ADAMS
ARMATUREN

MAKO

New generation
Control Valve
Built to meet critical requirements

Made in Germany

The company

The plant in Herne was acquired in 1972 and the company management already planned a long way ahead. The land provided sufficient space to expand and thereby accommodate the fourteen production buildings erected so far, as well as the adminstration building. Today, more than 250 employees work in the main adminstration building and at the plant.

Our plant in Herne / Germany covers 70,000 square meters and currently performs practically all production steps required for the manufacture of valves, including welding, mechanical processing, assembling and approval. Only the making of cast parts is outsourced to certified foundries. We also operate a specially designed large-parts production area for manufacturing oversized valves. The broad scope of production that can be provided by the main plant in Herne is in keeping with the high degree of flexibility and quality that we offer our customers.

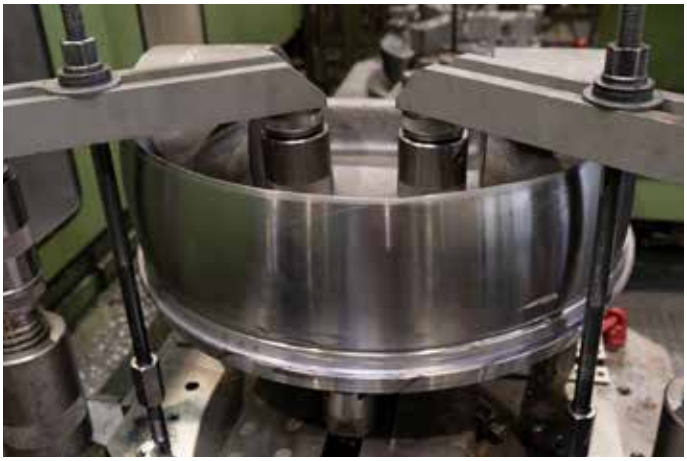
Commitment from all employees

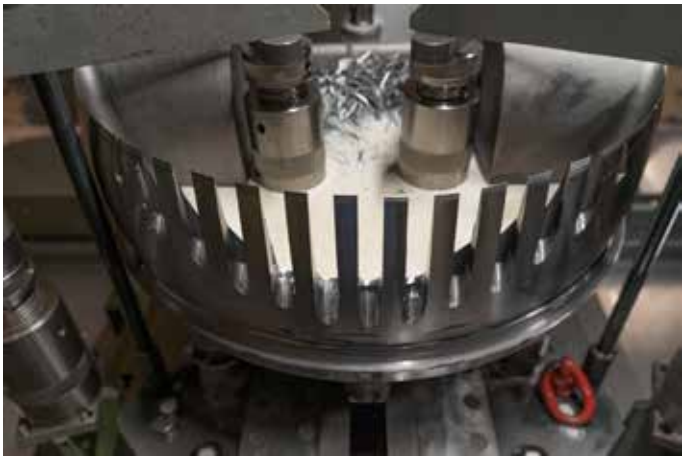
Product development at Adams has always comprised two main areas: the general development of valves and details and the development of products specially designed for individual customers. In our view, we can only make real progress if research and development are solidly embedded as integrated corporate tasks. This also includes close interaction with other departments of the company, for example exchanging views with those of the sales department who pose questions straight from the market, or cooperation with the production department regarding the latest technologies, e.g. finishing processes, which enable the engineers' ideas to be implemented in the first place.

Continuity and reliability – worldwide

ADAMS Armaturen GmbH has been privately owned by the Adams family since 1960. As a medium-sized company we have established a sound reputation for ourselves among our customers as a reliable partner during this time. Our systematic trainee and further training programme, which we have been promoting for years, ensures that it will remain that way in the future. Thus a number of leading positions are occupied by young people who have nevertheless worked for the company for many years. A third-generation member of the Adams family is also a member of the board of management, thus ensuring continuity.

Safe valves for critical processes





60 years of experience finds its way in one unique rotary control valve design MAKO.

