Press-in system retooling in 60 seconds!

How the Dutch special machine manufacturer Integron creates more flexibility and efficiency when inserting nuts into automotive assemblies with the clever combination of TOX®-Powerpackage Drive Cylinder, proportional valve technology and RFID chip

A comparatively small country and no natural resources whatsoever, but a high degree of creativity and flexibility as well as well trained experts, these are the prerequisites under which the Dutch manufacturing industry must assert itself in a competitive global environment. The keywords creativity (in this case for production technology solutions) as well as flexibility (foresighted actions or fast responses to customer requirements) are of particular importance here, as the Dutch automotive suppliers for example are faced with worldwide competition and must pull out all the stops to stay in business. The group of companies called Integron, which is active with four companies in mechanical engineering, drive technology, special machine technology and marine technology, provides repeated and effective support. Special machine manufacturing in particular focuses on the development, construction, manufacturing and service of adapted solutions for the Dutch manufacturing industry. Dirk Woudstra, head of special machine manufacturing, explains: “Our know-how is the development and realization of customer-specific solutions. Whether it is large-scale production or the production of versions in small to medium-sized batches, we build the systems, special machines and devices for these purposes with a pragmatically oriented degree of automation. The Dutch automotive industry represents a large customer segment, and here we supply highly automated production systems as well as partially automated, flexible stand-alone machines, which are characterized by multifunctional usage and fast retooling.”

Compressed air is converted to press force

A very good example for this is the recently realized flexible insertion machine for an automotive supplier, which manufactures oil coolers amongst others. Several single-purpose insertion machines have already been built for this customer, adapted to one oil cooler type each. But now the customer expressed the desire for a multifunctional insertion machine, to be able to machine different oil cooler types flexibly and quickly for example in smaller batches or for start-up series. In plain language this means that only a few hundred units each are needed per cooler type, before retooling for the next type occurs, whereby retooling should take as little time as possible. Retooling in turn means that depending on the cooler type, the press unit installed in the insertion machine must be set up for the required press force for one to four press-in nuts. Dirk Woudstra illustrates this as follows: “We have been working successfully with the pneumohydraulic drive cylinders TOX®-Powerpackage for some time. We wanted to retain this technology, as we are generating the required press force here based on compressed air in a closed oil circuit cylinder system. No hydraulic unit is required, and fast lifting movement is possible with the
purely pneumatic piston advance in forward/return stroke operations. The small, additionally adjustable as well as precisely reproducible power stroke in lifting and press force is only applied on impact on the components to be joined and thus also takes very little time. Compared to many conventional press force drives, this results in a total of very short working cycles. The pneumohydraulic TOX®-Powerpackage is thus an efficient, clean, energy-saving and environmentally friendly complete solution, which can also be easily controlled."

Precision press force paired with intelligence

As smaller series are concerned as mentioned, the insertion machine is activated manually. The 200 mm long forward/return stroke selected here provides the advantage that the operator has ample clearance to insert the bulky aluminum oil cooler components into the holding fixture unhindered or remove them again following insertion of one to up to four press nuts. The TOX®-Powerpackage Drive Cylinder generates a press force of up to 100 kN. Depending on the number and type of press nuts and oil cooler design, however only between 30 and 40 kN are required. A pressure sensor in the fixture of the piece part detects whether the set end pressure was reached. If this is not the case, an error code is displayed and the press-in station only opens once the operator has acknowledged the error. The key feature of the insertion complete solution for different oil cooler types is the RFID chip belonging to each respective product type, which issues a signal to a PLC relating to the required press force. This in turn then activates an electronic proportional valve and signals the TOX®-Powerpackage with which press force it has to press in the press nut(s). The self-activating press force setting only takes approx. 60 seconds and the proportional valve then switches in a split second, so that the operator is not required to intervene. All relevant data and parameters for the pressing procedure are stored in the RFID chip and are compared after pressing in to the process data determined by the said pressure sensor. Consequently, all press nuts are always pressed in with the press force intended for this purpose. In addition, several sensors and laser detectors are installed in the piece part fixture of the press-in machine, which check the correct position and presence of the rivet nuts as well as correct positioning of the piece part and provide the operator with visual information about proper functioning. If not, a red lamp signals the requirement for correction or replacement, the safety hatch cannot be closed and the 2-hand control cannot be activated.

Summary

Finally practical person Dirk Woudstra says: "This solution is just ideal, as it provides the customer with maximum flexibility as regards application and usage as well as top quality concerning parts delivery. We have included TOX® PRESSOTECHNIK in the project from the start and made the machine specifications available. The engineers of TOX® PRESSOTECHNIK then worked out recommended solutions and suggested the respective drive cylinders of type TOX®-Powerpackage. We received a complete solution for installation and this works so well in the
daily application that the customer has already commissioned another flexible and multifunctional insertion machine. Instead of a number of assembly presses for each oil cooler type, the customer now relies on these flexible press-in machines. They enable him to retool to any oil cooler type within one minute, he is also more productive, saves a lot of space and increases his overall competitive edge at the same time.”

**Image descriptions:**

Image 1 shows the general view of a multifunctional insertion machine for flexible application for positioning between one and four press nuts at oil cooler systems.

Image 2 shows the piece part fixture and insertion of the component with the RFID chip

Image 3 shows a detailed view of the tool and the position of the drive cylinder TOX®-Powerpackage with 100 kN press force

Image 4 shows the setup of the TOX®-Powerpackage

June 2015

Image 1 shows the general view of a multifunctional insertion machine for flexible application for positioning between one and four press nuts at oil cooler systems.
Image 2 shows the piece part fixture and insertion of the component with the RFID chip.

Image 3 shows a detailed view of the tool and the position of the drive cylinder TOX®-Powerpackage with 100 kN press force.

Image 4 shows the setup of the TOX®-Powerpackage.