Pipe workshops in flux: systems for CAP, CAD, CAM, CAQ and PPS

In the field of tube and pipe construction, modern electronic control systems are becoming increasingly common. In order to take advantage of these digital systems, it is essential for all departments to consistently use a common, unified interface, in order to ensure integrated communication.

Such methods include CAP (P&I diagrams and planning), CAD (design, coordination), CAM (machine control, production control), CAQ (quality control), CAE (calculations and engineering), and PPS (process organization, human resource optimization, and basic data management). The individual areas are not clearly defined, and often overlap.

The main aim with this software is automatization of the work process with consideration of machine costs and utilization. Such software also assists in reducing costs for the supply and transport of material to the workplace.

The known problem areas for tube and pipe production are delivery times for special materials, internal flow of material, internal transport, storage of fabricated parts, design changes, backflow of modifications, and inflexible structures.

In the field of tube and pipe production the problems are often so complex, that the development of a global strategy to satisfy all demands is simply not realistic and feasible.

3R Software Solutions, Germany, offers a centralized software solution, which concisely illustrates the potential synergy of all production areas. This allows the user to react economically, prevent errors, and quickly make the right decisions.

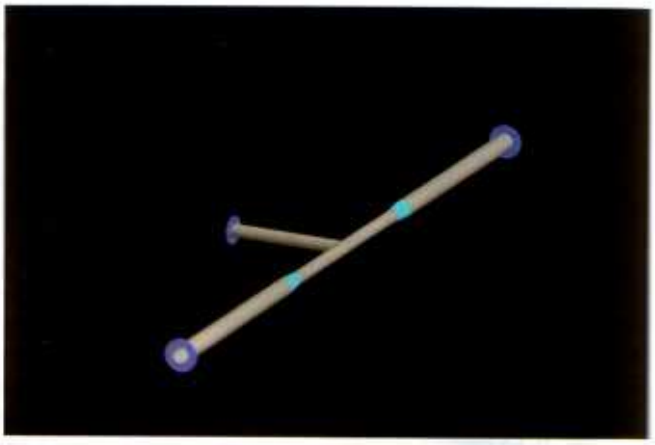
The programs offered by 3R Software Solutions have been developed to meet specific demands.

They offer a high amount of flexibility and adaptability, with increased work speed, quality and reduced training time. The cost reduction resulting from these three points should not be underestimated.

The reliance on separate individual systems can seem like a cost-effective solution, but often proves to be a mistake, since it can result in a number of new problems. One consistent and unified system, covering everything from design and planning to construction and fabrication, makes the development of suitable interfaces unnecessary, while also ensuring exhaustive knowledge.

One central database allows every application to access the information of all other applications.

3R Software Solutions attempts to streamline the systematically similar or unchanging processes, and determine the exact requirements of a tube and pipe shop.



RoniCAD is compatible to all currently common database systems

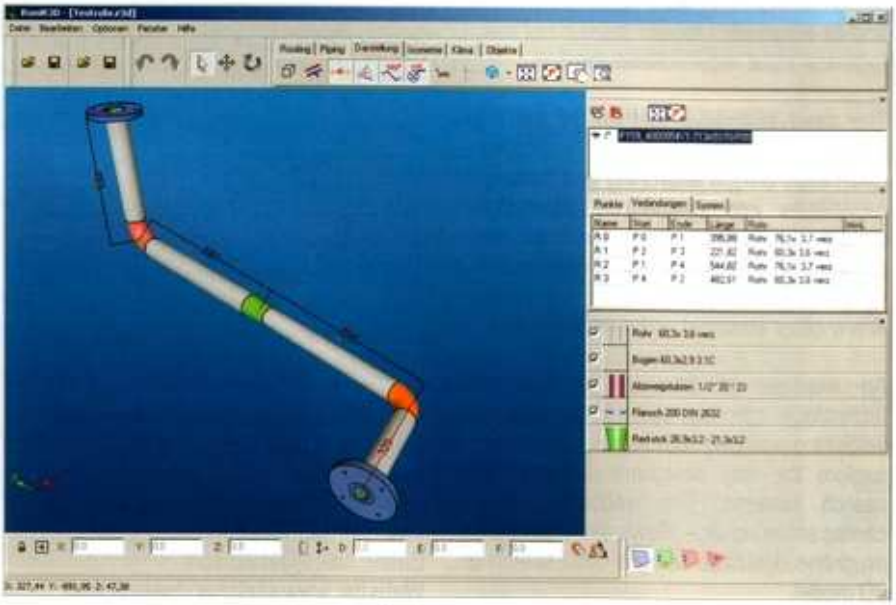
The company offers Roni2D, which is a P&I diagram system used for the development and rough planning of process facilities.

