TSURUMI PUMP

Application Reports - Issue No. 4 - December 2004

Tsurumi Manufacturing Co. is the world's biggest manufacturer of electrical submersible pumps.

**Tsurumi's Kyoto Plant is the world's most modern submersible pump manufacturing plant.
Total manufacturing capability: 1.000.000 units per year.**

Established in 1924 Tsurumi is one of the most experienced pump manufacturers.

**Tsurumi is quality and durability.
Pumps for professional use.**

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Road tunnel B236n, Dortmund-Berghofen

The project:

Construction of the road tunnel B236n in Dortmund-Berghofen

The problem:

Open dewatering during the underground tunnel heading and also cut-and-cover work with the aid of submersible pumps.

Our solution:

Pumps of types KTZ32.2, KTZ45.5 and KTV22.2 were used. Continuous snore mode and the possibility of dry running are possible with Tsurumi pumps and secure driving at this construction site.

Figure above: Dumper in the tunnel
Figure on right: Shaft ring dewatering

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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Escaping hazardous material, Fire Brigade Hamburg

The project:

Action of the **Hamburg Fire Brigade** following an accident in which a hazardous material escapes

The problem:

Sucking up from the surface of the road the very small residual quantities of the liquid that had escaped

Our solution:

Use of a residue water pump of type LSC1.4S. This sucks up liquids of depths down to 1 mm in a self-priming manner and then continues to operate in snore mode without supervision. After use the pump was cleaned with fresh water so that the plastic parts and elastomers were not attacked by the liquid.

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Inland waterway canal Hohenems, Austria

The project:

Construction of the inland waterway canal as well as the installation of concrete girders for securing purposes in Hohenems, Austria

Executing company:
Hilti & Jehle, Feldkirch, Austria

The problem:

Pumping off dirty water with high levels of sludge (turf, humus, sand)

Our solution:

Use of two Tsurumi KRS2-100s with agitator in baskets with 30 mm perforations. The stirrer mounted on the shaft swirls up the medium and ensures that slick, sand and sludge can be conveyed away without any problem. In this way the pump basket remains unclogged and the pump line does not get blocked. In this way the work of one man for maintaining the pumps and pressure line was saved. Previously the pumps had to be frequently opened and the silted-up pipes dried and cleaned.

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Sand dressing, Quartz works, Frechen

The project:

Construction of a new handling system for quartz sand

Executing company:
Quarzwerk Frechen

The problem:

The pump is installed at a depth of 7 m and ends in a collecting shaft which receives the flushing water contaminated with sand. The solids content at flushing can be up to 20 % or even exceed this figure.

Our solution:

A pump of type KRS2-150 with agitator for pumping off the high level of sand. The integrated agitator ensures a level of swirling sufficient to ensure that the high sand concentrations can be pumped and so that the quartz sand arising cannot deposit on the floor of the shaft.

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RWE brown coal open-cast mine, Indem

The project:

Pumping surface water from the main level of the Indem open-cast mine into the receiving body of water

Executing company:
RWE Power AG, Braunkohletagebau Indem

The problem:

The surface water, which arises discontinuously from the complete Indem open-cast mine, is first taken up in the main level. From here it is pumped continuously into the receiving body of water. Requirement to be satisfied by the pump: maximum delivery performance at pressure variations from 3,5 to 4,5 bar.

Our solution:

Use of a high-pressure pump of type LH855 with 55 kW. This delivers the water into the existing pressure line at the rate of 5,7 m3/min at a pressure of 3,5 bar. Since the Tsurumi pump can be operated not only vertically but also horizontally, it can be connected perfectly to the existing pressure line.

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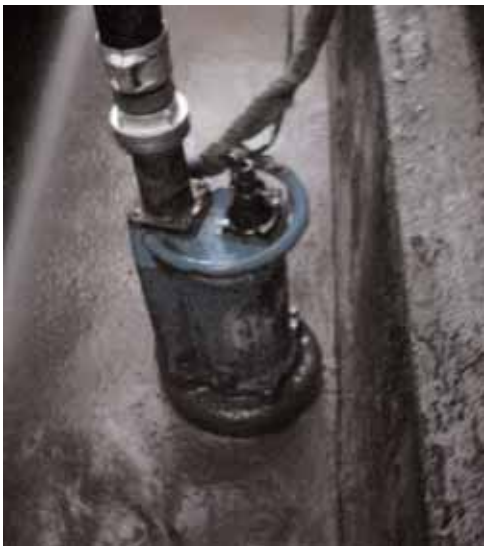
Cleaning of a truck washing pit, Dormagen



The project:

Pumping away the washing water from the truck washing pit

Executing companies:
Spedition Grote, Dormagen

The problem:

The washing water arising from the truck cleaning process and which is contaminated with sand and granulate has to be pumped off.

