

# Mechanical Wastewater Screening



- Reliable screens for any application
- Fine and micro screens for separation of even fine suspended material
- Innovative technology from one source

## ►► Screens for any application

Mechanical treatment is indispensable as the first process step of preliminary treatment for both municipal and industrial wastewater applications.

Initially coarse material has to be removed in order to protect subsequent treatment stages against damage/pollution or to relieve them. The goal is usually to completely separate floating, settling and suspended material, dependent upon the bar spacing or perforation, and remove the material from the flow into a container.

Based on the principle of *screening-washing-transport-dewatering within one machine* a complete ROTAMAT® family was developed and then successfully

launched within the worldwide wastewater treatment market. In recent years the STEP SCREEN® family and then the MAX® family were added to complement the range. The HUBER screening range therefore comprises of a range of screen systems and enables us to offer the perfect solution for

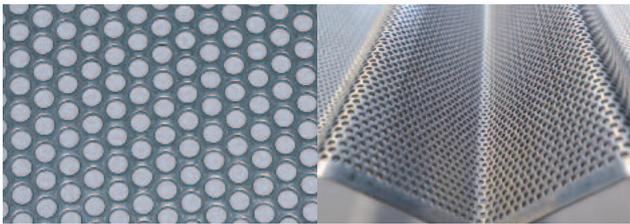
- any site specific installation conditions
- any flow rate
- any bar spacing/perforation
- any application



Coarse screen



Fine screen



Perforated plate screen, rolled - folded



Mesh screen

## ►► The development of finer screens opens up new fields of application

The development of very fine screens for separation of finer particles opens up new fields of application in wastewater treatment.

For the recently introduced new type of membrane bioreactors within the market an improved performance is required to ensure reliable separation of hairs and fibrous material to allow the membrane process to function effectively.

The fine screens are equipped with a stainless steel square mesh or perforated plate which provides the defined separation size that enables an extensive removal of hair and fibres to be achieved. By application of this new technology a high degree of environmental protection can therefore be achieved at a reasonable cost.

A further application for these units is *river and sea outfalls* which frequently only have coarse mechanical screening installed but feel it will increasingly become more common and important to reduce the COD/BOD concentration of the wastewater discharged into the receiving water course. These new fine screens within a single process step can remove undegradable toilet and plastic particles along with organic material contained within the wastewater.

The high solids removal rate permits reuse of treated wastewater. If used for irrigation, even the nutrients contained within the treated water can be utilised.

With many regions within the world with no wastewater treatment plants, or insufficient wastewater treatment plants, fine screening can be a first and quick step in the right direction.

## ➤➤ Mechanical Wastewater Screening – ROTAMAT® Family

### ➤➤ Design and function

The operation of the ROTAMAT® family screens is based upon a unique system that allows combination of screening, washing, transport, compaction and dewatering in a single unit.

Depending on the screen bar spacing or perforation and screen size (screen basket diameter), the throughput can be individually adjusted to specific site requirements.

The ROTAMAT® screens are installed in the channel with a specific installation angle. Whilst the wastewater flows in through the open front end of the screen basket and through the screen bars or perforations, solids are retained by the screen basket, whereby the separation of floating, settling and suspended solids is dependent upon the screen bar spacing or perforation size. Blinding of the screen surface generates an additional filtering effect so that solids can be retained that are smaller than the bar spacing or perforation. The screen starts to operate when a certain upstream water level is exceeded due to screen surface blinding.

The centrally installed screw conveyor takes up the screenings and transports them upwards within the closed rising pipe.

Whilst the screenings are transported, the screw conveyor dewateres and compacts them without any odour annoyance prior to discharging them into the customer's container or a subsequent conveying unit.

### ➤➤ Integrated screenings washing system IRGA

The ROTAMAT® principle allows for direct integration of the screenings washing system.

As the soluble matter is separated from the inert material, faeces are virtually completely washed out which leads to a significant weight reduction.

### ➤➤ The user's benefits

#### **Low headloss – High separation efficiency**

Due to the screen basket design and the flat installation a large screening surface is available which results in a low headloss and high separation efficiency.

#### **Corrosion protection**

The ROTAMAT® units are completely made of stainless steel and acid treated in a pickling bath.

#### **Small space requirements: Several functions combined in one system**

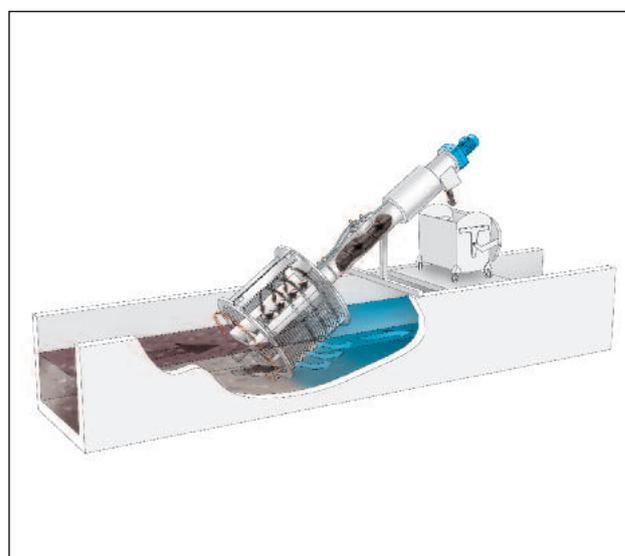
The ROTAMAT® Screens perform the functions of screenings removal, transport, washing, dewatering and compaction in a single space-saving unit. An additional bagging unit guarantees operation of the entire system without odour nuisance.

#### **Outdoor installation**

For outdoor installations, ROTAMAT® Screens can be supplied with a frost protection, combined with an additional insulation, if required.

#### **Retrofitting**

The design of the ROTAMAT® Screens allows for later modification so that the systems can be adapted to changing requirements. Both the heating and integrated screenings washing system for example can be retrofitted.