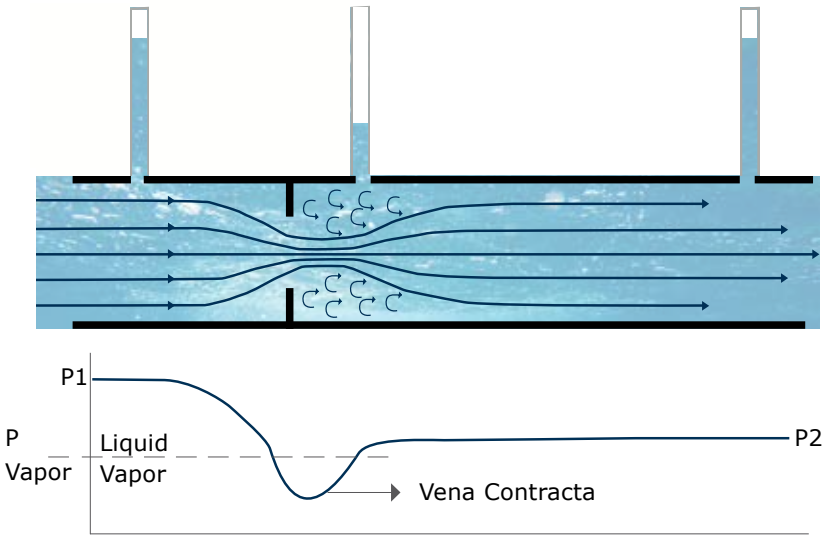
ADAMS new generation control valve type MAKO. A control valve which is specifically adopted for each individual process without the need of pipe modifications by using state of the art design and manufacturing technologies.

Another great product produced by the inventor of the triple eccentric valve design.

ADAMS ANTI-CAVITATION TECHNOLOGY

What is Cavitation?

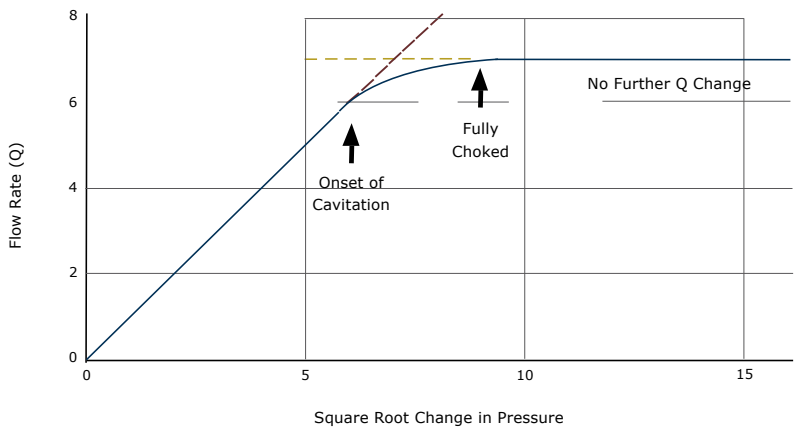
Pressure drop is present in all control valve applications. It can range from very little to quite large depending on the system design and valve function. When the pressure drop is large enough the pressure of the fluid passing through the valve drops below the outlet pressure. As the pressure drop increases the difference between the pressure of the fluid passing through the valve this is called vena contracta (see below graph) the downstream pressure increases further. If the pressure at the vena contracta drops below the vapor pressure of the fluid at the operating temperature but the outlet pressure is above it, cavitation is present and vapor bubbles will occur Cavitation is the process of the fluid vaporizing at the vena contracta then collapsing as it recovers to the downstream pressure.



What is Choked Flow?

The expected flow rate should increase as pressure drop increases however, as cavitation increases the flow rate through the valve begins to be impacted. This is due to the fluid vaporizing as it is passing through the valve. This impact becomes greater as pressure drop increases. The fluid reaches a point where flow cannot increase further regardless of the pressure drop across the valve. This point is called "Choked Flow" and it can cause serious disturbances in process control. As operators require more flow in a valve, they cannot get it because the fluid is choked, so they open the valve further. This can lead to overshoot and then hunting as the control loop attempts to correct for the choking through the valve.

