# Global Presence

Addresses of all business partners in 60 countries are available upon request or by visiting:

www.netzsch-pumps.com

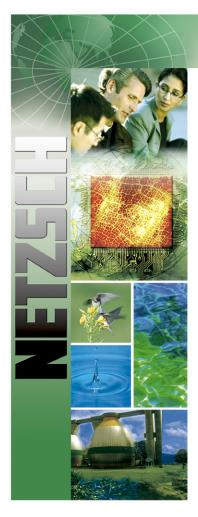




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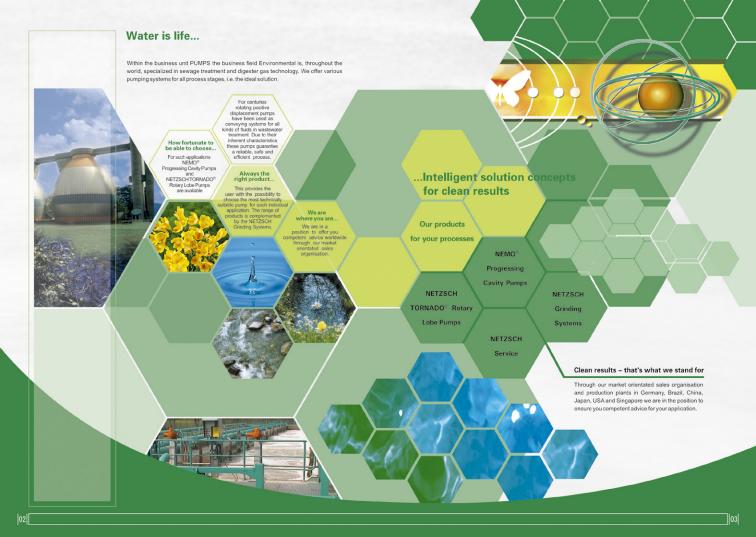




# NETZSCH The heart of your process

Water is life
Intelligent solution concepts
for clean results





Activated sludge

We are ready

for anything.

Centrate
Clay sludge
Combined sewage
Compacted sludge
Conditioned sludge
Crude sewage

Digested sludge Excess sludge Faecal substances Ferric Chloride

Fresh sludge
Grease and oil enulsions
Gypsum suspension
Hygienic sludge
Industrial wastes
Leachate

Liquid manure
Lubricant
Metallic hydroxide sludge
Peat sludge
Pit water
Polymer
Polymer
Polymer
Polymer
Suddge
Refined sludge
Returned sludge
River sludge
Secondary sludge
Secondary sludge
Sevage sludge
Sludge cakes
Sludge

Surplus Activated Sludge

Wastewater

#### Your Medium...

#### Thickened sludge

By static or mechanical thickening methods a first reduction in the volume of the sludge is achieved. The objective is to reach a dry solids content of 6 % to 11 % in the pumped fluid.

Depending on the consistency, the fluids have low to high viscosity and may be pumped over long distances.

Multistage NEMO® progressing cavity pumps are capable of pumping against high pressures. Even fluctuating process conditions are handled without problems.



Flotation sludge and sludge foam are floating sludge fractions building up on the surface of the secondary sedimentation tank.

This undesirable effect will necessitate the pumping away of the flotation sludge in the form of an air-fluid mixture.

The ideal device for this application is the NEMO® progressing cavity pump which can reliably and continuously convey fluids containing a high degree of ass.

#### Thin sludge

This sludge is the most common sludge in a wastewater treatment plant. The dry solids content is approx. 1 % to 4 %. According to the stage of the process the sludge contains varying quantities of organic and inorganic solids.

Depending on the process, pumps with long serviceable lives are required which provide high flow rates at low pressures.

Both NEMO® progressing cavity pumps and NETZSCH TORNADO® rotary lobe pumps are eminently suitable. The NEMO® progressing cavity pump stands out above all for its high performance based on L or P geometries. Another advantage is a long service life due to an extended seal line and a reduced sliding velocity of the rotor.







#### ...our product through thick and thin

#### Dewatered sludge

Dewatering of the sludge with the addition of conditioning additives into centrifuges, decanters or filter presses generates a further reduction of volume between 65 % and 80 %. The result is a crumbly, compacted, non-flowing product.

Due to these features force feeding of the fluid within the pump is required. Furthermore, bridge-building has to be avoided.

