

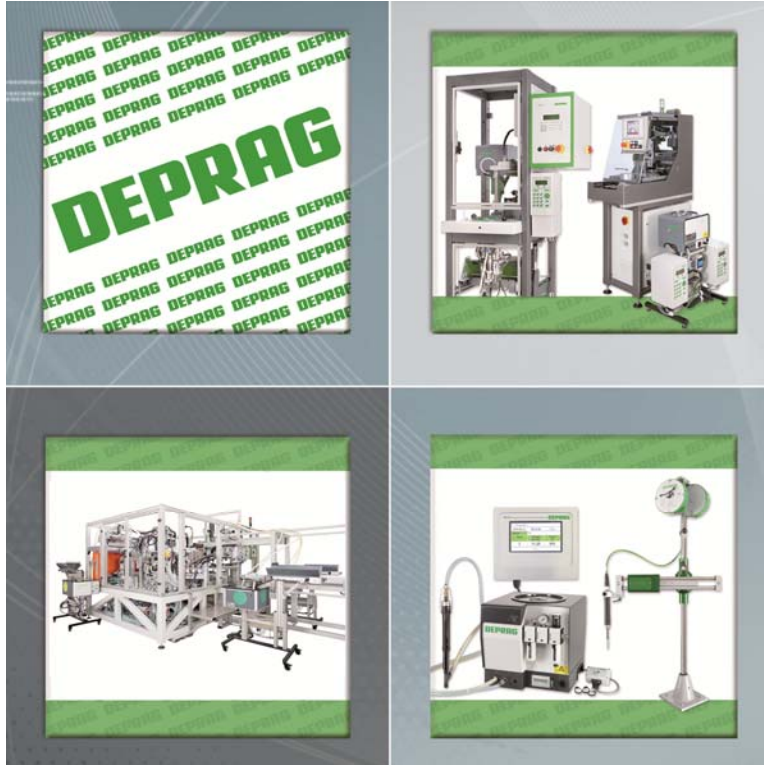
Demonstration of ECU assembly process at the AUTOMATICA 2012

Versatile assembly components from a single source

Automation partner DEPRAG - top-notch expertise on show – The player with the best recall wins the game!

In the popular game of "Memory" (or Pairs), the person who best remembers which pairs of pictures go together is the winner. "This also applies when choosing a partner to build an assembly system," explained Jürgen Hierold, marketing manager at DEPRAG. "All I have to do is remember DEPRAG's top-notch expertise in feed systems, handling, screwdriving, assembly, inspecting, testing, evaluating, analyzing and data recording, and I am already ahead." The assembly specialist means to take this message to the AUTOMATICA Trade Fair in Munich (22 to 25 May 2012). The mission is to increase awareness, and those who remember the name of DEPRAG when it comes to automation will win the game!

"As the automation partner DEPRAG, we are promoting our expertise gained from 80 years of machine manufacturing, 40 years of feeder technology, and 25 years of designing DCAMs. We are the automation partners for everything from manual workstations to fully automated assembly systems!" What sounds very much like acute self-awareness is confirmed module by module in the specially constructed assembly line on DEPRAG's exhibition stand. Its task is to assemble an electronic control unit (ECU) similar to one that might be used to control the engine in a car. For AUTOMATICA 2012 (stand 311 hall A1), DEPRAG engineers have built a linear transfer system with return, in square formation, on which the most important assembly steps are demonstrated on a sample component.



