

Water

MAGAZINE OF ANDRITZ PUMPS

ANDRITZ PUMPS

Infrastructure projects in India *(Page 8)*

ANDRITZ RITZ

Water supply of Las Vegas *(Page 14)*

ANDRITZ ATRO

40 years experience with screw pumps
and hydrodynamic screws *(Page 16)*

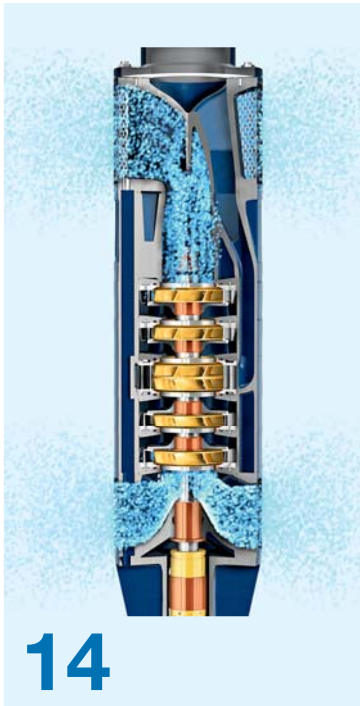




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ANDRITZ pumps

We move water

Centrifugal pumps and screw pumps for water and media containing solids, submersible motors, hydrodynamic screws, and pumps as small turbines for energy generation – ANDRITZ combines them all under one roof.

ANDRITZ brings together the pump suppliers ANDRITZ Ritz and ANDRITZ Atro and presents its extended product portfolio.

Do you perhaps operate a water works, or are you project manager of a large infrastructure project for irrigation, drinking or industrial water supply? You operate in the

energy sector? Or you own water rights that you would like to use to generate electricity? Do you operate a paper mill or sugar factory? Or are you an expert in offshore mining?

ANDRITZ offers pump solutions, special motors, hydrodynamic screws, as well as small and mini-turbines for all these applications.

In the following, you will find a brief overview of the many different applications and potential uses of our products.



QR code to download the ANDRITZ pump app with your iPad



QR code to open the eReader with your android tablet

ANDRITZ at a glance



ANDRITZ is one of the leading suppliers worldwide of pumps, submersible motors, and hydrodynamic screws for many different industries and applications.

The ANDRITZ GROUP is headquartered in Graz, Austria, and has a staff of approximately 16,750 employees worldwide. ANDRITZ has more than 180 production sites as well as service and sales companies all around the world. With its HYDRO, PULP & PAPER, SEPARATION, METALS, and FEED & BIOFUEL business areas, the technology Group offers innovative products of top quality.

ANDRITZ pumps

ANDRITZ deals with the development and manufacture of customized large pumps, standard centrifugal pumps, submersible motors, screw pumps, and hydrodynamic screws for many different applications, such as water transport for water supply and irrigation, the energy sector, process pumps in the sugar and bioethanol industry, and in pulp and paper mills.

Decades of experience in building hydraulic machines and also comprehensive know-how form the basis of the high standard of ANDRITZ pump engineering.

Research and development, also in the GROUP's own ASTRÖ laboratory for fluid mechanics, enable us to develop innovative and target-oriented solutions for pumps and complete pumping stations.

ANDRITZ offers model testing, design and engineering, fabrication, project management, service, and training – all from a single source.

Applications for ANDRITZ pumps, submersible motors as well as hydrodynamic screws

ANDRITZ develops and manufactures standard centrifugal pumps and customized large pumps for many different applications.

