



## The Power of One

### Location:

Nordhausen, Germany

### Segment:

MOEM

### Problem:

Test systems for burst tests, autofrettage, pulse tests and rotating bending fatigue and for supporting series production and prototype development

### Solution:

Electrics: XC200 compact PLC,  
Hydraulics: Axial pumps, vane pumps, hydraulic valves, hoses, fittings, pressure filters

### Results:

Fast and uncomplicated programming and commissioning of the test stand.

### Contact Information

Peter Domke  
Sales Representative, Eaton Electrical Sector  
PeterDomke@Eaton.com

Juergen Bach  
Lead Engineer-Appls, Eaton Hydraulics Group  
JuergenBach@Eaton.com

Christian Buecker  
Trade Press Manager  
ChristianBuecker@Eaton.com

*The fact that we can source both the hydraulics and the electrical engineering from Eaton as a single supplier opens up new possibilities for us*

*Frank Baudler, Poppe + Potthoff Maschinenbau*

### Background

Poppe + Potthoff is a company that specializes in the field of high pressure. From high pressure lines, pipe components and precision parts, right through to machines and services for testing technology, the group of companies develops and produces advanced technology solutions for the automotive and utility vehicle sector, shipbuilding and general industry. An Eaton test system with Eaton hydraulic and electrical components is one of the latest projects. Over the course of the cooperation, Poppe + Potthoff Maschinenbau GmbH came to value the partnership with Eaton and the possibility of sourcing components as well as solution know-how for both worlds from a single supplier.

### Challenges

At its Nordhausen site, Poppe + Potthoff concentrates on test systems for burst tests, autofrettage, pulse tests and rotating bending fatigue and for supporting series production and prototype development. The latest machines include a

burst pressure test stand that is suitable for both testing tube fittings and also hydraulic hose lines, and which also fully supports the new and further development of these components. Test sequences can be programmed flexibly, not only allowing testing with linear pressure increases and decreases, as well as holding times at a constant pressure and volume, but also burst pressure tests with a linear volume flow. In a massive test chamber with a 10 mm stainless steel safety cage, test objects can be burst tested in a controlled manner at pressures of up to 4,000 bar, for which data can be recorded in real-time with an accuracy of 100,000 measured values per second.

### Solution

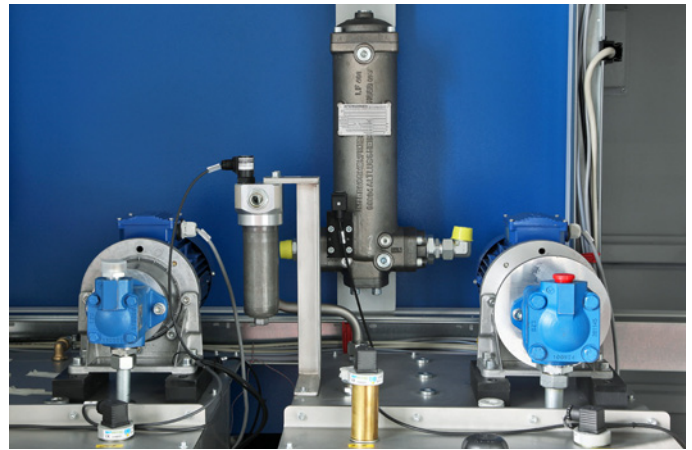
The development of the test stand described placed particular requirements on the design of the system, particularly because of the different properties of the test objects, fittings and hoses.

In the past, Poppe + Potthoff Maschinenbau GmbH had the hydraulic power unit



Powering Business Worldwide

Eaton Corporation is a diversified power management company with more than 100 years of experience providing energy-efficient solutions that help our customers effectively manage electrical, hydraulic and mechanical power. With 2011 sales of \$16.0 billion, Eaton is a global technology leader in electrical components, systems and services for power quality, distribution and control; hydraulics components, systems and services for industrial and mobile equipment; aerospace fuel, hydraulics and pneumatic systems for commercial and military use; and truck and automotive drivetrain and powertrain systems for performance, fuel economy and safety. Eaton has approximately 73,000 employees and sells products to customers in more than 150 countries. For more information, visit [www.eaton.com](http://www.eaton.com).



manufactured by an outside company, however, the machine builder decided to pursue a different approach with this test stand. In partnership with Eaton, an in-house hydraulic power unit was developed which is controlled by Eaton automation and switchgear technology.

