



PUMPS

PREMIUM PUMPING TECHNOLOGY FOR THE MINING INDUSTRY

IIoT ENABLED PUMP SOLUTIONS

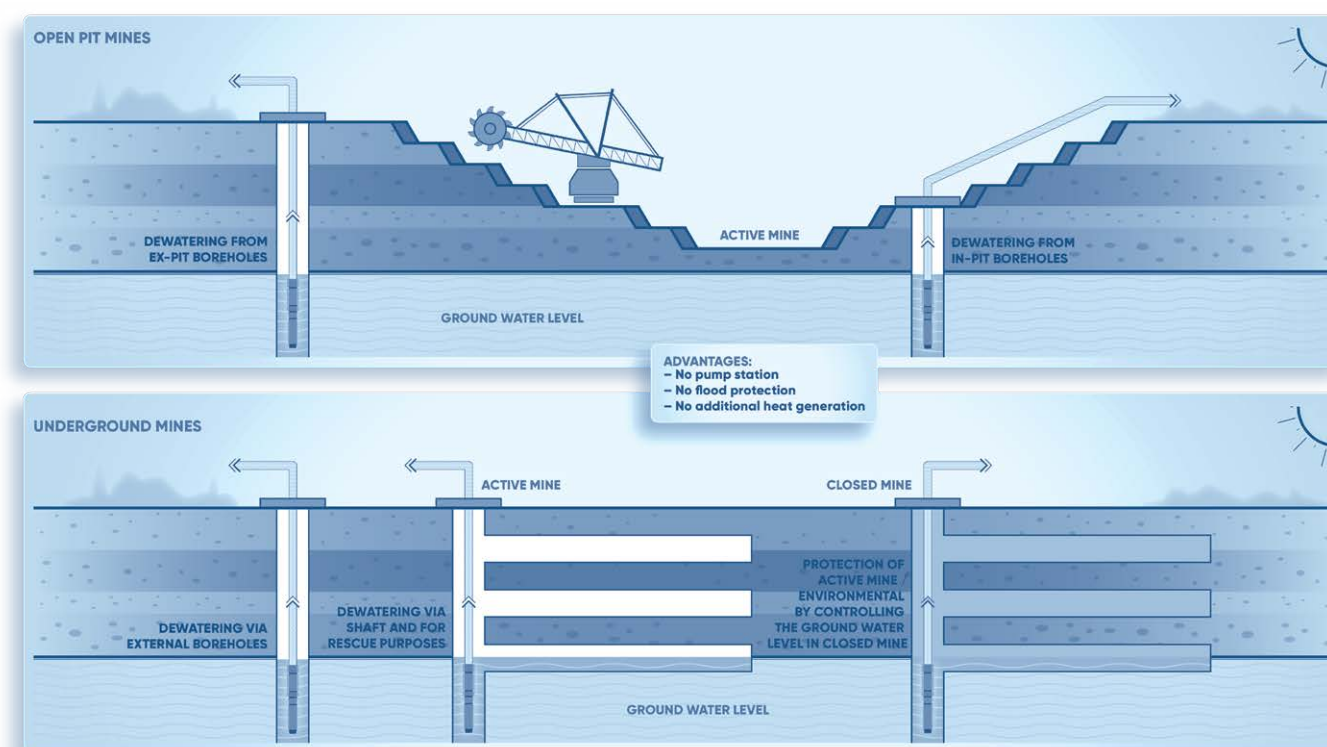
ANDRITZ

ENGINEERED SUCCESS



ANDRITZ in the mining industry

Safety and reliability are the greatest necessities in surface and underground mining in order to ensure that there are no disruptions in extraction. ANDRITZ is one of the leading manufacturers of pumps for water management and emergency drainage in surface and underground mining. Mine operators around the world trust in ANDRITZ highly economical, maintenance-free, innovative submersible motors and pumps to remove mine water reliably from operating areas.



Tailor-made pumping solutions

Are you looking for safe and effective solutions in mining water management? ANDRITZ is one of the leading manufacturers of pumps and motors for water management and emergency drainage in surface and underground mining.

SUBMERSIBLE PUMPS

One of the most important requirements for trouble-free extraction operations is pumping the accumulated mine water out of the working area. ANDRITZ single-suction and double-suction submersible pumps are used in all areas of water procurement, distribution, and dewatering for mining applications. Equipped with innovative MST-Technology the pumps can be flexibly adapted to changing pumping conditions. ANDRITZ maintenance-free, innovative submersible pumps are the response to extremely stringent demands for operational reliability, service life, and efficiency. Thousands of submersible pumps have been installed in mines around the world, working under severest conditions; including the largest submersible dewatering pumps in the world.

