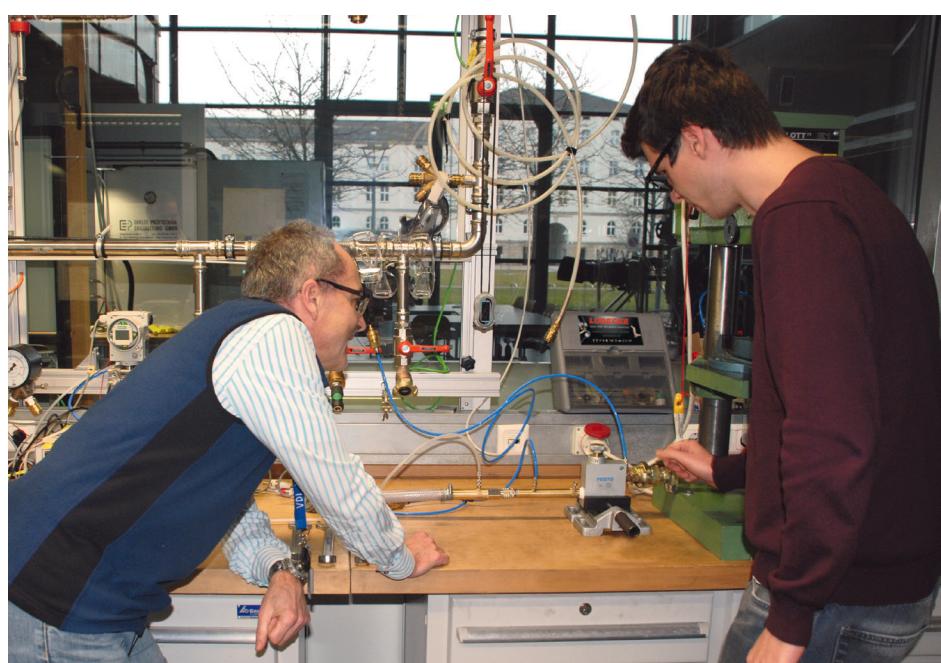


Energy efficient coupling systems for compressed air applications

Despite numerous advantages, compressed air has more often than not the reputation of being a cost intensive energy carrier. However, on closer inspection, this popular assumption is not justified. Because often, too narrow pipe cross-sections, line networks with leaks, and fittings that are inadequately set up for mechanical flow, lead to high-energy loss and unnecessary high consumption values.

As a well-established provider of quick disconnect coupling systems, **LÜDECKE** has been concerned with the energy efficiency of its products for a long time. Thus, the goal of a student project, in cooperation with the Eastern Bavarian Technical College Amberg-Weiden, was the optimization in accordance to the mechanical flow of the automatic shut-off of quick coupling systems for industrial continuous use.

The purpose was to determine the highest possible flow rate with the lowest decrease of pressure with the dimensions of the operational practice established, "Euro-Profile" DN 7.2. In cooperation with Prof. Dr. Andreas P. Weiss's laboratory for continuous-flow machines at the EBT College Amberg-Weiden, flow studies were conducted to improve the inner geometry of the couplings. Afterwards they succeeded in implementing the results and verified them with the help of a flow rate control unit.



The test set-up consists of a piping system with an electronic feedback controller. By using a pressure sensor and a pressure reducer, the controller maintains the pressure at a predetermined level. The same applies in the event that compressed air is removed from the system.

The requested predetermined pressure can be manually adjusted. Additionally, a hot wire anemometer takes the measurement of the flow rate of the compressed air.

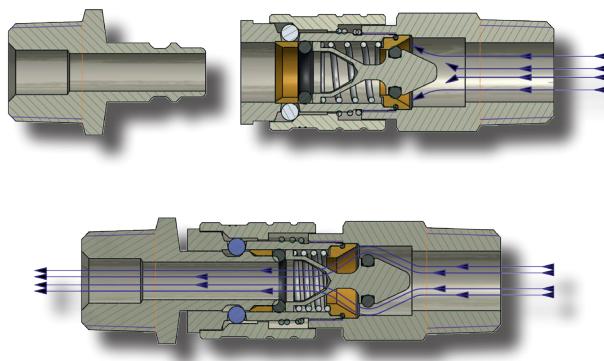
Test set-up of the EBT College Amberg-Weiden
(left: Prof. Dr. Weiss; right: Student Michael Singer)



Beginning at the pipe system, and with the help of individual fabricated testing items, the medium first flows through the coupling ① and afterwards the plug nipple ②, before it enters into the open through a needle valve. ③ The test object of the coupling has a pressure gauge at the entrance of the coupling system ④ (pressure before coupling). The test object of the plug nipple has a sensor at the outlet ⑤ (pressure after coupling). With the needle valve, which is mounted to the test object of the plug nipple, it is possible to vary the flow rate through the coupling system.