Flow Rate vs. Pressure Drop for a Single Cv

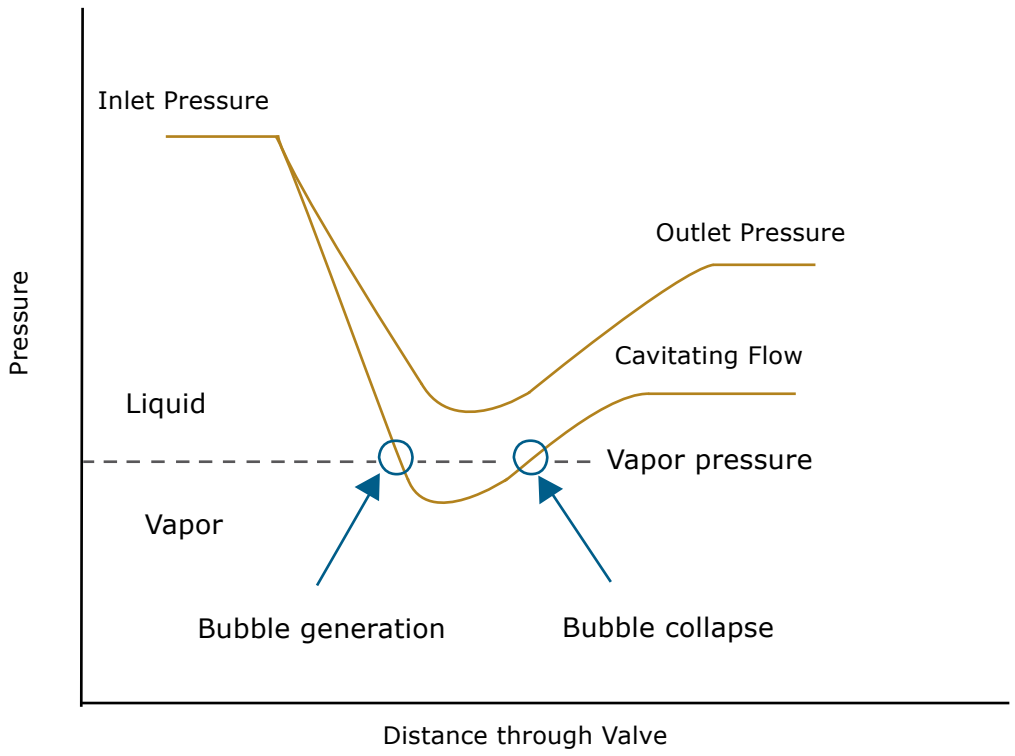


Cavitation Damage

Another negative aspect of cavitation is erosion and vibration. When the pressure recovers and increases downstream of the vena contracta, the vapor pressure will be exceeded and the bubbles will collapse and release a significant amount of energy. Dependent on the intensity and location this may cause erosion to the valve body, trim or disc; it can even affect downstream piping or flanges. The wear on these parts can cause failure in a matter of weeks or months. Many “fixes” include hardening of the surfaces where cavitation is found. However, cavitation also increases noise level through the valve, which can lead to vibration of the valve assembly and surrounding items. Vibration can cause bolts to loosen and welds to crack. For these reasons cavitation must be prevented by correct selection of the MAKO valve trim. For severe services Adams can also design and produce a multiport orifice plate to assist the MAKO disc in mitigating cavitation.

