TSURUMI PUMP

Application Reports - Issue No. 6 - December 200 5

Established in 1924 Tsurumi is one of the most experienced pump manufacturers. Tsurumi is quality and durability. Pumps for professional use.

ARGE Tunnel Wienerwald, Austria

The project:

Tunnel Wienerwald, Chorherrn, Austria

Executing companies:
Porr Tunnelbau GmbH
Porr Technobau und Umwelt AG
Ed. Züblin AG
Hochtief Construction AG
Jäger Bau GmbH
Swietelsky Baugesellschaft

In the course of expanding the western railway, OBB Infrastruktur Bau AG is building a 42,3km long section of rail between Vienna and St. Pölten.
The approximately 13,35km long Wienerwald Tunnel comprises a significant part of this newly built section and connects the western edge of Vienna (Hadersdorf-Weidlingau) with Tullnerfeld.

The opening of the complete Wienerwald Tunnel as part of the newly built section between Vienna and St. Pölten is planned for 2012.

The problem:

Open drainage during tunnelling and construction in the open using submersible pumps.

Our solution:

Use of the following pump types: KTV2-22, KTV2-37, KTZ22.2, KTZ32.2, KTZ45.5, KTZ47.5, LH25.5W

Advantages of Tsurumi pumps:
- longer operating life
- lower replacement parts costs

ARGE Tunnel Koralm, Austria

portal of the Koralm Tunnel upwards. This should be completed by the end of 2006.
The second tunnel towards Koralpe is planned to take around 1,5 years and break through to the exploratory tunnel that has now been started in Paierdorf. The exploratory shaft in Paierdorf, which is the first exploratory section, has a final depth of 125 metres and has already been completed. Since July 2005, tunnelling of the

storage tank. The groundwater is pumped to the surface through a 120 m high vertical shaft by way of two risers, each with three pumps that are switched one over another.

Our solution:

Use of twelve KTZ411 and five KTZ32.2 for the complete drainage of the tunnel. The pumps were switched one over another with distances of 40 metres using a cascading control system. The pumps are equipped with a pressure release valve so that the collecting pressure cannot destroy the mechanical seal.

The project:

ARGE Koralmtunnel, Paierdorf, Austria

Executing companies:
Max Bögl Bauunternehmung GmbH & Co. KG
Swietelsky Baugesellschaft m.b.H.

The Koralmtunnel in Austria represents a key structure of the new high-performance railway between the provincial capitals of Klagenfurt and Graz. The exploratory tunnel in Mitterpichling is around 2,6km long and runs from the future west

approximately six km long exploratory tunnel in Paierdorf has been making progress. Work on the approximately 2,2 kilometre long exploratory tunnel in Leibenfeld in Styria has been taking place since mid-May 2005. The total cost for the continuing exploratory projects totals around EUR 145 million and should be completed by 2009.

The problem:

Pumping out abrasive groundwater that accumulates by using submersible pumps in a

In the event of abrasive and corrosive utilization, stronger wear and tear will take place naturally in certain components. Wit h regards to the above application wear and tear can take place mainly in impeller , suction plate, shaft sleeve, oil ring, mechanical seal, pump casing, strainer , motor casing and discharge coupling. Depending on the working conditions the lifetime of those parts might vary significantly and can be shorter than the legal warranty period.
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Antwerp Zoo, Belgium

Our solution:

The first attempt to supply oxygen using a fountain failed because the fountain attracted the tiger's attention with the result that he climbed onto the pump and destroyed the hose. A type 15-TRN submersible aerator now provides a continuous supply of oxygen. The hose for the air supply is out of the tiger's reach.

The project:

Aeration of the ditch in the outdoor Siberian tiger enclosure.

Executing companies:
Zoo Antwerp, Belgium
Marine Motors & Pumps (nv)

The problem:

The intense algae growth in the ditch in the outdoor Siberian tiger enclosure should be stemmed through aeration.

Our solution:

After many problems with pumps from other manufacturers a decision was made to use a 80C21.5 with a built-in cutting mechanism. Solid material such as twigs and leaves are chopped up and pumped along with the water. This ensures problem-free operation.