## ➤➤ Mechanical Wastewater Screening – **ROTAMAT® Family**

### ➤➤ HUBER Fine Screen ROTAMAT® Ro1

- Screenings removal, transport, washing, dewatering and compaction
- Integrated screenings press
- Integrated screenings washing system (IRGA)
- Enforced cleaning by the action of a rotating rake
- Bar spacing  $\geq 6$  mm
- Screen sizes (basket diameter): 600 – 3000 mm



*HUBER Fine Screen ROTAMAT® Ro1 for installation in a channel or container*

### ➤➤ HUBER Rotary Drum Fine Screen ROTAMAT® Ro2/RPPS

- Screenings removal, transport, washing, dewatering and compaction
- Integrated screenings press
- Integrated screenings washing system (IRGA)
- Bar spacing:
  - Wedge wire basket (0.5 - 6 mm)
  - Perforated plate basket (1.5 - 6 mm)
- Screen sizes (basket diameter): 600 - 3000 mm



*HUBER Rotary Drum Fine Screen ROTAMAT® Ro2 units with closed stainless steel cover*

### ➤➤ HUBER Perforated Plate Screen ROTAMAT® STAR

- Removal of hair and fibres to protect downstream membrane filtration plants
- Screenings removal, transport, washing, dewatering and compaction
- Increased throughput capacity due to the increased surface area provided by the folded perforated plate
- Very high screenings separation capacity
- Perforated plate: 1 / 1.5 / 2 mm



*HUBER Perforated Plate Screen ROTAMAT® STAR, 1 mm perforation, protecting downstream membrane systems*

### ➤➤ HUBER Micro Strainer ROTAMAT® Ro9

- Screenings removal, transport, washing, dewatering and compaction
- Integrated screenings press
- Integrated screenings washing system (IRGA)
- XL-version with an extended screen basket for a higher throughput, suited for narrow and deep channels
- Economy version Ro9 EC
- Basket: 0.5 - 6 mm bar spacing, 1 - 6 mm perforation
- Screen sizes (basket diameter): 300 - 700 mm



*HUBER Micro Strainer ROTAMAT® Ro9 – the cost-efficient solution for small flow rates*

## ➤➤ Mechanical Wastewater Screening – ROTAMAT® Family

### ➤➤ Screening of large volumes of wastewater SGAM

- Treatment of dry weather and average flow by the main screen
- Activation of the bypass screen at a predetermined high flow level
- Reduced settling processes due to optimised flow conditions
- Specifically suited for sea and river outfall applications



*Combination of different screening systems for optimised treatment of large volumes of wastewater*

### ➤➤ HUBER Sludge Acceptance Plant ROTAMAT® Ro3

- Mechanical treatment of septic sludge with HUBER Fine Screen ROTAMAT® Ro1, HUBER Rotary Drum Fine Screen Ro2, or HUBER Micro Strainer ROTAMAT® Ro9
- Integrated screenings press
- Integrated screenings washing system (IRGA)
- Optional as a complete plant with integrated grit trap (HUBER Sludge Acceptance Plant ROTAMAT® Ro3.3)



*HUBER Sludge Acceptance Plant ROTAMAT® Ro3 – a worldwide well-proven solution*

### ➤➤ HUBER Screw Conveyor Ro8 / Ro8 T

- Screw conveyors with customised design and manufacture
- Available as a closed pipe conveyor (Ro8) or screw trough conveyor (Ro8 T)



*HUBER Screw Conveyor Ro8 / Ro8 T, applicable for any type of screenings transport*

## ➤➤ Mechanical Wastewater Screening – **STEP SCREEN® Family**

### ➤➤ Design and function

The HUBER Fine Screen STEP SCREEN® system is widely accepted and successful due to its unique function and easy-to-follow operation principle as well as the simple cleaning method without any aids (self-cleaning effect according to the counter-current principle). It is furthermore easy to maintain and able to handle extremely big screenings volumes while it offers also a high operational reliability.

The motor linkage drive has been developed from the well-proven and patented link system. To the benefit of our customers we intentionally avoided difficult-to-maintain chain drives. With the new linkage type we are able to master the occurring bending moments on the lamellae, especially with high water levels.

The solids contained blind the screen surface producing a mat of screenings that has the effect of a filter the pores of which retain also smaller solids than the actual slot width would allow.

### ➤➤ The user's benefits

#### **Lifting of screenings at bottom level**

- due to a special bottom step design

#### **Separation efficiency:**

- Maximum separation efficiency due to the narrow slot width and the produced screenings carpet

#### **Cleaning:**

- Self-cleaning effect due to movable lamellae

#### **Operational stability:**

- Reduced susceptibility to grit, gravel and stones due to the bottom step washing system