SUBMERSIBLE MOTORS

ANDRITZ rewindable submersible motors are the ideal drives for submersible deep well pumps, bottom intake pumps, seawater lift pumps, and for sub-sea machinery for mining and deep mining. They are equipped with an innovative modular cooling technology (MCT), enhancing durability and also being the most efficient means of cooling submersible motors. Interior permanent magnet motors (IPM) are the new premium class submersible motors with highest efficiencies over a wide performance range. They can achieve a much higher performance from small wells.

HDM – HEAVY DUTY MINING

If rescue pumps are needed to drain water from mines reliably and quickly in emergencies, the patented HDM technology is the best possible solution to keep people and the environment safe. Two pumps are arranged one above the other, running in counter direction and driven by a continuous pump shaft. Splitting the workload between both pumps

ensures complete axial thrust balancing and thus, contributes towards solving the problems of force effects on the unit and loads on the thrust bearings; at the same time, the flow and suction speed outside the pump is halved. Thus, the well walls are protected around the suction areas, and the intake of abrasive particles is minimized. ANDRITZ submersible motor pumps with HDM-Technology provide maximum operating reliability, minimal wear, and long service life, which can often be more than 20 years.



THE ADVANTAGES AT A GLANCE

- Deployment under extreme conditions
- Highest operating reliability
- Long service life
- Maintenance-free operation
- High-grade materials

Double-flow submersible motor pumps

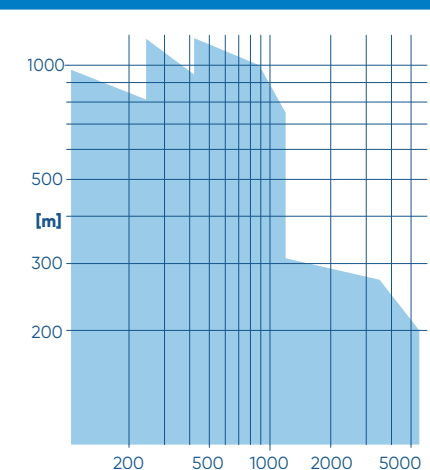
The use of single-suction submersible motor pumps for pumping liquids in huge quantities or from great depths is associated with extreme loads on the unit. The higher the pump performance, the stronger the axial thrust exerted on the pump, the motor, and its thrust bearing. The consequences are overloading and untimely shutdown. A double-suction pump design, however, provides full compensation of the axial thrust. ANDRITZ double-suction submersible motor pumps are multi-stage, double-flow submersible motor pumps

characterized by a full compensation of axial thrust and 50% lower flow velocity. The economic benefits are maximum operational reliability, minimum wear, and an extremely long service life (quite often exceeding 20 years). Every pump featuring HDM is tailor-made from standard modules to suit the customers' specific application. Thousands of HDM pumps have been produced and are in trouble-free operation around the globe; including the biggest submersible motor pump in the world.

PRODUCT FACTS*

- Flow rate up to 6,000 m³/h
- Head up to 1,500 m
- Pressure up to 150 bar
- Well diameter from 20"
- Temperature up to 75° C

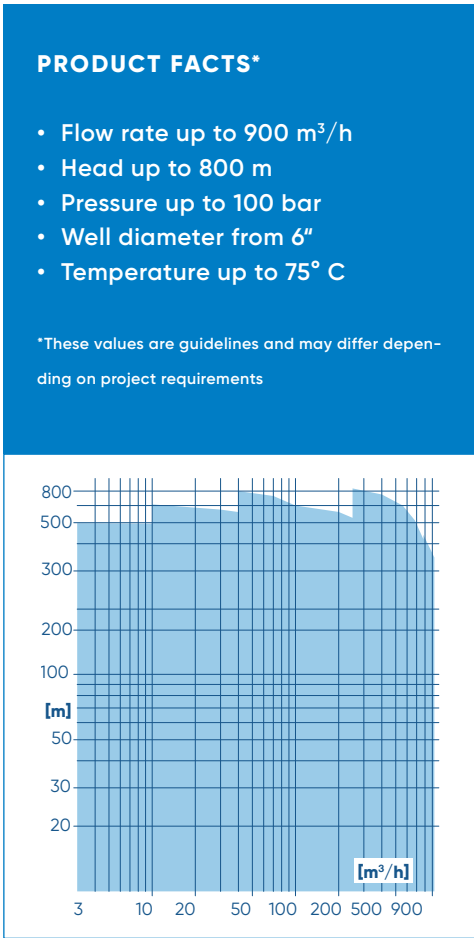
*These values are guidelines and may differ depending on project requirements