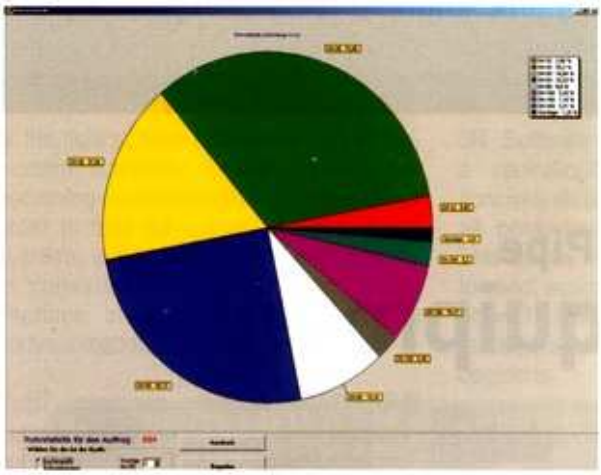
During creation of P&I diagrams the basic dimensions, type of fittings and tube material (including diameter), are selected from a database. Due to the integration into this centralized database the client can, even in this early stage of the process, have access to a multitude of information that could require weeks to be derived from an Auto-CAD drawing (for example). This time reduction can be a great advantage especially when it comes to the tracking of modifications and changes.

The system automatically assigns tube and fitting numbers according to the user's input within fractions of a second. A manual preparation of an index might require great investment with every modification or change, and the risk of error during numeration could not be eliminated. When the client uses the created diagrams, there is automatic creation of lists for parts and fittings.

A number of systems are used to further utilize the information derived from the P&I diagrams. Since this information can be stored in a centralized database, no interface is necessary. Data redundancy, which can be both storage intensive and prone to mistakes, is generally avoided. 3R Solutions provide Roni3D for user-friendly system coordination of tube and pipe production.

Roni3D is used to exactly position fittings and tube, flanges and bends





Ramp software undertakes entire work preparation for industrial tube production

In contrast to known 3D-systems, whose features are not streamlined towards special requirements, the user of Roni3D can confidently coordinate 3D tube and pipe. The spatial geometry of the tube can be added using various import interfaces.

Since the system, like all 3R-systems, uses a centralized database, the client can load entire schematic drawings and use them as coordination templates. The client can use Roni3D to exactly position fittings and tubes, as well as add flanges and bends. Every 3R data element exists as a 2D schematic symbol, a 3D symbol, and an Iso-symbol.

A 3D volume model can be displayed at any point during the design phase. The addition of the Kolli software allows the client to perform a producibility analysis of a tube's isometric image during the design phase, using the machines and tools that are available in the tube shop. All necessary data to fabricate an isometric projection is calculated automatically.

There are import interfaces to load and edit tube drawings from several large systems (eg Unigraphics™, Tribon™, NupasCadmatic™).

These isometric drawings undergo a logic test, so that deviations and inconsistencies can immediately be recognized and displayed. RoniCAD is compatible with all currently common database systems. It is available both as a network client and an individual version.

In order to manage fabrication control, the company offers Ramp software for work preparation. This software can carry out the entire work preparation for industrial tube production, with work packets created by using filter functions as desired. For each fabrication step and selected work station the user has the option to create part lists, drawings and worksheets including all relevant fabrication information.

Ramp features process optimization, so all transferable CNC files are automatically made available, while worksheets for the stations are created and sorted efficiently. The software also includes process tracking and expediting, based on both the date structure of the job numbers and the calculated times for each isometric image. Completion notices can also be generated at each individual workstation, while the current stage of the fabrication process can be determined and visualized at any time. It is therefore possible to eliminate bottlenecks or planning mistakes at an early stage.

The Ramp software also analyzes human resource management and usage, with different ways to determine work time and usage rates. For each single work step (eg welding or bending), a time value can be entered for each element or tube in the database. These values are calculated using company-specific internal processes. Ramp is also capable of deriving and statistically analyzing all material data and part counts from the database using freely selectable filters.

Kolli is a bending simulation designed to test the producibility of individual tube and pipe. As a subprogram of RoniCAD or as standalone software, Kolli offers solutions for the bending process of given tubes, so they can be fabricated.

Starting with version 7, Kolli includes a machine editor, a tool editor, and a material manager. This is important as the local setting and conditions of each tube and pipe shop have to be displayed individually, in order to perform an exact producibility analysis.

The machine editor is software with an intuitive user platform, which allows the user to measure new machines as necessary. The tool editor is designed to accurately represent the tools for various machine types. The material manager allows the input of material traits, since these have a determining impact on springback values and the 'actual' cutting length.

Using a selected bending machine, Kolli determines if the tools required to fabricate a tube design are available. It also establishes what machine sequence is needed to ensure a successful bending process, without collisions of the tube with machine or external collision sources (ie the floor or workstations). Kolli also supports bending of tubes with flanges, with calculation of the flange rotation during bending. Each bending step can be displayed as a 3D-image.

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Producibility testing of individual tube and pipe with Kolli bending simulation