



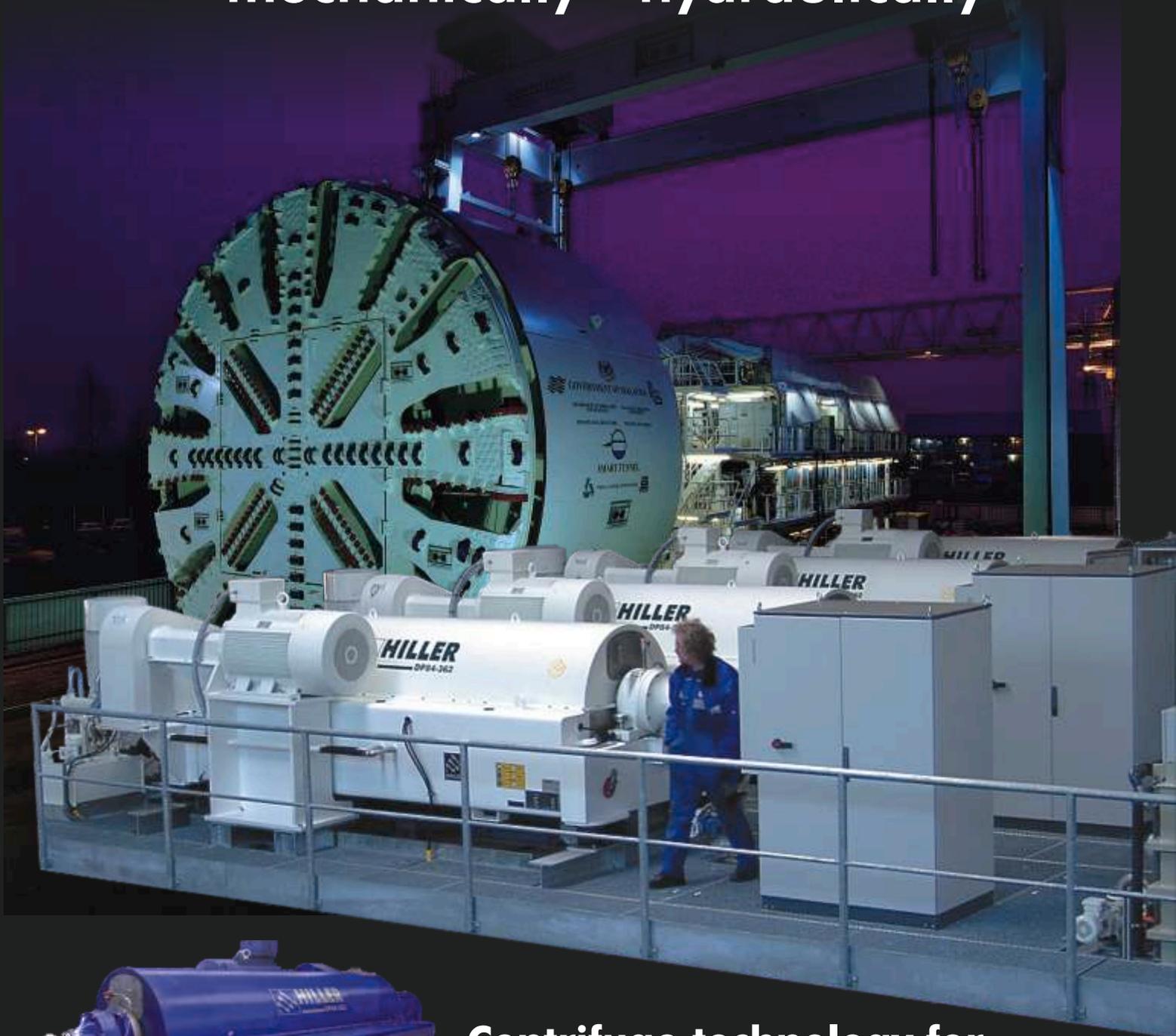
HILLER

separation & process



On a drawing still preserved to this day, Leonardo da Vinci (1452-1519) sketched a large-sized helical propeller, which would - Leonardo hoped - drill itself into the ground by mechanics and rotation, and even make flying objects soar to the sky.

rotating - advancing mechanically - hydraulically



Centrifuge technology for tunnel construction



“The principle of all things is water; everything originates from water and everything returns from water.”

(Thales, Greek philosopher 620-540 B.C.)