Single-flow submersible motor pumps

Dewatering with completely floodable submersible motor pumps provides the most economical and maintenance-free solution. No underground pumping station is required, for example, and the heat of the motor is taken away by the water pumped to the surface (less cooling required). ANDRITZ multi-stage, single-flow submersible motor pumps are designed to transport clean, slightly contaminated and abrasive raw wa-

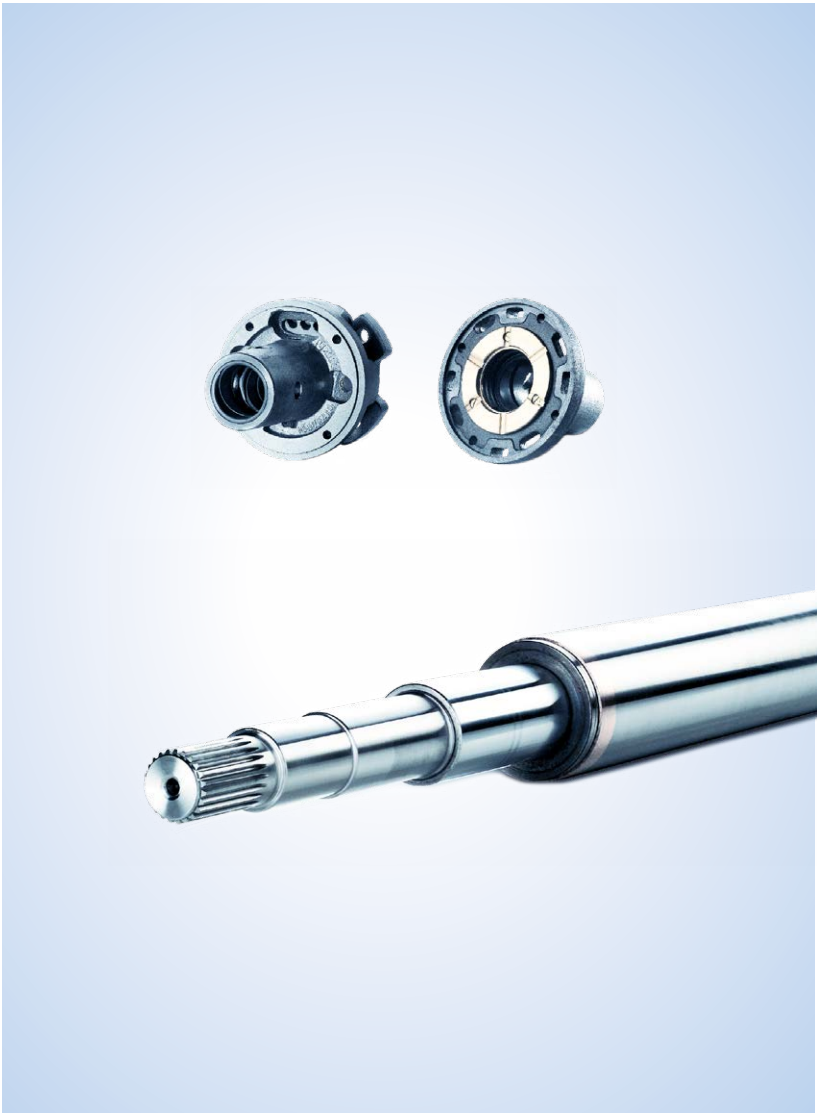
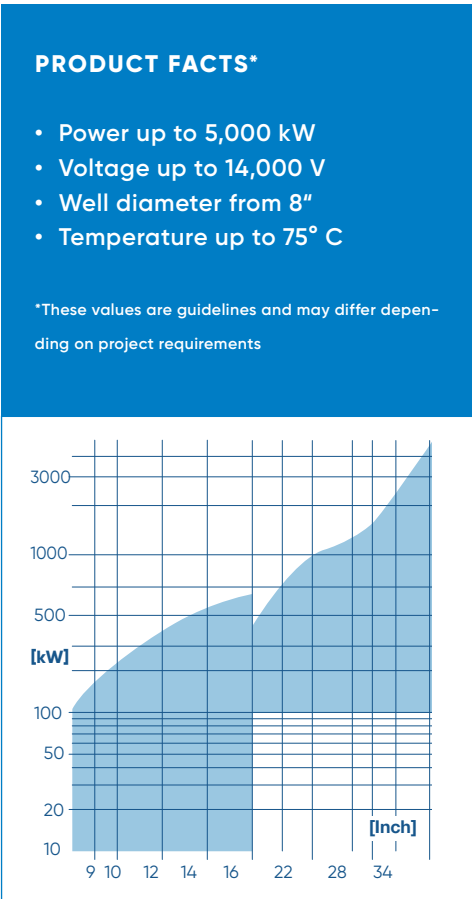
ter as well as mineral, sea, industrial, mine and cooling water. ANDRITZ submersible motor pumps are characterized by zero maintenance, a long service life, high operating reliability and our innovative modular shaft technology (MST). Equipped with MST-Technology, the pump cannot only be flexibly adapted to changing pumping conditions, but is furthermore also saving storage costs.