#### **Protection against corrosion:**

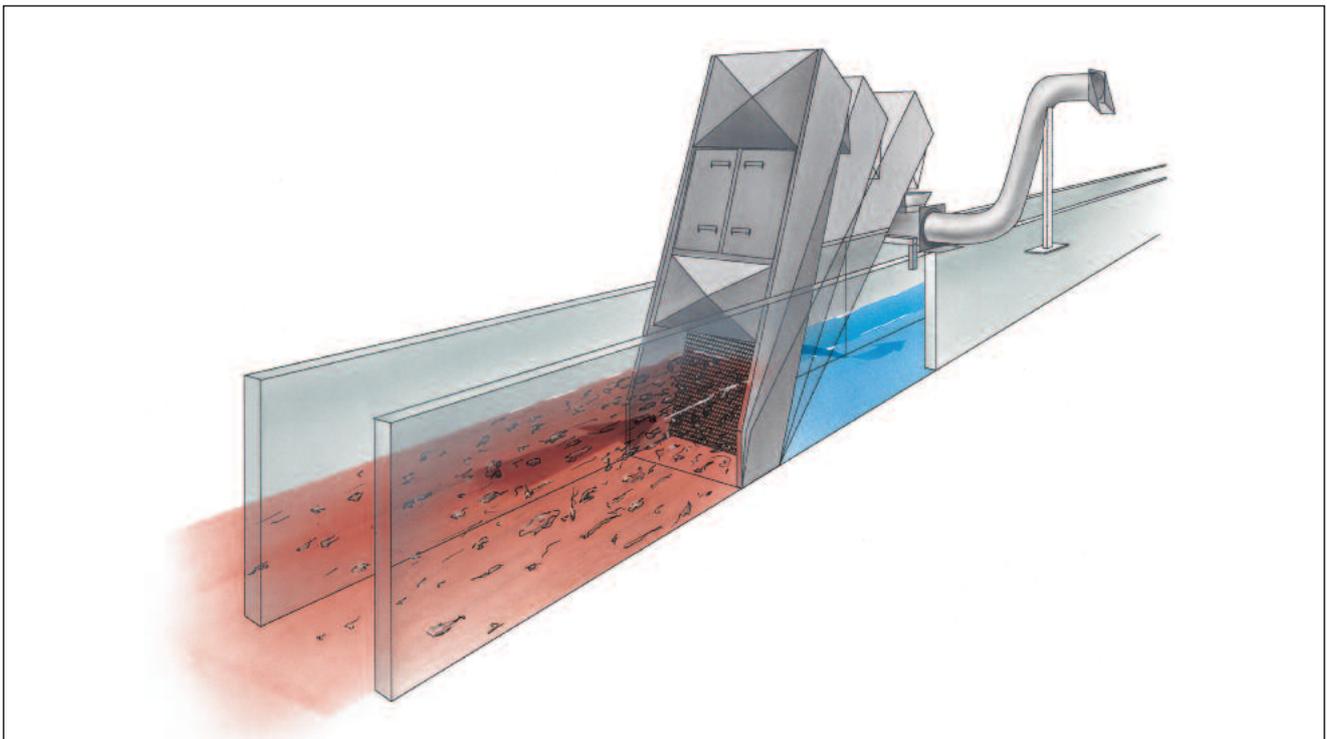
- Manufactured from stainless steel and acid treated in a pickling bath

#### **Experience:**

- Unrivalled for more than 20 years

#### **Pivoting arrangement:**

- Removal of the subsequent wash press or conveying unit is not required.



➤ Installation examples of the HUBER Fine Screen STEP SCREEN® SSF/SSV



*HUBER Fine Screen STEP SCREEN® SSF: length 3500, width 1826, slot width 6 mm, installation angle 50 °, high capacity as the flow passes the screen surface only once.*



*HUBER Fine Screen STEP SCREEN® SSF application in Russia: pivotable in the channel without having to remove the downstream HUBER Wash Press and HUBER Screw Conveyor*



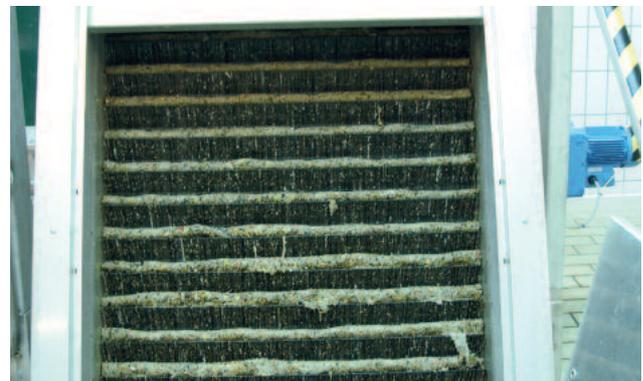
*HUBER Fine Screen STEP SCREEN® SSF combined with HUBER Wash Press WAP® SL for intensive screenings washing. Totally enclosed, odour-free design.*



*4 HUBER Fine Screen STEP SCREEN® SSV units: length 5300, width 1376, slot width 6 mm, installation angle 75°. Maximum operational stability without impairment by grit, gravel and stones due to the special bottom step design.*



*2 HUBER Fine Screen STEP SCREEN® SSV units, length 4300 mm, width 1676, 6 mm slot width, combined with HUBER Wash Press type SL for intensive screenings washing. Totally enclosed, odour-free design.*



*HUBER Fine Screen STEP SCREEN® SSV: very high separation capacity due to the fine slot widths and the produced screenings carpet*

## ➤➤ Mechanical Wastewater Screening – **Max® Family**

### ➤➤ HUBER Multi-Rake Bar Screen RakeMax® – Design and function

The cleaning elements, attached to the chain system, can easily be adjusted to different requirements, the screenings discharge capacity is then extremely variable. This is especially favourable for high solids loads. The cleaning elements, consisting of the rake and comb plate, are screwed and thus independently replaceable.