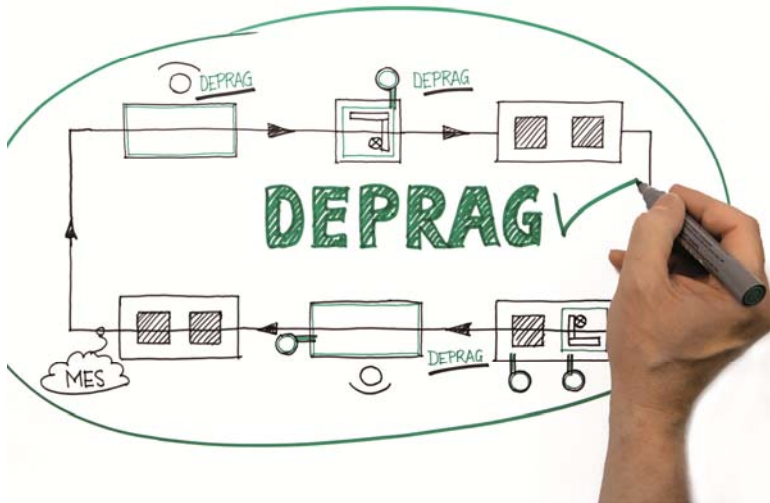
First, the upper and lower halves of the component arrive at a manual workstation on a workpiece carrier. A printed circuit board has been pre-mounted onto the lower half and is fastened down with four screws. Sales Manager, Jürgen Hierold explains, "All the relevant components for this manual workstation come from our own in-house design and manufacturing facilities. With the Automation partner DEPRAG, everything is from a single supplier. That is what distinguishes us from other assembly system suppliers." Where a high level of process reliability is required, a MINIMAT EC manual screwdriver is used and guided on a position control stand as a fully automated screw feeder device feeds the screws into the operation.

The position control stand coordinates and optimizes the screw-driving process on the manual workstation. Screws for placement on a workpiece often have to be fed through in a specific order. The "intelligent" stand controls this process as the screw can only be fitted if the worker keeps to the correct sequence. If required, it is possible to automatically select the correct screwdriving program using the screw coordinates. Functions can also be used to monitor the entire manual assembly process, such as clamping and locking the workpieces, feeding the fasteners, or triggering measurement functions.

A series 6 standard screw feeder automatically dispatches the four fasteners for the screwdriving task to the operator at the manual workstation. DEPRAG feeders position the screws with precise timing and total reliability. The oscillation amplitude in the feeder hopper is metrologically controlled and automatically regulated. It means that variations in advancing

speed cannot occur due to change in mass inside the vibrating hopper. Parameters specific to up to ten individual employees can be stored on the RFID system and retrieved by chip. As each operator starts his shift, he can activate his personal data and start the screwdriving task at his own individual pace. This produces a high level of work process acceptance, and a low error quotient.

A DPU100 (DEPRAG PROCESSING UNIT) controls the entire manual screwdriving sequence. The monitor guides the worker through the screwdriving process. As Jürgen Hierold reminded us, "DEPRAG stands for expertise and experience! For decades we have been planning and creating assembly systems along with the necessary measuring technology to ensure process reliability. Our engineers know the problems that system operators and workers face, and what they want in order to carry out their assembly tasks. This knowledge has been assimilated into specially developed DCOS software." An optimized Human Machine Interface (HMI) ensures maximum production system availability. Likewise, the control unit is designed to be very user-friendly in operation. The uncluttered color touch-screen can be operated by a touch with a finger or stylus, and can be easily seen from a distance.



If the DPU100 gives the OK to the sample part on the DEPRAG exhibition stand with its fastened circuit board, the operator sends the workpiece holder containing the part to the next workstation. In a compact assembly cell, the DEPRAG COMPACT ASSEMBLY MODULE (DCAM), a fully automated bushing pressing operation, is demonstrated. Sales Manager, Jürgen Hierold

explains, "Our DCAM is a success story in itself. Our assembly cells are in use throughout the world. There are DCAMS in Chennai, India and in Manau in the Amazon, and of course, always with on-site service." In the 25 years of producing our DCAMs, the compact work platform has been continuously enhanced. Jürgen Hierold states, "With its modular and flexible platform design, this assembly cell, combined with programmable axes, can be deployed flexibly for a wide variety of assembly tasks. When faced with an assembly problem, DEPRAG offers the solution! A DCAM combines efficiency with the greatest possible reliability process which is standardized, and particularly economical."