Submersible motors

ANDRITZ water-filled and water-cooled submersible motors are designed for a consistently strong performance at high temperatures, special voltages and in extreme conditions. They are the ideal drives for sub-sea machinery for mining and deep mining. ANDRITZ submersible motors are equipped with an innovative modular cooling technology (MCT), enhancing durability and also being the most efficient possi-

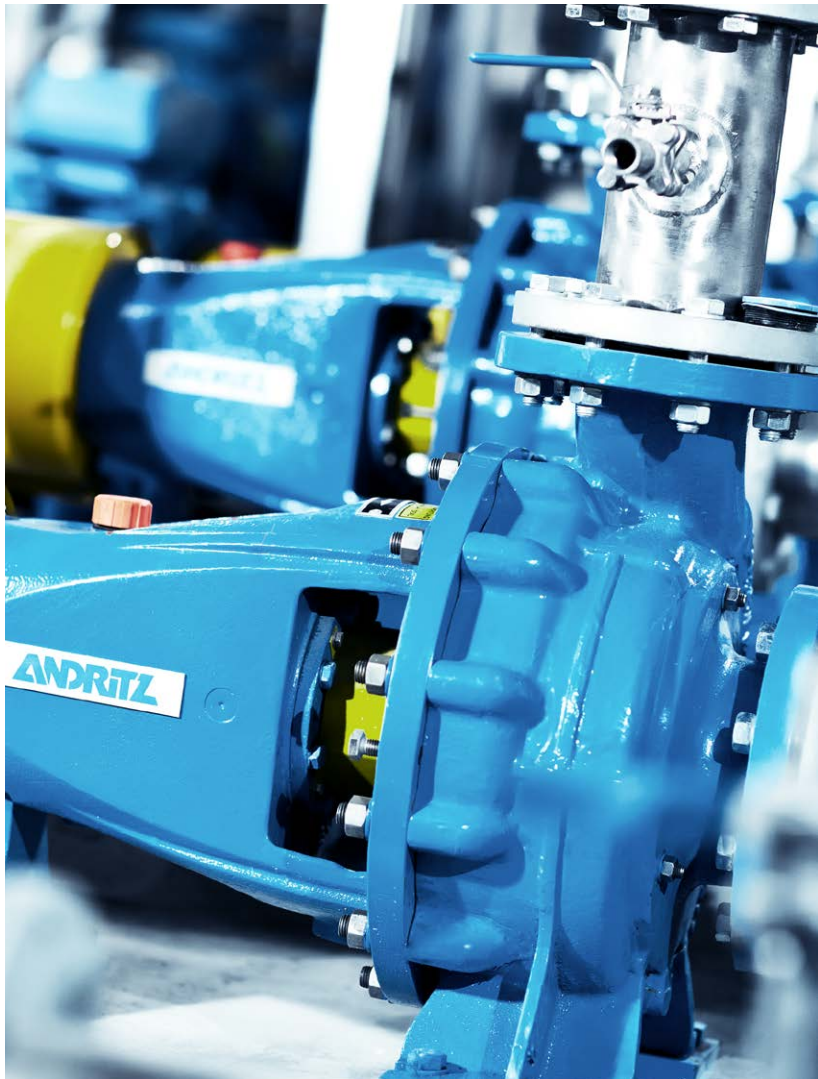
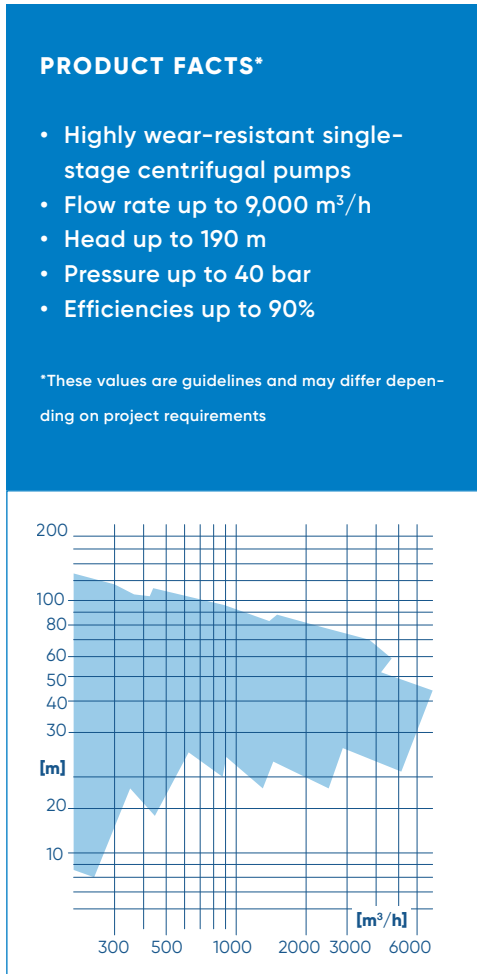
ble means of cooling submersible motors. Optimized cooling circulation featuring specially designed cooling channels ensures that the heat is absorbed where it is generated. Interior permanent magnet motors (IPM) are the new premium class submersible motors with highest efficiencies over a wide performance range. They can achieve a much higher performance from small wells.