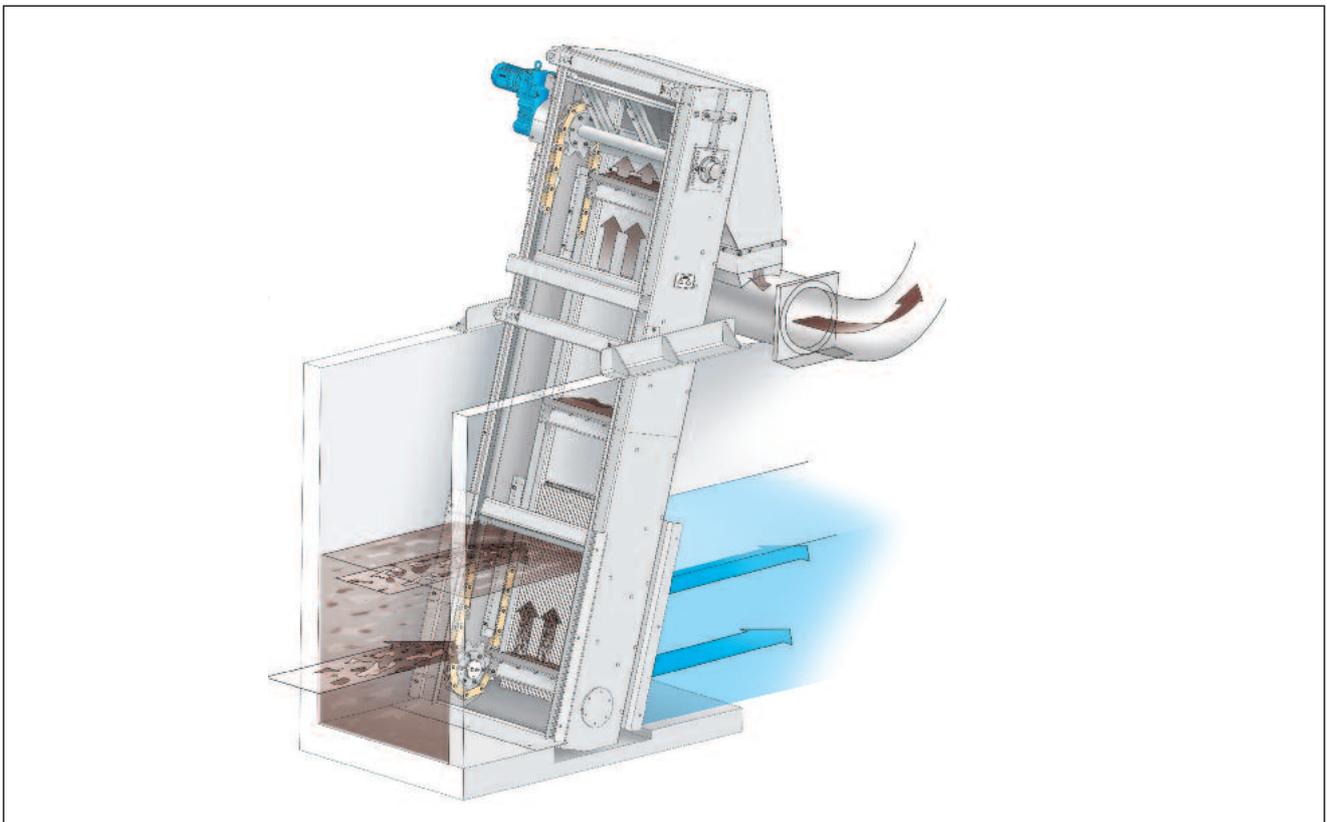
The installation height of the HUBER Multi-Rake Bar Screen RakeMax® above ground level is very small and only dependent, even in case of deep channels, on the installation height of screenings transport or washing units.

Both ends of the cleaning elements are connected to drive chains. Each chain is driven by a sprocket on a common shaft and a flange mounted gear motor. Furthermore, defined meshing of the cleaning rakes with the bar rack ensures a high operating reliability. If the screen operation is blocked, a mechanical overload protection interrupts the operation.

- Very high screenings discharge capacity
- Low headloss
- Low installation height above ground level even in deep channels
- Control-independent safety system
- Bar spacing  $\geq 1$  mm



*Reliable, sturdy travelling HUBER Multi-Rake Bar Screen RakeMax®*



## ➤➤ Mechanical Wastewater Screening – Max® Family

### ➤➤ HUBER Multi-Rake Bar Screen RakeMax® HF – Design and function

The HUBER Multi-Rake Bar Screen RakeMax® HF is the 'high flow' version and further development of the successful HUBER Multi-Rake Bar Screen RakeMax® that is well-proven in hundreds of installations. The HUBER Multi-Rake Bar Screen RakeMax® HF consists of a flat, hydraulically advantageous bottom section and a steep conveying section.

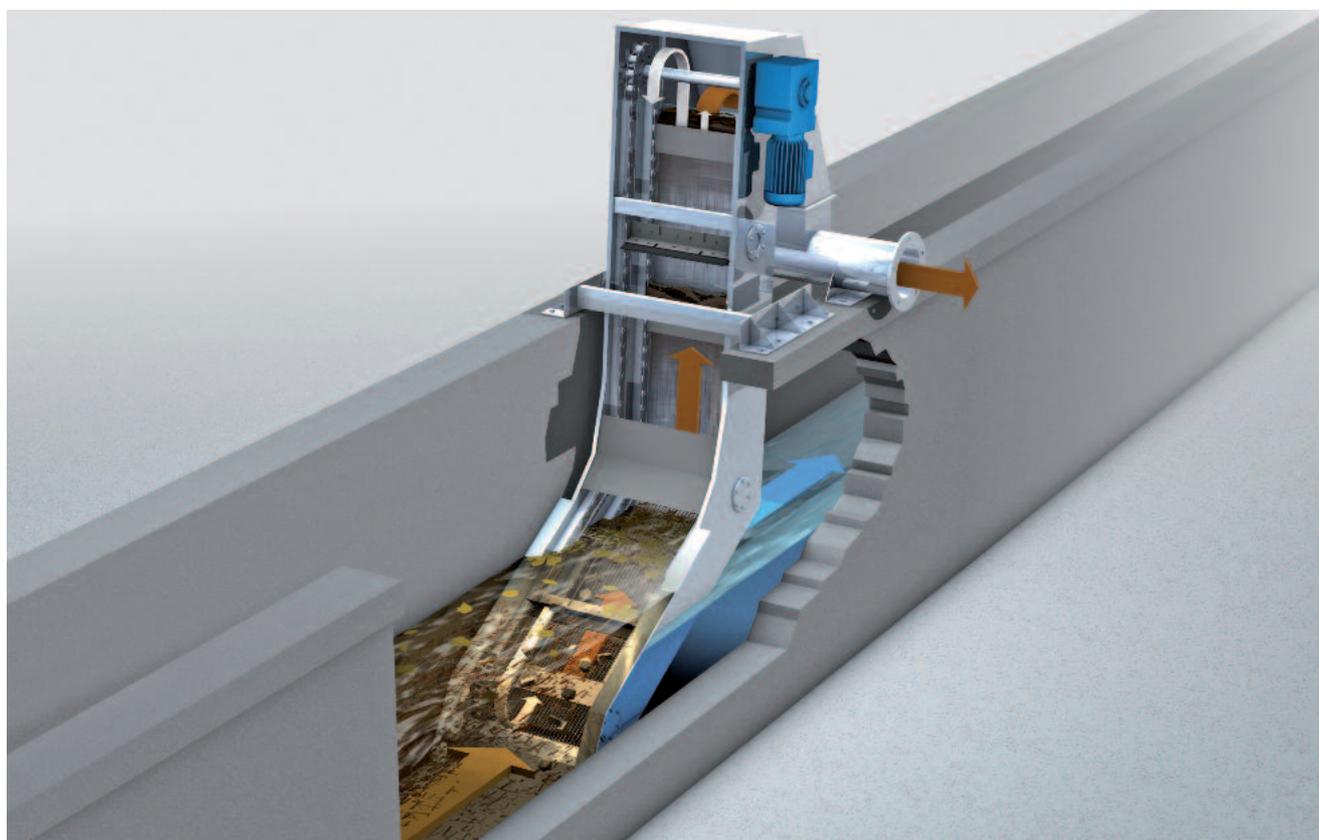
Material removal from the screen starts virtually right at the bar rack mounted flat to the channel bottom so that any accumulation of disturbing material is eliminated. The optimal approaching flow conditions and large effective bar rack surface ensure a high hydraulic throughput capacity.

