

Press Release

Flow-Form Screwdriving – Technology just won't stand still

JOINING SHEET METAL QUICK AND EASY & DIRECTLY!

Innovative screwdriving system for vehicle bodywork production

Whereas in the past, steel sheets were easy to join by spot welding or resistance welding, today this is no longer economical due to modern material mix. The automobile industry is under pressure from Federal requirements to reduce CO² emissions; they need to use lightweight construction and consequently find alternative joining methods. Where access to both sides of the connection point is available this can be done using rivets. If however only one side is accessible, then the well-established direct screwdriving flow-form principle comes into use. A flow form screw is positioned on aluminum- or steel sheet without pre-drilled holes and the screwdriving process begins. The screw is applied with a high down-force pressure and is rotated at an extreme high speed, generating a frictional heat which forms a crater through which the screw's thread then passes under reduced pressure. A machine thread is created; a normal screw can also pass through in the case of repairs. After the flow passage has been formed, the speed is reduced and the screw is tightened until the head connects with the surface and then the final tightening of the fastener to the pre-determined parameters of torque and angle takes place. The entire procedure usually takes less than two seconds. Additional fastening elements such as nut and bolts are not required as the assembly has been optimally adjusted to the passage and thread of the screw. The screw is fixed. There is no need for preparatory drilling or punching of the component.



Side View of the DEPRAG FFS

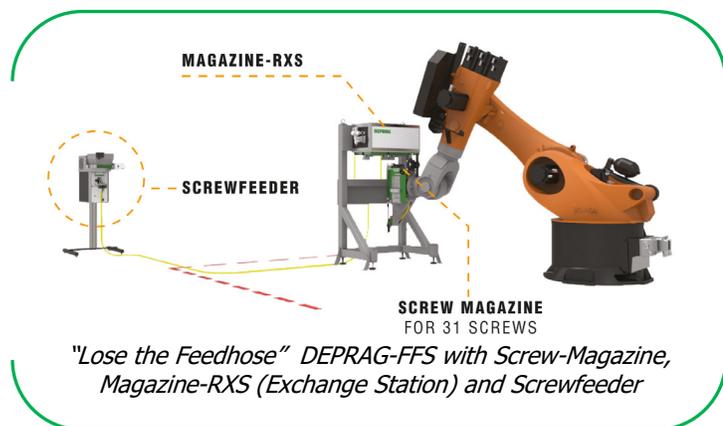
The screwdriving specialists DEPRAG SCHULZ GMBH u. CO. presented a live show on the topic of flow form screwdriving (FFS) at this year's AUTOMATICA. This presentation was aptly titled "Sheet Metal - Direct - Screw Assembly and development-, product-, and processing engineers from auto-body construction departments could gain first hand information about the next generation of the DEPRAG FFS. It is important to also understand that this assembly system is not just limited to the use in the automotive industry, but can also be applied to many other branches in which sheet metal is assembled such as white goods, appliances, etc.

What is new?

The DEPRAG engineers have successfully developed a freely programmable gear for a torque range of up to 15 Nm and a speed range of up to 8000 rpm by using two gears with 15 Nm at 6000 rpm and 12 Nm at 8000 rpm. We were also able to simultaneously reduce the cost for these gears, which means a reduction in customer investment as well as a reduction in processing costs as replacement expenses are severely reduced.

The current established FFS units usually shoot the flow-drill screws tip first through the mouthpiece. Damage to the screw tip geometry is inevitable and can have devastating consequences because the required frictional heat, which is necessary to penetrate the material, cannot be generated. It is different in the new innovative DEPRAG flow form screwdriving unit: here the screw is shot in head first and an integrated revolving separator positions the screw so that its position is secured even for overhead assemblies. The next screw is reloaded already as the first screw is being seated. A decisive benefit in optimizing the cycle time!