The project:

Running a waterfall in the park grounds of the zoo

Executing company:
Zoo Antwerp, Belgium
Marine Motors & Pumps (nv)

The problem:

Twigs and leaves result in the clogging of standard pumps.

Gotthard Basistunnel, Switzerland

The project:

Railway Tunnel Alptransit Gotthard,
Sedrun Section

Executing companies:
ARGE Transco Sedrun
Batigroup AG Tunnelbau,
Frutiger AG
Impresa Pizzarotti & C.S.p.

The “Sedrun Section” of the Gotthard Basistunnel encompasses two tunnels that are each 6,2 kilometres long and supplied through a 800m deep mine shaft. Two tunnels are at the base of the shaft and each breaks through to the north and south in the conventional manner.
The project tunnels through the unstable rock of

the Tavetscher Zwischenmassiv with an up to 2.000m overlay. One of the two multifunctional sections of the 57km long Gotthardbasis Tunnel is also being built in the Sedrun section.

The problem:

Pumping off the abrasive water that collects during the tunnelling excavations.

Our solution:

Use of the current 80+ Tsurumi wastewater submersible pumps for complete drainage. Pump series used: KTZ, KRS, KTV, LH, KRS with agitator.

Kieswerk Hess AG, Switzerland

The project:

Pumping off the collecting gravel wash water to the separation system

Executing companies:
Kieswerk Hess AG, Laupen, Switzerland

The problem:

The submersible pumps that were previously used transported the gravel wash water to the separation system in a way that interfered with the efficiency of the plant.

Our solution:

Use of type KRS822 submersible wastewater pumps that are tested for continuous operation and that can be controlled using an intake quantity regulator that is independent of rpms. The result is a more highly efficient plant. The amount of sediment in the basin decreases as a result of the constant movement of water. Pressure and air surges in the pipelines are avoided.

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Rösrath Treatment Plant, Germany

The project:

Reconstruction of the sand filter at the Rösrath treatment plant

Executing company:
Rösrath Treatment Plant
AggerverbandLS-Anlagentechnik

The problem:

Pumping of water with high levels of sediment.

Our solution:

Use of a KRS2-80 with agitator mounted on the classifier (separating plant), which is completely built upon the scraper.

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ARGE Tunnel Katzenberg, Germany

Two parallel tunnels, each 9.385 metres in length, single-shell segment lining, tunnelling using two Herrenknecht EPB tunnelling machines.

The project:

Part of the expansion and new Karlsruhe-Basle section to provide access to the New Transalpine Rail (NEAT).

Executing companies:
Wayss & Freytag Ingenieurbau AG
E. Züblin Tunnelbau AG
Marti Tunnelbau AG
Jäger Bau GmbH

The problem:

Open water drainage using submersible pumps to the tunnel portals and during tunnelling operations.

Our solution:

Use of Tsurumi submersible sewage pumps for complete drainage. Pump series used: KTZ, KTV, KRS with agitator.

ARGE North-South Urban Railway Cologne, Germany

GPN3-80 in slot wall cage

The project:

Construction of the north-south urban railway, Cologne, south section

Executing companies:
Wayss & Freytag Ingenieurbau AG
Ed. Züblin AG

The section is about four kilometres long. By far the largest section of the route is underground in two single-track tunnels that run parallel to one another.

Slot wall with pressure lines

First problem:

Slot walls up to 45 metres in depth were created. During the building phase the slot walls were filled with bentonite support fluid. In order to cast the slot walls, the ratio of sand in the bentonite must not be greater than 3%. For this reason, the bentonite and sand mixture is pumped to a separating system. There the sand part of the mixture is filtered out, and the regenerated bentonite suspension is reused.

Our solution:

Use of a GPN3-80 agitator pump mounted in a slot wall cage.

Shaft with NKZ3-100H

Second problem:

Two shafts were drilled near the Old Market (Alter Markt). From here the foundations of the adjacent residential buildings were stabilised. In doing so, various cross drillings are drilled to a depth of up to 50 metres depending on the shaft. Next, the boreholes are injected with a cement suspension. In the case of the boreholes as well as the injections the slurry that collects is diverted out of the shaft using a submersible pump.

