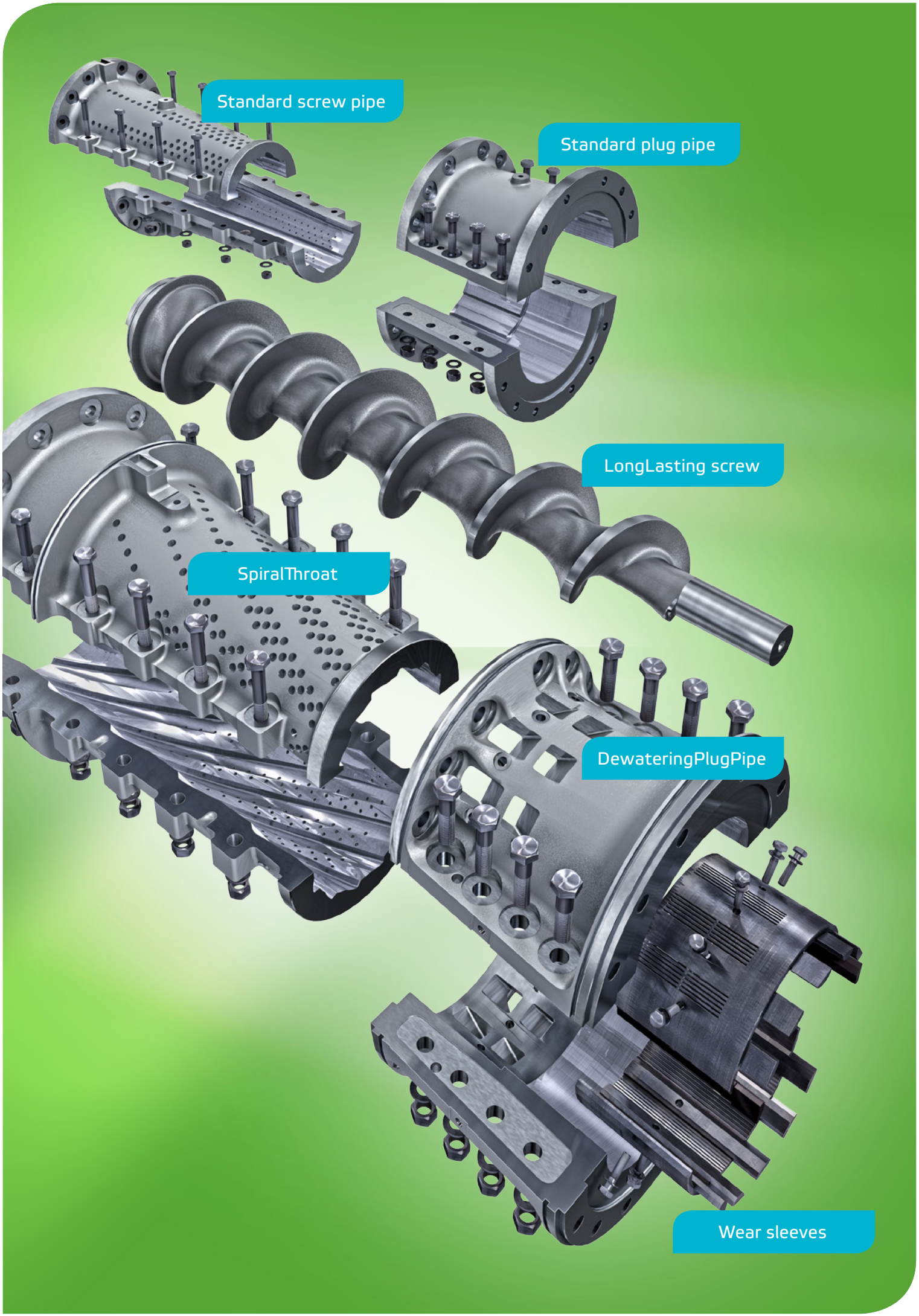
Valmet
FORWARD

FeedMax™

Improved screw feeder concept


Standard screw pipe
Standard plug pipe
LongLasting screw
SpiralThroat
DewateringPlugPipe
Wear sleeves

FeedMax™

A screw feeder upgraded with a FeedMax provides uniform feeding, optimized dewatering and therefore reduced energy consumption. Consequently, this concept is the optimal answer for upgrading our customers' various processes.

Why is choosing correctly so important?

Different processes have different requirements. In some processes dewatering is the most important parameter, while in other applications very uniform feeding is essential. The main factors that can be influenced by choice can be summarized as follows:

- Capacity
- Energy consumption
- Feeding stability
- Lifetime
- Dewatering.

Benefits

One or more benefits can be attained depending on the application:

- Improved dewatering
- Increased liquid absorption during impregnation
- Increased brightness using less chemicals as a result of improved washing
- More uniform and stable feeding of chips or pulp, which stabilizes the load on the refiner
- Longer lifetime
- Reduced motor load
- Less energy consumption.