Water transport

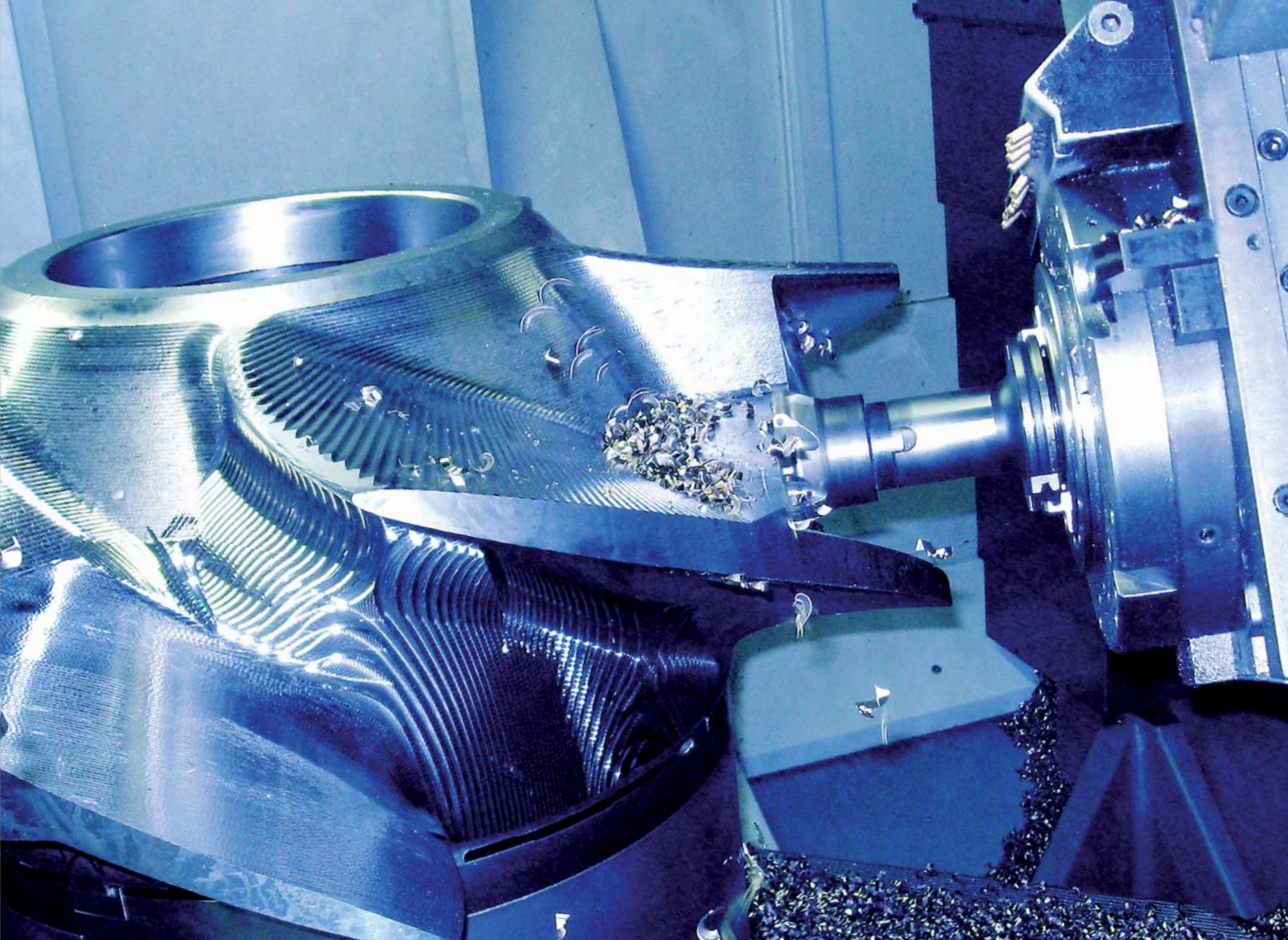
- Irrigation and drainage
- Drinking and industrial water supplies
- Waste water transport
- Sea water desalination plants

The energy sector

- Cooling water pumps
- Main coolant pumps
- Flue gas desulphurization pumps
- Pumps as turbines
- Hydrodynamic screws for energy generation up to 500 kW

Various industries

- Pulp and paper industry
- Mining
- Offshore sector
- Sugar and bioethanol industry
- Chemical industry
- Steel industry
- Automobile industry



▲ ANDRITZ manufacturing facility in Austria:
milling of a pump impeller

ANDRITZ headquarters
in Graz, Austria ▼



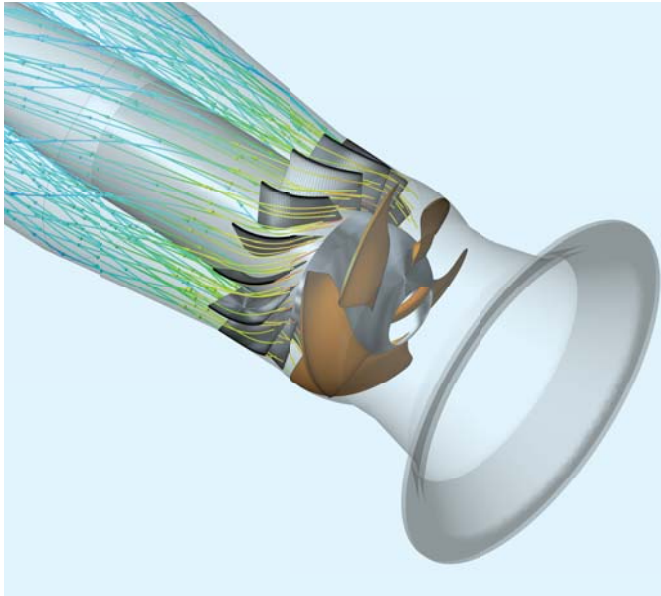
ANDRITZ key figures (2011)

Employees: approx. 16,750

Locations worldwide: about 180

Turnover: 4,596.0 million Euros

CFD fluid dynamics calculation of a vertical line shaft pump



▲ Cooling water pumps for a power plant in Gent, Belgium



The ANDRITZ GROUP is close to its customers with 58 manufacturing, service, and F&E facilities worldwide.