Highly wear-resistant centrifugal pumps

ANDRITZ single-stage centrifugal pumps with closed, semi-open, or open impeller are also available in highly wear-resistant design. They are characterized by robustness, maintenance-friendliness, and economic efficiency. Various material combinations guarantee long

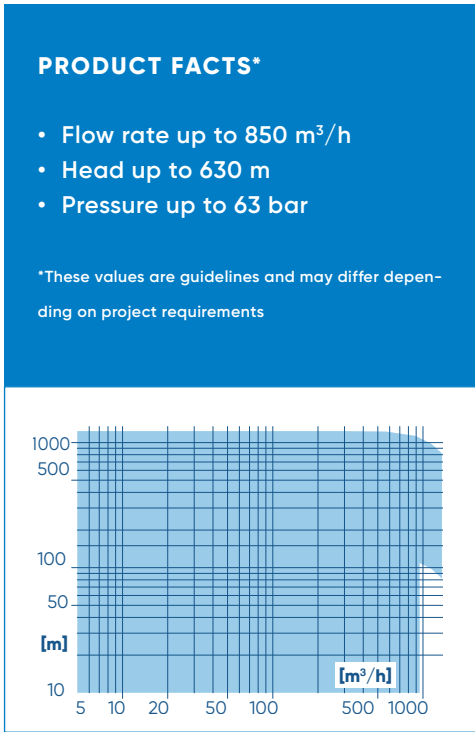
product life cycles and excellent efficiencies. A modular system ensures high availability, enables the use of proven components and reduces the number of spare parts to be held in stock.



High-pressure pumps

ANDRITZ multi-stage, high-pressure pumps meet the highest customer requirements in terms of efficiency, service life, serviceability and economy. Numerous horizontal and vertical models allow for efficient building designs. A variety of material and sealing versions

guarantee optimal adaptability to the medium. Different hydraulic systems for each pump size enable a selection at the best efficiency point. These pumps are used for various high-pressure municipal and industrial applications.