Cavitation consequences:

- High noise levels
- Strong vibrations
- Choked flow caused by vapour formation
- Damages piping , leaks

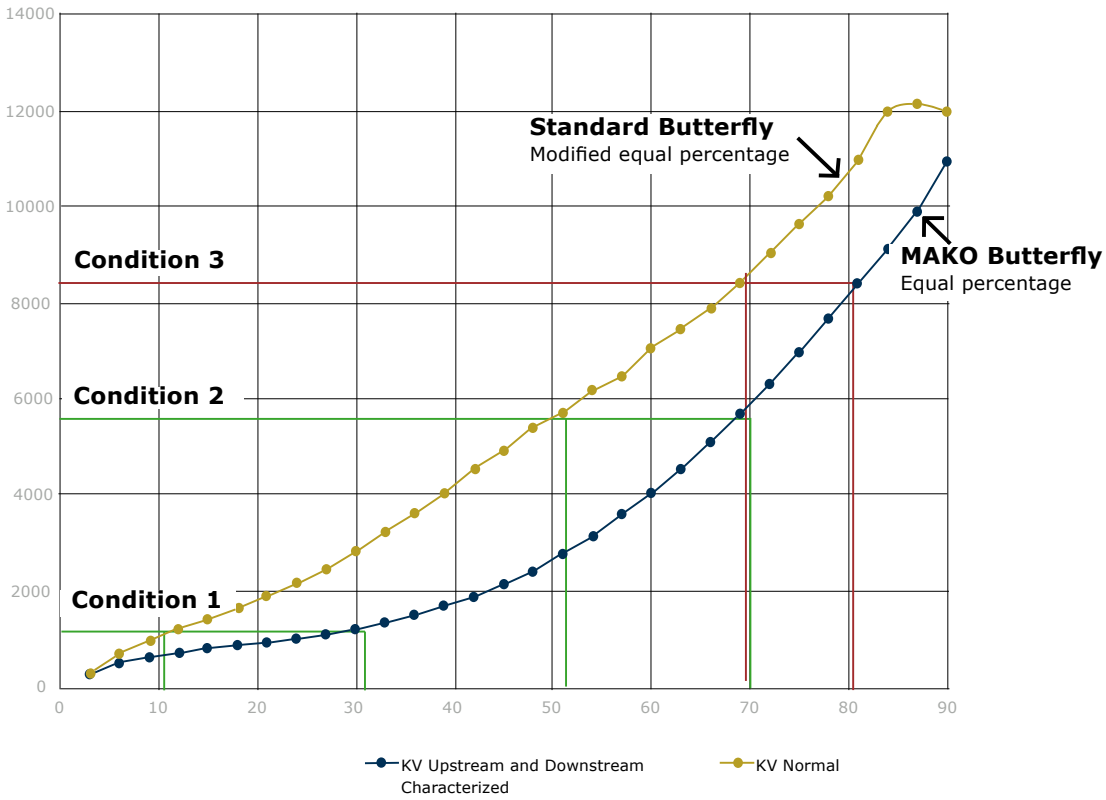


The MAKO - ADAMS special control valve

ADAMS MAKO valves address cavitation and offers an equal percentage control curve.

Although many control valves are available with published ranges of 50 to 1 (Turndown / Rangeability) and even greater, these are the result of testing in a lab at constant pressure drop, a condition that rarely exists in an actual plant. The requirement for rangeability is that the valve must handle the maximum flow at the minimum pressure drop available down to the minimum flow at maximum pressure drop (Alireza Bahadori Ph.D., in Natural Gas Processing, 2014).

Adams MAKO sizing calculations will be checked at both extremes to assure controllability over the entire range of flow rates and pressure drops as per below graph. The blue line indicates a higher rangeability and an Equal Percentage Curve.



The MAKO TRIM (Disc with Teeth) works in two different ways.

The first is by adding flow channels to the disc to increase the FL (pressure recovery coefficient), Xt (Choked Flow Factor) and reduce Fd (valve style modifier). This allows the disc to handle more severe pressure drops with less noise and vibration. This is because the flow channels break the fluid into many smaller jets, which have a higher sound frequency. This higher frequency does not transmit through the pipe as easily (increases Transmission Loss/Pipe Absorption). Since this frequency is increased it is far less likely to be near resonance frequencies of the surrounding components, and less vibration is created.