In general, NEMO® progressing cavity pumps with rectangular hoppers and feeding screws are used for this application. The special features of these pumps are the positioned, patented feeding screws for optimal transfer into the conveying chambers. For studges with a tendency to bridge-building the NEMO® progressing cavity pump is equipped with an interarted bridge breaker.



#### Pio mass

Bio-mass is a renewable raw material representing a source for the future. The inhomogeneous, organic substance occurs in anything between liquid and solid form. With the help of micro organisms gaseous methane and carbon dioxide are reclaimed.

Depending on the process, the bio-mass has to be continuously agitated in the reactor. In this case you need pump systems capable of easily coping with high flow rates and large particle sizes within the dry solids content.

Both NEMO® progressing cavity pumps and NETZSCHTORNADO® rotary lobe pumps are used for this application. However, due to the completely free passage of particle sizes up to 70 mm NETZSCH TORNADO® rotary lobe pumps are usually preferred. Another advantace of this pump is its compact, space-saving design.



#### Lime mill

By lime milk we understand an inorganic suspension consisting of lime hydrate and water. Alternatively, lime milk can be produced by slaking unhydrated lime with water. Lime milk is used as a conditioning substance for dewatering sludges.

Geometry and structure of the calcium hydroxide (lime) is dependent on its origin and the method of processing. The medium is very abrasive.

For long serviceable life, NEMO® progressing cavity pumps are made from high quality rotor/stator materials. Most suitable is the wear-free NEMO CERATEC® ceramic rotor in connection with an extremely wear resistant polyurethane stator.



#### Auxiliary Flocculents

Flocculents are added to the sludge before dewatering. They stimulate the formation of big flocs of suspended solids contained in the sludge, thus, contributing to improved dewatering results.

In general, flocculents are dosed as polymeric solutions or dispersions.

Their viscosity - together with the necessity for exact dosing - asks for pumps with certain capabilities, capabilities which NEMO® progressing cavity pumps provide.



The following flow chart shows the individual process stages of wastewater treatment in municipal and industrial sewage plants, from the inlet to the discharge following the sludge treatment.

Apart from sand, the wastewater contains coarse floating contaminants, digestable material, sludge forming suspended solids, dissolved organic matter and bacteria.

During mechanical waste treatment solid particles are separated, heavy impurities are held back by screens or prepared for pumping by efficient NETZSCH grinding systems. The mineral parts in the wastewater are caught in the sand trap and the studge is discharged into the preliminary clarification tank. This sludge is conveyed to the static pre-thickening. When the mechanically cleaned wastewater has passed through the preliminary clarification zone the biological advanced waste treatment starts.

During this stage the decomposition of carbon compounds as well as the elimination of nitrogen and phosphorus takes place. Bacteria are added to the organic pollutants and then the introduction or exclusion of oxygen separates them into solidis (sludge particles), water, carbon dioxide and elementary nitrogen.

Thereafter, the wastewater flows into further clarification tanks from where part of the activated sludge from biological treatment is pumped back to the activated sludge tank.

Excess sludge is brought over to the mechanical pre-thickening process. The addition of polymer causes a reduction in volume.

In a hermetically sealed septic tank, at a temperature of approx. 37 °C. about 70 % to 80 % of the thickened sludge are reduced to 45 % to 50 % of its volume within approx. three weeks. The digester gas, methane, carbon dioxide as well as small quantities of nitrogen, oxygen and hydrogen sulfide produced during this process is utilized as energy for heating or generating power.

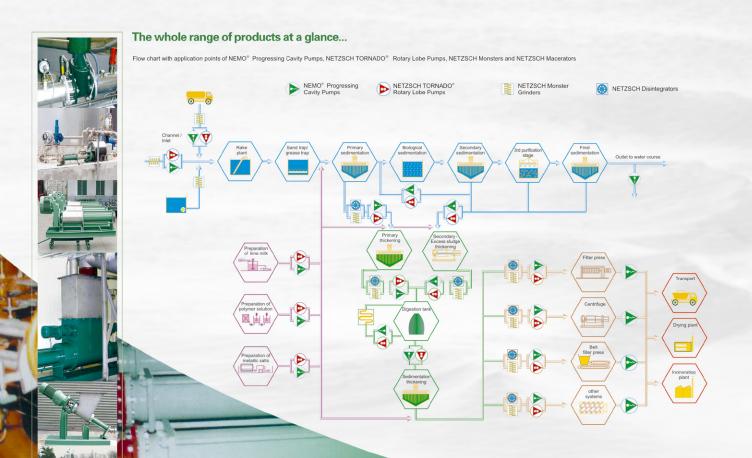
For the continuous feeding and agitating of the studge in the septic tanks a NEMO® progressing cavity pump is used. The displaced digested studge is pumped to a thickening tank for solids/water separation.

