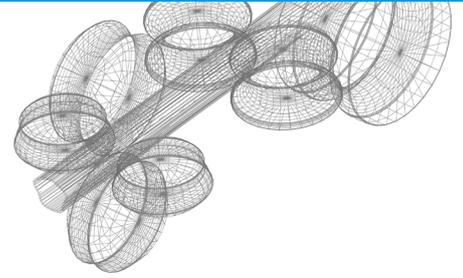
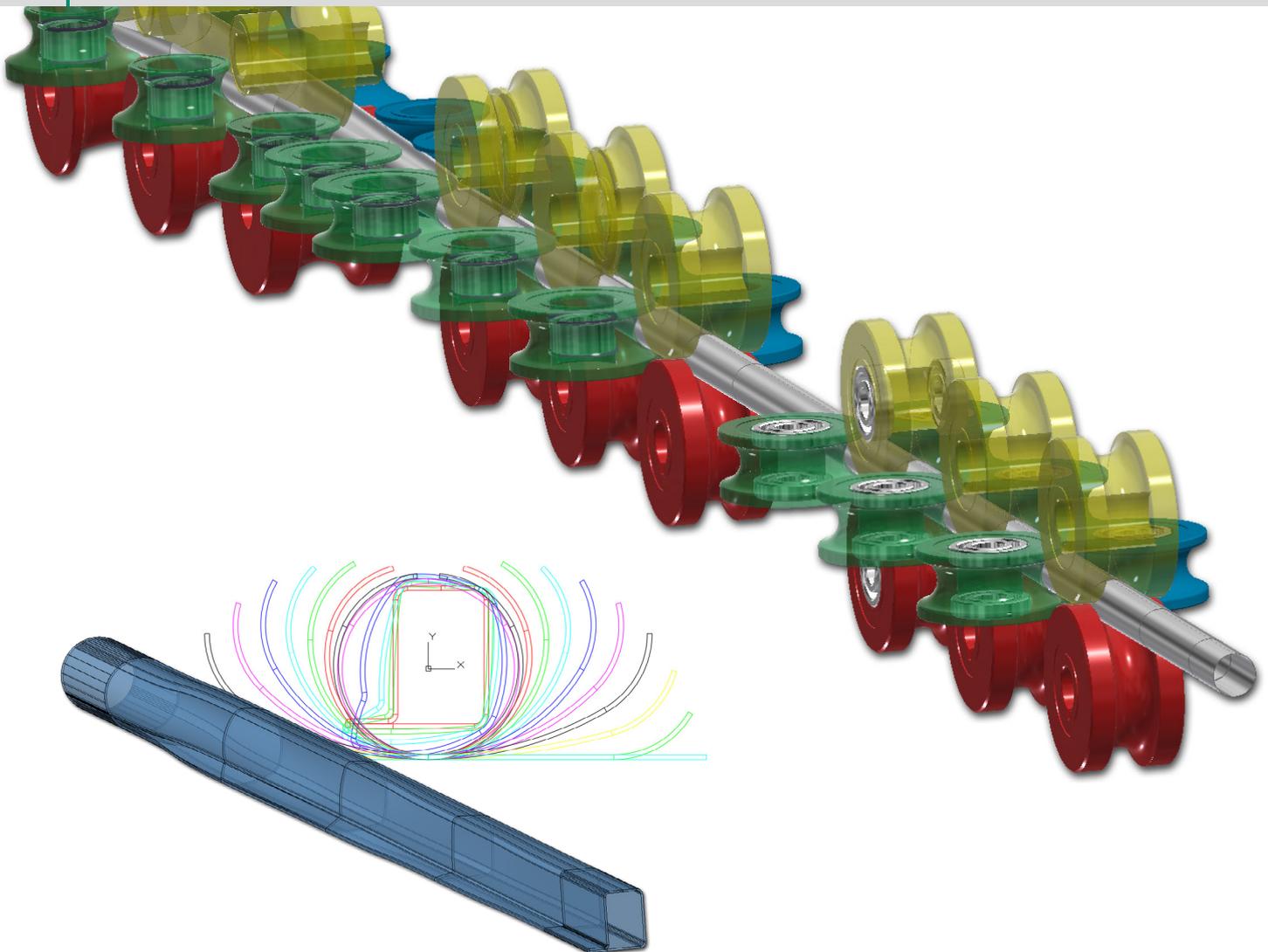


COPRA® RF TUBES



COPRA® RF Tubes is the leading software solution for the design of roll tools in tube mills. The program comprises design and flower calculation for the production of standard as well as complex round- and rectangular tubes and also shaped tubes. The designer simply needs to adjust the predefined setup to the actual conditions of the tube mill.