Focus on research and development

The top position that we hold in the supply of hydraulic machines is based on our strong commitment to research and development.

At present we are running five test loops in Austria, Switzerland and Brazil, where we develop our pumps and turbines and “put them to the test”.

These R&D centers work together closely, creating a network within the ANDRITZ-GROUP with continuous know-how transfer, to the benefit of our customers.

Global quality management

The high technical quality of our pumps derives from our stringent manufacturing standards, targeted organization, clearly defined processes, and well-trained staff.

Quality assurance, process requirements and the quality standards that our pumps have to meet are defined globally on a uniform level.

Service and maintenance

Providing service and maintenance support has a long tradition at ANDRITZ and has been an important part of the company's philosophy from its very beginnings.

The goal still is to offer top-class service to secure sustained customer satisfaction and product reliability.

Our most valuable capital is the experience and expertise of our service staff, as well as our service and production sites around the globe.



▲ Single-stage standard centrifugal pump on the test rig in Graz, Austria

Double suction split case pump for water supply to the major Chinese city of Guangzhou ▶



◀ Impeller of a vertical concrete volute pump with a flow rate of more than 27 m³/s

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Irrigation projects in Andhra Pradesh, India

ANDRITZ pumps for area-wide irrigation of agricultural land in India. Only three of these enormous units could fill an Olympic pool (2,500 m³) within less than 40 seconds.

Strategic importance

The Indian state of Andhra Pradesh has been hit time and again by widespread drought, particularly in the years 2002 to 2004. As some 70% of the population makes a living directly or indirectly from agriculture, the Indian government launched the Jalayagnam project for irrigation of agricultural land. ANDRITZ is contributing to a total of eleven sub-projects in this large venture, which is also to build numerous pumping stations on greenfield sites in the next five years.

Scope of supply and special technical features

Infrastructure developments are awarded turnkey as so-called EPC (Engineering, Procurement, Construction) projects in Andhra Pradesh. The EPC contractors are usually large infrastructure companies. In this type of contract the fundamental requirement is that key components - in irrigation projects these would be pumps and motors - can only be supplied by suitably qualified companies that also have a healthy balance sheet and good liquidity.

In order to transport water over long distances, very large volumes of water are conveyed typically with a small number of large vertical volute pumps. For the Bheema sub-project, ANDRITZ supplied three vertical volute pumps each for two pumping stations. The first of these, with three units, conveys a total of 63 m³/s water to a level 38 m higher up. In comparison these three pumps could fill an Olympic pool (2,500 m³)

in less than 40 seconds. There, some of this water is distributed through canals. Then a second pumping station pumps approximately 32.3 m³/s water into a canal system that is 22 m higher up. The pumps are driven by synchronous motors with nominal ratings of 12 MW and 4 MW, respectively.

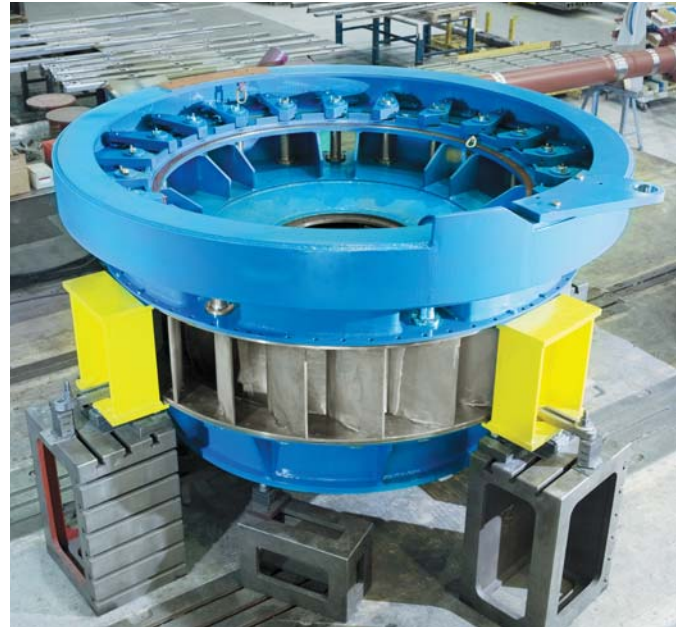
The special aspect of the pumps supplied is that they are very similar to turbines due





