

for clients, suppliers and employees of Moehwald GmbH

CRI 4000 Injection Test Bench

To give our customers the ideal platform for all Common Rail injector tests, at the beginning of the year we added the CRI 4000 model test bench to our portfolio. This test bench was designed to be used both for development and for small series testing of diesel injectors in the automobile, commercial vehicle, and large diesel areas.

Its very compact basic structure is composed of the base frame with an integrated oil pan, the large, easily accessible test chamber, and the measurement system and power cabinet. To save space, the base frame integrates the high-performance high-pressure assembly with up to 2200 bar peak pressure and the entire media supply system. The wide-opening doors give the operator optimum access to the test chamber and to the injector holder on the measurement head of the EMI 21.

Especially for large-scale diesel applications with injectors up to 1000 mm high and a test object weight of significantly greater than 10 kg, this simplifies manual test object clamping and hydraulic adaptation. The extensive noise insulation encapsulation permits the test bench to be operated in a laboratory setting with other workplaces without the noise level being perceived as an irritation.

Specific selection of the measurement system and test object control system has made it possible to adapt the test bench perfectly to



Test bench CRI 4000

customer-specific measurement tasks without varying the basic structure and operation for the areas of use listed. This allows the flexibility to be retained for later adaptation to new injector types at any time.

This has served us well in the past few years with recent developments in the model family of the EMI21 injection volume measurement system, which is now available with four devices in the measurement range end values of 600 mm³, 1500 mm³, 5000 mm³, and 10,000 mm³ per injection cycle.

In addition to the relevant pressure and temperature values, the control and/or guidance leakage of the injector is measured extremely accurately with a continuous measurement system and logged. Independent of the test power stage used, both classical solenoid valves and injectors with piezoactuators

can be controlled with up to 8 partial injections. Alternatively, the rail pressure regulation and injector control can also be implemented with a customer-specific engine or test controller that is parameterized and controlled via corresponding interfaces. The operation, control, and visualization all use an industrial PC and large 19" monitor integrated into the measurement systems cabinet. The set-point values for test pressure, injection frequency, and injector control can be parameterized and varied during the test cycle along with many other characteristics via the extremely flexible Prisma NT testing software. The system can automatically be brought to an arbitrary number of load points, and the values are measured and stored.

With the CRI 4000, we can provide our customers with the ideal test environment for precise injector investigations. Both for the development area and also as a test bench for small series in injector fabrication.



Accessibility to the test area

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best testing – best quality

moehwald
Bosch Group

A lot more real time – PRISMA RT is here!



Many people know of our Prisma NT test systems platform. It was created 14 years ago from customer desires to be able to create test programs and tests independently with the least effort possible. In the meantime, Prisma NT is running on almost 2000 test benches worldwide. Continually developed further and driven by good ideas and the suggestions of our customers, Prisma NT today is a power application platform for test benches. And it can handle real-time applications, too – so why the need for something new?

Prisma NT uses signal processor subsystems to solve real-time tasks, which lets us meet most requirements today. Parts of the hardware and software outside the signal processor environment, however, may not communicate with it with the determinism needed. Measured values from field bus peripherals or software controls on the Windows

computer, for example, aren't guaranteed to be available within the increasingly small time intervals. These are the limits that today's testing system software has to remove. Then real-time capability will be available throughout the test bench, and we can solve today's and tomorrow's tasks efficiently and cost-effectively with the optimum components.

Thanks to our extensive experience with Prisma NT, the Bosch/ATMO OpCon control system, and our customers' current requirements, the next generation of our test system software is now ready for use: **Prisma RT – RT for real time.** Equipped with real-time-capable interfaces to field bus peripherals (e.g. EtherCAT master and slave interfaces), to program code (e.g. MATLAB Simulink), and high-end measurement system cards, this software provides all the technical options needed to solve the tasks of

the future quickly, simply, and cost-effectively.

Just as in Prisma NT, there are tools available to the user that make it easy to manage this complex technology and manage it efficiently. In RT Studio, test procedures can be changed and measurement channels "rewired", configured, and calibrated. The new visualization module developed in collaboration with the Bosch internal special machinery group ATMO1 provides modern displays and a variety of configuration options. With this toolbox, the user can adapt their test bench to quickly changing needs independently within very broad limits. Using the integrated Web server, the status of the real-time system can be observed and controlled at any time, so that Prisma RT offers temptingly simple access in this area as well.