Applications

This type of upgrade is suitable for screw feeders in the following applications:

- Mechanical pulping
- Fiberboard
- Bio energy
- Bioenergy.

Exchange agreement

An exchange agreement provides high availability for vital parts at a low cost. The agreement is a cost-effective alternative to purchasing and storing spare parts. The price is based on an annual fee and a fixed price for repairs. An exchange agreement secures problem-free operation and guaranteed availability for key components.

- Valmet owns the exchange units
- Annual fee
- Reduced working capital
- The guarantee is valid from the date of installation
- A cost-effective solution.

Customized installations

Depending on the specific process, the FeedMax concept is customized to fit each function by careful choice of screw type, screw compression, screw pipe and plug pipe.

Screw	Compression	Screw pipe	Plug pipe
Standard	1.6:1 - 4:1	Standard	Standard
XP screw		SpiralThroat	DewateringPlugPipe
LongLasting screw		Semi SpiralThroat	
		LongLasting	

Screw

Screws are available in two main designs.

XP screw

The screw is cast and machined to achieve geometric perfection. This optimizes dewatering and reduces friction between the screw and the screw pipe. Reduced friction also means reduced energy consumption. The screw is always centered at the free end, which increases its service life. No wobble occurs because of asymmetry. A new and more durable material has been selected to optimize lifetime. A spare for the screw can be included in a storage and exchange agreement.

LongLasting screw

The LongLasting screw is cast and heat treated to a very durable material. This type of screw is suitable for applications where maximized lifetime is required. This screw is not repairable. Price and wear resistance are its benefits – as much as three times longer lifetime. The energy consumption has also been found to decrease by as much as 30% in some cases.

Standard screw

The standard screw with a hard faced repairable screw is available in many different designs.

Compression

The screws are available in various compressions (volume at inlet/volume at outlet). High screw compression produces higher capacity and dewatering, but at the same time requires greater torque, which can cause increased wear.

Screw pipe

The screw pipe is adapted to the new screw type and is available in two main designs.

Standard

A standard screw pipe with straight bars.

SpiralThroat

Depending on process requirements, running pulp or chips through a SpiralThroat reduces friction in the compression zone. Decreased friction produces lower energy consumption and more uniform feed.

Plug pipe

The plug pipe is available in two designs, the choice of design depending on process requirements.

Standard

Standard design, to create an effective plug.

DewateringPlugPipe

This product extends the dewatering zone and therefore achieves better dewatering. A drain hood is installed to collect the water squeezed out from the plug pipe. The dewatering can be increased by as much as 30%. The plug pipe is equipped with replaceable wear sleeves available in different designs.

Mechanical pulping references

The function of the plug screw feeder is vital for refining stability, optimized chemical and energy consumption.

Stora Enso Fors, Sweden

Application
ADI 13 ½ delivered and started up in January 2005.

Requirement
Improved plug screw feeder technology.

Result
Improved refiner availability as a result of more stable feeding and improved dewatering.

FeedMax ADI13½, Preheater feeder, SW CTMP 500 ml CSF		
Production, ADMT/d	314	314
Screw speed, rpm	~126	~126
Zone 1, l/min	153	
Zone 2, l/min	44	
Total flow from screw pipe, l/min	197	119
COD average, kg/ton	9.5	6
Total extract, kg/ton	0.6	0.35
Refining consistency, %	45	45
Dillution flow in refiner, l/min	319	222

Dag Arthur Lunnan, Project Leader, Södra Cell, Folla, Norway, alongside one of the upgraded screws at the CTMP mill.

Stora Enso Skoghall, Sweden

ADI 420 replaced an existing PSB 390.

Requirement

Increased production.

Result

Increased production from 500 admt/d to 570 admt/d.

Södra Cell Folla, Norway

2 x ADI 13½ delivered and started up in January 2006.

Requirement

Reduced chemical consumption and uniform feeding to the pre-heater.

Result

- A 14% reduction of sulfite consumption in impregnation for a certain pulp type due to improved dewatering for impregnation.
- The ROI was less than one year.
- Due to increased dewatering the dilution water in the refiner could be increased by 15 to 20%. This makes it easier to attain increased fiber consistency in the refiner.

Elk Falls, Canada

2 x ADI 13½ x 37" 4:1 with SpiralThroat. The original was 13½ x 30". Delivered for four lines and started up during 2007.

Requirement

By converting to 37" the mill wanted increased dewatering and greater and more stable production.