◀ Impeller of an irrigation pump for India

Guide vane mechanism of a vertical volute pump for the Bheema large-scale project in India ▼

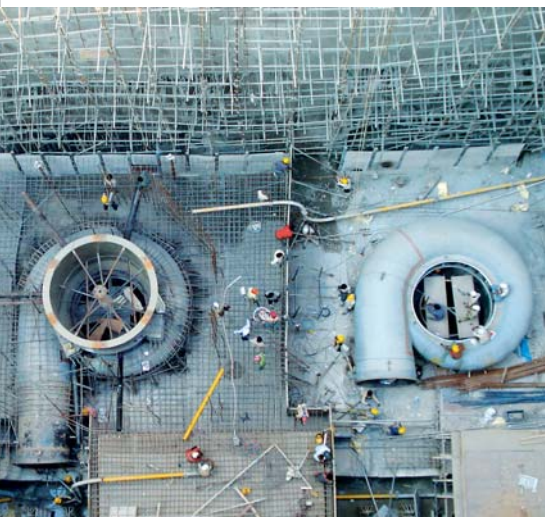


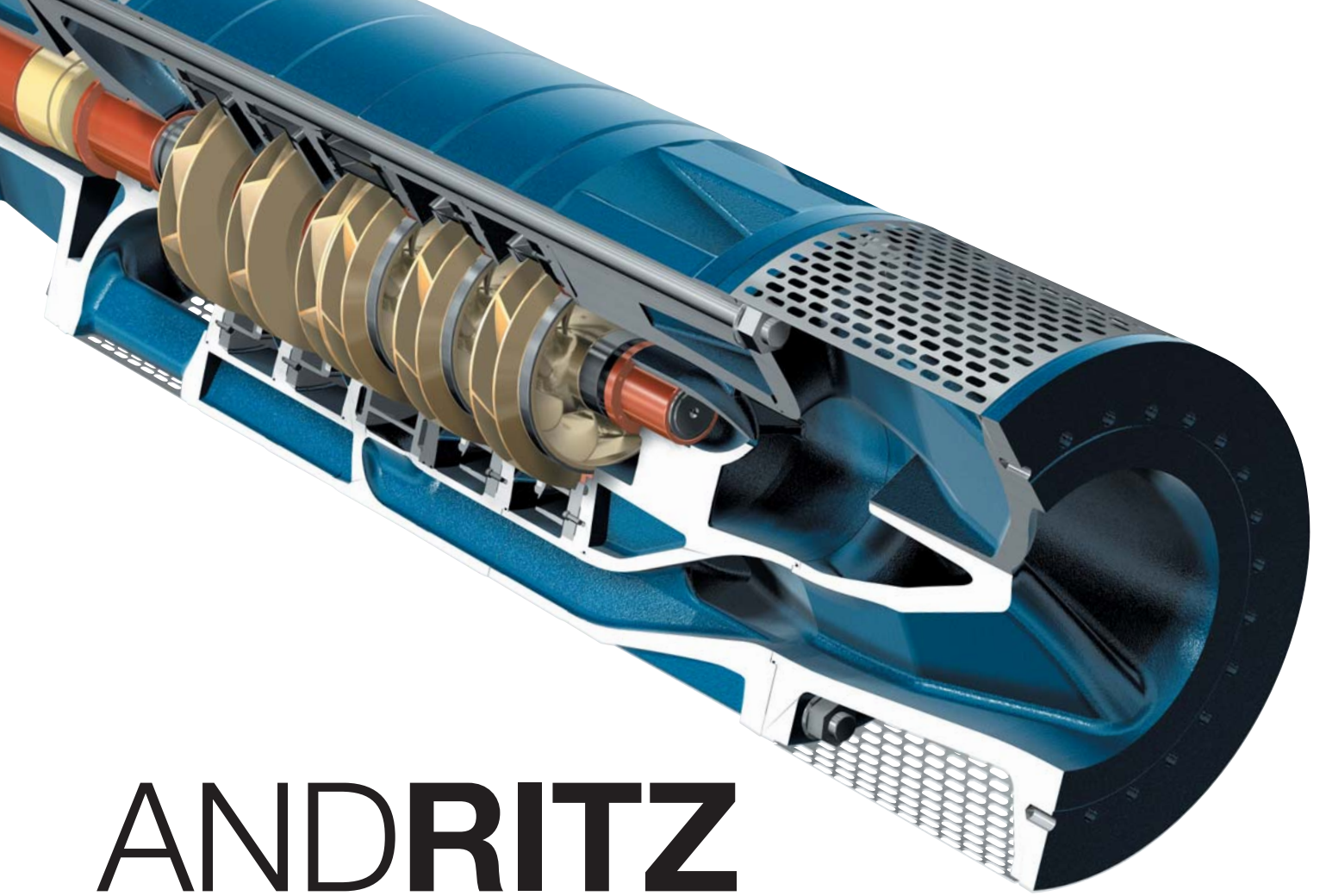
to their size and the integrated guide vane mechanism. The guide vane mechanism is adjusted by means of a hydraulic servomotor to suit the changing tailwater level. This achieves a broader efficiency progression compared to conventional pumps, as well as much lower power input on start-up of the pump if the guide vane mechanism is closed.