Knowledge in Action

Tunnels are an increasingly important element in today's infrastructure. Not only are they used to provide an easy crossing through mountainous regions for road and rail-bound traffic. Increasingly they are also used in urbanised areas to augment over-loaded roads, to provide quicker routes through crowded cities, and to reduce noise and pollution impacts on residents.

Other uses include traffic links across waterways, as well as for collection and attenuation of storm water or wastewater peak flows. Modern tunnel boring machines (TBM) can have diameters of 14 meters and more, and thus enable our civil engineers to design multi-purpose tunnels, with all their economical and environmental benefits. In recent times, the technological trend for tunnel boring machines is increasingly towards the hydrosshield technology.

In hydrosshield technology, the progressing tunnel is sealed from the tunnel excavation front by means of continuous recirculation of a bentonite slurry. At the same time, this slurry also serves as carrier for removal of the cuttings from the excavation front to the solids separation plant. In the solids separation plant, the cuttings are removed by means of screens and hydrocyclones. The thus cleaned bentonite slurry is then ready to be recycled to the TBM.

Searching for regenerative energy sources „geothermal power“ was discovered. During the vertical drilling process so-called drilling mud is produced which has to be dewatered with a **HILLER** high performance centrifuge.

The „tunnel dewatering“ is the latest field of application for **HILLER** high performance centrifuges. For this application natural water penetrations have to be pumped out of the tunnel and are then cleared with **HILLER** centrifuges.



Application:

- Hydrosshield technology for mega tunnel construction
- Microtunneling (HDD)
- Foundation and slurry wall technology
- Geothermal power
- Tunnel dewatering

Features:

- Automated operation with our proprietary control systems
- All modern scroll drive systems
- 24 hour service
- All parts in contact with the product available in stainless steel or high tensile strength carbon steel
- In-house development and manufacturing of hydraulic components for scroll drive systems

Depending on the properties of the soil where the tunnel is being drilled, very fine cuttings are accumulating in the bentonite slurry and thereby its properties are increasingly affected over time, in spite of the mechanical removal of cuttings mentioned afore. This negative effect can be monitored by measuring the density of the slurry. When the slurry density has risen above the acceptable limit, some of the slurry inventory is discarded and replaced with fresh bentonite slurry, in order to maintain the density in the system at the desired level. After having passed through the normal mechanical treatment the discarded slurry is fed to a decanter centrifuge plant for separation and dewatering of the spent bentonite, i.e. the very fine cuttings plus the bentonite. The dewatered solids are then sent to land-based disposal, or are used with rougher cuttings whilst the clear water can be discharged to sewers and is recycled to the process.

In this demanding application, where reliability is of the highest importance for un-hindered tunnel progress, and performance is equally important due to increasingly strict environmental legislation and rising landfill costs, **HILLER DDF** high performance centrifuges are the first choice.

Decanter centrifuges for solid/liquid separation in tunnelling and in vertical drilling

In hydrosshield tunnelling, **HILLER DDF** high performance decanters are the first choice for the processing of spent bentonite slurry.

For vertical drilling applications, **HILLER** can offer standardised multi-purpose machines, as well as customised designs which are optimised for your specific requirements.

HILLER DDF

State of the art in all drilling mud applications.

If your application has not been mentioned, please talk to us. We have the solution.

You specify your requirements! We have the solution.



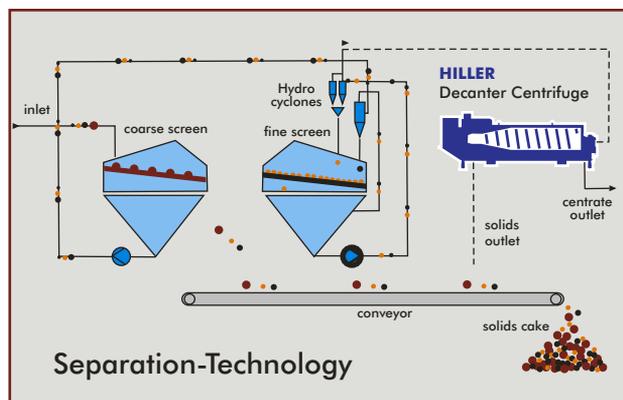
HILLER DDF centrifuges fulfil all those pressing needs of the user on site:

- High reliability, meaning minimal down time
- Heavy duty wear protection system, meaning long life-time without wear repairs
- Service friendly design, meaning quick and easy maintenance in the field
- Most powerful drive system on the market, meaning highest possible cake dryness and shear strength
- Hydrodynamically optimised design, meaning minimal power and polymer consumption, i.e. low operating costs



Economy and quality

- Very little operator attendance required
- Highest cake dryness
- Various wear protection systems for long lifetimes
- Simple and service-friendly design
- Low specific power consumption per unit product processed

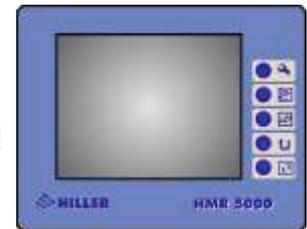


HILLER-DecaTorque scroll-drive systems

- Automatic differential speed control
- Maximum torque at fastest reaction times
- Very precise control of differential speed and product quality
- Hydraulic system = unrivalled robustness
- **HILLER HMR 5000** control system with touch screen



HILLER DecaTorque

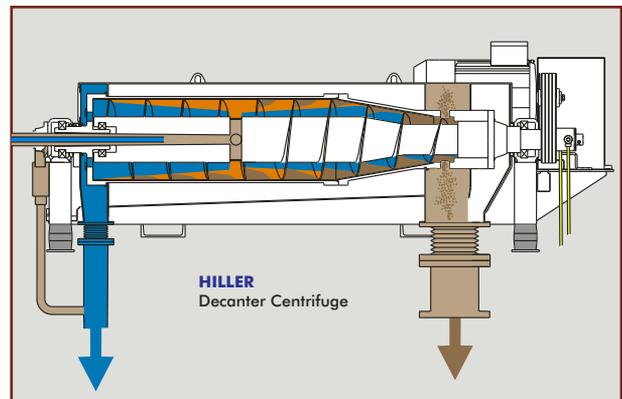


HILLER HMR 5000

HILLER-DDF high performance centrifuges are the first choice for the dewatering of spent bentonite slurry in tunnel drilling.

However, the versatility of the **HILLER-DDF** concept also provides optimal solutions for:

- Dewatering of sludge from the construction of foundations
- Dewatering of sludge from quarries
- Dewatering of sludge from cutting and grinding of rock, concrete, and ceramics
- Dewatering of sludge from sand and gravel washing
- Dewatering of sludge from soil remediation
- Recovery of barite from weighted mud in vertical drilling applications
- Removal and dewatering of fines from unweighted or pre-processed mud in vertical drilling applications





The separating methods regard

- conditioning of scavengings ~ high load processing
- disposal of scavengings ~ high-grade dewatering performance
- recovery of bentonite or barite ~ high processing performance

HILLER - Centrifuges for tunnelling slurries and drilling mud

DDF Series

Type	DDF37	DDF45	DDF54	DDF66	DDF84
Solids load	1-3 t/h	3-6 t/h	5-10 t/h	10-12 t/h	15-20 t/h
Feed rate	4-12 m ³ /h	12-24 m ³ /h	15-40 m ³ /h	25-50 m ³ /h	40-80 m ³ /h

The **HILLER-DDF** series is manufactured in our modern factory in Vilsbiburg (Bavaria) under the most stringent quality controls. The quality of manufacture is reflected in the satisfaction of our customers.

HILLER decanters have been used for 'drilling mud' in vertical exploration drilling for the development of oil and gas fields for more than 20 years.

For over 10 years **HILLER decanters** have not only been used in horizontal drilling for the development of traffic routes and the construction of roads, railroads, and metro lines but also for drilling supply and disposal tunnels for the management of water, waste water and energy to clean bentonite, barite, and drilling polymer scavengings when so-called hydro-shield driving techniques are applied.

Even with changed slurry input and flowing conditions in the decanter, new hydraulic drives with a wider speed range and higher oil output allow for the processing of slurry quantities 20% to 50% higher than usual.

HILLER can provide competent solutions for these industries and special applications:



Foods and beverages / **DecaFood** / **OV**



Mineral oils, gas and regenerative energy / **DecaOil**



Chemical, processing and pharmaceutical industry / **DecaChem** / **DecaPharm**



Environmental technology / **DecaPress** / **DecaThick** / **DecaDrain**



Mining, tunnel construction, mineral raw materials and drilling fluids / **DecaDrillingFluid (DDF)**

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