COPRA® RF 2003

News Release for the powerful Rollform Software

COPRA® Explorer

1) Completely new Roll and Flower Browser
COPRA® RF 2002 already included the COPRA® Explorer in a first version, but the way of integration caused some trouble when changing fast between the passes. For this reason COPRA® RF 2003 includes a completely new Flower and Roll Explorer.

The COPRA® RF Explorer shows in the lower tabs the switches *Project*, *Flower* and *Rolls*. When picking the *Project* tab, the current project and the belonging project information is being displayed. When picking the *Flower* tab, the Flower design is automatically started, the belonging toolbars are loaded and the designed sections are shown in the COPRA® RF Explorer. The same is done when picking the *Rolls* tab. When picking a pass in the browser it is made the current one. In a second window flower and entity informations can be displayed as an option. Via the individual roll attributes it is also possible to link any CAD drawing to a roll or a station. The AutoCAD drawings linked to a roll can be seen in the COPRA® RF Explorer. Double-clicking the linked part will open the respective part.
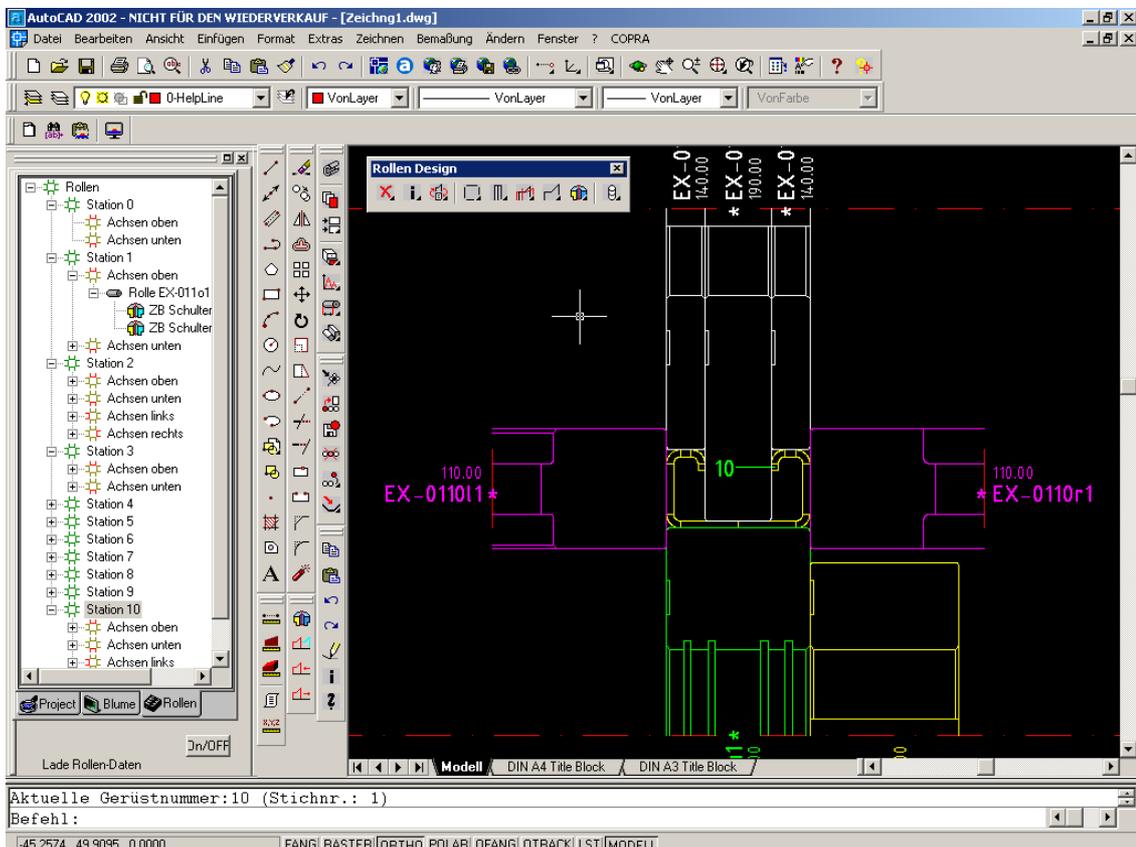
2) COPRA® - ME10 Interface

For COPRA® there is now also an interface for ME10 Windows available. It does *not* use a file interface working with e.g. DXF format but has direct access to the COPRA® database. The design itself is mostly done with COPRA® functions, usually in combination with the COPRA® StandAlone option. In ME10 itself the following functions are available:

➢	Get pass	(first-last-previous-next-interactive)
➢	Show flower	(complete-interactive-complete)
➢	Save current pass	
➢	Profile from ME10	
➢	Rolls from ME10	
➢	Save active pass	
➢	Show rolls	(on / off)
➢	Automatic zoom	(on / off)
➢	Update pass	

➢ In Windows 2 applications are running: ME10 and COPRA®

➢ ME10 can also be operated with a tablet. Because of the platform change, the handling will be a little bit different from Unix

➢ You also can use the tablet for some COPRA® commands. Mouse and tablet can be operated parallel.