"In order to create the pressure in our plant, the hydraulic power unit first of all generates a pressure of up to 350 bar," explains Johannes Montag, responsible for Design Construction at Poppe + Potthoff Maschinenbau GmbH. "For the first time we have used two pressure amplifiers to create the high pressure. These have different piston diameters so that we can pre-fill quickly with the large pressure amplifier and then, particularly for position-controlled burst pressure testing, very finely regulate the pressure at high resolution using the small pressure amplifier." The key components for the precise control of the pressure amplifiers and thus the pressures in the test chamber are the proportional valves.

Besides the proportional valves for the two pressure amplifiers, other important hydraulic components for the drive, control and connection are supplied by Eaton and integrate together seamlessly. The following components are used: Axial piston pumps and vane pumps, as well as valves from Eaton's Vickers product series, Aeroquip hoses, tube fittings from the Walterscheid product

series, screw in cartridge valves from the Integrated Hydraulics brand, as well as Internormen pressure filters and ventilation filters for the tank system. For the machine builders in Nordhausen, the service oriented integration of Eaton's distribution arm also played an important role in the cooperation with Eaton. The Düsseldorf company Hyflexar Schlauch- und Armaturen GmbH was the Eaton service partner for Poppe + Potthoff, that not only kept all tubes, pumps and fittings in stock, but also configured and installed on site with its mobile workshop fluid conveyance solutions to customer specifications, as well as providing a 24/7 spare parts service. Furthermore, the Eaton Store in the Rastatt Service Center provides Eaton customers and partners with a point of contact for components and finishing services.

The proportional valves of this burst pressure stand are connected to the controller via CANopen. Poppe + Potthoff chose Eaton's modular XC200 for the PLC. "For us, the XC200 offers two major benefits for this test stand," explains René Karwoth, who is responsible for software development at Poppe + Potthoff in Nordhausen. "Firstly, the integrated Ethernet interface allows us to connect the PLC directly to National Instruments LabVIEW and the network, without having to use MPI or PPI converters as was necessary before. Secondly, the CoDeSys-based software (SW-XSoft-CoDeSys-2) and the extensive range of functions of

the closed-loop control toolbox enable us to complete programming and commissioning faster and more conveniently than before

"Eaton's closed-loop control toolbox contains around 120 ready-to-use function blocks that make life easier for the developer by providing already implemented closed-loop control know-how, so that individual application solutions can be made simply and quickly by combining and cascading standard function blocks.

A commissioning screen created with the XSoft-CoDeSys Target visualization shows all important parameters at a glance, and thus not only noticeably simplifies commissioning, but also supports the end user with later optimizations.

Poppe + Potthoff also sourced key components from Eaton in terms of switchgear. These include contactors, motor-protective circuit-breakers, soft starters, power supply units, miniature circuit-breakers and residual current circuit-breakers for this burst pressure test stand. In addition to this are the operating elements and safety technology products. The burst pressure test stand is thus provided with a two-hand control, an emergency-stop circuit and interlocking doors that are switched using Eaton safety relays.

## Results

"Thanks to this project and the close cooperation with Eaton, we are now able to also offer

our customers Eaton hydraulic power units in future for different test stands," Frank Baudler, head of engineering/R&D at Poppe + Potthoff Maschinenbau GmbH, is delighted. "The fact that we can source both the hydraulics and the electrical engineering from Eaton as a single supplier opens up new possibilities for us. By taking on our suppliers as partners, we can also increasingly give them greater responsibility." In future the specialist for high pressure test stands will also use Eaton hydraulic power units in different performance classes. Thanks to the broad and comprehensive range of Eaton products a scaling of the unit is easy to implement.