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Challenges in Tube Production

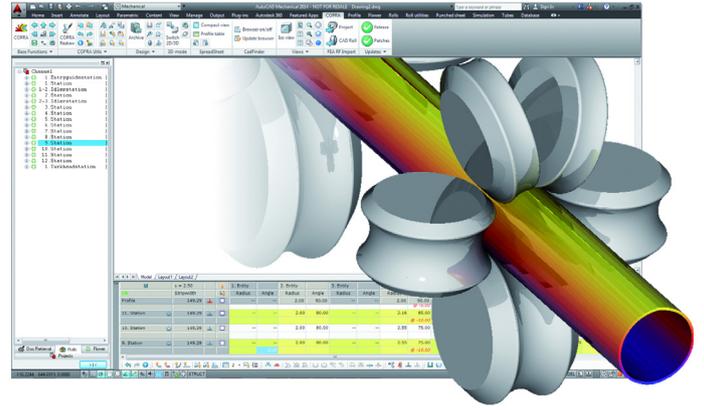
The market for tubes has been suffering from overcapacities as well as small profit margins from standard products. Although there was an all-time high in revenues, there were less tubes produced. Efficient process execution especially in complex tube production with high-strength material and small wall thicknesses is growing ever more important. The higher the ratio of diameter to wall thickness gets, the higher are the requirements for an efficient design of the roll tool set. data M has been supporting tube manufacturers and producers of tube mills for almost 30 years in process optimization with tailored soft- and hardware products as well as with competent consulting.

The COPRA® Tube Mill

An essential part for successful implementation of a tube project is the so called flower. It arises out of the underlying reshaping steps as well as the previously defined product parameters. COPRA® RF Tubes already contains pre-made strategies that can be adjusted to company specific requirements with maximum flexibility. Integrated calculation methods allow the definition of angles and radii from a given fin width as well as process specific additions like welding and sizing addition. A cross section can consist of up to eight different arcs. The respective angles, radii or arc lengths can either be calculated or defined individually. Common stand types are also available within the machine definitions of COPRA® RF Tubes.

Additionally, you can define any number of variants for round- and rectangular tubes. In this way, the rolls can be adjusted automatically and at any time to modified wall thicknesses.

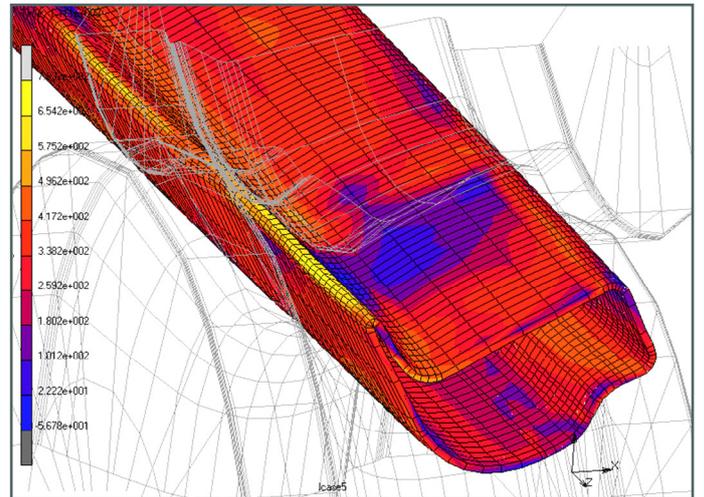
Hence, each variant corresponds to an own dedicated COPRA® Project in a way that all functions like automatic roll setup or model processing for a Finite Elements Simulation are available. Numerous other functions allow your designers to focus on the essentials: The optimal design of forming strategy and roll geometry. You can for instance define bending sequences for the automatic tube processing or various forming and machine parameters. Furthermore, COPRA® RF contains an award-winning (International Tube Association) optimization program that can calculate the ideal down-hill forming curve. This allows a strain-minimized forming of tubes.