Prisma RT can be used for a variety of purposes. With its flexibility, it's the perfect choice for laboratory applications and development test benches on which test processes can be developed and optimized. For the integration of e.g. handling or security functions, it can easily be connected to OpCon. And thanks to the open Ethernet and EtherCAT interfaces, it can be used together as a power subsystem with Prisma NT, OpCon, or other higher-level systems. That means it is now possible to transfer tests and algorithms perfected on development test benches to production test benches with very little effort.

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FLR 1000:

Leak testing for gasoline injection valves

After the successful market introduction of FID measurement systems in 2006, the conventional design of the FLR 1000 leak test bench was updated based on experience with different customer requirements and test bench implementations.

The changes involve both the mechanical structure as well as adaptations of the test systems to the increased requirements of our customers for leak testing. Mechanically, we added a modular implementation to our compact test bench for this reason. This solution makes it possible for the operator to adapt the test bench perfectly to the space available. This extension also gave us the opportunity to provide the test bench with its working gases in a flexible manner, that is, through a central supply or partly/ completely from gas bottles.

Due to our customers' increased requirements for our testing systems, the existing pressure regulation (± 3 bar accuracy) can optionally be extended with a high-precision pressure regulation at up to 300 bar (± 0.5 bar accuracy).

To ensure a stable test run at this pressure level, the test bench is equipped with a pressure converter. The test bench can thus be operated independently of the supply pressure available from a central or



bottle pressure supply. To ensure that testing of injection valves is close to real operation, an optional heater can be added to the test bench. This permits tests on heated values in a temperature range of up to 100 °C. The test bench is designed in such a way that even in the case of a temperature test it doesn't need to be setup in an Ex protection area. That makes it flexible to use and means it doesn't require much space investment on the part of the operator.

Particularly for development departments, this test bench continues to provide a system that can be used in a variety of today's applications in the area of leak testing.

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Spotlights

Anniversaries in 2010

10 years:

- **Christoph Meyer, Stefan Hemmerling, Patric Weirich, Joachim Wenzel, Hagen Dahl, Jürgen Gentes, Dr. Michael Ziegler, Andreas Bastian**

25 years:

- **Robert Jennerwein**

To retire

- **Dr. Hermann Bolle**

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† Obituary

We mourn our employee
Ludwig Daniel.

“More power, Scottie”



Science fiction fans know how easy it was for Captain Kirk to issue that command to his Chief Engineer. Today, everybody's talking about energy, but from a very different point of view.

By 2050, the world's energy requirements are expected to double, even as resources dwindle. Even though there are sufficient amounts available right now, even today energy is a cost factor that cannot be underestimated. These insights are nothing new, but their significance is growing at an increasing rate – even at Moehwald. While developing our test benches, we have continually made sure they

waste no energy. Where the electric power grid permits it, we work with return power feeds to avoid simply discarding braking energy; belts run only when there is something to convey. But there are still often compromises to be found between immediately availability of a test bench and the lowest possible energy consumption. Test benches operated with warm media, for example, can be brought to temperature shortly before planned using with a simple time controller, and need not be kept permanently at the target temperature of 40 °C overnight. In 2009, we started to devote even more attention to the topic of energy efficiency. We started an energy checklist – the “sin list” – and power audits, and are now systematically examining our plants. We want to

provide our customers not only particularly good test benches, but also very frugal ones. We have learned just how fascinating and varied the topic of energy efficiency really is. We still haven't completely determined power consumption or the consumption of compressed air and cooling water. Every machine has multiple operating modes that are engaged for different lengths of time. Only a detailed analysis can bring potential savings to light. With the experience gained from our own products, we hope to offer our knowledge as a service in the future as well. That will benefit not only our customers, but the environment itself.

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Change in business management

*Dear business friends,
dear colleagues
everywhere in the world*

I have had the opportunity to enjoy 34 unbelievably interesting years of my career. Now it's time for me to start a new phase of my life. After more than 11 years, I will step down from the management of Moehwald GmbH in July 31, 2010, and will devote myself entirely to private life in the future. I would like to take this opportunity to thank you all for the trust you've place in Moehwald GmbH



Dr. Hermann Bolle and Wolfgang Geenen

and in me for all these years. Times haven't always been easy, but for me they have always been infused in a spirit of cooperation and mutual respect. I am very thankful for that.

The greater part of my former tasks will be handled by my technical colleague of many years, Wolfgang Geenen, with whom I've worked together closely for all these years. Business tasks, as well as the responsibility for our production facilities, will continue to be handled by my colleague Jens Last.

I would ask you to work with my colleagues in the same constructive way you did with me. I wish you and your teams all success in the coming years. In this spirit: All the best to everyone!

Yours, Hermann Bolle

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