For further dewatering the digested sludge is mechanically treated by the addition of polymer or lime. In general, centrifuges, decanters, belt and filter presses are used to generate sludges with a dry solids content of approx. 30 % -40 %.

With a specifically designed NEMO® extruding pump system the crumbly, compacted sludges are conveyed for transportation to dumping grounds, thermal treatment or combustion in order to generate energy.

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### **Wide Range of Applications**



NEMO® progressing cavity pumps and NETZSCH TORNADO® rotary lobe pumps are normally used in wastewater treatment plants for pumping fluids with the following properties:

- · low viscosity or compacted
- solids content up to 50 % and solids size up to 150 mm
- · fibrous
- · adhesive
- thixotropic
- abrasive
- · corrosive and aggressive
- · lubricating and non-lubricating

#### · Pressures up to 48 bar

#### **NEMO® Progressing Cavity Pumps**

#### Advantages

- · variable, modular system
- · robust and compact block design also available with
- bearing housing
- · four rotor/stator geometries and an extensive range of materials
- · the most suitable joint for every application · mechanical seal as standard, other seals optional
- Additionally, for high viscosity pumps
- · various hopper dimensions with and without force feed
- · bridge breaker (optional)

#### Special features

· varying temperatures

. Flow rates up to 700 m3/h

· high gas content

· toxic

· continuous, almost pulsation-free conveyance independent of pressure and viscosity · high dosing accuracy even at low rotational speed

Large Capacity and Pressure Range

- high suction and pressure capability (-0.9 bar up to +48 bar), no valves
- · reversible direction of flow
- . stator inlet with taper for optimal entry of the fluid into the conveying chamber · patented, positioned feeding screw for viscous products
- · pumps for fluids with high dry solids contents
- . low life cycle cost due to high operational reliability and
- simple service requirements

#### NETZSCH TORNADO® Rotary Lobe Pumps

#### Advantages

- · variable, modular system
- · robust and space saving design
- · three lobe geometries
- · highly abrasion resistant and replaceable protection
- plates on both faces of the housing
- · adjustable housing for long service life
- . standard mechanical seal, will accept any DIN 24960 seal
- . the patented timing gear, together with separate seals for pump and drive housings prevent ingress of any product
- · rotary lobe shaft with polygon type plug-in shaft connection for ease of maintenance

- Special features
- · high efficiency, space saving · continuous, almost pulsation-free conveyance
- · high solids handling capability even with small pump
- sizes
- · flow rate proportional to speed
- · reversible direction of flow
- · high suction capability and resistant to dry-running
- · use of special geometries to avoid wrapping
- · low life cycle cost due to high operational reliability and simple service requirements

#### **NETZSCH Grinding Systems**

#### Advantages

- · depending on the application two different designs are
- · cutters made from wear resistant, hardened steel
- · hard faced mechanical seal with an oil reservoir
- · flanged drive housing
- · reliable protection for the NEMO® progressing cavity pumps and NETZSCHTORNADO® rotary lobe pumps

#### Special features

- · the self adjusting cutter head ensures optimal cutting performance
- · inline version: product inlet and outlet ports are the
- · heavy duty bearings to withstand large loads



#### We speak the same language...

Today, there is a trend towards economical energy recovery by the fermentation of organic waste.

Bio-gas is produced in various ways.

Biological waste with a high solids content is delivered to a separate receiving station. The waste is emptied into a collection box. Next to the collection box there is a grinding system and, if necessary, a separation device. From the collection box the biological waste is transported by loaders or conveyor belts into the grinding system. Thereafter, the ground waste is forwarded to the flotation process.

During flotation water is added to the biological waste until it turns into a pumpable suspension (pulp). This process is supported by an agitator in the tank. Also, interfering material like parts of metal, stones and glass are removed by a trap.

Afterwards, the suspension is pumped into the hydrolysis containers. Here, the medium has a dry solids content of approx. 10% to 12%. At a temperature of 30°C – 35°C and a pH-value between 4 and 6 the organic waste is digested by acetogenic bacteria and turned into organic acids. The digestion of the material takes place during a retention time of three to five days. Air is introduced to accelerate the formation of organic acids. Material that does not turn into acids is removed from the hydrolysis fermentation tank and devalened in a dehydration system. The remaining filter cake can be mixed into the compost for final rotting.