➢ Design data can be exchanged between COPRA® / UNIX and COPRA® / Windows. Designs created with the COPRA® UNIX platform can also can be used with COPRA® Windows.

To work with a project it is only necessary to make it the current one in the COPRA® ProjectManager. The COPRA® - ME10 interface has access to this information and automatically uses this project. To change to another project the command „Init / Update" needs to be executed.

Static Properties' Values

3) Technical terms
Values for mechanical strength can be printed in technical short terms (e.g. I_x).

Roll design

Define roll attributes

4) Roll attributes
Each roll can be defined by individual roll attributes. The following attributes can be assigned to a roll:

- borehole details
- undercut and bearing carrier, roll number and stamping groove
- processing defaults like tolerances , true running accuracy and hardness
- roll material , E.g. 1.2379, SPK, KMV Etc.
- name of the roll, E.g. Top - / bottom rolls , groove - / turk head rolls
- difference between driven rolls, side rolls and spacer rings

All rolls will be drawn with their individual attributes. Thus is it possible to define also rolls running on a bush. When a roll does not have the standard attributes it will be marked.

5) Using default – attributes
When beginning with the design each roll will have the default attributes by standard. Therefore for all rolls the same base information is automatically available.

6) Change Attributes for one roll
all attributes of a roll can be individually adapted. In terms of used material, borehole diameter, bearings, processing etc. there are almost no more limits.

7) Copy attributes of one roll
If various rolls do have the same attributes that are not the default attributes the attributes can be copied into the clipboard.

8) Paste Attributes for one roll
If various rolls do have the same attributes that are not the default attributes the attributes can be pasted from the clipboard..

9) Roll details are shown during the design
the roll details like borehole, borehole chamfer, bearing seats, stamping groove, keyway etc. can now be made visible in the design state. Beneath adding AutoCAD drawings for accessories this is a very helpful feature during the design.

Define roll accessories

10) Bind CAD-Drawings as roll accessories
to each roll you can add with AutoCAD or the COPRA® Standalone option the necessary accessories like bearings or shafts as drawings. These accessories are simply saved as block in AutoCAD and will be automatically displayed when a station is loaded. This allows to also design and manage roll accessories with COPRA® . Beneath the path, the part name and an integrated preview also a part number for the automatic creation of a bill of material can be defined.

11) Visibility of roll accessories in the CAD drawing
whether the designed accessories are visible during the design period or in the manufacturing drawings can be controlled by the user. The accessories can be made independently visible during the design, in the single roll dimensioning or in the assembly plan dimensioning.

Roll modification

12) Defined rolls are conserved
in previous versions of COPRA® rolls that needed to be changed were exploded and had to be redefined by the user after the modification was done. In the new version a roll will always be a roll, regardless which modification is made: it is possible to add or remove fillet radii and replace it by a chamfer or a different radius. The basic roll will always be maintained. All respective functions of COPRA® where improved accordingly.

Insert spacer rings

13) Make use of existing spacer rings
from an table existing spacer rings are loaded and distributed in each station according to a predefined strategy. It is also possible to add a code number to the table that is shown in the spacer ring list. This list can directly be used for manufacturing. The table can be modified in the spacer ring dialogue.

14) Fill up empty shafts with spacer rings
if a shaft (E.g. top shaft) is left blank, spacer rings can be inserted optionally to prevent the shaft from damage during operation of the machine.

15) Use a grid to fill up shafts with spacer rings
The spacer rings are inserted according to a grid pattern, e.g. in a 5 mm gradation.

16) Place spacer rings interactively
Spacer rings can now be inserted not only automatically, but also with a user-defined position. This makes the handling and administration of spacer rings easier.

Assembly plans

17) Mark the position of the roll number
The side of the roll number can be marked with an arrow depending on the machine side. This is to make sure that the roll number is visible during the setup of the machine.

18) Draw the assembly plan without the section
The assembly plan can optionally be drawn without the profile cross-section.