The cleaning elements, attached to the chain system, can easily be adjusted to different requirements, the screenings discharge capacity is then extremely variable. This is especially favourable for high solids loads. Depending on the size of bar spacing, the bar rack design is either a flow-optimising bar or non-blocking wedge wire profile.

- High hydraulic capacity due to the extremely flat installation angle of the bar rack
- High operating reliability due to defined meshing of the cleaning elements with the bar rack
- Compact L-shaped screen
- Not hindered by gravel or grit
- Completely odour-encased screen with easy to remove covers
- Bar spacing  $\geq 1$  mm



HUBER Multi-Rake Bar Screen RakeMax® HF (high flow)



## ➤➤ Mechanical Wastewater Screening – **Max® Family**

### ➤➤ HUBER Belt Screen EscaMax® – Design and function

The screening elements of the HUBER Belt Screen EscaMax® are perforated plates. Each end of the perforated plates is connected with a drive chain, each chain is driven by a sprocket on a common shaft and a flange mounted gear motor. At their upper turning point the perforated plates are continuously cleaned by a fast counterrotating brush which increases the cleaning energy and thus significantly improves the cleaning efficiency. Cleansing is supported by an integrated spray bar that removes the screenings against screening direction from inside to outside.

Another advantage of this cleaning method is that a majority of the screenings, including abrasive material, are removed from the screening elements already in the first step of the cleaning process by the spray bar. It is obvious that the wear of both the screening elements and the roller brush is considerably reduced in this way.

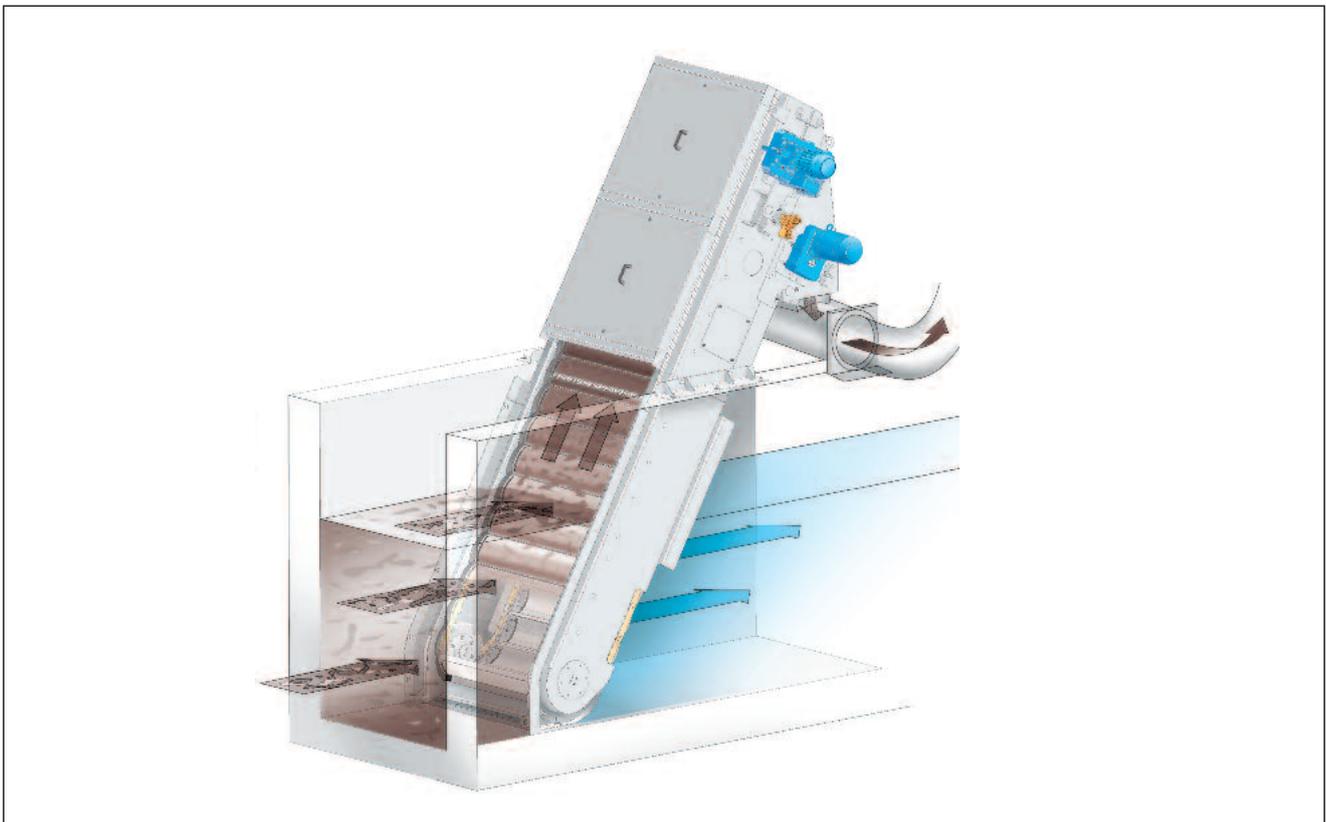
The sturdy HUBER Belt Screen EscaMax® is able to reliably cope with even high amounts of gravel and grit. The two-dimensional screening elements prevent especially long fibres from passing through the screen and achieve thus the maximum separation efficiency.