Our solution:

Use of an NKZ3-100H agitator pump.
The NKZ series is especially well-suited for pumping abrasive suspensions.

Nibelungen Bridge Worms, Germany

The project:

New building of second Rhine Bridge

Executing company:
Max Bögl Bauunternehmung GmbH & Co. KG

The new bridge project, built 36 metres away from the old bridge, is a total of 745 metres in length. The section over the Rheinstrom is 322 metres long.

The problem:

Pumping off the water and concrete mixture created in the course of boring piles that are 900mm in diameter at a depth of up to 50m into the ground for soil stabilization.

Our solution:

Use of a KTZ411 Tsurumi pump for securing the boring piles during the casting phase. The unit is used to pump out the mixture of water and concrete.

NordCeram, Germany

The project:

Pumping off abrasive ceramic slurry during production.

Executing company:
Nord Ceram Fliesenproduktions und Vertriebs GmbH & Co. KG, Bremen

The problem:

Large amounts of water are used to wash adhesive clay residues from the treatment aggregate. The washing water, which carries clay slurry, collects in the ground cavity and has to be pumped back out of the cavity. The problem is that the clay settles, forms sediment and is very difficult to pump. The pumping of abrasive and corrosive fluids subjects the parts to great wear , is prone to failure and is a costly venture. Not all pump technologies are able to handle this.

Our solution:

Use of type KTV2-37 submersible pumps for pumping of f abrasive materials.
The pump housing is made completely out of nitrile rubber and has no problem resisting ceramic slurries.

Trapp GmbH Cologne, Germany

The project:

New construction of canal made of site-mixed concrete and liner renovation, Viehtrift, Cologne

Executing company:
F. C. Trapp Tief- und Straßenbau Köln GmbH

The problem:

Transferring collecting wastewater during the 14 months of construction.

Our solution:

Eight type 50C2.75 sewage pumps with cutting mechanism were used.
The cutter blades chop up the collecting solid material to prevent clogging. Operational safety was of the utmost importance.

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Rheinkalk GmbH Wülfrath, Germany

The project:

Treatment Plant Flandersback, Main water drainage

Executing company:
Helin GmbH, Hagen
Biergans Pumpen-Vertrieb GmbH, Duisburg

The problem:

In the course of restoring the industrial plant, mud that was contaminated and had settled in an 8m wide arch shaft had to be disposed of.

Our solution:

Producing a disposal concept together with Biergans Pumpen Vertrieb GmbH and Helin GmbH. The contaminated mud was pumped and disposed of using submersible pumps through settling basins to the surface in containers.

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2nd Strelasund Crossing Stralsund, Germany

The project:

Construction of the second Strelasund crossing

Executing companies:
Max Bögl Bauunternehmung GmbH & Co. KG

The Strelasund crossing, which is 4.100 metres long, consists of several bridges and dam structures. These include the 580 metre long cable-stayed bridge that crosses the Ziegelgraben. An enormous, 128 metre tall yet elegant pylon structure makes the cable-stayed bridge a captivating piece of architecture that is certainly the most prominent structure of the crossing. The Stralsund (645m) and Dänholm (530m) approach viaducts connect on both sides in addition to the structures over the Strelasund (1.070m).

Our solution:

Use of two KTZ411 units for securing the boring piles during the casting phase. These units are used to pump out the mixture of water and concrete.

The problem:

Pumping off the water and concrete mixture created in the course of boring piles that are 900mm in diameter at a depth of up to 50m into the ground for soil stabilization.

TBG Ready-mix Concrete, Germany

The project:

Recycling basin on a ready-mix concrete mixing facility

Executing company:
TBG Transportbeton Lüssen, Bremen

The problem:

The concrete mixer is cleaned with water, which is then diverted to the recycling basin where cement slurry is deposited.

Our solution:

A type KTZ45.5 submersible pump is used to pump the recycling water containing the cement slurry to the mixing system. The pump has been in continuous operation for three years and shows no signs of wear.