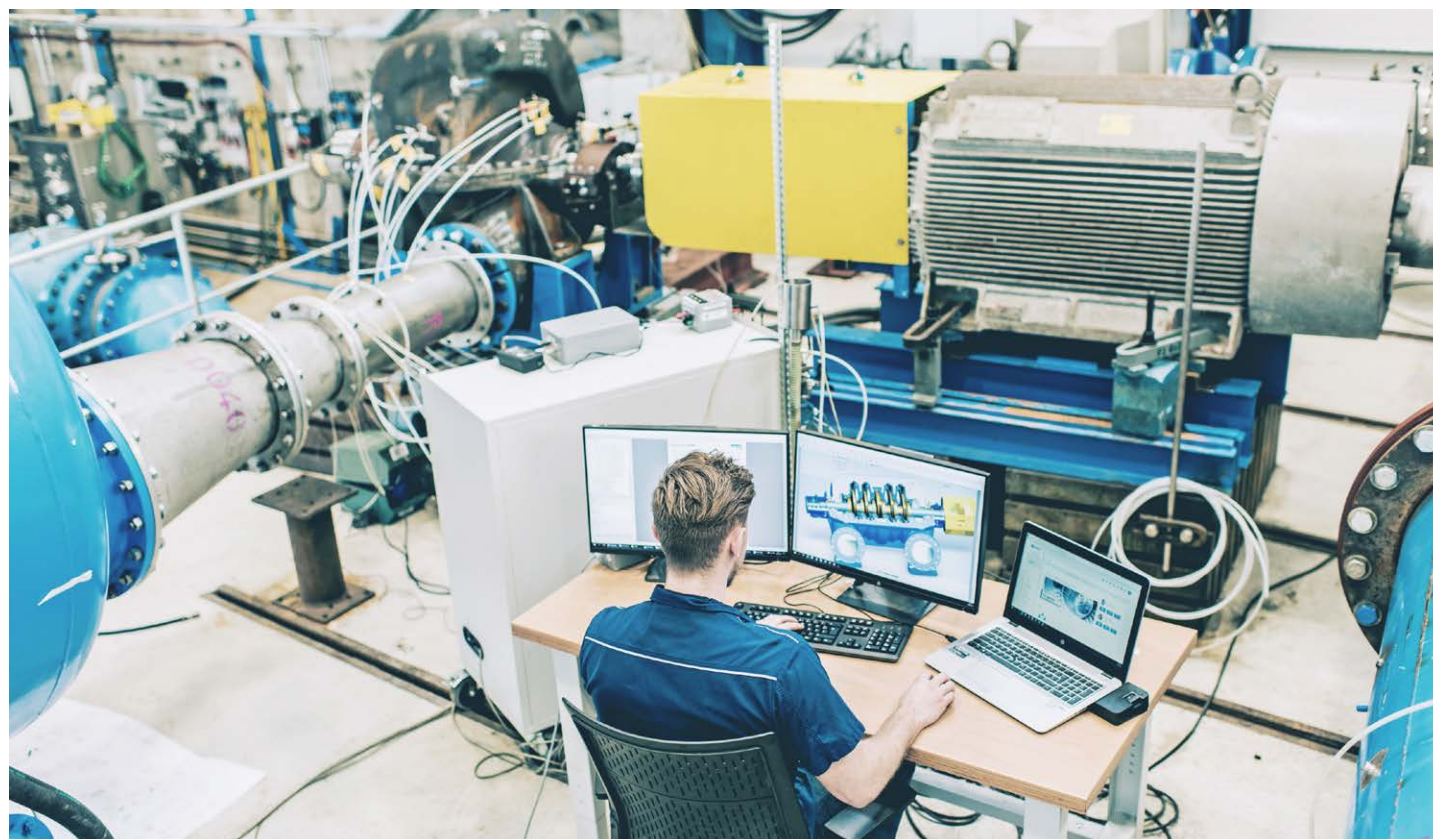
Always a flow ahead – Research and development

Our affiliate ASTROE enjoys an internationally renowned reputation for its hydraulic developments and investigations. The high efficiency of the ANDRITZ pump series is ensured by Computational Fluid Dynamic (CFD) calculations and extensive testing carried out in our company owned laboratory.

Continuously increasing demands by customers in our operating industries emphasize the significance of R&D in the constant optimization of products and services. Today, efficiency, flexibility, and reliability over an extended lifetime are the major challenges of the market.

Our commitment to research and development forms the basis for our advances in hydraulic machine manufacturing. With ASTROE, center for hydraulic engineering and laboratory, we have an internationally renowned institute for hydraulic development work at our disposal. We are currently developing and testing our pumps and

turbines at five locations in Austria, Germany, Switzerland, and China. Our test stands are among the most accurate in the world. By networking these research and development centers, we provide a continuous transfer of know-how within the ANDRITZ GROUP for the benefit of our customers. The main tools for R&D are numerical simulation methods as well as experimental measurements in the laboratory and on site. State-of-the-art equipment, highly precise measuring instruments as well as the latest simulation technologies, and powerful software form the basis of the high technical quality of the pumps from ANDRITZ.



Smart Pumps

ANDRITZ has launched its IIoT activities already back in 2005 and its basic activities in the automation sector began as early as 1984. Now, the company has combined its innovative, industrial IoT solutions, which are field proven in many reference plants, under the technology brand “Metris – Foresee digitally”. Metris technologies include latest state-of-the-art Industrial IoT solutions (IIoT) as well as any kind of smart digital services. These can be fully tailored to individual customer requirements and unite our clients’ physical and digital worlds.

