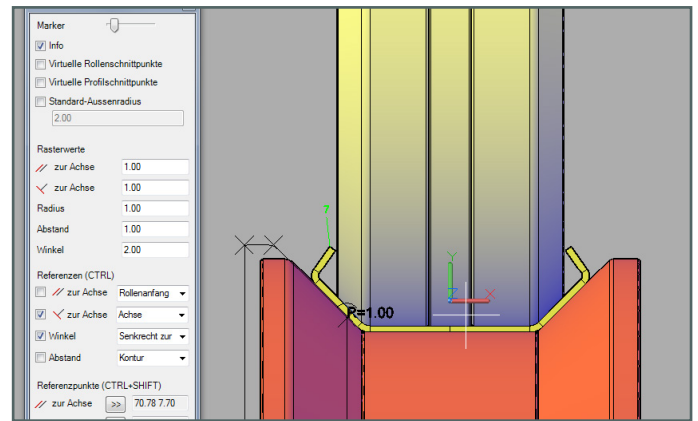


Fig. 3: Dynamic modification of roll design with COPRA® RF SmartRolls

AssemblyCheck – Implementation of Roll Forming system without mishaps

The newly added function AssemblyCheck (COPRA® RF 2017) helps your technicians significantly with the start-up of a roll formed product. After design of the required roll set, the delivered rolls need to be measured with the COPRA® RollScanner. Following the transfer of the contours to the data base COPRA® RLM, the designed and scanned rolls will be overlapped and compared in COPRA® RF. Thus, all deviations regarding roll widths or radii will be exposed instantly. They would have otherwise caused incorrect positioning in the bending area. The first roll will be aligned with the machine side, all further rolls along their respective predecessor. If the rolls need to be adjusted during implementation, the whole design will be updated straight away. AssemblyCheck also provides detailed information regarding roll positions. Displacements of single rolls due to faulty roll widths are also easily identified.

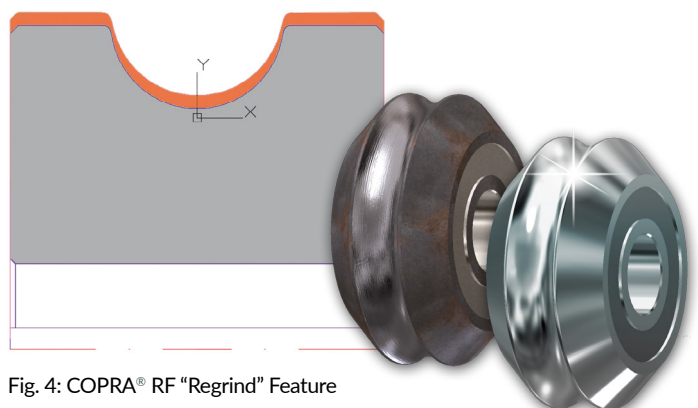


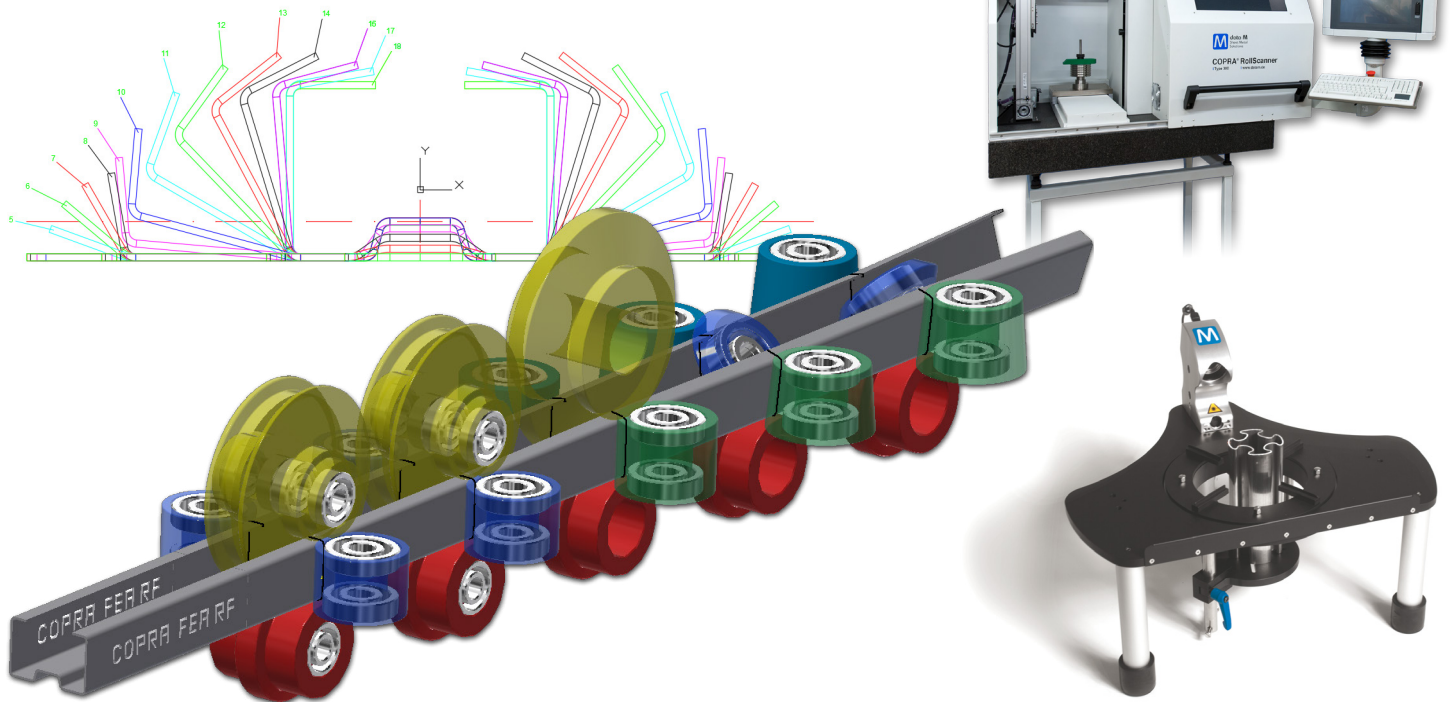
Fig. 4: COPRA® RF "Regrind" Feature

Design of combination roll tooling

Due to greater variety of section forms and rising tool cost, manufacturers increasingly exploit combination roll tooling, thus enhancing the tooling utilization rate significantly. COPRA® RF for sections offers various applications for different scenarios. For instance, should identical section forms with varying measurements have to be produced, COPRA® RF adjusts the available flower automatically to the newly required

dimensions. Hence, sections of similar shape only need to be handled once. Due to the overlay of the modified cross sections with the related roll tooling, the designer can then easily determine which rolls only need repositioning, width or diameter adjustments or where spacer rings might have to be inserted. Should it be desired, both the repositioning of the rolls as well as the width adjustments can be done automatically by COPRA® RF, the designer only needs to adjust the necessary roll diameters.

- | CAD Finder Project- and document-management
- | SpreadSheet – parametric flower design
- | Punch Hole Editor: modification of 2/3D model
- | Analytic simulation with COPRA® RF FTM
- | Effective roll design with SmartRolls
- | Automatic generation of drawings
- | Direct link to COPRA® FEA RF
- | RLM – data base powered Roll Lifecycle Management



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