

# ANDRITZ

## Pulp & Paper

### Ultra High Dispersing

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# Ultra High Dispersing

## Content

- Features of dispersing systems
- Basics of stock heating
- Advantages of high consistency for bleaching
- Advantages of high consistency for dispersing
- High-consistency dispersing set-up
- Disperser fillings
- Conclusions

# Ultra High Dispersing

- Features of dispersing systems
- Basics of stock heating
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# Ultra High Dispersing

## Features of dispersing systems

### Status quo

- Dispersion is necessary to reach high final pulp quality
- Feed consistency to disperser today between 25% and 30%
- Different heating procedures and heating times available on the market
- Most important parameters are temperature, SEC and plate design

### Ultra High Dispersing

- For “Ultra High Dispersing” a consistency of up to 40% is utilized
- Significantly lower steam demand
- Leads to lower chemical costs for bleaching at high consistency
- Higher efficiency for contaminants (sticky, dirt) removal
- Patented “Ultra High Dispersing” lowers the operation costs significantly

# Ultra High Dispersing

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# Ultra High Dispersing

## Basics of stock heating

### Basic equation

$$\Delta Q = c m \Delta T$$

$\Delta Q$  ... change in heat

$c$  ... specific heat capacity

$m$  ... mass

$\Delta T$  ... temperature difference

▶ At higher consistency, both **specific heat capacity** and **total mass** are lower

# Ultra High Dispersing

## Basics of stock heating

### Specific heat capacity

$$cp \text{ (water)} = 4.18 \frac{\text{kJ}}{\text{kg}}$$

$$cp \text{ (pulp)} = 1.26 \frac{\text{kJ}}{\text{kg}}$$

$$\frac{cp \text{ (water)}}{cp \text{ (pulp)}} = 332\%$$

- ▶ At higher consistency, the **relative pulp amount** increases and **specific heat capacity** of the mixture is lower

# Ultra High Dispersing

## Basics of stock heating

### Heating from 45°C to 90°C

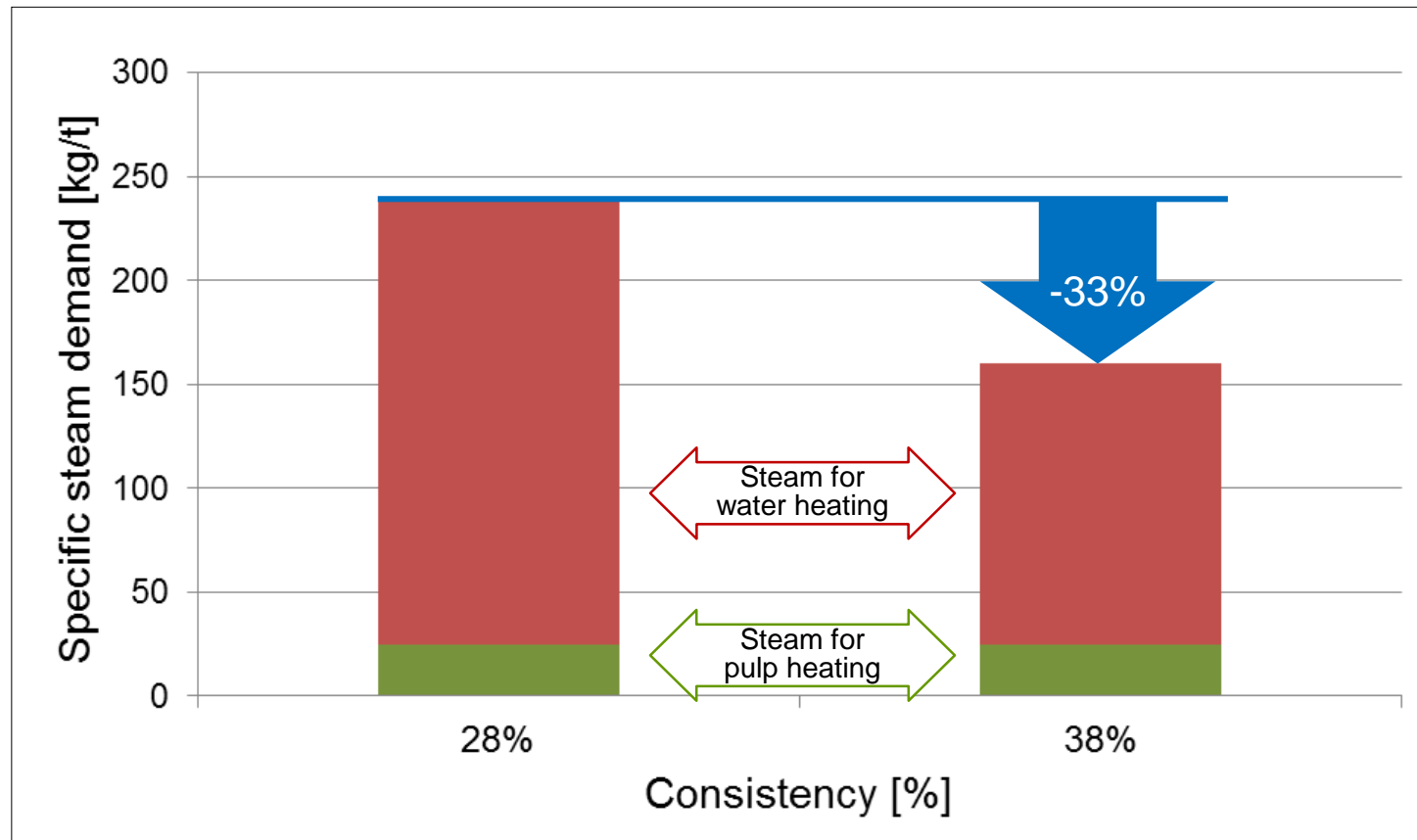
Consistency	[%]	28%	38%
Total mass/kg pulp	[kg/kg]	3.6	2.6
Specific heat capacity	[kJ/kg K]	3.36	3.07
Specific heat	[kJ/kg]	540	364



