

TITELSTORY

ROHRMONTAGE 4.0

Vernetzte Umformtechnik für Hydraulikleitungen





TUBE INSTALLATION 4.0 – WITH NETWORKED MACHINES

Connectivity key term digital production. With the latest generation of the SFO-F forming machines, Stauff demonstrates the advantages connectivity offers for the assembly of hydraulic tubes. The SFO-F series will in future be equipped with a connection to the “Internet of things” and a cloud provided by Stauff as a standard.

Author: Dipl.-Ing (FH) Carsten Krenz, Managing Director of
Walter Stauffenberg GmbH & Co. KG in 58791 Werdohl, Germany

The use of formed connection systems is ideal where very high requirements are placed on the safety and reliability of reusable hydraulic line connections. For this application profile, Stauff has developed a forming system which meets these requirements and offers easy installation.

The tubes are formed into the Stauff Form Contour using the SFO-F Series forming machines, which were specially developed for the Stauff Form system. These machines are used by manufacturers of offshore plants, cranes and lifting gear or forming systems, who assemble large numbers of hydraulic tube connections, and also by hydraulic service providers, who benefit from the compact design of the SFO-F and often form the tubes directly at the customer location. The machines are also used at international Stauff locations, where customised



POINTIERT

TUBE FORMING MACHINE UPDATABLE VIA CLOUD

DIGITAL PARAMETRIZATION AND DOCUMENTATION BECOME POSSIBLE

PREDICTIVE MAINTENANCE OF THE TUBE FORMING MACHINE BECOMES REALITY



01 Assembly machines, such as this tube forming machine, will be easy to monitor in future using cloud connectivity

hydraulic lines are manufactured as part of the Stauff Line range of services.

LOOKING AHEAD: SIMPLIFIED UPDATE ROUTINES

In the practical operation of the forming machines, regular software updates are indispensable. This allows for improved program sequences or new functions to be implemented. Users also often ask for parameter sets for tube materials which were previously not covered by the machine standard. These parameters can be determined at the Stauff Technology Centre in Werdohl and then transferred to the respective customer.

The previous process for updating the machine, however, was in need of improvement both for customers and for Stauff. One option

was for a Stauff service employee to visit the user on site and transfer the new software version from their laptop to the machine. It was also possible to do this online, but not easily: A precise date and time had to be arranged for establishing a network connection. Then the update was triggered from the factory.

UPDATES AND PARAMETER SETS ONLINE

With the latest machine generation, this process has been greatly simplified, explains Andreas Toporowsky, Product Manager Stauff Connect: "Updates will be transferred online in future. Our service then only has to agree a time with the user when the machine is switched on and not in use." This is made possible by a communication module with a SIM card integrated into the machine, following the principle of the Internet of things.

But the communication module is not only used for updates. Andreas Toporowsky: "Users often ask us for parameter sets for new tube materials which were not previously provided with the machine upon delivery and have to be individually determined by our forming experts. We can now transfer these parameter sets just as easily, quickly and reliably."

DOCUMENTING AND OPTIMISING THE FORMING PROCESS

The communication features offer additional benefits for users. The machine documents the completed assembly processes in detail and provides continuous online access to the data. If desired or required by the end customer, this can then be used as evidence of correct assembly, on paper or as a digital file.

A further benefit comes from the option of viewing the machine history and parameters through an online service. Dipl. Ing. Oliver Wagner, Electronics Developer at Stauff and the engineer responsible for the development of the cloud connectivity, explains: "We can now analyse data together with the user and, for example, optimise the machine settings." The parameter of each individual forming process and the number of forming cycles with the tools for the individual tube diameters (tube shapers, clamping jaws and internal tube supports) are visualised.

One example of using this data is if the parameters show that the assembly pressure values in a specific process are always at the limit of a defined and stored threshold, we can specifically counteract this to maintain the high quality level of the forming process. And if a machine malfunctions, the cause can be quickly identified, as all the relevant data for the machine and for the individual tools can be accessed in the cloud. This allows users to reduce or prevent machine downtime.

DATA SECURITY AND RETROFITTING ENSURED

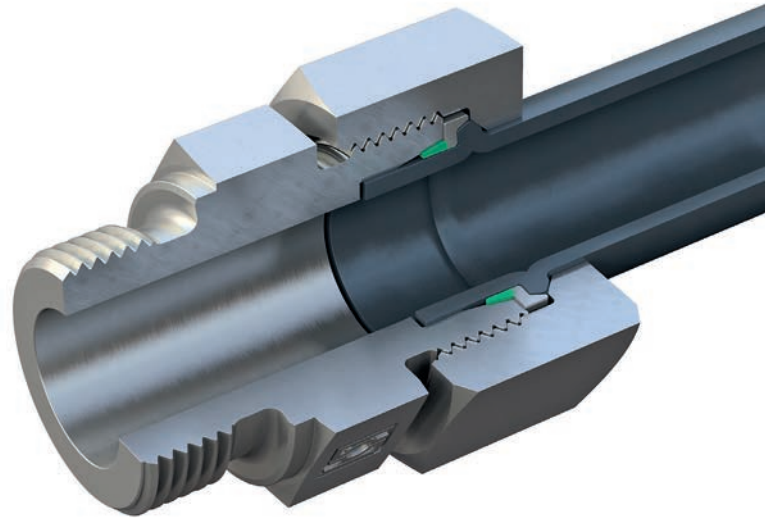
The required data security is guaranteed in all the applications presented here, as the data exchange with Stauff's own cloud is encrypted. This protects data against unauthorised access, misuse and manipulation.

This cloud connectivity allows Stauff to equip its machines with key functions – and benefits – of predictive maintenance, which is currently a hot topic throughout the industry. This solution is implemented with a communication module which connects the forming machines to the "Internet of things" and offers secure storage in the cloud.

Existing machines can easily be retrofitted with this module. Stauff has also developed a similar technology for the cutting ring assembly machines (SPR-PRC series).

OPENING UP NEW BUSINESS MODELS

A typical feature of Industry 4.0 solutions is that they offer not only technical benefits but also provide the prerequisite for opening up new business models. This also applies to connectivity and cloud storage for tube forming machines. For customers who are reluctant to purchase a new machine, Stauff offers completely new opportunities for collaboration with this technology – including selling the forming service alone on a "pay per use" basis.



02 With Stauff Form, Stauff has developed a highly reliable forming system for hydraulic tubes

DETACHABLE LINE CONNECTION FOR THE HIGHEST REQUIREMENTS

Stauff Form offers the hydraulics industry a highly reliable and easy-to-use connection system for steel and stainless steel tubes with dimensions from 6 x 1.5 mm to 42 x 4 mm. The compact machine forms a contour on the end of a conventional tube. The Stauff form ring is pressed onto the tube end with a fixed and therefore captive elastomeric seal.

This creates a positive connection which in turn provides a reliable, permanent and maintenance-free seal on the only possible leakage path when used in combination with a conventional fitting body with a 24° inner cone and a union nut compliant with ISO 8434-1, both from the Stauff Connect range. The sealing effect is supported by the system pressure of the hydraulic system, making the new tube forming system ideal for high pressure applications. Another design feature of Stauff Form is that excessive or incomplete tightening is virtually impossible. The installer tightens the union nut to the point where the force increases noticeably and completes the installation with another turn of 15° to 20° beyond this point. A clearly noticeable torque increase signals completion and the short, defined path after reaching the fixed point allows intuitive assembly requiring little space.

As all other components in the STAUFF Connect product range, the form rings are manufactured with a high quality zinc/nickel finish as a standard. This provides corrosion protection which goes far beyond previous market standards.