Successful start-up

The two pumping stations were installed by personnel provided by the customer, under the supervision of an ANDRITZ site installation supervisor. Start-up of both pumping stations was successfully concluded in April 2012.

Vertical volute pumps from ANDRITZ during assembly and start-up of the Bheema pumping station, India ▼





ANDRITZ

ANDRITZ Ritz part of the ANDRITZ GROUP

It's not just the company name of Ritz Pumpenfabrik that fits in well with ANDRITZ but also its product portfolio. Ritz products complement and extend the ANDRITZ product range perfectly. The German company with a long tradition in the pumps sector became part of the ANDRITZ GROUP in December 2010 and is now operating under the name of ANDRITZ Ritz.

ANDRITZ Ritz generates more than half of its total annual sales from pumps and motors for water supply systems. About one quarter comes from the mining sector, where the pumps are used to remove mine water from the working area – a particularly demanding field of application for the equipment. The third largest segment is the offshore sector, where ANDRITZ Ritz primarily supplies sea water lift pumps, pumping sea water to offshore platforms. Other applications are found in various industries, wherever liquids of any kind – cooling agents, utilities, cleaning agents, etc. – have to be transported.

“We operate worldwide; however, our largest market is the domestic market in Germany, followed by the Middle East and Africa,” explains Heinz-Dieter Ross, Sales and Marketing Director at ANDRITZ Ritz. ANDRITZ Ritz set up an affiliate in Singapore in 2006 and the Ritz Pumps South Africa

joint venture in 2008. Its 100% affiliate ANDRITZ Atro, with a staff of around 30 based in Nuremberg is a leading supplier of screw pumps for the effluent sector and of hydrodynamic screws. This equipment is used to generate energy from rivers and canals in the output range up to 500 kW. These are applications in which turbines are not suitable technically or not profitable economically. ANDRITZ sees a large potential for energy production in several countries that can only be tapped efficiently with hydrodynamic screws.

Over one million pumps in 130 years

In 1877, more than 130 years ago, Ritz Pumpenfabrik was established in the town of Schwäbisch Gmünd in southern Germany. At that time, the product portfolio comprised slow-rotating suction and pressure pumps, with various types of centrifugal pumps being included later. In 1948, submersible motors were also added to the

program. In 2007, ANDRITZ Ritz built the world's largest submersible pump for the water supply system in Las Vegas, pumping water from the largest reservoir in the United States, Lake Mead. In 2010, the company secured the order to build the world's largest subsea drive (3,000 kW, 6,600 V). It will be used at a depth of around 3,000 m to pump a mixture of gas and oil.

“The name Ritz has stood for quality and sound engineering in the pumps industry for over 130 years,” says Rainer Schöller, Managing Director of ANDRITZ Ritz. “With over a million pumps installed worldwide, we have a wealth of experience with which to offer reliable and forward-looking solutions to meet the most exacting requirements.”

Flexible manufacture

ANDRITZ Ritz has around 240 employees, 200 of which are based in Schwäbisch Gmünd, where the manufacturing facilities are located. Production operations cover all sectors needed to manufacture pumps, motors, and pump units in many different designs. The main advantage of the production location is its enormous flexibility – besides standard products, individual large-scale projects can also be executed reliably. The integrated management system according to ISO 9001 (quality), ISO 14001 (environment), and OHSAS 18001 (occupational health and safety) guarantees the high quality standard.

Innovations

ANDRITZ Ritz uses the experience gathered from its numerous pumps and motors installed, as well as an exact knowledge of the customers' needs, to develop its solutions further on a continuous basis. Here, the main focus lies on further reducing costs, extending service life, and adapting products to cope with extreme conditions,

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▲ Ecological energy generation with ANDRITZ Ritz pump turbines at a German water supply network

“ The name Ritz has stood for quality and sound engineering in the pumps industry for over 130 years.”