The second principle is the characterized disc opposite of the channels. This characterization creates a modification to the flow curve in the first 20 degrees open and the last 10 degrees. As you can see in the above reflected curves, the characterized disc gives a near perfect equal percentage characteristic over the entire range of flow. Other butterfly valve technologies fail to do this on the high end of the control curve. They are often limited by the typical drop off over the final 5-10 degrees. The max Kv reversal caused by the disc/stem offset in the butterfly valve geometry cannot be overcome by adding a cartridge to the valve. It can only be overcome by modifying the discs characteristics. The ADAMS MAKO provides this cutting-edge technology while maintaining the reliability and robustness of the Adams butterfly valve.

ADAMS Control valve for Metering Skid in a GAS Plant, DN 600 Class 900

Direct valve features / benefits

The MAKO design is based on the Adams Type MAK, a valve design with over 30 years of successful application in all major industries.

- Cavitation is avoided by means of a special designed MAKO cutting edge pressure reduction trim technology.
- No double valve set ups or modifications needed
- Custom designed trim to suit specific applications
- Equal percent inherent flow characteristic allows installed characteristic to be linear.
- High rangeability with stable gain over wide range of opening.
- Operation of the MAKO control valve is not susceptible to debris: lowering maintenance & downtime.
- Suitable for bi-directional flow with bubble tight shut-off in both directions.
- Triple Eccentric Metal Seated
- No screws on disc retainer ring which can get loosen.
- No additional cartridge needed => standard face to face and no pipe modifications for existing applications.

Indirect benefits for your application

- Cost saving by integration of control functionality. No need for additional control valve
- Custom designed valve trim enables optimal process conditions in joint effort with end user.
- Increased energy production as MAKO control valve is able to follow the relatively rapid changes in pumps, heat exchange systems and steam turbines.
- Longer life when compared to off the shelf globe or rotary control valves. This means less downtime and repair/replacement costs.
- Optimized CV and control curve

Some typical applications for MAKO Control valves

Energy markets / Power generation:

- Steam Turbine overspeed control
- Boiler feedwater control
- Heat exchanger flow control
- Pump bypass control
- District Heating

Refining / Petrochemical :

- Crude Tower Pumparounds
- Heavy/Light Cycle Oil Recycle
- Feed Drum Flow Control
- Residual Oil Separator
- Inter-tank transfer; pumping facilities; loading filling road tankers or barges;
- Ship loading/unloading