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ARGE Tunnel Tröingeberg, Sweden

The project:

Torebro-Heberg Tunnel Tröingeberg, Sweden
two-lane railway tunnel, tunnel length: 1.160 m

Executing company:
Per Aarsleff Bygg- och Anläggnings AB
Beton & Monierbau Gesellschaft.m.b.H

The problem:

Drainage with the help of submersible pumps in preliminary section and during the tunnel drive.

Our solution:

Type KTZ32.2 and KTZ45.5 pumps are used.

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East Butterwick Pumpstation, UK

The project:

Renovation of a pump station in East Butterwick, North Lincolnshire, Great Britain

Executing companies:
T-T Pumps Ltd., Cheshire
Messingham Internal Drainage Board

The pump station was built after the Second World War and is used to pump off flood water.

The problem:

In 1981 our partner, T-T Pumps Ltd., equipped this pump station with two TO500B855 units, each with a 55kW power rating.
900 litres per second is moved at a height of 4,5m. The operating range should additionally be between 0m and 7,5m.
Although the pumps have run for twenty-three years without failure or need for spare parts, the Messingham Internal Drainage Board decided in 2004 that the pumps had reached the end of their lifespan.

The solution:

Again, T-T Pumps Ltd. won the bid. The solution that was offered was simple and inexpensive: In 2005 it was possible to employ two new type TO500B855 pumps of the latest design to be operated for another 24 years – without risks or large-scale reconstruction.

The installation of the pump control developed by T-T Pumps Ltd. has now made it possible for the pump station to be used for draining the surrounding fields during dry periods.

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ARGE Tunnel Grouft, Luxemburg

The project:

ARGE Tunnel Grouft, Lorenzweiler, Luxemburg

Executing companies:
Wayss & Freytag Ingenieurbau AG,
Max Bögl Bauunternehmung GmbH & Co. KG
Societe de Travaux Galere s.a.
Tralux s.a.r.
Felix Giorgetti s.a.r.

An approximately three km long tunnel is being built north of the city of Luxemburg. It is part of the new section of the “Route du Nord” and consists of two tunnels from which one three-lane and one two-lane tunnel have a gradient of almost 4,5%. The tunnelling work is being performed using conventional construction methods and explosives. The tunnel connects the Heeschdrëfferbierg plateau in the south and the Alzettetal near Lorentzweiler in the north. This will create a section connecting to the important north-south track in Luxemburg.

The problem:

Open drainage during tunnelling and construction in the open with the help of submersible pumps.

Our solution:

Producing a drainage concept. Types used:
KTZ22.2, KTZ32.2, KTZ45.5, KTZ47.5, LH25.5W

Storm Flood Gate Maeslantkering, Netherlands

Foto: Rijkswaterstaat

The problem:

To close the gates, the ballast tanks are flooded. To open these gates the ballast tanks have to be pumped out again.
The prolonged dry run is particularly demanding for the pumps because the gates are only closed a few times per year.

The solution:

Thirty KTZ type pumps were installed for this purpose. These KTZ pumps also remove the last remaining silt from the tanks.

The project:

Operating the ballast tank of the storm flood gate Maeslantkering

Executing company:
Distrimex Pompen & Service b.v., Netherlands
Van der Ende Pompen b.v., Netherlands

The Maeslantkering, a storm flood gate, is located at Hook of Holland (Netherlands). This gate closes off the inland-directed waterways when there is a threat of a storm surge. The gigantic gates are the size of a seven-storey high-rise building.

Foto: Rijkswaterstaat

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Mink Farm, Netherlands

The project:

Pumping out faeces from a mink farm

Executing company:
Distrimex Pumpen b.v., Netherlands
Van Mierlo Pompentechniek b.v., Netherlands

The problem:

The faeces of the animals are gathered in a slurry tank. This tank is emptied from time to time.

The solution:

A wastewater pump of the type 100B43.7 equipped with canal impeller, duck foot bend and guide rail fitting was installed in the slurry tank of the mink farm.