# Ultra High Dispersing

## Basics of stock heating

### Steam demand



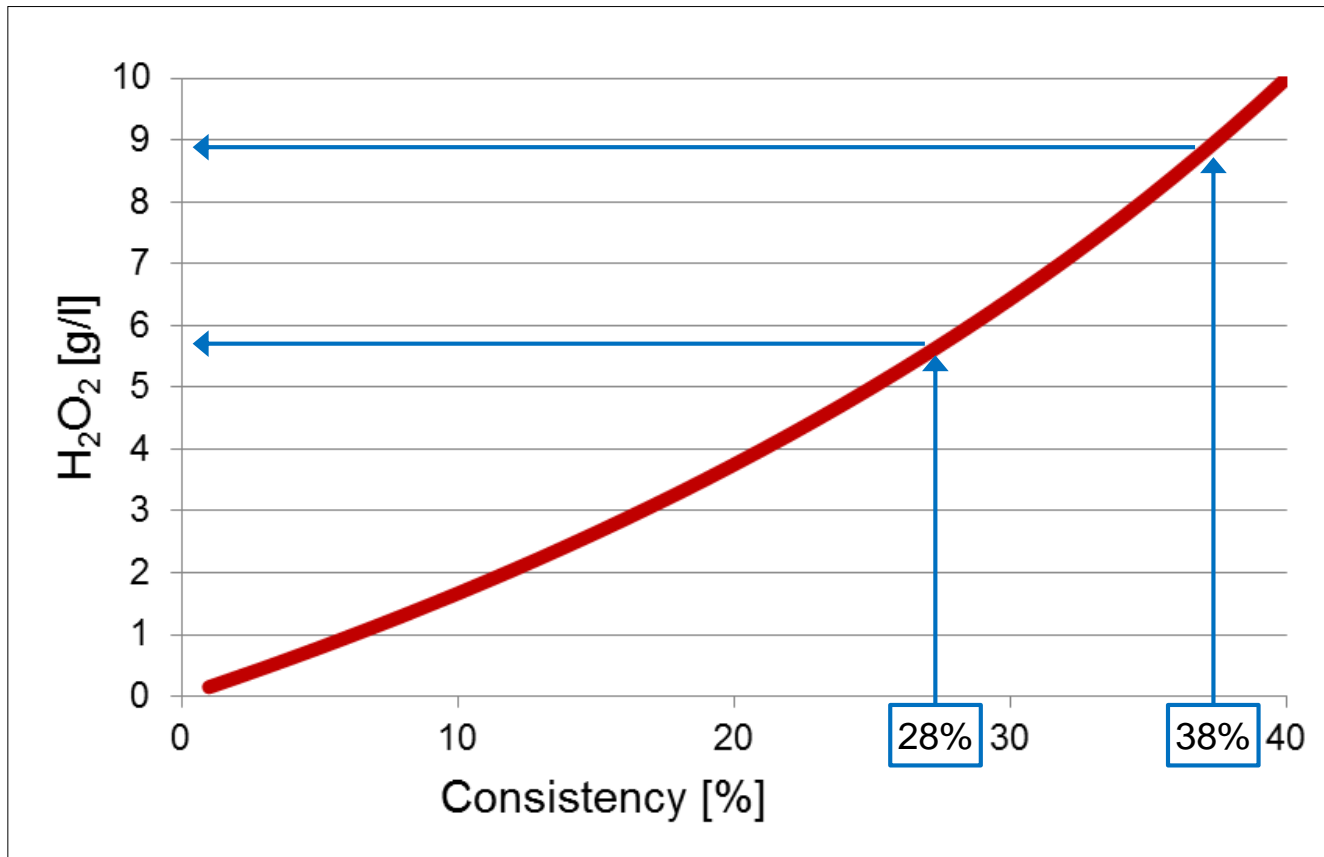
# Ultra High Dispersing

- Features of dispersing systems
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- **Advantages of high consistency for bleaching**