- Optimal efficiency due to an internal spray nozzle bar and counterrotating brush

- Excellent separation efficiency due to its two-dimensional perforated screening elements
- Very compact system with minimum space requirements
- Easy-to-retrofit into existing channels
- Optimally suited for deep channels with high water levels
- Perforation  $\geq 3.5$  mm



*HUBER Belt Screen EscaMax® – a versatile inlet screen*



## ➤➤ Mechanical Wastewater Screening – **Max<sup>®</sup> Family**

### ➤➤ HUBER Coarse Screen TrashMax<sup>®</sup> – Design and function

The HUBER TrashMax<sup>®</sup> Screen is ideal to be used in pumping stations, as first treatment stage of wastewater treatment plants or industrial plants, and in the inlet to power plants. The screen removes coarse and bulky material and therefore protects downstream systems.

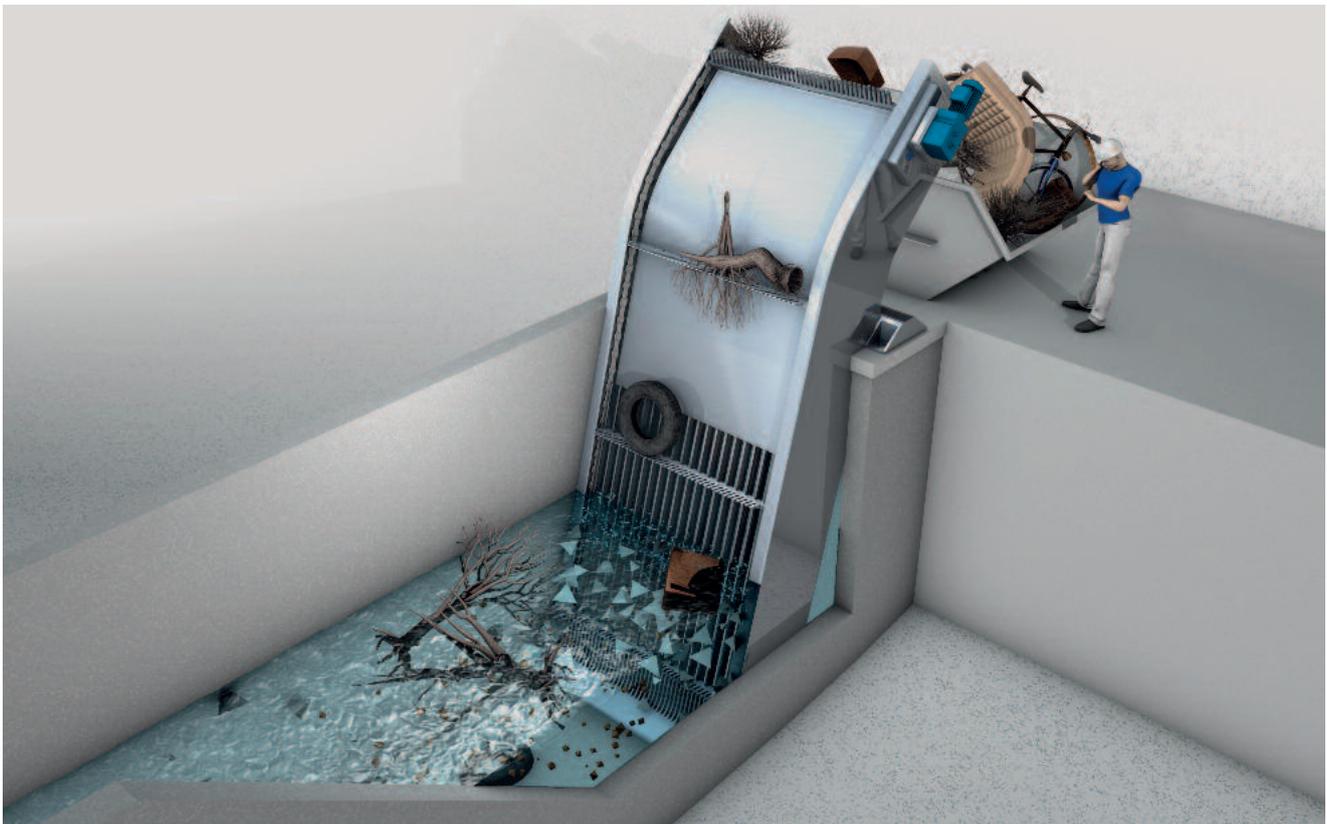
The rakes of the TrashMax<sup>®</sup> Screen mesh with the screen rack bars at the bottom dead centre, at first with the back cleaned screen rack and then with the behind front cleaned screen rack. This avoids the accumulation of material in front of the screen and even extremely bulky objects are removed by the screen rakes and transported out of the channel.

The lower part of the TrashMax<sup>®</sup> consists in the steep conveying section followed by the upper part, the flat discharge section with a small inclination. This screen design guarantees the reliable discharge of screenings into a downstream transport or disposal system.