MAKO Control valves

Nominal diameters

80 mm to 2400 mm
4 inches to 96 inches

Temperature range

-196°C up to 600°C
-423°F up to 1,112°F

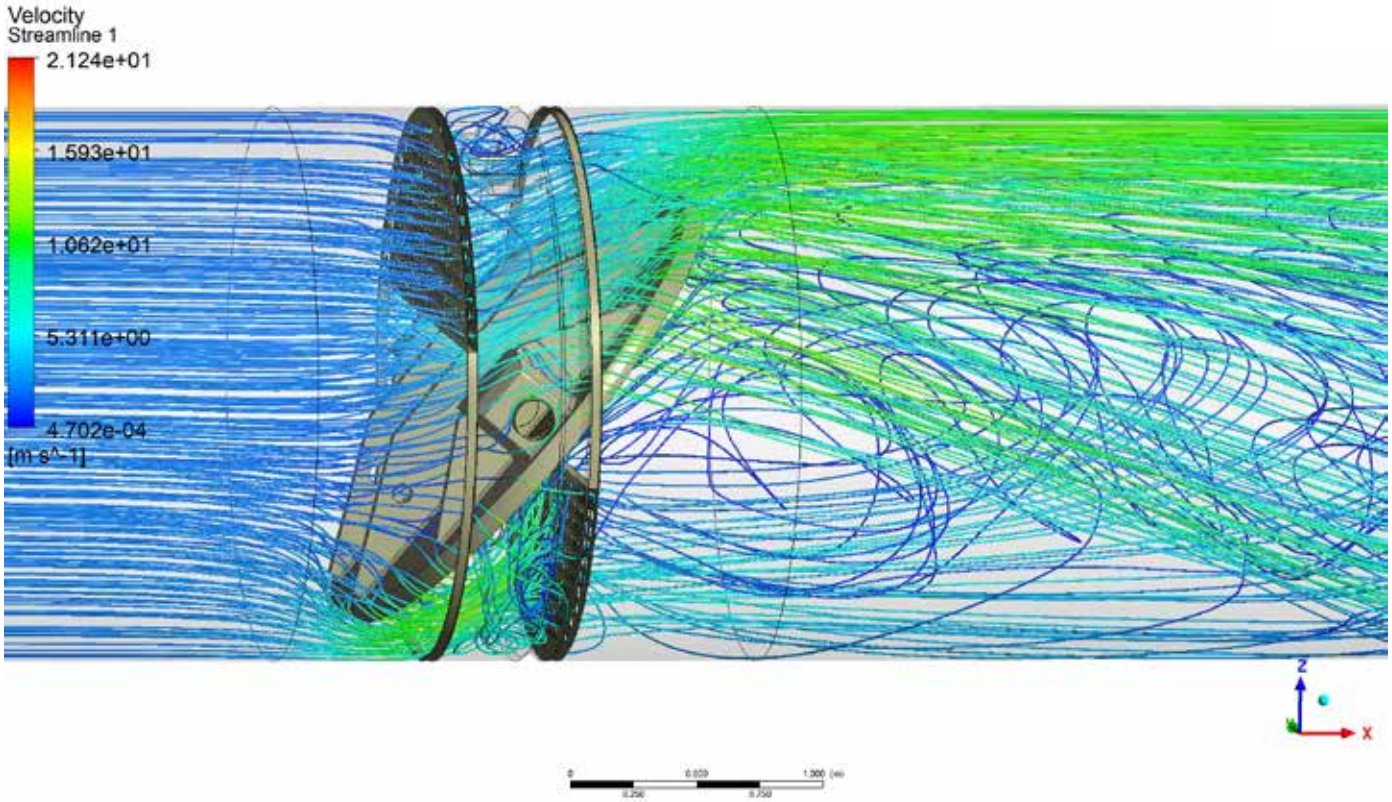
Pressure class

PN 10/16/25/40/64/100
ANSI 150/300/600/900/1500

ADAMS Flow Control Systems Solutions

Further to the ADAMS MAKO control valve we offer tailor made solutions and system design support for specific flow control challenges in your plant.

You can rely on expert knowledge resulting in solutions for cavitation, vibration and high noise for flow control challenges. ADAMS offers CFD simulations based on design for Restriction Orifice Plates, Multiport Orifice plates, Diffusers, bypass systems and special valve trims.



Modification of existing valve with multiport restriction orifice plates to allow the valve to handle higher pressure drops.

Quality surveillance

At ADAMS, we focus on high quality to guarantee longlasting and sustainable valves for our customers. Since 60 years, our valves are made according to the highest standards and regulations or by the specifications of our customers - all made in Germany. We work daily to retain this level of quality – systematically and with great attention.

Since 1960, we have expanded our buildings and halls, invested in state-of-the-art equipment and have constantly enhanced our valves with it.