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# Ultra High Dispersing

## Advantages of high consistency for bleaching

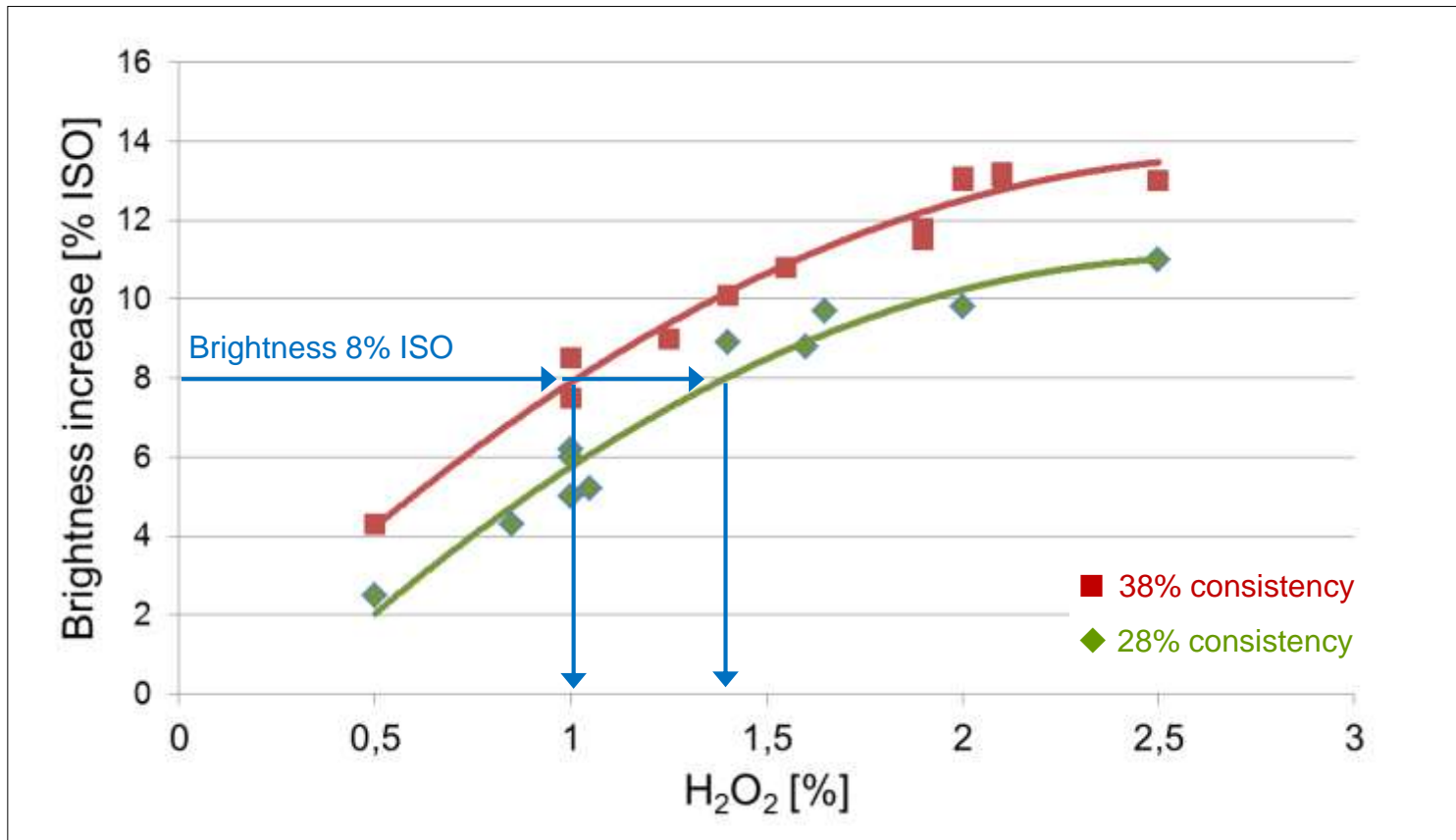
Peroxide concentration (at 1.5% H<sub>2</sub>O<sub>2</sub> dosage)