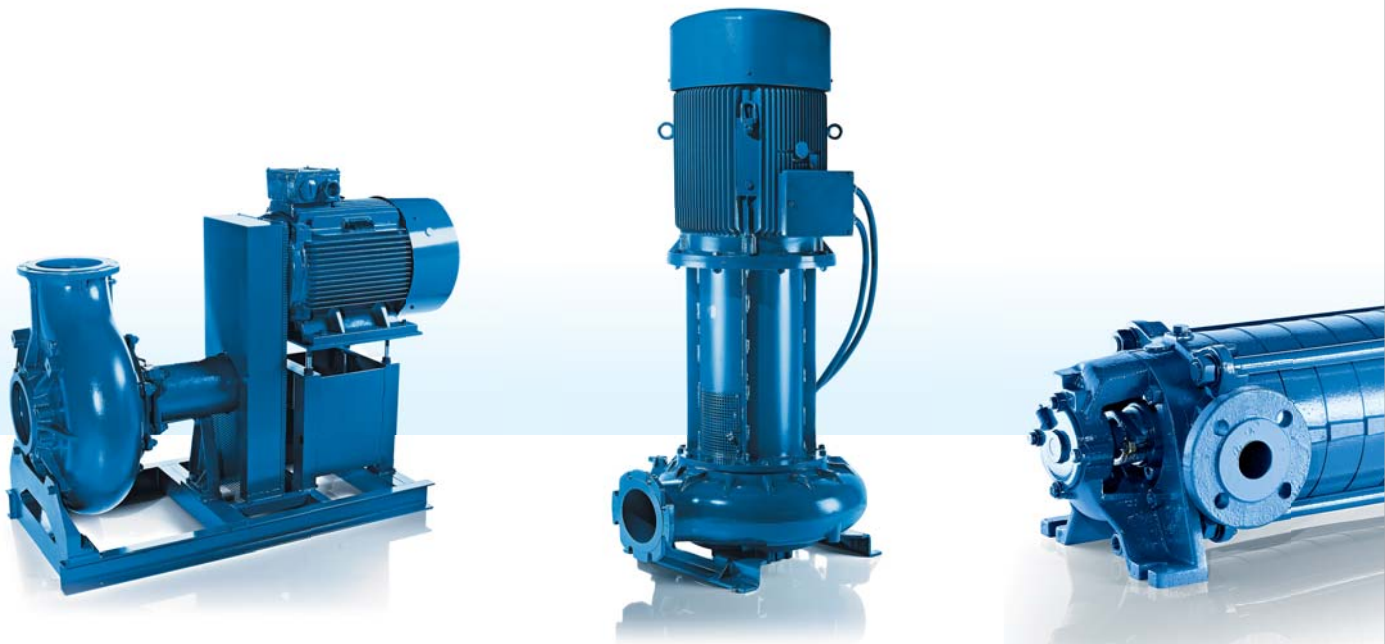
Rainer Schöller, Managing Director of ANDRITZ Ritz



▲ Fitting four bottom intake pumps with ANDRITZ Ritz custom-made submersible motors in Marina Barrage, Singapore



◀ 13,000 volt high-voltage motors ensuring the water supply to the famous fountains in Las Vegas



▲ Some examples from the comprehensive ANDRITZ Ritz pump portfolio

such as high temperatures or great depths. Examples of innovations from ANDRITZ Ritz include: a modular-design shaft (MS-T Modular Shaft Technology) that reduces operating and maintenance costs and provides flexibility in adapting to changing pumping conditions; a new and very long-lasting design for submersible motor pumps for large volumes or extreme depths in the mining sector (HDM Heavy Duty Mining); as well as an intelligent, compact cooling system for efficient and economical cooling of submersible motors for use in wells and mining applications (MC-T Modular Cooling Technology).