With regard to IIoT solutions for pumps, ANDRITZ has set a key focus on ensuring continuous and sustainable operational reliability and performance of pumps and plants ever since. ANDRITZ delivers highly sophisticated condition monitoring solutions for pumps. These solutions can be standard software packages or tailored to specific customer request. Special sensors are installed at the pump for this purpose and take measurements continuously. All data can be analyzed within the software or exported to various file formats. Limits and alert notifications with a traffic light system approach are also provided. The data is stored in an ANDRITZ Metris database. Metris cloud’s data are accessible by both the client and ANDRITZ condition monitoring experts, which enables 24/7 service for the customer. Finally, ANDRITZ also provides optimization modules for pumps in plants or pumping stations as

well as remote control options for locally installed platforms.

Thus, ANDRITZ is taking pump and plant operations to the next level. By monitoring an intuitive human-machine interface of the control system that is equipped with groundbreaking digital and visual technology, highly efficient workflows make the future calculable and enable proactive action through the analysis of data. Thereby, ANDRITZ IIoT technologies become the basis for Internet of People (IoP) solutions by connecting our customers’ specialists among each other as well with ANDRITZ experts. This value-adding interrelation results not only in a professional preparation of the collected data improving the plant’s performance, but moreover enables our customers to practice successfully applied business intelligence.

IoP

ANDRITZ connects people through VR, AR, OPP, IDEAS and many other tools. ANDRITZ IoP reduces costs and risks for our clients, while at the same time sustainably supporting and developing their valuable workforce.

Greater efficiency for a competitive edge - Pumps service

Find out more about
ANDRITZ pumps service



Optimization / Modernization / Operating reliability

The conditions of your plant have changed, but your pumps are still operating as previously and therefore, wasting energy? Would you like to optimize your system to reduce costs? With ANDRITZ, you will have a competent partner for these and numerous other services at your side.

Service and maintenance have a long tradition at ANDRITZ and complement the product portfolio. The century-long expertise is reflected not only in a service portfolio with innovative solutions and advanced products that can be optimally adapted to the respective customer needs, but also in a specially trained staff. ANDRITZ has specialized in the servicing of pumps to achieve improved efficiencies and adaptations to changed operating points of the installed pumps. A large potential for savings can already be achieved by improving the efficiency of 20 percent of the installed pumps. Our service team provides prompt, professional, and reliable assistance – also for other manufacturers' products. Book our service package and you can be sure of the best operating reliability for your systems in the long term. We conduct an expert assessment together with you, thus creating transparency and mak-

ing an optimum solution possible that is tailored to your needs. After examining your plant, we determine its savings potential and realize it by improving the efficiency of the pumps installed. Additionally, this individual solution lowers your maintenance costs. You do not have to think about personnel, nor about maintenance schedules or utilities. Assembly is conducted according to defined schedules and with assistance from our trained personnel.

AN OVERVIEW OF OUR SERVICES

- Supply of original spare parts
- Deployment of trained personnel
- Installation and start-up
- Inspection
- Repairs, overhauls, maintenance
- Machine assessment by an expert for early fault detection
- Consulting and modernization
- Performance and vibration measurement
- Fault and damage analyses
- Feasibility studies
- Energy consulting for pumps and systems
- Preparation of maintenance schedules
- Service and maintenance agreements
- Automation and Electrical Power Systems
- Electronic equipment
- Training



Pump technology in XXXL format

The use of submersible motor pumps to deliver enormous volumes or from very great depths is associated with extreme loads on the aggregate. The higher the pump power, the stronger the axial thrust that acts on the pump, the motor and its thrust bearing. The consequences are overloading and premature failure of the pumps. In contrast, a double-flow pump construction can achieve complete compensation of the axial thrust.

In the ANDRITZ HDM (Heavy Duty Mining) pump series, two submersible motor pumps are arranged one above the other in opposite directions and driven by a continuous pump shaft. The suction areas of the two pumps are in each case at the ends. Each pump carries half the flow at full pressure to the center of the pump. There, a deflection stage directs the flow through external housing channels in the pressure line. The double-flow construction completely neutralizes the axial thrust. This construction and construction is unique. Loads on the unit are reduced to a minimum and the tons of pressure on the thrust bearing are eliminated. The wear is significantly reduced and the service life increased to more than 20 years.