Result

- On Line 5 the primary and secondary drive loads are more uniform with less variation
- The secondary refiner load standard deviation has decreased from 0.59 MW to 0.38 MW. The new 4:1 preheater feeder extracts more pressate and CAD/BOD
- Pressate increased by 38% to 0.65 m^3/ton
- COD increased by 11.3% to 5.5 kg/ton
- BOD increased by 80% to 1.1 kg/ton
- Less waste from the paper machines.

SpiralThroat™ performance update

When close to the nominal capacity of a given feeder, a net feeder capacity can be increased by 10-30% or the feeder can be run at a much slower speed to achieve the same production rate (i.e. longer life). Due to the reduced speed, overall power consumption is lower in most cases.

Other benefits and side benefits:

Dewatering capacity usually drops immediately after spiral throat installation. Because the spiral throat tolerates adverse operation conditions much better than the straight throat, the original drainage can be regained and exceeded by adjusting screw speed, raising blowback damper load and using a DewateringPlugPipe.

"The latest Valmet SpiralThroat is 'unpluggable'. We now have 19 months of operation on the Impregnator PSD and have not seen any deterioration in performance,"

Superintendent Greg Carello
Pine Falls mill Pulping

Location	Feeder size	Production rate	Screw speed		Drive load (torque)		Power Consumption		Pressate flow		Feed fluctuation	Other changes
			Before rpm	After rpm	Before %	After %	Before %	After %	Before l/min	After l/min		
Abitibi-Consolidated, Iroquois Falls	ADI 21"	1 100,0	101,0	75,0	39,0	52,0	39,4	39,0	181,0	420,0		Blow back damper load increased to 100%
Ponderay Newsprint, Usk	ADI 21"	650,0	89,0	65,0	45,0	56,0	40,1	36,4	460,0	460,0	Drastically reduced	Blow back damper load increased to 100%
Tembec, Pine Falls	ADI 420	500,0					0,0	0,0				
Stora Enso, Port Hawkesbury	PDA 1700	730,0	60,0									
Papier Masson, Masson	ADI 500	700,0	86,0	74,0			70,0	65,0	581,0	564,0		
Irving Paper, St John	ADI 21"	650,0	57,0	49,0	37,0	55,0	21,1	27,0	133,0	266,0	No change noticed	Slotted plug pipe added. Blowback damper load increased to 100%
	SFA 420	650,0	110,0	80,0	45,0	45,0	49,5	36,0	No change noticed			

Fiberboard references

The function of the plug screw feeder is vital for refining stability, electrical and energy consumption.

Customer in Germany

Screw feeder type 13,5" in combination with DWPP and internal cone in chip bin.

- Wood, 90% softwood, 10% hardwood
- Production, 10 t/h
- Preheater discharge screw is feeding better (lower rpm for same production)
- Motor load for plug screw is lower than before
- Dewatering has improved and stabilized the process
- Lifetime of Plug screw and pipe is three times longer than with a standard screw and pipe (9 months, compared to 3 months with standard screw).

Customer in Russia

Screw feeder type 13,5" in combination with LongLasting screw and DWPP

- After four months of operation the wear is insignificant (previous lifetime 3 months)
- > 5 times lifetime on screw and screw pipe
- Dryer temp is reduced from 230 to 170 °C, Attackbar segments reduced the SEC from 180-200 to 140 kWh/t.

Customer in Poland

Screw feeder type ADI 13,5" in combination with LongLasting screw and DWPP.

- Improved feeding and dewatering
- Lower and more stable dryer load
- > 3 times lifetime on screw and screw pipe.

Customer in Argentina

"We don't have a flow metering device in the drain pipe from the plug feeder screw, but we detected an increase in the effluent flow. The decrease in the dryer inlet temperature is around 20°C (from 182 to 162). Now we have a more stable process in the dryer, and we increased our fiber production by around 1.5 ton/h.

Customer in Germany

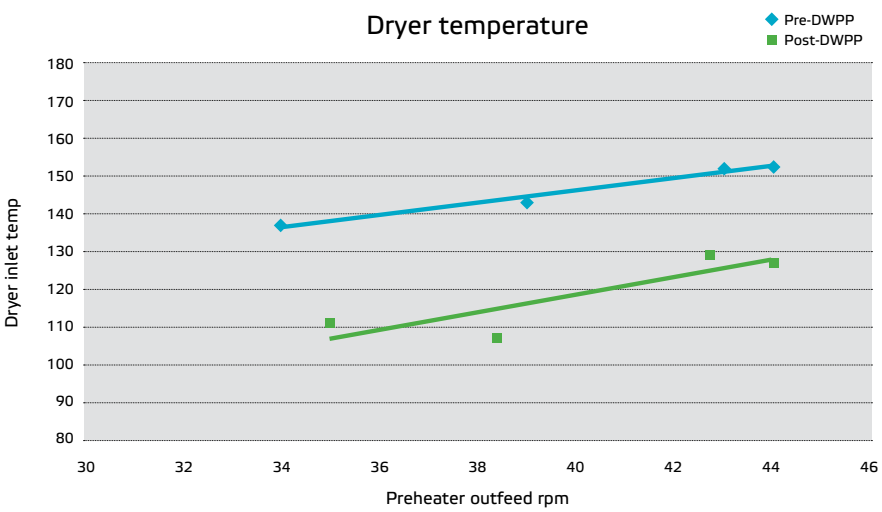
Dryer inlet temp dropped down (DWPP and new plug screw) from 230°C to 180°C. Natural gas consumption dropped down from 12 000 Nm^3/day to 6 000 Nm3/day. Possibility to increase production from 25 to 30 t/h.