ANDRITZ Ritz within the ANDRITZ GROUP

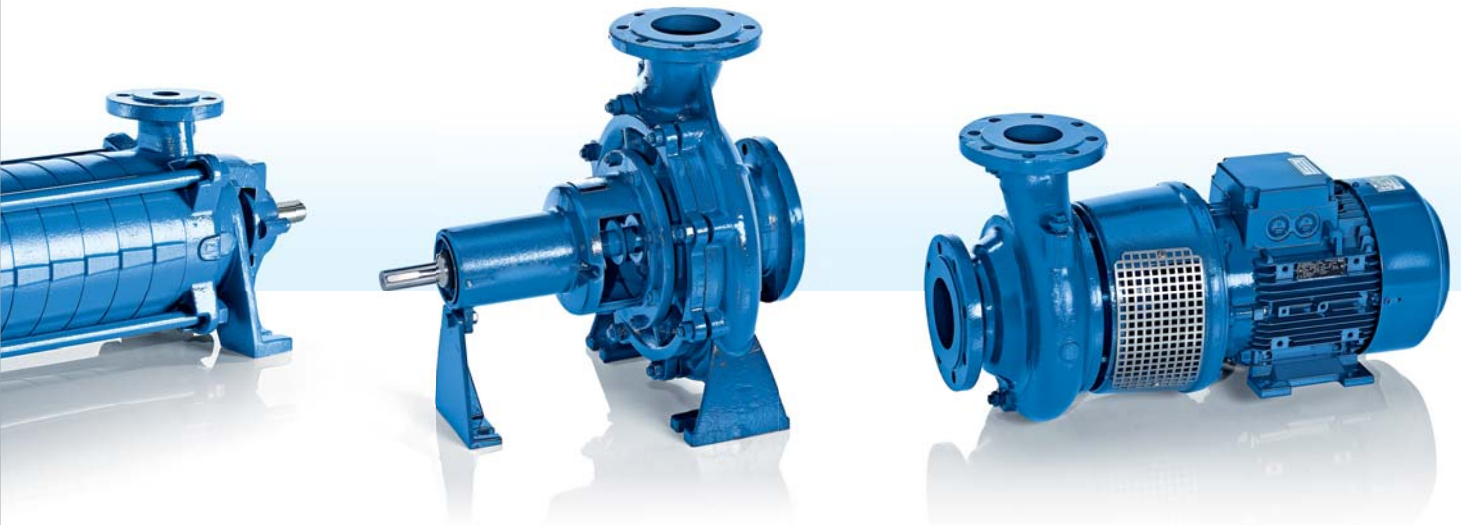
“Pumps have a long tradition in the ANDRITZ GROUP. They have been part of the ANDRITZ program for over 150 years,” says Manfred Wörgötter, Senior Vice President ANDRITZ pumps “The product portfolios of Ritz and ANDRITZ complement each other very well, particularly in the centrifugal pumps sector. Joint use of the Ritz and ANDRITZ sales networks is one of our central goals in the first phase of our cooperation,” Wörgötter points out.

“We operate worldwide; however, our largest market is the domestic market in Germany, followed by the Middle East and Africa.” **Heinz-Dieter Ross,**
Sales and Marketing Director of ANDRITZ Ritz

19 vertical high pressure pumps with a total output of 6,000 kW used for water supply in the Middle East ▶

Installation of an ANDRITZ Ritz submersible motor pump in a deep well ▼





Water for Las Vegas

ANDRITZ Ritz supplies its largest ever pump to the city of Las Vegas, ensuring a stable water supply for decades to come

A persistent drought and consequent lowering of Lake Mead levels – both pressing reasons why the desert city of Las Vegas needed an improved water supply and distribution system. The patented HDM technology of ANDRITZ Ritz was the right answer to this challenge. Thanks to a patented double-suction design, long service life, and high efficiency, these pumps have remained unsurpassed for years. The South Nevada Water Authority (SNWA) now uses three of these giant submersible water pumps to recover water from the depths of Lake Mead. The simplified, maintenance-free installation and efficient performance were reason enough to convince the water authorities to try out new technology. The city's water is now pumped from a depth of over 80 m at over 11,000 hp.

‘When we installed the new HDM pumps, the SNWA staff kept touching them to check they were working – since the pumps ran so quietly. The old pumps were as loud as a jet engine’, reports Rainer Schöller, managing director of ANDRITZ Ritz. Now, instead of

the near 130 dBA of days past, silence prevails as the gigantic 50-inch pipes pump the city's water from below the surface of Lake Mead. Why so quiet? ANDRITZ Ritz's HDM (heavy duty mining) technology, employs a submersible motor pump located directly at the suction point, sucking the water upwards in two separate flows. The water is pumped to the surface smoothly and efficiently – with no multi-bearing shaft and no axial thrust. This size of submersible pump for this application was completely new to the SNWA.

The operators were pleased that the pump was operational after just two days. They were used to installations that took several weeks. At first, no one believed the pump could be replaced in a single day, or that there were no bearings or parts requiring lubrication.

Water supply of Las Vegas

Lake Mead, the nation's largest man-made lake and reservoir, has formed the cornerstone of the city's water supply since its creation in 1936 when the Hoover Dam was built on the Colorado River. Covering 640 km², the lake is around 100 km² larger

Flow simulation of the double suction HDM technology ▶



The company-owned pump test centre of ANDRITZ Ritz in Schwäbisch Gmünd impressed the American delegation ▶



▲ View of a stator casing of a submersible motor

of water. Sourced from Lake Mead, up to 2 million m³ of water per day are pumped to Las Vegas.