In developing this new generation further, years of operating experience have been incorporated. Jürgen Hierold, VP Sales at DEPRAG explains, "Due to the complex geometry of an auto body, the highest requirements for mobility of robots and the FFS unit are set. Combined rotation and pivoting movements of the robots are required in order to reach the screw assembly positions. Often the used feedhose can bend or twist so that the screws get stuck during loading. Massive disruptions to the assembly process, high risk to the processing reliability of the complete system and extensive fault clearance are the inevitable consequences. Therefore, we were approached by one of the largest internationally active companies in the automotive industry to develop a system, which presented screws without a feedhose. We have developed a magazine system for our customer, which is based on three basic elements, the screw magazine, the magazine exchange-station and the screw feeder". Whilst one magazine is in operation and docked at the FFS unit systematically presenting 32 fasteners, the second magazine is being filled at the exchange station by the screw feeder. The screw feeder is outside the



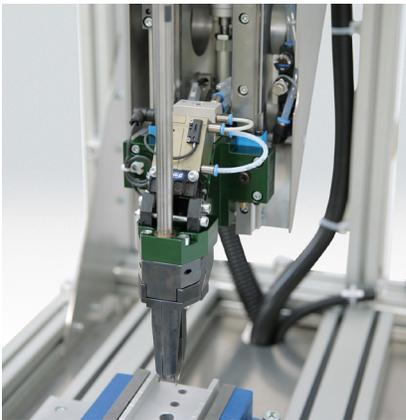
"Lose the Feedhose" DEPRAG-FFS with Screw-Magazine, Magazine-RXS (Exchange Station) and Screwfeeder

active range of the robot, refilling screws without interference in the danger zone. If the first magazine is empty or nearly empty, then the robot moves the empty magazine to the exchange station it to be refilled and picks-up an already filled magazine so that assembly may continue. Thereby the best possible processing times are achieved with guaranteed processing reliability. "We now have this exchange-magazine available as a standard solution. Even existing FFS systems can be simply and easily refitted to include this feature", explains Jürgen Hierold.

Another aim of the developers for the new generation of FFS systems was the parameterization of the screwdriving procedure for the operator. The goal was for it to be as intuitive and simple as possible. System adjustment is automatic. The operator must only enter the screw geometry (shaft diameter and length), information relevant to the part (quantity, material and strength of the sheet-metal, with/without drill hole) and the tightening parameters onto the clear-to-operated HMI panel. Of course, each screw assembly is individually analyzed and displayed. Additionally, the software provides comprehensive documentation and archiving options not only for individual screw assemblies but also for the different sets of parameters.



Easy input options for screwdriving parameter



*Single-Button exchange feature
Mouthpiece with cylinder activated
Jaws*

Another plus point is the one-touch mouthpiece exchange device. To adjust to a different screw type or when to clear a feed-error, all it takes is the touch of a button. The lock is activated and the complete mouthpiece can simply be exchanged.

Usually the holding function of the nosepieces is based on spring-loaded pressure. The disadvantage here is that the screws open the jaws against spring pressure and mechanical load through friction can occur. This is not the case on the new DEPRAG flow form unit. Here the cylinder controlled nosepiece jaws control the release of the screw, as soon as the screw begins to form the passage. Therefore friction between the screw head and nosepiece is greatly reduced.

“There are a number of advantages as a result of the improvements that we have made to the FFS unit. These changes include, but are not limited to increased user friendliness, reduction of maintenance, increased user options and simplified system integration, above all however it includes the decisively increase of the processing reliability of the complete flow form process”, concludes Jürgen Hierold.

DEPRAG SCHULZ GMBH u. CO. employs over 600 staff members in over 50 countries and is headquartered in Amberg, Germany. DEPRAG has made its name as a full service provider in the field of screwdriving automation. The core competencies include high-grade EC-servo and EC-screwdrivers, sophisticated measurement technology and first rate screw feeders. The scope of product range, service, quality and commitment makes DEPRAG a much sought-after partner in the field of automated assembly.

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