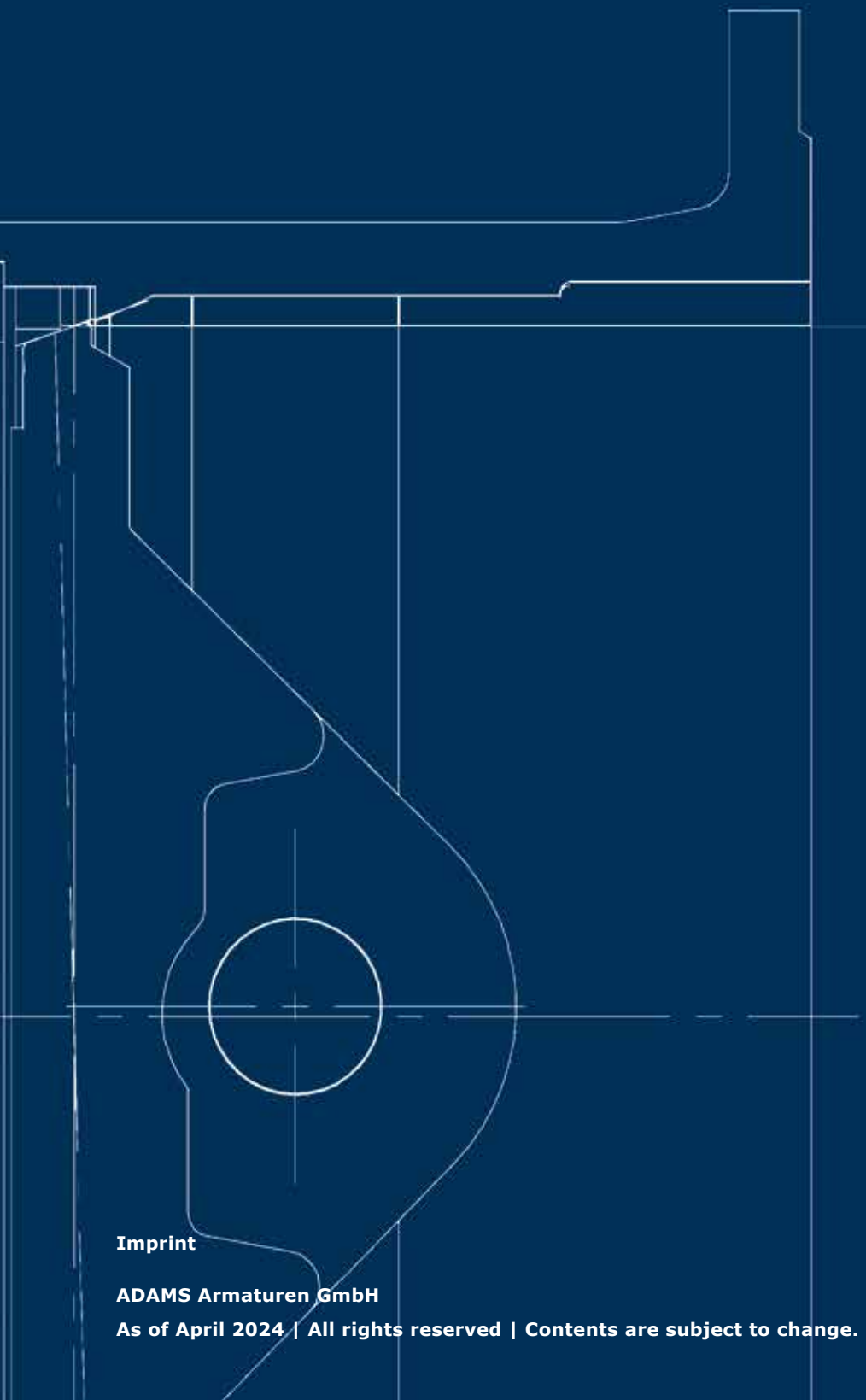
Next to the equipment, we have invested as much in our employees. Many of them have started their apprenticeship at ADAMS and are still working for us. This guarantees the flow of information from our experienced employees to the next generation.

Quality tests

Our tests comply with the above-mentioned standards. We perform the testing processes with our own state-of-the-art equipment either personally in-house or in cooperation with well-known testing institutions.

Non-destructive testing:

- Dye penetrant test (PT)
- Magnetic particle test (MT)
- Ultrasound test (UT)
- Visual test (VT)
- Leak test (LT)
- Positive Material Identification (PMI)
- X-ray test (RT)
- Hydrostatic pressure tests
- Fugitive Emission Tests



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