- Innovative combination of a front cleaned and back cleaned screen in a single unit
- Reliable removal of bulky material with high operating reliability
- High capacity screen rakes
- Exact screen rake guidance for reliable cleaning of the front cleaned and back cleaned screen rack
- Compact L-shaped screen



*Robust screen for coarse material removal with high capacity screen rakes*



## ➤➤ Mechanical Wastewater Screening – **Fine Screening**

### ➤➤ Screen with very fine apertures

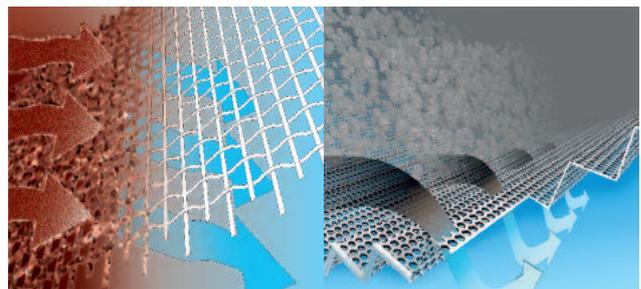
#### **Removal of hair and fibres**

The removal of hairs, fibres and fine suspended material is a prerequisite for trouble and maintenance free operation of subsequent treatment steps. Separation of fibrous material is particularly important for hollow fibre membrane plants as they require very fine prior screening in order to prevent blocking by hairs and fibres which impair the membrane permeability and hydraulic capacity of the membrane plant. The conventional screening systems available with 3-10 mm bar spacing or perforation are unable to meet these requirements. Finer screens are a reliable solution to mechanically eliminate such material.

To achieve removal of high oxygen-consuming loads, screening elements with very fine apertures, preferably square mesh or perforated plate, are used. Their two-dimensional design combined with the defined separation size of the square mesh enables an extensive removal of solids to be achieved. In addition the very fine square mesh has a very large free surface area and is therefore able to cope with high hydraulic capacities. With the two-dimensional design, very fine apertures and the defined separation size provided by the square mesh, it will prevent in particular fibres and hairs being washed through the mesh before the screen basket surface is cleaned. The volume of screenings produced proves the high efficiency of square meshes. Compared to a wedge wire with a comparable bar spacing, a square mesh or perforated plate is able to separate up to three times more solids when handling municipal wastewater after a preceding coarse screen. In addition, square meshes have a very large free surface and are therefore able to cope with high hydraulic capacities despite their fine mesh.

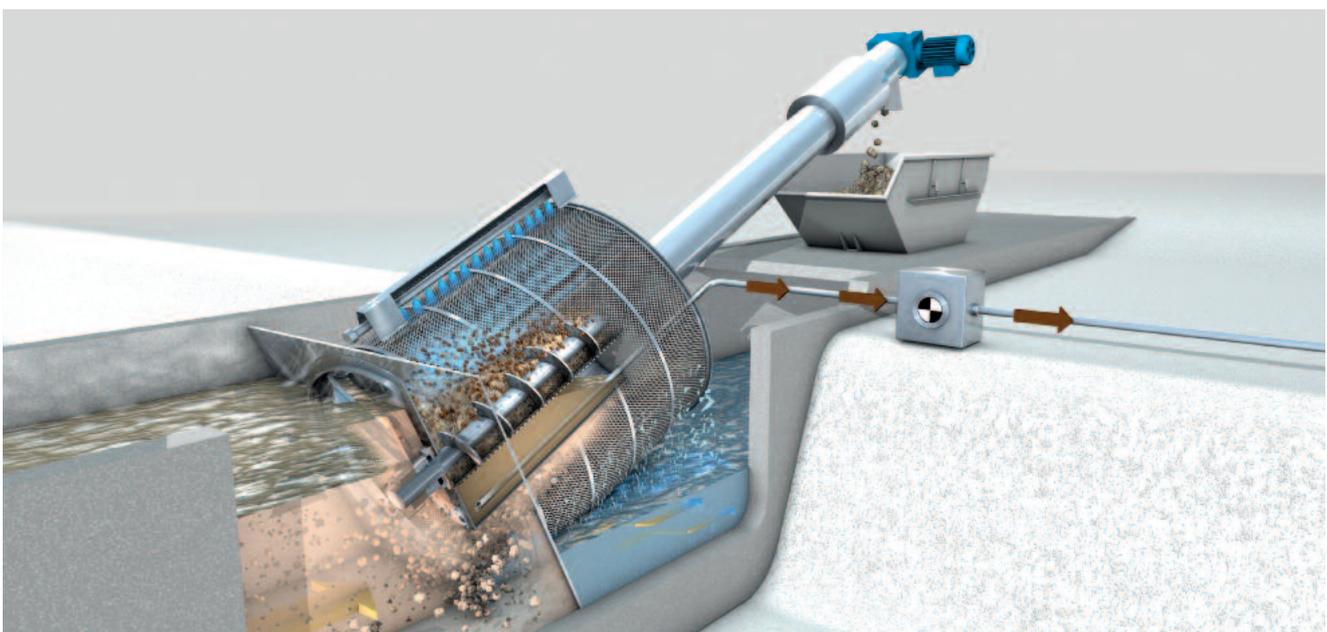
#### **Alternative to primary settlement tanks**

The task of primary settlement tanks is to mechanically remove very fine particles that settle on the bottom or float to the surface. However, the space requirements and investment costs for primary settlement tanks are high. Fine screening with up to 0.2 mm apertures can achieve the same reduction rates on a much smaller footprint and with significantly lower investment costs. The separated solids can be dewatered in a wash press and discharged into a container, or directly transported to the digester after partial dewatering. Due to its small space requirements and low investment costs the screen is especially suitable to upgrade smaller plants and a fast to implement solution to reduce the load on downstream biological treatment systems.



