



# ***Try-Out Presses “With System”***

***Application Report  
FRAUNHOFER Institute***



***“100% Parker in Presses”***

# Complete hydraulic system for new “try-out” presses

Parker supplies a powerful system for shaping technology

Based on a hydraulic two-column press from Umformtechnik Erfurt, a new generation of “try-out” presses have been developed at the Fraunhofer Institute for Machine Tools and Shaping Technology (IWU) in Chemnitz. The complete hydraulic system originates from Parker Hannifin Systems Technology in Chemnitz. This comprehensive project, whose innovative base module can be used on other presses, contributes considerably to the testing and running-in of press dies. A highly dynamic, extremely precise operating hydraulic system is absolutely essential and was achieved with the Parker products. The try-out press from IWU possesses everything which will gladden the hearts of hydraulic engineers: Direct pump drive, accumulator drive, parallel ram retention, hydraulic cushions in the ram and 16 separately controlled hydraulic cushions in the press bed.

**Experience in project planning, dimensioning, design and manufacturing of large hydraulic drive and control units for presses** - these were the preconditions for the

**A Parker piston accumulator drive with integrated highly dynamic proportional 2-way valves of series TDL** reproduces the driving behaviour of a mechanical press.



The individual base modules for the stroke controller can be extended or adapted to other presses.

take-off of this project. Dr.-Ing. Thomas Päßler, project coordinator at IWU in Chemnitz, referred to the use of Parker components in earlier projects:



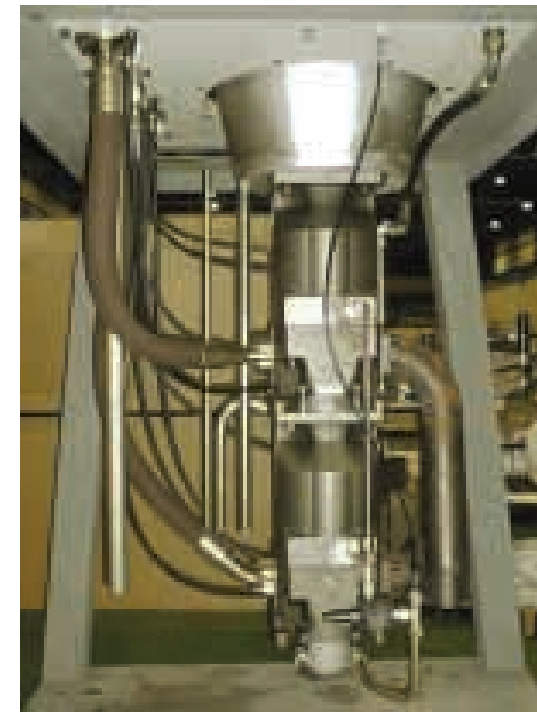
Dr.-Ing. Thomas Päßler, Project Coordinator for the try-out press at Fraunhofer IWU in Chemnitz.

“Apart from market economy reasons and the increasing level of direct contact with Parker Hannifin Systems Technology in Chemnitz, our positive experience has led to increased joint activities. Even during the project planning phase our own ideas were considered, from which it was possible to set up a joint project. During commissioning and servicing we also received fast and competent support.”



Try-out presses appear to be “top heavy” since a major part of the hydraulic control units are installed in the upper part of the press and hence close to the consumers.

This involves the ram following a specified path and velocity profile at a velocity of 10 to 500 mm/s. Two piston accumulators each with a volume of 140 litres provide the 16,000 kN pressing force for shaping works following charging and when running at maximum stroke. Thanks to the proportional throttle valve TDL 100, nominal size 100, alone this extreme velocity profile became controllable with a full stroke position time of 22 ms. A TDL 100 valve can safely control up to 30,000 l/min at a pressure differential of 100 bar. At the same time it can also manage very small flows precisely through the hydraulic follower.



The Parker twin pump module resulting from the project, with 2 PVplus pumps incl. mounting plates, electric motor and piping, will be the standard drive module in future press hydraulics.

## High efficiency - low energy loss

The PVplus twin pump combination permits the press drive to achieve high processing accuracy with optimum energy utilisation. Each of the three high pressure twin pumps, which are of the same version, is driven by a 132 kW three-phase motor (1,450 rpm) and delivers up to twice 400 l/min of hydraulic oil at a maximum operating pressure of 280 bar. “The pumps and valves from Parker fully meet the high technical demands which a try-out press makes on the hydraulic system”, confirmed Dr.-Ing. Päßler. Regulation of pressure, volumetric flow and power for each individual axial piston pump in swash plate design is carried out by a p/Q electronic module. The drive always operates on the optimum characteristic curve of the three-phase motor, so that the best possible pump efficiency is achieved and energy losses are avoided. Volumetric flow regulation is carried out by a standard proportional valve with an electronic P\*D controller - a cost-effective solution with the big advantage of high control-reproducibility.

The modular design of the press drive is continued in the stroke controller of the try-out press, in which all the control modules are mounted on one base block. The stroke controller has been divided into pump train relief, press movement and return stroke movement as well as the control of the filling valve. Protection of the ram from non-permitted falling down and pressure intensification is ensured with leak-free 2-way active cartridges of series C13 and safety valves from the press safety program - from Parker.

## Optimum, reproducible shaping results

A control block with four hydraulic bubble accumulator permits the operation of the ram cushion as a closed circuit which is independent of the main press drive. Optimum and reproducible shaping results can be achieved since the insertion of the ram cushion does not impair the ram movement during the shaping process. The parallel ram retention as well as the 16 hydraulic cushions in the press bed are supplied by a 5,000 litre Parker hydraulic unit with two PVplus twin pumps.

The 16 hydraulic cushion cylinders are constructed as hydraulic axes with regulating valves and position transducer. They are separately controlled and can be freely positioned within a 150 mm grid system. For this project, Parker manufactured customized cylinders allowing direct mounting of the control block without piping.



Two out of 16 hydraulic cushion cylinders with directly flanged control block: Pressure, tank and control lines are mounted directly.

## Thanks to its modular design the hydraulic drive and control technology of the try-out press can easily be adapted to other presses.



Dipl.-Ing. Hans G. Fleischer, Business Manager of Parker System Technology, carried through this project successfully with his team.

In order to obtain an hydraulically-rigid system all the control units are arranged in the immediate vicinity of the consumer.

The hydraulic concept of Parker Hannifin Systems Technology in Chemnitz has in the meantime been applied to two other try-out presses at two well-known car manufacturers.

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**The Fraunhofer Institute for Machine Tools and Forming Technology IWU** was established in 1992 in Chemnitz, the industrial and economic centre of Southwest Saxony.

At Fraunhofer IWU, more than 140 employees and approximately 100 students of various subject areas carry out applied research in the fields of forming technology and cutting methods which are unique to the tool and die industry. In the year of the project concerned alone, 410 projects were carried out together with the industries, involving ca. 100 students.

Since its founding, the Institute has undergone continual growth and improvements in both its administrative and research facilities. These efforts were crowned by the new test facilities which were opened at an official ceremony. The facilities consist of a shop for forming technology with machine tools for sheet and bulk metal forming, a shop for tool manufacturing with precision machine tools, 3D-coordinate measuring technique and machining centres for cutting methods, as well as a laboratory and office area. The Institute is laid out over 6,000 m<sup>2</sup>, where research for regional, national and international machine and automotive industry can be conducted.

The project on which this report is based was supported financially by the **SMWA, the State Ministry of Economic Affairs and Employment of Saxony** (project no. 5987/920). Responsibility for the contents of this report is with the editors.



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HY11-3270/UK,  
10/2002