19) Fade in roll information automatically
In the assembly plan and during the design period it is possible to display different information of a roll. The information to be shown can easily be selected in a dialogue. The following information can be faded in:
➢ Roll number
➢ Consecutive number
➢ Roll weight
➢ Roll bore etc.

Cutlist

20) Material dependent diameter list
Now it is possible to create a diameter list for each roll material (e.g. 1.2379, 1.2080, KMV, SPK). Usually on the market for each material standard diameters are available which can be purchased sawn or not sawn. Via the roll attributes it is now theoretically possible to assign a different material to each roll. If COPRA$^{®}$ can find this material in the diameter list, then the correct raw diameter of that material will automatically be selected.

21) Diameter-dependent material allowances
the allowance for raw width and raw diameter are individually adjustable in the diameter list. So with increasing diameter the correct allowance for the respective material can be determined automatically.

22) Definition of part numbers for raw diameter
For each material in the diameter list a part number can be defined. This part number appears later in the cutting list or also in the raw material list. This information could be directly used by a PPM- system.

23) Additional information
The values from the cutting list and the final roll weight have been partly summarized. In the cut- and material list also the raw weight, the weight of the bore hole and the length of the roll contour appear. The difference between raw weight and final weight results from the volume of metal removed from the bore hole and of the length the roll contour. The length of the roll contour gives also an estimate for the manufacturing time.

24) Cutting list: sort rolls
The cutting list can be sorted by the roll number or optionally by roll diameter. For this purpose the cutting list can also be imported in e.g. Microsoft Excel.

Assembly list

25) Rolls used, number of pieces
From the existing design an assembly list will be created. This list includes all rolls that are necessary for the complete assembly of a roll set. The list is sorted according to stations which allows for a correct collection of the rolls directly from the stock.

Database Management System

26) Automatic recognition of roll shapes
In the roll forming process you often get recurring roll geometries. This is above all true for cylinder or cone shaped standard rolls, but also for rolls assigned to a certain profile section. These rolls are not defined via their contour shape. Instead they possess very special parameters, which they can be searched after. The best example for that are taper rolls. So far it has always been problematic to search for a roll with an angle of 60 degrees. Now the angle will be added automatically to a table. If you search for a suitable roll, you now have direct and immediate access to this information. Thus the time spent for searching is reduced drastically. For step 1 we integrated 18 different roll geometries.

- automatic recognition of roll types (18 different roll types)
- automatic recognition of geometrically identical or mirrored rolls; these rolls automatically get the number of the comparison roll. The usage list is actualised.
- automatic generation of roll numbers for contour rolls; roll type and type of forming pass can be taken into account
- storage of complete information (attributes) into the data base management system; attributes are visualised in dialogue boxes and edited accordingly
- the division of the user dialogue into quotation and order part has been changed to one single dialogue box where all settings required can be entered

Simulation DTM (Deformation Technology Module)

27) Calculation of permanent (plastic) strain values

The analytical approach of calculating the occurring longitudinal strain values with COPRA® DTM has been extended by the calculation of plastic elongations. This allows for an examination of permanent elongation values at critical points of the cross section. As soon as the material's yield point is exceeded, a hardening effect occurs. The new value of the yield point equals the stress value reached (assuming that the material's own tensile strength is still high enough). This work hardening effect occurs only locally, i.e. at positions with plastic deformation. This applies for the circumferential as well as the thickness direction.
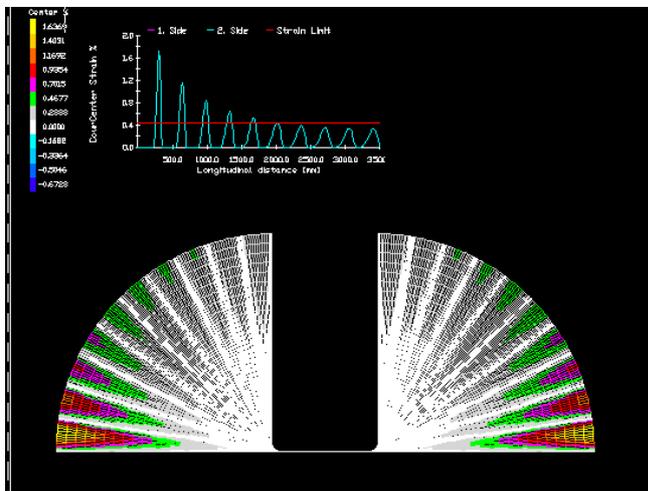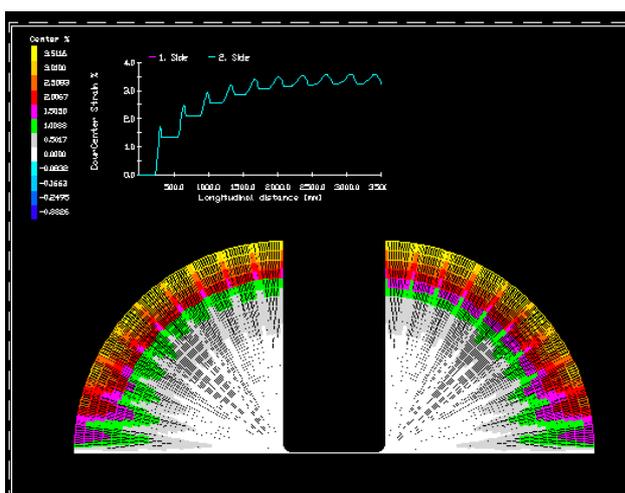