# Ultra High Dispersing

## Advantages of high consistency for bleaching

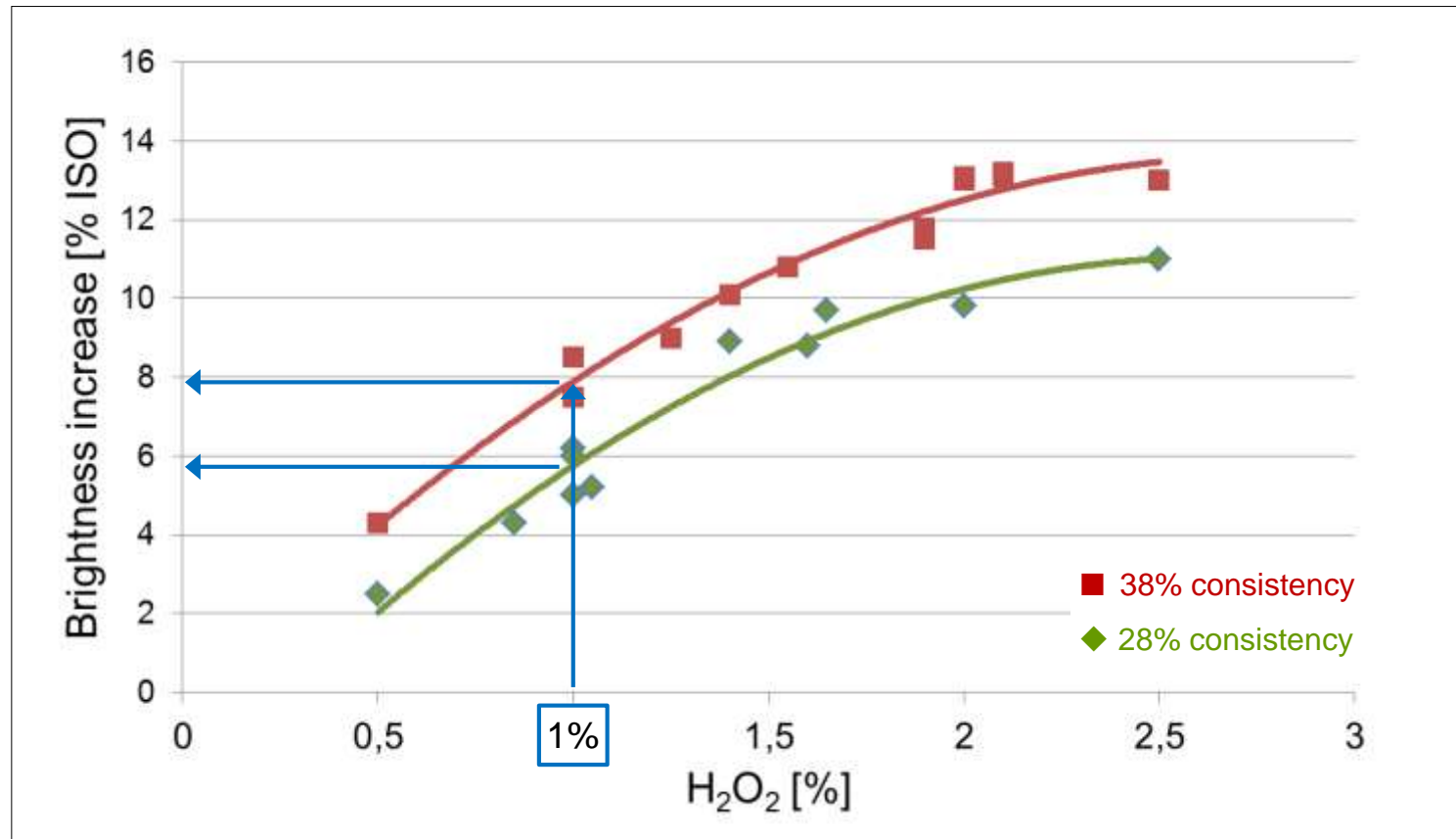
### Brightness increase (for MOW)