ANDRITZ HDM pumps are now operating worldwide, including the largest submersible pump ever built. These are three pump units. The two larger submersible motor pumps each provide 4 megawatts (4,000 KW), the smaller at least 3,2 megawatts (3,200 KW). The double-flow units with the patented HDM technology are characterized by extremely high efficiency and long service life and are extremely quiet. The pumps, each consisting of three individual components, are 22 meters long or high when mounted

and weigh more than 32 tons. Thus, the pumps are only slightly larger than the 20 meter high sphinx at the Pyramids of Giza in Cairo, Egypt. In a Chinese mine, the pumps are installed at a depth of 900 meters, suspended from the pipeline. A pump unit delivers 1000 m³/h to a height of 1000 m. The aggregates are part of the mine's safety facility in China, where they protect the lives of miners by preventing flooding of the tunnels.

In South Africa, too, this type of pump has been a gigantic lifesaver since 2014, but in a different way than in China. In Johannesburg, South Africa, acid mine water is an ongoing problem. Rainwater seeps into the old mine tunnels and reacts chemically with residual minerals like pyrite, producing corrosive sulphuric acids. In the worst case scenario, this can result in a pH value of 2, which is enough to cause lasting damage to humans and the environment.

In spring 2014, two powerful ANDRITZ submersible motor pumps were installed in the middle of Johannesburg city center, in the so-called "Central Basin", with each pump capable of bringing 1,500 cubic meters (=1.5 million liters) of acid mine water to the surface and onwards into an adjacent treatment plant. The design is based on ANDRITZ's proven HDM technology, which uses the concept of a double-suction pump. The thrusts produced are offset by the counter-rotating arrangement of the impellers, and the pumps run without axial thrust, giving a properly maintained pump a service life of 10 to 15 years. Part of the new system is an encapsulation of the submersible motors preventing the intrusion of the corrosive water destroying the components inside the motor.

DESIGNED TO
SAVE LIVES / 22 METER
LONG, WEIGHS MORE THAN
32 TONS (SPHINX: 20.21 M) /
INSTALLED IN A DEPTH
OF 900 METERS





INNOVATION SINCE 1852

The internationally renowned ANDRITZ GROUP has been building pumps for more than 170 years. We offer innovative and targeted solutions with pumps and complete pumping stations. Our longstanding experience in hydraulic machine manufacturing and complete process know-how form the basis of the high standard of ANDRITZ pump engineering. Our quality and high-efficiency products as well as our understanding of customer requirements have made us a preferred partner for pumping solutions worldwide. ANDRITZ offers everything from a single source – from development work, model tests, engineering design, manufacture and project management, to after-sales service and training. We also perform complete start-up on site and guarantee our customers the best support. Our declared goal is your complete satisfaction. See for yourself!

EUROPE

ANDRITZ AG
Stattegger Strasse 18
8045 Graz, Austria
p: +43 316 6902-2509
f: +43 316 6902-413
pumps@andritz.com

ANDRITZ Pumps Germany GmbH
Güglingsstraße 50
73529 Schwäbisch Gmünd,
Germany
p: +49 7171 609-0
f: +49 7171 609 287
ritz@andritz.com

ANDRITZ Hydro S.L.
Polígono Industrial La Garza 2
Carretera de Algete M-106, Km. 2
28110 Algete
Spain
p: +34 91 6636 409
f: +34 91 425 1001
bombas.es@andritz.com

SOUTH AMERICA

ANDRITZ HYDRO S.A.
Av. Juruá 747, Alphaville Industrial
06455-010, Barueri, SP - Brasil
p: +55 11 4133-0000
f: +55 11 4133-0037
bombas-brazil@andritz.com

ASIA

ANDRITZ (CHINA) LTD.
No.83 B Zone, Leping Central Technology & Industry Park, Sanshui District,
Foshan 528137, Guangdong, P.R.China
p: +86 0757 6663-3102
atc_pumps@andritz.com

ANDRITZ Separation & Pump
Technologies India Pvt. Ltd.
S.No. 389, 400/2A & 400/2C,
Padur Road, Kuthambakkam
Village, Poonamallee Taluk,
Thiruvallur District –
600124, Chennai, India
p: +91 44 4399-1111
pump.in@andritz.com

ANDRITZ FZCO

Dubai Airport Free Zone (DAFZA)
Building 6WB – Office No. 642
Dubai, United Arab Emirates
p: +971 4 214 6546
dubai@andritz.com

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