*Maximum separation efficiency due to the square mesh or perforated plat that provides a defined separation size*

*Significant increase in hydraulic throughput capacity (approx. 30%) due to the folded screen basket design (right)*



*Schematic diagram of the HUBER Membrane Screen ROTAMAT® RoMem*

## ➤➤ Mechanical Wastewater Screening – Finer Screens

### ➤➤ HUBER Perforated Plate Screen ROTAMAT® STAR liquid

- Removal of hair and fibres to protect downstream membrane filtration plants
- Increased throughput capacity due to the increased surface area provided by the folded perforated plate
- Optimum operating reliability due to screenings transport by gravity (launder channel)
- External screenings treatment, e.g. in a HUBER Wash Press WAP® liquid or alternatively combined treatment with sewage sludge
- Perforation: 1 / 1.5 / 2 mm



*HUBER Perforated Plate Screen ROTAMAT® STAR liquid with screenings discharge by pump*

### ➤➤ HUBER Drum Screen LIQUID

- Removal of hair and fibres to protect downstream membrane filtration plants
- Reduction of COD and BOD in river or sea outfalls
- Load reduction in the biological treatment system of sewage treatment plants without primary clarification
- Removal of algae from surface waters
- Available screen basket covers: wedge wire, perforated plate or mesh size 0.2 to 6 mm



*HUBER Drum Screen LIQUID with 1 mm perforation, zig-zag folded screen basket for maximum separation efficiency and throughput capacity*

### ➤➤ HUBER Drum Screen RoMesh®

- For a fine, specified separation size
- For removal of hairs, fibres and fine suspended material
- Reduction of COD/BOD in river or sea outfall applications
- Insensitive to the high inlet concentrations of industrial wastewater
- Throughput of up to 1,000 m<sup>3</sup>/h, mesh size 0.1 - 1.0 mm, perforation up to 6 mm



*HUBER Drum Screen RoMesh® with 0.5 mesh size for wash water recovery*

### ➤➤ HUBER Membrane Screen ROTAMAT® RoMem

- Removal of hair and fibres to protect downstream membrane filtration plants
- Increased operational stability of MBR plants
- Ideal for installation in existing channels
- Screening, compaction, dewatering and transport of screenings in one unit
- 0.75 mm mesh size



*HUBER Membrane Screen ROTAMAT® RoMem for increased operating reliability of MBR plants*

## ➤➤ Mechanical Wastewater Screening – Filtration & Micro Screening

### Municipal applications

Due to high hydraulic loads, insufficient tank depth and poor settling behaviour of the activated sludge, secondary clarifiers are frequently unable to reliably ensure the solids retention required. Under storm conditions, the amount of filterable solids can be up to three to four times the volume experienced under dry weather conditions. The increased COD, BOD and phosphorus load of the effluent will finally lead to higher wastewater fees and the loading of the receiving water-course with oxygen-consuming substances.

Frequently, further reduction of the filterable solids in the secondary clarifier effluent is required, in particular where the wastewater is discharged into weak receiving water-courses. The required low solids content of < 5 mg/l can only be reliably achieved by means of a subsequent filtration unit, such as the HUBER Sandfilter CONTIFLOW® or HUBER Disc Filter RoDisc®.

Micro screening retains filterable solids and prevents eutrophication and thus the growth of algae and other plants in waters.

### Industrial applications

- Extensive reduction of nutrients through phosphorus elimination and denitrification
- Removal of powdered active carbon to reduce trace substances
- Modular design for easy adaptation to any flow rate
- No need for wash water tanks, wash pumps and complicated backwashing systems
- High operating reliability through constantly high filtrate quality



*HUBER Sandfilter CONTIFLOW®, stainless steel design*

## ➤➤ HUBER Disc Filter RoDisc®

- Significant reduction of filterable solids and COD/BOD/P concentrations in the WWTP effluent
- Removal of trace substances / micropollutants if combined with use of powdered active carbon
- Preliminary filtration in drinking water recovery from surface waters and in UV disinfection applications
- Gravity system with a large separation surface
- Can reduce wastewater fees
- Throughput of up to 2000 m<sup>3</sup>/h, mesh size as small as 2 µm



*HUBER Disc Filter RoDisc® with up to 35 discs in one unit*

➤ Installation examples



*HUBER Belt Screen EscaMax® – versatile inlet screen for high efficiency*



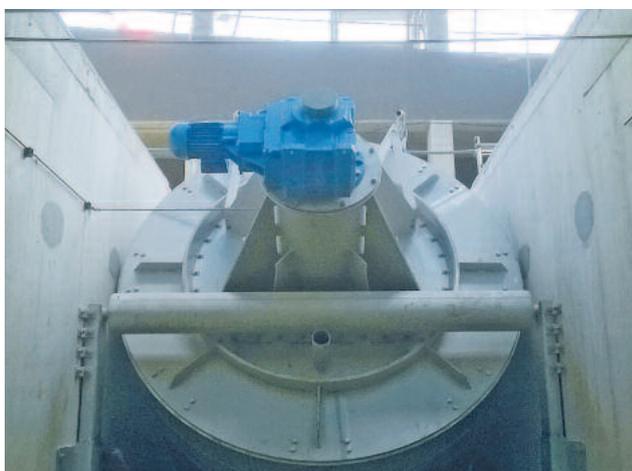
*HUBER Multi-Rake Bar Screen RakeMax®, 23 m long, during installation into a pumping station*



*28 HUBER Disc Filter RoDisc® units, with 24 discs each, cleaning almost 8.5 m<sup>3</sup> wastewater per second*



*4 HUBER Disc Filter RoDisc® units, with 18 discs each, mounted in stainless steel tanks*



*HUBER Perforated Plate Screen ROTAMAT® STAR liquid, 2400 mm diameter, protecting downstream membrane systems, screen sizes up to 3000 mm diameter available*



*HUBER Perforated Plate Screen ROTAMAT® STAR liquid with folded screen basket for a 30% increase in throughput capacity with perforations of 1 / 1.5 / 2 mm*

➤ Installation examples



*HUBER Perforated Plate Screen ROTAMAT® RPPS units*



*HUBER Membrane Screen ROTAMAT® RoMem prior to a hollow fibre membrane plant*



*Enclosed HUBER Fine Screen STEP SCREEN® SSV for odour-free screenings discharge*



*HUBER Sludge Acceptance Plant ROTAMAT® Ro3.3, compact plant with grit trap and grit classifier*

**HUBER SE**

Industriepark Erasbach A1 · D-92334 Berching  
 Phone: + 49 - 84 62 - 201 - 0 · Fax: + 49 - 84 62 - 201 - 810  
 info@huber.de · Internet: www.huber.de

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