Our solution:

A pump of type KRS2-80 with agitator was selected for pumping off the washing water with its high level of sand and granulate (up to 25 % solids by volume).
The integrated agitator swirls the water to such a degree that the solids cannot settle out at the bottom of the shaft.

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Construction of an office building, Spreeport

The project:

Construction of an office building, 1st construction phase

Executing company:
HOCHTIEF Construction AG, Niederlassung Berlin
Responsible for setting up the construction site and for the technical equipment:
STREIF Baulogistik GmbH, Niederlassung Ost

The problem:

Pumping off the storm water arising on the roofs during the construction phase.

Our solution:

Eight type KTVE21.5 pumps with integrated electrode controls were installed in the shafts. The slim electrodes, which are attached, replace float sensors which take a lot of space and are maintenance-intensive. Only the motor line of the pump has to be relaid; no additional cables for float switches have to be connected.

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Augustaburg tunnel, Erfurt

The project:

Construction of a railway tunnel with a length of 1480 m.

Executing companies:
ARGE Tunnel Augustaburg, Erfurt
Hochtief Construction AG, Frankfurt
Alpine Bau Deutschland GmbH

The problem:

Drainage during the underground tunnel heading

Our solution:

Use of type KTZ32.2 submersible pumps operated in 24-hour snore mode for drainage purposes during the tunnel heading. Thanks to their special properties including their internal rotating mechanical seal and upstream shaft protection sleeve with seal, the Tsurumi pumps can be operated in 24-hour snore mode. The advantages of this design are:

- Extended service lives
- Lower costs for spare parts
- Lower labour costs

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ARGE Tunnel Achrain, Austria

The project:

Construction of a 3,200 m long road tunnel

Executing companies:
ARGE Tunnel Achrain/Österreich
Beton- u. Monierbau Gesellschaft m.b.H.
Alpine Mayreder Bau GmbH
Jäger Bau GmbH

The problem:

Drainage during the complete tunnel heading work.

Our solution:

Use of type KTZ32.2 submersible pumps. These are operated in 24-hour snore mode.

Thanks to their special properties including their internal rotating mechanical seal and upstream shaft protection sleeve with seal, the Tsurumi pumps can be operated in 24-hour snore mode.

KTZ32.2 in snore mode

The advantages of this design are:

- Extended service lives
- Lower costs for spare parts
- Lower labour costs

Tunnel Brixlegg, Austria

The project:

Construction of a 4,200 m long railway tunnel

Executing companies:
ARGE H2 Tunnel Brixlegg
Porr Tunnelbau
G. Hinteregger & Söhne
Östu Stettin

The problem:

Open drainage during the tunnel heading.
The ARGE H2 Tunnel Brixlegg is building the 4,200 m long railway tunnel in a construction time of 20 months. In order to keep to this schedule, up to five headings will be worked at the same time. The 2,276 m long exploration gallery, which was completed in 2001, serves in part for supplying the headings. In the course of the work the exploration gallery will be enlarged to serve as a rescue gallery. In addition the creation of a 330 m long access gallery from the centre of Brixlegg is planned. Crosscuts at intervals of 500 m are being constructed.

Our solution:

Use of submersible pumps of type KTZ32.2, these operating in 24-hour snore mode.

Thanks to their special properties including their internal rotating mechanical seal and upstream shaft protection sleeve with seal, these Tsurumi pumps can be operated in 24-hour snore mode.

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Remediation, wastewater sewer, Cologne

The project:

Remediation of a wastewater sewer, stormwater treatment SKO 405 Cologne

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

The problem:

Pumping of the wastewater arising during the 8-month construction period including complete construction and laying out of a DN 250 pressure line with a length of 1200 m including overpasses and transverse sections.

Our solution:

Three wastewater pumps of type 100C411 with non-clog impeller with cutter were used.
The special impeller comminutes solid matter that arises so that blockages cannot occur.
Operational reliability held the highest priority here.

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Tunnel Siegkreisel, Betzdorf

The project:

Construction of a 360 m long tunnel with three lanes as component of a municipal bypass system; completion: Spring, 2006.

Executing companies:
ARGE Tunnel Tunnel Siegkreisel, Betzdorf
Hochtief Construction AG
Kirchner Bau GmbH
Alpine Bau Deutschland GmbH

The problem:

Pumping off of the water arising during the underground tunnel heading.

Our solution:

Use of submersible pumps of type KTZ32.2, these being operated in permanent snore mode (dry running) during the complete construction period. This application is no problem for the pump thanks to the patented oil distributor in combination with the rotating mechanical seal, which is located completely internally.