Customer in UK, Scotland

Measured squeeze out water flow had increased 30-40%. Estimated decrease of dryer inlet temperature is approx 15-30% (-50 °C 220-170 °C). Estimated decrease of steam flow to preheater is 20-30%. Increase of dryer capacity is approx 25%. Increased production 3 m3/h.

Customer in Brazil

Dryer temperature reduced with 20-25% or a production increase from 30 to 34 tons/h. 25% reduction of plug screw feeder motor load.

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Bioenergy references

Using a plug screw feeder to mechanically remove unwanted water has a great impact on profitability.

Skellefteå Kraft, Sweden

"We realized several benefits when we replaced a very old Metso PFA 500 plug screw with a new FeedMax ADI 500 plug screw equipped with a DewateringPlugPipe. The greatest gain was dewatering capacity. Greater capacity has meant greater production efficiency. "With FeedMax, d.b moisture content is now reduced by 10%, and that contributes a lot to our strong belief that bioenergy will play an important role in Swedish energy production," says Henrik Palmlöf, Project Leader, Hedensbyn Bioenergikombinat.

Before FeedMax, raw materials entered the plug screw at 50% d.b moisture content and exited at the same value. The Hedensbyn Bioenergikombinat is a subsidiary of Skellefteå Kraft, a wholly-owned municipal joint-stock company and one of the largest energy companies in Sweden.

Svante Carlsson, Production Manager, Skellefteå Kraft, and Henrik Palmlöf, Project Leader, Hedensbyn Bioenergikombinat.

Sustainable energy and biopellet resources

The raw materials used at Skellefteå Kraft in general and at Hedensbyn in particular are of the highest quality. They are sourced from by-products of the logging, sawmilling and wood¬working industries. Making use of local energy resources helps to ensure a sustainable energy supply that is part of the natural energy cycle.

The main operation at Hedensbyn is a combined heating and power plant. In this operation, steam is produced in the boiler at high pressure and temperature, and then led to a turbine, which drives an electricity-producing generator. Most of the steam is then led away from the high-pressure turbine to a heat condenser, where it warms the water used for district heating.

Mechanical drying reduces steam drying

The steam not used for district heating is transported over to the pellet factory at Hedensby, where it is used to dry the raw materials for production of biopellets. This process presses the dried raw material into small, cylindrical pellets. The result is a compressed environment-friendly biofuel of high energy content that is sold to district heating and institutional facilities as well as to households.

The drying process is where the significance, as well as the benefit, of the dewatering capacity of the FeedMax becomes apparent.

"Quite simply," as Palmlöf puts it, "mechanical dewatering before steam-induced heating means using less steam to dry the raw materials from which our pellets are made."

Increased income from electricity production

"With 10% improvement in dryness, we now can divert more steam to the pellet plant's low-pressure turbine to generate electricity, which we sell to the grid. And we don't object to adding to our income as a result of selling electricity," adds Palmlöf with a smile. According to Palmlöf, other benefits accruing to Hedensbyn as a result of installing FeedMax, apart from efficient dewatering, are

low maintenance, high availability, increased capacity and the ability to control solids content. “Product stability is also an important factor for us. FeedMax has meant a more uniform product of higher quality, easy operation and excellent control of the process,” says Palmlöf.

FeedMax: a technology leader

Since Skellefteå Kraft is a wholly owned municipal joint-stock company, projects must be put out for competitive bidding. Palmlöf established three criteria for deciding on a supplier. One was cost, another was technology, and the third was references.
“A lot of technical development has taken place since we installed our original plug screw. And, in my view, Valmet has led this development,” says Palmlöf.

Depending on the specific process, the FeedMax concept can be customized to fit each function by careful choice of screw type, screw compression, screw pipe and plug pipe. In this specific application, the natural choice was to use the DewateringPlugPipe, which extends the dewatering zone and therefore achieves better dewatering.

“This equipment has been in operation for about six months, so we haven’t really had enough experience of it to calculate a Return On Investment. But I can say now that we are happy with the results we’ve seen so far,” says Palmlöf.

Our 11,000 professionals around the world work close to our customers and are committed to moving our customers' performance forward – every day.

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