Parametric 5-Roll Welding Station

COPRA® RF Shaped Tubes

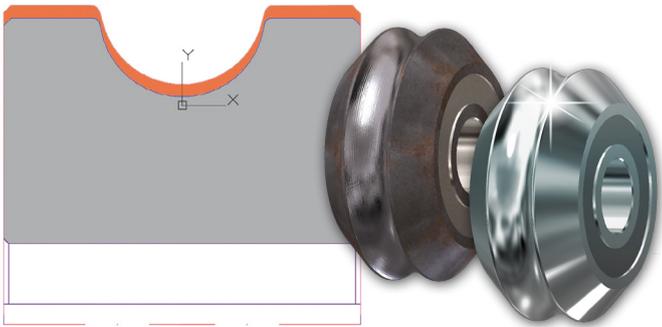
Our module for shaped tubes conducts the necessary calculations for the reshaping of round- to shaped tubes. The designer merely needs to define the number of shaping steps. The specification of the reshaping degree or the percental compression within the respective stations are optional. COPRA® RF calculates and optimizes the individual calibration steps, the basis for the subsequent roll design. There are two mathematic methods available for the calculation of the reshaping steps: The calculation of the respective angle values or the topographical method. With the targeted distribution of compressions, so-called undercuts can be better controlled.



FEA Simulation of Shaped Tube with COPRA® FEA RF

Efficient reworking of rolls with „Regrind“

In most cases, tube makers simply replace worn roll tools. It is however far more efficient to not scrap the old rolls, but to rework and thus recycle them. Nonetheless, the correct capturing of the roll contours is too big a challenge, so that manufacturers shy away from the risk. With the integrated products COPRA® RF Tubes, COPRA® RollScanner as well as the Roll database RLM, roll tools can be reworked quickly and easily which can lead to a significant time- and cost-reduction. COPRA® RollScanner captures the roll contours with high precision and transfers them to the RLM database. They will of course also be available for the roll design. COPRA® RF subsequently calculates the necessary degree of reshaping, identifies the roll with the highest wearout and conducts the repositioning of the axis automatically.



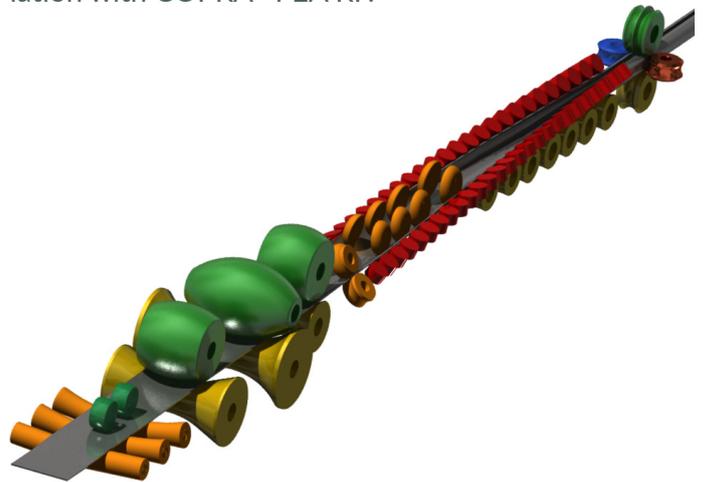
COPRA® RF "Regrind" Feature

COPRA® RF Drawing Dies

The module COPRA® Drawing Dies calculates the forming steps required for the reshaping of round tubes to shaped tubes. It is the only dedicated software worldwide for this specific design problem. As a first step, the final cross section of the shaped tube will be outlined with a drawing of the contour. The respective reshaping steps will subsequently be defined by these cross sections. For the individual cross section supporting points a compression coefficient can be defined allowing a curvature in the drawing die surfaces. Conclusively, COPRA® RF calculates the cross sections, by which the material will be distributed across the stations. This method allows an optimal material flow.

COPRA® RF CageForming: Tube Cage Forming Technology

Cage Forming Technology enables a flexible process for the manufacturing of tubes with various diameters and minimized tool changes. The forming is done by a group of roll tools arranged on a cage working from the outside of the tube. More tools are for instance located within or under the tube. With the integrated parametrics, all common types of roll cages can be designed with COPRA® RF. This method saves tool cost and furthermore allows a faster setup of the tube mill as the rolls don't need to be changed. The rolls and their respective locations are stored in a special database and will be automatically refreshed in case of modified parameters. The geometry of the roll cage and the respective cage rolls will automatically be converted into an FEA model for subsequent simulation with COPRA® FEA RF.