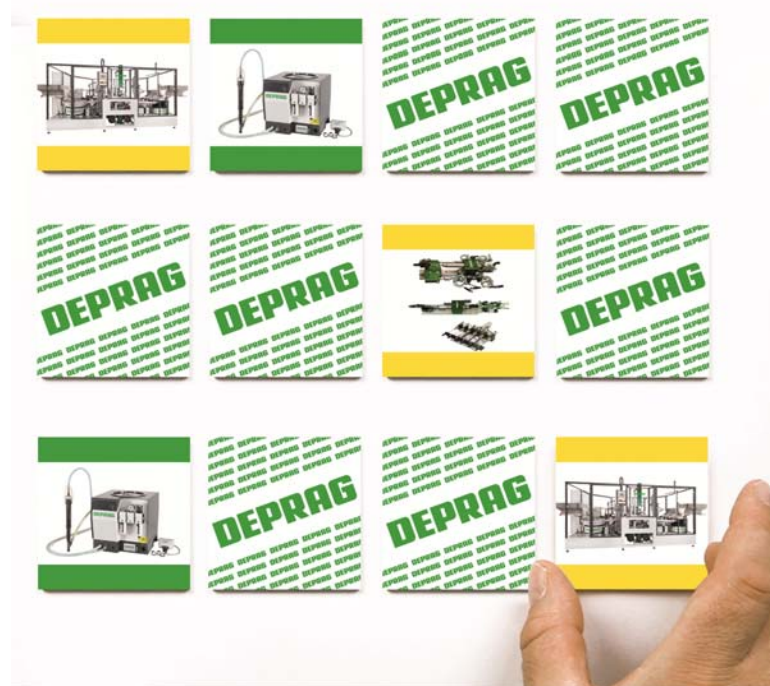
Four bushings are pressed onto the upper half of the electronic component. For this task, the vacuum spindle on the press-in tool travels towards the bushing feeder, which uses a pick and place process to ready the bushing. Then taking the bushing, it passes through a visual inspection station where the geometry of the bushing is measured. The dynamic display of test results appears on the touch screen. If the measurement is OK, the press-in tool moves above the press-in position and presses the bushing in. A force/stroke monitoring system ensures process reliability. The process is repeated four times until this assembly step has been successfully completed. The linear robot then places the upper half of the ECU onto the lower half, and the workpiece carrier moves on to the next workstation.

Jürgen Hierold explains how the assembly work is progressing, "The upper part is now screwed onto the lower part on a second DCAM. This is also fully automated, with maximum process reliability. Our screwdriving function modules with EC stationary screwdrivers have proven themselves throughout the world and are designed to ensure optimum process reliability. Torques, arcs, speeds, waiting times and rotational direction can all be programmed at will within the performance spectrum of the spindle concerned, and adapted individually to the screwdriving task at hand. The EC stationary screwdrivers are equipped with brushless EC motors and guarantee low-maintenance operation. A DEPRAG AST10 automatic sequence controller with integral web server is used in combination with a MINIMAT EC screwdriver. This makes it possible to create and configure screwdriving programs on a Linux operating system.

After the screwdriving operation, the next step at this second assembly platform, the screws are fed from a hose feeder, checking the function of the printed circuit board, which was fastened at the manual workstation. For this task, the workpiece carrier is raised and fixed in position, so that a test adaptor can make contact with the printed circuit board. If this functional test is positive, the DPU100, which is controlling the processes on both the DCAMs, indicates on the screen that the fitted component is "OK". This DEPRAG PROCESS UNIT is also equipped with DCOS software, available in various standard packages, and includes many modern operating data recording functions as well as statistical quality and process analysis functions.

The finished ECU moves forward on the workpiece carrier to the second manual workstation. Jürgen Hierold stated, "Here the component is dismantled again, so that the reliable process of assembly operation can resume, giving the next demonstration to visitors on the stand. In reality such a workstation would be used as a repair workstation, for example. The operator either removes the fitted assembly or carries out corrective work as indicated on the controller's screen. Only once the ECU has been passed as "OK" is it released to move on to the next step.

"With our exhibition assembly line we are able to demonstrate to full effect our expertise as the automation partner for the widest possible variety of assembly tasks," summarized Sales Manager, Jürgen Hierold. As with the popular memory game, if a customer turns up the cards picturing customer orientation, expertise and experience, reliability, quality, innovation, international presence, he will remember that DEPRAG is the right partner. As Jürgen Hierold concluded, "Then achieving success is child's play!" And with regard to child's play, DEPRAG has an appropriate gift for visitors who attend the AUTOMATICA. They will receive a DEPRAG memory game. Remember Automation partner DEPRAG, and win the game!



DEPRAG SCHULZ GMBH u. CO has more than 600 employees in more than 50 countries. For several decades DEPRAG engineers have been producing innovative automation concepts for a wide variety of industrial sectors. DEPRAG is not just a system integrator but the company provides complex automation solutions itself as a "one stop shop".