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Tunnel Vomp, Austria

The project:

Construction of a railway tunnel with a length of 8000 m.

Executing companies:
ARGE Tunnel Vomp, Österreich
Strabag AG
Ed. Züblin AG
Hochtief Construction AG

The problem:

Drainage during the earth tunnel heading with the aid of submersible pumps.

KTZ32.2 in use for drainage at the working face

Our solution:

Use of Tsurumi type KTV2-22, KTV2-55 and KTZ32.2 in 24-hour snore mode.
A total of some 35 Tsurumi pumps are in use.

Figure on left:

To be seen here is a KTV2-22 which has been taken apart for cleaning.

Just four screws have to be released to expose the pump hydraulics.

The lateral guiding of the medium makes removal of residues of concrete a simple matter.

High savings in costs can be achieved through the simple form of construction of the Tsurumi pumps.

Tunnel U2/2, Vienna, Austria

The project:

Construction of an underground railway tunnel with a length of 1500 m.

Executing companies:
ARGE Tunnel U2/2 Taborstraße, Vienna, Austria
Östu-Stettin Hoch- und Tiefbau GmbH
G. Hinteregger & Söhne Bauges.m.b.H.
Wayss&Freytag Ingenieurbau AG

The problem:

Drainage of the underground tunnel heading with the aid of submersible pumps.

Our solution:

Use of submersible pumps of the KTV series which can reliably ensure drainage in 24-hour snore mode during the heading work.

Thanks to their special properties including their internal rotating mechanical seal and upstream shaft protection sleeve with seal, the Tsurumi pumps can be operated in 24-hour snore mode.

The advantages of this design are:

- Extended service lives
- Lower costs for spare parts
- Lower labour costs

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Tunnel Weißenburger Street, Dortmund

The project:

Construction of an underground railway tunnel with a length of 130 m, descending heading with a partial cut machine.

Executing companies:
ARGE Tunnel Weißenburger Straße, Dortmund
Wiemer & Trachte AG
Alpine Bau Deutschland GmbH

Portal with partial cut machine in operation

The problem:

Drainage during the tunnel heading work.

Our solution:

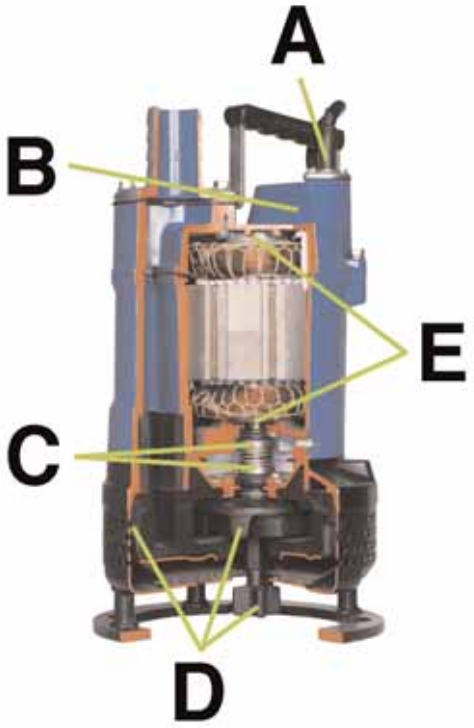
Use of submersible pumps of the KTZ series which can reliably ensure drainage in 24-hour snore mode during the heading work.

Collecting shaft with KTZ47.5 and KTZ35.5 in operation in snore mode

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.

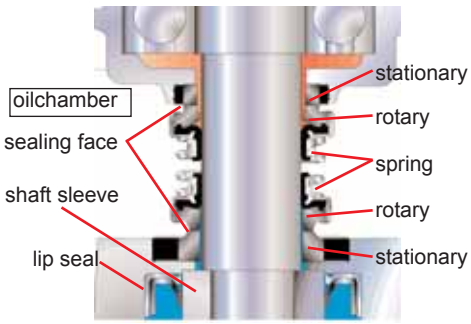


B - Continuous use under dry run ("on snore")

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

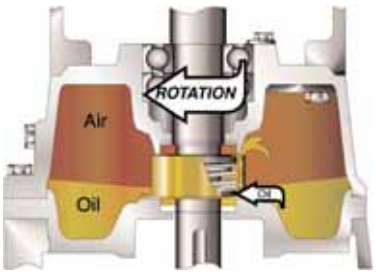
As contractors´ pumps are used in unpredictable circumstances, Tsurumi has gone a long way towards making the impeller capable of the impossible and towards providing spare motor power to match.
Tsurumi contractors´ pumps are used extensively for bentonite mud, often with earth in the case of the models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