The B series proved very effective in cattle breeding and is used quite often for keeping pigs and piglets.

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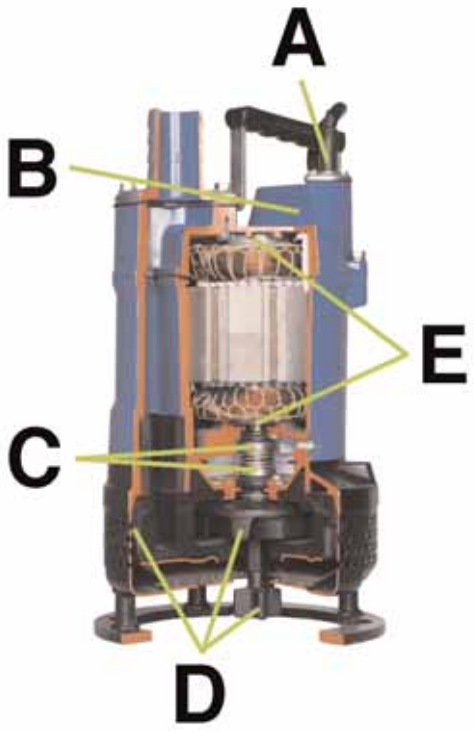
Latest Technology and Highest Quality

A - Tsurumi stuffing box - absolutely watertight

The stuf fing box is located at the cable entry section and takes the part of sealing of f water. As the cable conductors consist of twisted wires, water may penetrate into the motor by the capillary phenomenon when cable sheath or insulation is damaged or when the end of the cable is submerged. The construction is such that a certain part of the insulation of each conductor is peeled and filled with rubber or epoxy resin for the complete sealing.

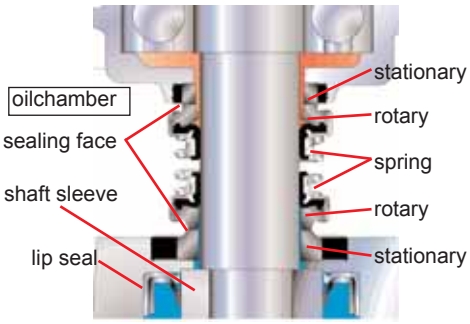


B - Continuous use under dry run ("on snore")

Located directly above the motor windings, a snap-action self-resetting bi-metal device cuts of f voltage from all three phase windings simultaneously if the current is too large in one, two or all three windings, or if the windings get too hot.
Tsurumi enables measurement of winding resistance and insulation from the far end of the cable, without ever removing the cover from the motor in the field.

C - Double mechanical seal in oil bath

All Tsurumi pumps dispose of a double sealing systems for extended lifetime:



1. A shaft sleeve in connection with a special lip seal protects the mechanical seal from particles - abrasive particles are expelled back into the flow - they don't have contact with the mechanical seal at all !!

2. All Tsurumi contractors' pumps - even the 400W class - have double mechanical seals inside an oil both. The seal material is Silicon Carbide - no other has greater hardness. Resistance to temperature fluctuation and corrosion is also the best available.

D - Increased wear resistance of pump casing and impeller

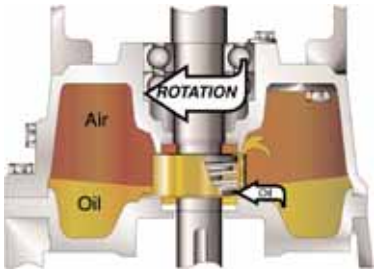
As contractors´ pumps are used in unpredictable circumstances, Tsurumi has gone a long way towards making the impeller capable of the impossible and towards providing spare motor power to match.
Tsurumi contractors´ pumps are used extensively for bentonite mud, often with earth in the case of the models fitted with an agitator.

E - Ball bearings of highest quality

Due to the high quality of the shaft and the bear rings all pumps can be run horizontally when entirely submerged.

Oil Lifter

A special patented guide vane is attached inside the oil chamber. With the motor rotation oil is pumped up.
Therefore even at low oil level lubrication and cooling of the mechanical seal is secured.



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