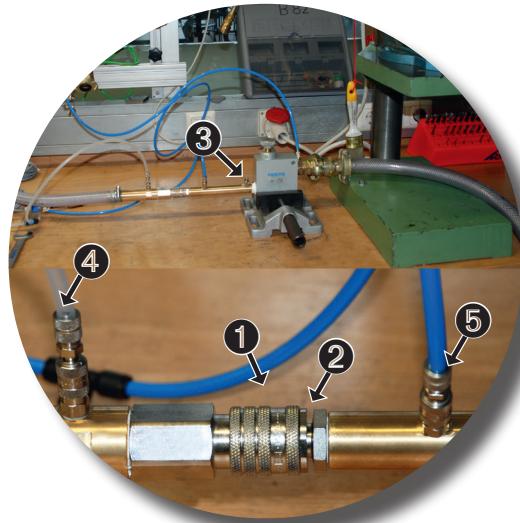
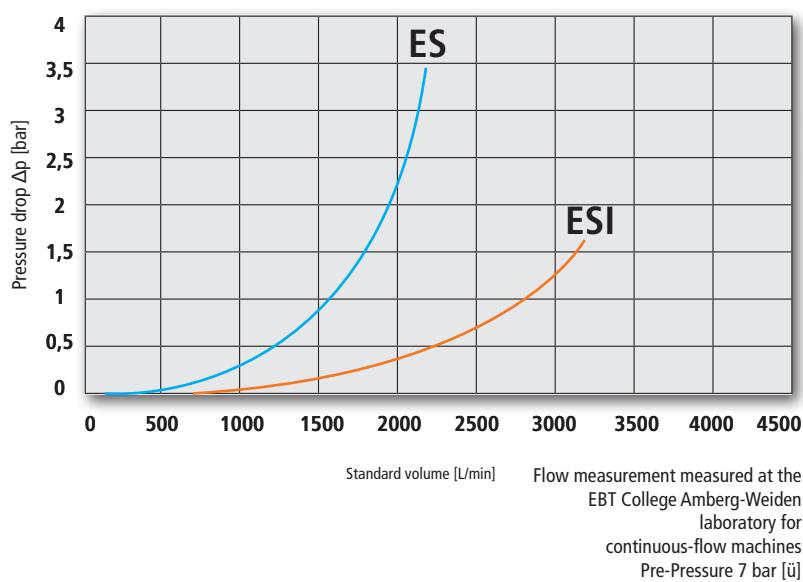
Flow-through simulation of the quick disconnect coupling series ESI with Opti-Flow technology

**Opti
Flow**
by LÜDECKE



Flow comparison chart

European-Standard-Couplings DN 7.2 to series ESI DN 7.8



The measured values of the two pressure sensors and the current flow rate are displayed and recorded with the help of a LabView programmed surface. From the measurement results, the pressure difference between entry and exit of the quick disconnect coupling dependent to the flow rate can now be determined. Thus, a relative statement to the efficiency of the coupling can be made: If at a lower pressure drop Δp more volume is forwarded, results in less loss within the coupling. The resulting comparisons of different coupling systems give an indication to their energy efficiency.

The performance of the individual operations was worthwhile. For example the flow of the industrial quick disconnect coupling (series ESI DN 7.8), increased from 1800 l/min to 2150 l/min (one-way shut-off) with the same inlet pressure. Therefore, with the use of **LÜDECKE** coupling systems in continuous industrial use, an enormous savings potential is available.

DISTINCTLY HIGHER ENERGY EFFICIENCY IN CONTINUOUS INDUSTRIAL USAGE!

LÜDECKE quick disconnect couplings with Opti-Flow Technology

- high energy efficiency and long durability
- high operational safety and absolute sealing
- easy coupling as well as optional safety air-relief disconnect
- compact, ergonomic construction

LÜDECKE-quick disconnect coupling systems are characterized by their energy efficiency through their high durability, operational reliability, absolute sealing, easy coupling and optional safety air-relief disconnect. Thanks to their compact and ergonomic construction, they enable a maximum energy flow with simple handling from the generation of compressed air all the way to the tool. Working with lower inlet pressure is therefore realizable. This in turn contributes significantly to a distinctive reduction in energy costs and an increase in uptime and durability of pneumatically run machines and tools.



**Opti
Flow**
by LÜDECKE

- ✓ extremely high flow-through rates
- ✓ less pressure drop
- ✓ large passageway
- ✓ streamlined valve



Since more than 80 years, **LÜDECKE** has been the competent partner for supplying coupling systems to connect flexible, media-carrying lines with tools, machines and equipment.

In Amberg, **LÜDECKE** produces fittings for a variety of industries and various media, which are internationally distributed through technical trade specialists, or are implemented by leading machine manufacturers in OEMs.

The product spectrum includes a comprehensive range of standard and custom-configured solutions - **Engineered and Made in Germany**.

The **LÜDECKE** quality management is accredited with ISO 9001-2008 since 1994. The quality standards meet worldwide measurements and fulfill highest requirements.

For more information visit: www.ludecke.com

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