After the treatment in the hydrolysis container the biological waste suspension is transferred into the methane fermentation tank. There, bacteria turn the acids into acetic acid, methane and CO,. For this transformation a close pH-value of about 6.8 to 7.3 must be provided. 65 % of the acids generated in hydrolysis are disintegrated. Depending on the speed of the fermentation tanks, the process will take 10 to 15 days.

The generated methane will be made available to a combined heat and power station for the production of electricity or heat. The remaining bio-mass, still containing a remainder of organic material, will be further dewatered to produce a filter cake for final compositing.

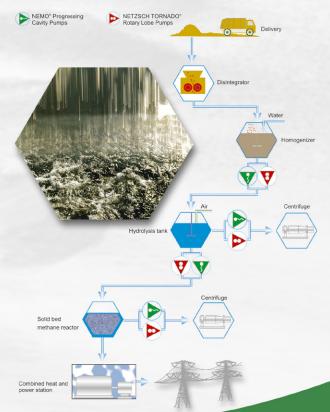




## ...the whole range of products at a glance



The accompanying diagram shows a simplified, multi-stage industrial bio-gas plant for the production of methane with application points of NEMO® Progressing Cavity Pumps and NETZSCH TORNADO® Rotary Lobe Pumps.





#### Flexible and mobile - and without a plug

The consequences of environmental climatic changes increasingly require the use of pumps that can be quickly and easily put into operation. Quite often, such operations have to be carried out away from buildings or plants and far from any infra-structure.

Ideal for applications of this kind is the NETZSCH TORNADO® Mobile consisting of a mobile NETZSCH TORNADO® rotary lobe pump with diesel drive. Independent of local conditions, this pumping system is capable of delivering large quantities of wastewater and sludge.



#### Wide Spectrum of Applications

- adjustable flow rates up to 600 m³/h
- · for pressures up to 10 bar
- low to highly viscous fluids
   abrasive products
- completely free passage of solids up to 60 mm
- resistant to dry-running
- \*self-priming up to a maximum of 8 mwc of water
- and sludge
- other pump sizes with different flow rates and pressures are available





#### "Tailor-made" disintegration



#### The right product for each and every application

For the protection of your plant including pump units, efficient NETZSCH grinding systems are used. They make sure that undesirable solids are disintegrated to a pumpable size. Thus, the danger of blockage and/or wrapping is reliably avoided.



#### **NETZSCH Monster Dual Shaft Disintegrators**

The solids contained in the wastewater flow into two shafts with different teeth combinations. The different speed of the shafts means the NETZSCH Monster is self-cleaning. Different tooth combinations are available for the desired degree of size reduction. Depending on the application, seven NETZSCH Monster versions for flow rates of 1 m<sup>2</sup>/1 to 9500 m<sup>2</sup>/1 har available.



#### **NETZSCH Inliner 6000 Macerator**

It can be directly connected to the pipeline before the inlet of a NEMO® pump. It can cut up the sundries of liber, granules, and hair, and can subside the hard materials of metal and stones, so as to prevent jam and wind in the pipeline, or damage of the downstream equipment.

The main body and the grinder head are welded parts of stainless steel structured simply and manufactured in short period.

A kind of hinge and fast-connection-clip is applied between the grinder head and the main body, so that the grinder may be overturned from the hinge. A balancer for buffering is mounted on the body for easy to examine and repair the grinder and clean the sediment box. The seal between the two parts applies a large diameter Otype ring, which has excellent sealing properties and simple structure.

The grinder is designed large volume main body for preventing against the medium with large specific gravity from damaging the grinder. The flow rate of the medium becomes lower in the main body, and the materials with large special gravity will sink downward and the cutting blades will not break down.

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In order to discharge the dregs easily, the bottom of the main body is designed inclined to the outlet for dregs. The sediments in the cavity of the main body will be easily cleaned when the outlet is opened.



Electric motor for the gear box. Power: 2.2 / 3 / 4 kw. Speed of rotation: 318 r / min. Flow rate of clean water: less than 300 m³ / h. Solid content 2 % ~ 8 %

Dimensions on flange: DN100 / DN125 / DN150 / Dn250 Center height of pipeline: 310 mm Distance between the flanges: 700 mm

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