Two million residents and around 40 million annual tourists regularly rely on the city's water supply. Ten of the world's 15 largest hotels are in Las Vegas – all packed with guests expecting to shower, bathe, and swim day after day. Lake Bellagio alone, in front of the 4000-room hotel of the same name, measures three hectares.





Hydrodynamic screws from **ANDRITZ Atro**

Experience, competitive edge, and cost advantages: At the end of 2010, Ritz Atro was acquired by international technology Group ANDRITZ, headquartered in Graz, Austria. Now named ANDRITZ Atro, the company has been successfully supplying hydrodynamic screws for energy generation in the private and municipal sectors for over ten years and is thus extending ANDRITZ's product portfolio in the hydropower sector for lower heads.

After 40 years of experience in building screw pumps for waste water applications, ANDRITZ Atro began developing screw pumps for low heads (up to 10 m) and water flow rates (up to 10 m³/s) in 1999. These were the beginnings of the use of smaller hydropower potential (up to 500 kW), for which there had previously been no suitable and reasonably priced equipment available.

As a result, small hydropower plants with an output of 18.5 kW (single unit) could be increased to outputs of up to 500 kW (two hydrodynamic screws as twin plant). So far, ANDRITZ Atro has equipped a total of 125 hydropower plants in single, twin, and triple screw configurations, and numerous other plants are currently in the building or planning phase.

At the turn of the millennium, the first three hydrodynamic screws from ANDRITZ Atro were supplied and commissioned at the following plants in Germany:

■ **Höxter:**

A new type of fish ladder was developed as part of a regional project for Expo 2000. In order to make use of the remaining water, it was decided to install a hydrodynamic screw that would allow the fish to travel downstream unharmed and generate energy at the same time. With a flow rate of 615 l/s and a head of 3.97 m, an output of around 18.5 kW is generated.



▲ If there are large amounts of water, twin screws can achieve an output of up to 500 kW even at small heads.

■ **Kiebingen:**

At the outlet of the Rottenburg wastewater treatment plant, a hydrodynamic screw was installed in the River Neckar to generate energy. In order to save on building costs in this difficult terrain, the compact-design screw was built with a fully enclosed trough. With a maximum feed volume of 288 l/s and a free outlet height of 3.42 m, an average output of 6 kW is generated.



▲ Hydrodynamic screw with upstream fish migration facility at a dam, guaranteeing an ecological equilibrium

■ **Hammelburg:**

At the Röder mill, one of three mill wheels operated on the Franconian Saale river, a hydrodynamic screw was installed, which generates around 7.5 kW at a flow rate of approximately 1,000 l/s and a head of only 1.1 m.

Even at low heads large amounts of water can be best exploited with efficiencies of up to 92%. ▼



Highest quality standards guarantee highest performance of ANDRITZ hydrodynamic screws. ▶



Many compact-design hydrodynamic screws, also as decentralized (isolated) solution, are prepared at the manufacturing works for operation as a single unit so that they can be installed on site in just a few hours. A plant of this type was used in a missionary project in Africa to supply electricity to a nursery and a school.

Further technological development and cost advantages

The proven technology from ANDRITZ Atro has been developed further and optimized continuously – particularly in terms of noise reduction and braking technology. As a result and with the appropriate basic setup, it is possible today to bring the plant to a halt without any wear at all and at low cost. As many plants are fitted with frequency controlled technology to comply with the requirement of maintaining the headwater level, adjustments can be made at any time.



◀ A classic mill wheel complemented by a hydrodynamic screw

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ANDRITZ pumps

We move water



ANDRITZ pumps

ANDRITZ pumps are used in innovative solutions for water transport in irrigation, drinking and industrial water supply, waste water, and as pumps for sea water desalination plants. ANDRITZ offers model testing, design and engineering, fabrication, project management, service, and training – all from a single source.

ANDRITZ Ritz

The product program from ANDRITZ Ritz comprises end suction pumps, axial split case pumps, high-pressure pumps, submersible motor pumps, submersible motors, as well as sewage dry and sewage wet pumps. ANDRITZ Ritz supplies pumps for water supply, mining, offshore and various industrial applications.

ANDRITZ Atro

ANDRITZ Aatro manufactures screw pumps for conveying water, waste water, sludge, and other media containing solids. In order to utilize the hydropower potential (from 1 kW to 500 kW) of flowing water with heads up to 10 m easily and efficiently, Aatro developed the hydrodynamic screw.