Cage Forming Model

Optional Analytics Tool: COPRA® RF DTM

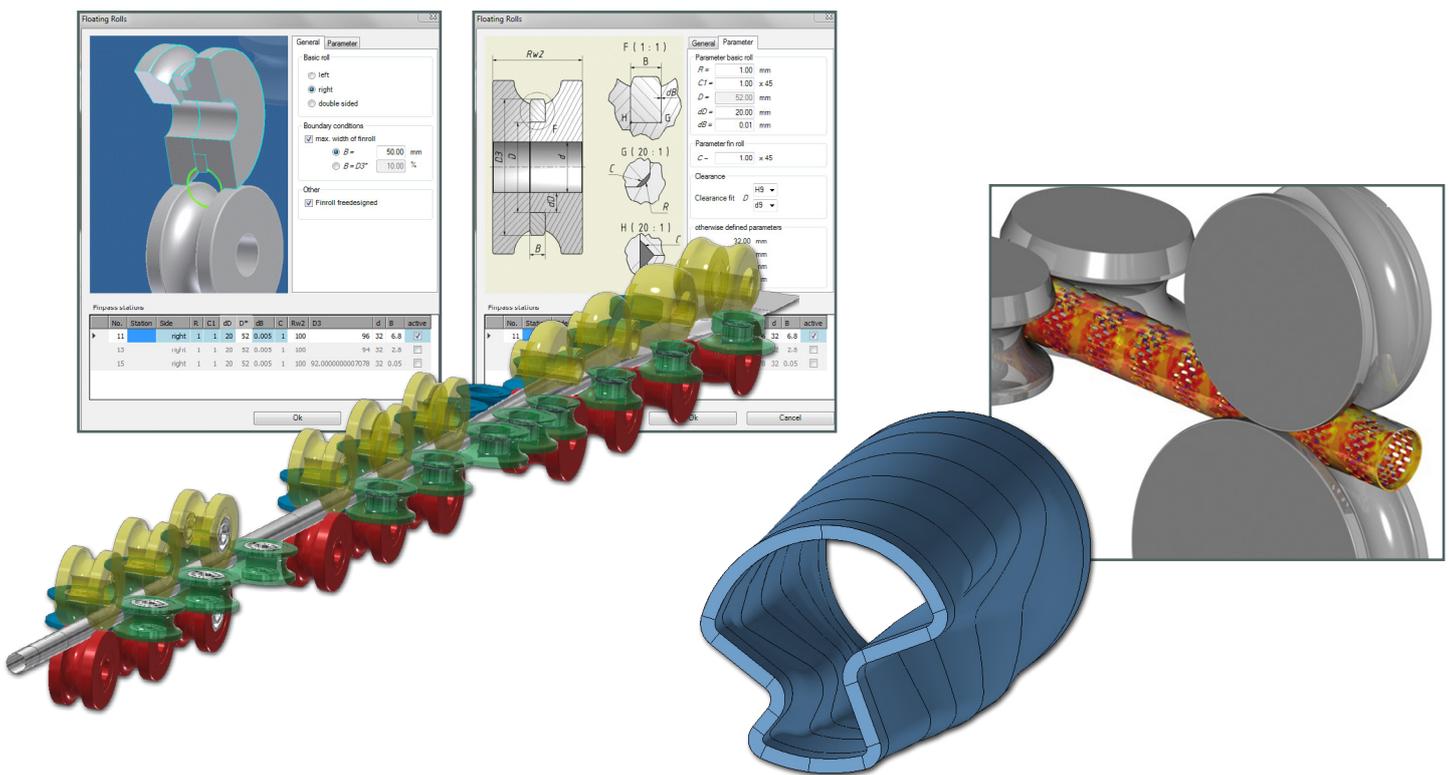
COPRA® RF DTM determines the maximum deformation values in longitudinal direction. Particularly in case of complex products, manufacturers can quickly and safely evaluate if the project can be implemented even without an FEA simulation. The Model is based on the theory of thin shells and allows a comparatively short processing time. The roll set can thus be optimized quickly and sufficiently precise in order to subsequently deploy an FEA simulation. COPRA® RF DTM is ideal for the pre-optimization of a reshaping process and thus a fitting addition to COPRA® FEA RF.

Focus on design: Easy to use and organize

Through longstanding cooperation with our customers around the world, we have been improving COPRA® RF Tubes constantly. Particularly the design of complex tube mills with pre- and post-operations can get confusing quickly. An integrated Browser simplifies the Navigation across the stations with specification of stands distances. The respective station types will also be labelled automatically.

Beyond the classic control elements, COPRA® RF can also be operated with tool bars, the so-called ribbons. Furthermore, the integrated COPRA® RF CADFinder contains a management tool for projects and documents including revision control which helps organizing your COPRA® projects.

- | Leading software for the design of roll tools in tube mills
- | CADFinder: Integrated management tool for projects and documents
- | Predefined and easily adjustable shaping strategies
- | Pre-Optimization of shaping possible with cage forming technology
- | Tailor-made parametric for the design of roll tools
- | The perfect solution for the design of round- and rectangular tubes as well as shaped tubes



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