

DORST Cross-Pressing Modules – X-press Technology for Near Net-Shape Powder Pressing

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As far back as in 2005, DORST Technologies equipped the first axial powder press worldwide with six servo-motorized cross-pressing modules – a development that would enable near net-shape pressing of entirely new part geometries. Major benefits of cross-pressing include the considerable saving of material and the specific side-compaction of surfaces as well as the fact that additional machining and post-processing steps may be reduced respectively eliminated altogether. Now the new generation of cross-pressing modules X-press has once again accomplished to set the benchmark both for the economic near net-shape production of compacts with undercuts and cross holes and in the field of cross-pressing.



Fig. 1 Cross-pressing module X-press by DORST Technologies (Source: DORST)



Fig. 2 Maximum configuration with six position-controlled cross-pressing modules X-press (Source: DORST)

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Introduction

Near net-shape pressing is increasingly gaining in importance, especially with high-cost powders, but also with regard to a sustainable and resource-saving production of powder metallurgy products of complex geometries. Apart from saving raw materials, this technology often makes it possible to reduce the number of costly machining and post-processing steps such as grinding operations or even eliminate them altogether. One issue that contributes considerably to this economic and near net-shape production are the new closed-loop controlled

cross-pressing modules X-press (Fig. 1) developed by DORST Technologies, which combine maximum precision, operator convenience and flexibility with unparalleled small space requirement and significantly reduced tool costs.

Technology

Owing to their modular design and flexible arrangement of up to six modules (Fig. 2, one basic setup is enough to cover the entire range of tasks and products. The individual modules can be positioned around the die as required in just a few steps and swiveled



Fig. 3 Cross hole



Fig. 4 Split die



Fig. 5 Open die

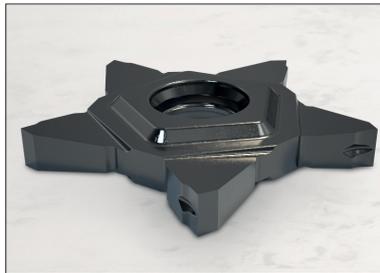


Fig. 6 Cross-pressing (Figs.: DORST)

out of the press center by up to $\pm 7,5^\circ$. Each X-press module is equipped with a precise load cell as well as a high-resolution linear position measuring system next to the tool locating surface, which enables to achieve a position control accuracy of $\pm 0,001$ mm. Combined with a maximum pressing force of 80 kN per module and high travel speeds of up to 50 mm/s, it is possible to realize even extreme demands such as are made by closed-looped cross-pressing of large surfaces precisely and without fixed stops on tool side.

The unique and innovative drive kinematics of the X-press module eliminates a spindle drive, which avoids radial runout of the axis and guarantees a completely linear movement across the entire stroke of the cross-pressing module. Combined with the compact and rigid structure of the modules and the overall system, this results in reduced tool wear and thus reduced part-specific tool costs. In addition to that, the fact that

there is no need for positive stops facilitates the design and production of the entire tool significantly, thus making it considerably more cost-effective.

When designing the modules and software, special attention has been paid to convenient set up and very quick tool change. A few quick steps are all it takes to position, clamp and determine the reference position of the modules. Owing to the seamless integration of the modules into the Intelligent Program Generator (IPG®), it is possible to generate and optimize the entire pressing sequence in a simple and user-friendly manner. The cross-pressing modules are additionally integrated into the electronic handwheel function to enable the operator both to position each module precisely and individually and to move all axes synchronously over the entire cycle.

As with all the other tool axes, the cross-pressing modules are integrated into the DORST Tool Setup (DTS), which enables a quick, standardized and reproducible product change between DORST presses.

The following examples illustrate some typical fields of application of DORST X-press modules.

Application – Cross hole

Two cross-pressing modules are placed opposite each other and equipped with a type of core rod to create a hole transverse to the main pressing direction.

Application – Split/Open die

Several cross-pressing modules are arranged in such a way that segments of the die will move transversely to the main pressing direction, thus enabling to demold compacts with undercuts or negative geometries.

Application – Cross-pressing

Up to six modules can be positioned around the die and can be swiveled out of the center if required to repress surfaces transverse to the main pressing direction at up to 80 kN.

Conclusion

The transformation towards an economic, sustainable and resource-saving production will increasingly require new pressing geometries and manufacturing processes to which the enhanced cross-pressing modules X-press can make an important contribution by enabling to reduce raw materials, process steps and tool costs.

Due to their space-saving design combined with high pressing forces and travel speeds at highest precision, the X-press modules represent the perfect complement to servomotorized precision powder presses from DORST Technologies.