

The New Generation of Hydraulic Presses – Progress in the Forming Process

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Abstract

The ever increasing requirements on today's compacts with regard to their geometry and precision call for flexible high-precision and most capable production systems. DORST Technologies has coped with these requirements by developing the new HP series for pressing forces between 1600 kN and 16000 kN and the new HS series for pressing forces between 150 kN and 1200 kN. These fully hydraulic presses featuring upper ram, lower ram, core rod, filler, up to 4 lower tool levels and up to 4 upper tool levels with closed-loop controlled movements. Thanks to latest servo technology and an electronic bus system it is possible to have all movements closed-loop controlled in the desired relation to each other. Thus, today's hydraulic presses provide high stroke rates, low energy consumption and a user-friendly interface. The input of data is carried out via clearly arranged screen masks on a touch-screen. The innovative DORST IPG® (Intelligent Program Generator) has been designed to support the set-up staff in preparing and optimizing the toolprogram. The combination of the machine type with the hydraulic unit determines the productivity in consideration of the specific application and the part to be pressed. Thanks to the closed-loop control circuits, DORST hydraulic automatic presses of the latest generation ensure unmatched precision and repeatability - and consequently process reliability - often without necessitating subsequent machining steps.

Keywords : Hydraulic Press, Precise Forming Process, Compaction without Die Sets, Side Compaction, Cross Hole.

1. Introduction

With the development of these two new series of hydraulic presses HP and HS, DORST Technologies has achieved a quantum leap in the PM industry.

For more than 40 years DORST Technologies has been a leader in the PM industry providing with the existing know-how innovations to the advancement of the PM industry.

The PM industry has to continue to develop in order to open up new product applications and in order not to give competition with alternative production processes in the existing sectors a chance. In order to ensure future competitiveness of the PM industry, the following aspects are of critical importance in the production of green compacts – the basis of the PM process:

Precision	Maximum precision of the compact
Repeatability	Constant, top quality of the compacts
Output	Maximum production rate
Energy	Minimum energy consumption
Flexibility	Very quick adaptation to new requirements
Availability	Very short setting times, absolutely reliable press concept, easy maintenance
Operation	Very easy to operate

2. Hydraulic automatic presses, HP series

The new series of presses from 1600kN to 16000kN with its modular concept, rigid press frame, pre-stressed tie rods, precisely operating die sets and filling from the side enables to produce intricate multi-level parts on a high precision level. The die sets comprise up to 4 upper and 4 lower levels with centralized, precise support of each platen by mechanical stops in pressing position. Fully automatic die set change minimizes the setting time. An energy management system in the software calculates the maximum output rate of the compact and reduces energy consumption to a

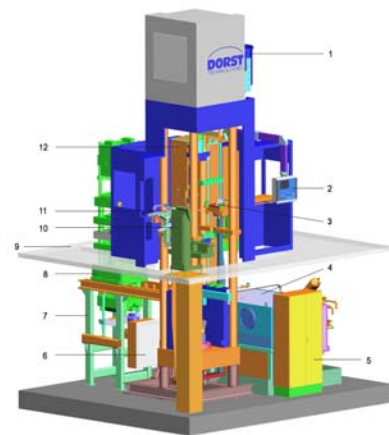


Fig. 1 Hydraulic automatic press - HP series

minimum. Compact optimization via IPG® provides a powerful tool for the operator to use his experience in powder metallurgy to manufacture a “good” part within minutes.

3. Hydraulic automatic presses, HS series

The new series of presses from **150kN to 1200kN**, with tools installed directly on the press, of extreme rigidity and with precisely controlled movements, meets even most stringent requirements regarding precision of geometry of the compact. High precision quick-action clamping systems minimize setting times while maintaining maximum precision in axial and radial direction. Pressing accuracy in the range of μm is ensured by precision guide ways, extreme rigidity, high-precision clamping systems and by measuring systems with a resolution of 0.0001mm. No costs of investment for storage, maintenance and repair of die sets. CNC presses without die sets, together with the IPG®, constitute an unbeatable “package” for more flexibility of production modules. A unique feature is the fastest job changeover, because tool and program can be installed within minutes on the respective type of press, and production can be started immediately. This new HS system on multilevel compacts makes powder pressing more efficient.



Fig. 2 Hydraulic automatic press TPA 30 HS Side compacting and cross hole – a new dimension

Side compaction is a spectacular leap forward in technology from uni-axial to multi-axial pressing. Up to six separate, freely adjustable and independently closed-loop controlled pressing punches operate in transverse direction to the main pressing direction. Undercuts – up to now nearly impossible to master – can be produced in one single step. No additional machining steps required; for many part families this means an enormous savings potential. Side compaction opens up new ways in product design. Article geometries so far not feasible by other production methods, are now possible. With side compacting a cost-effective alternative is being created to injection molding and MIM. In addition DORST Technologies offers many years of

experience in tool design for efficient implementation of the new dimension.

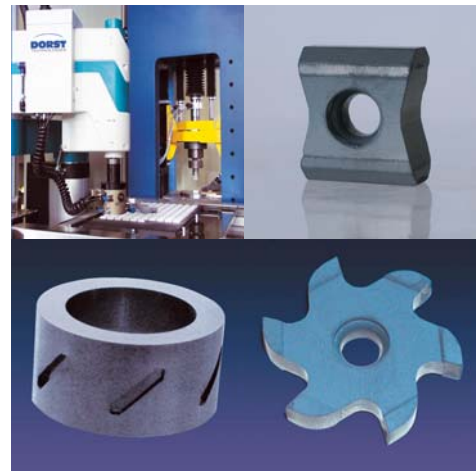


Fig. 3. Side compacting & cross hole

Also cross holes can be pressed on presses of the HS series. Two precisely controlled axes make holes transversely to the pressing direction feasible.

4. Summary

The two concepts of the closed-loop controlled hydraulic presses of the series HP from 1600kN to 16000kN and HS from 150kN to 1200kN from DORST Technologies meet all the requirements mentioned above in the introduction.

Maximum precision, precise maintenance of the tolerances in continuous operation, maximum production rate for intricate parts, minimum energy consumption, great flexibility in adaptation to new requirements, maximum availability of the machines for production and high comfort in operating the machines open up again and again new ways to obtain orders for new parts. Once again DORST Technologies is the trend setter in the PM industry.