Fig. 1   Simulation of strains

Fig. 2   Simulation of permanent (plastic) strain values

Simulation COPRA® FEA RF (Finite Element Analysis)

28) Project Manager for FEA Calculations
when analysing rollform projects it is very important to have a complete history of the modifications made. For that reason COPRA® now provides an independent Project Manager for Finite Element Calculations. It automatically saves the current design situation and all related calculation parameters so that it is possible at a later stage to understand the respective results and necessary modifications based on the calculation.

29) Automatic Preparation of FEA Model
for a Finite Element Analysis it is necessary to prepare the FEA model with all the material specifications and boundary conditions. This is automatically done by COPRA® with a wizard that helps to define all the necessary parameters. If the definition is finished the FEA model is created automatically and directly loaded in MSC.Marc. The calculation can be started without further modifications. In case the user wants to add some modifications this is also possible. A typical example would be to add extra punchholes or cut the strip in specific areas.

30) Analysis of FEA results
COPRA® FEA RF provides also the necessary tools to analyse the results of a Finite Element Calculation. This includes e.g. material displacement, occurring stress and strain, force effect, forming length, material movement and many more. It is possible to display and overlay the shape of the designed section and the actual shape created by the rolls. Tools for making reports and videos are also included as well as the possibility to cut off the when it comes out of the machine.
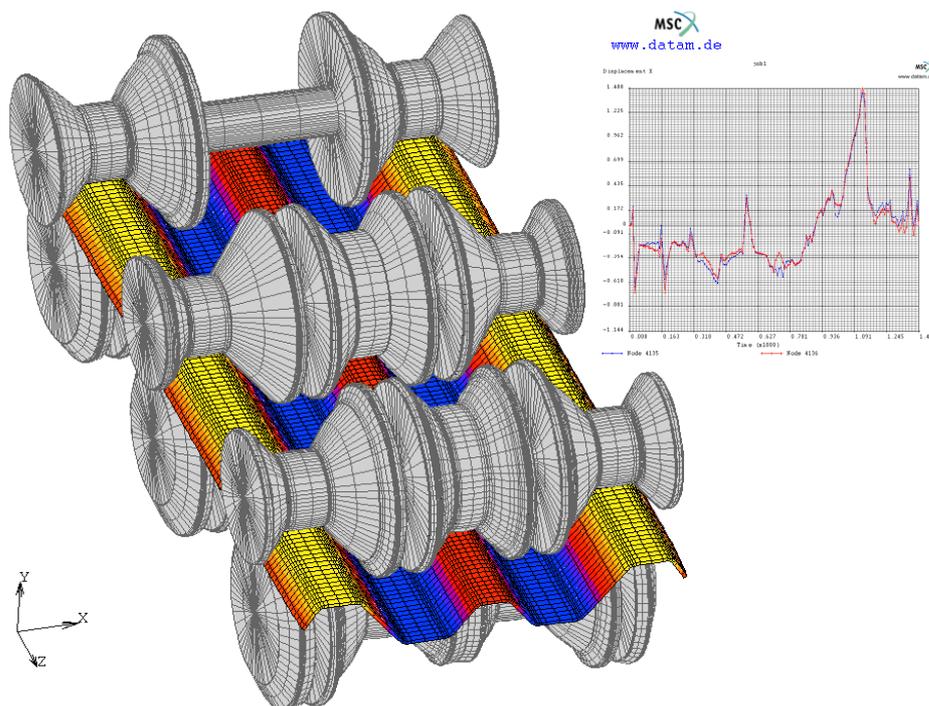
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