# Ultra High Dispersing

## Advantages of high consistency for bleaching

### Brightness increase (for MOW)

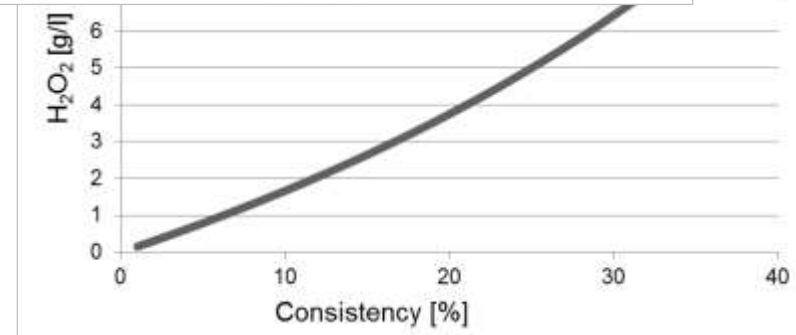
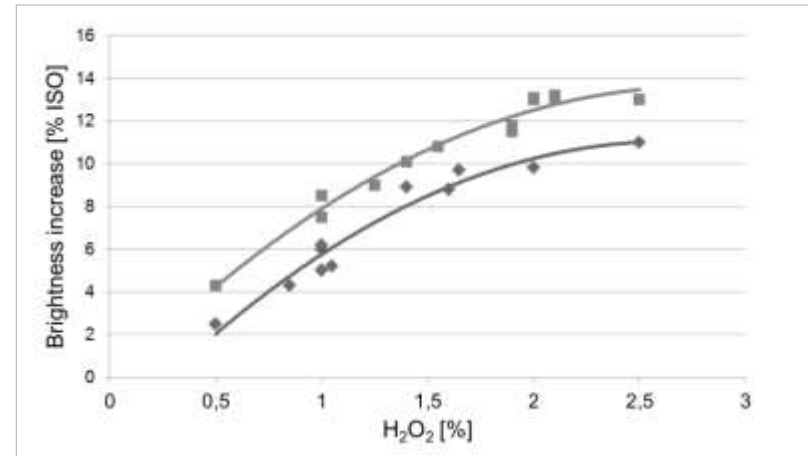


# Ultra High Dispersing

## Advantages of high consistency for bleaching

### Bleaching at higher consistencies

- Savings of chemicals
- Less side reactions that consume peroxide unintentionally
- Lower COD creation
- Improved water loop separation
- Reduced anionic trash towards paper machine



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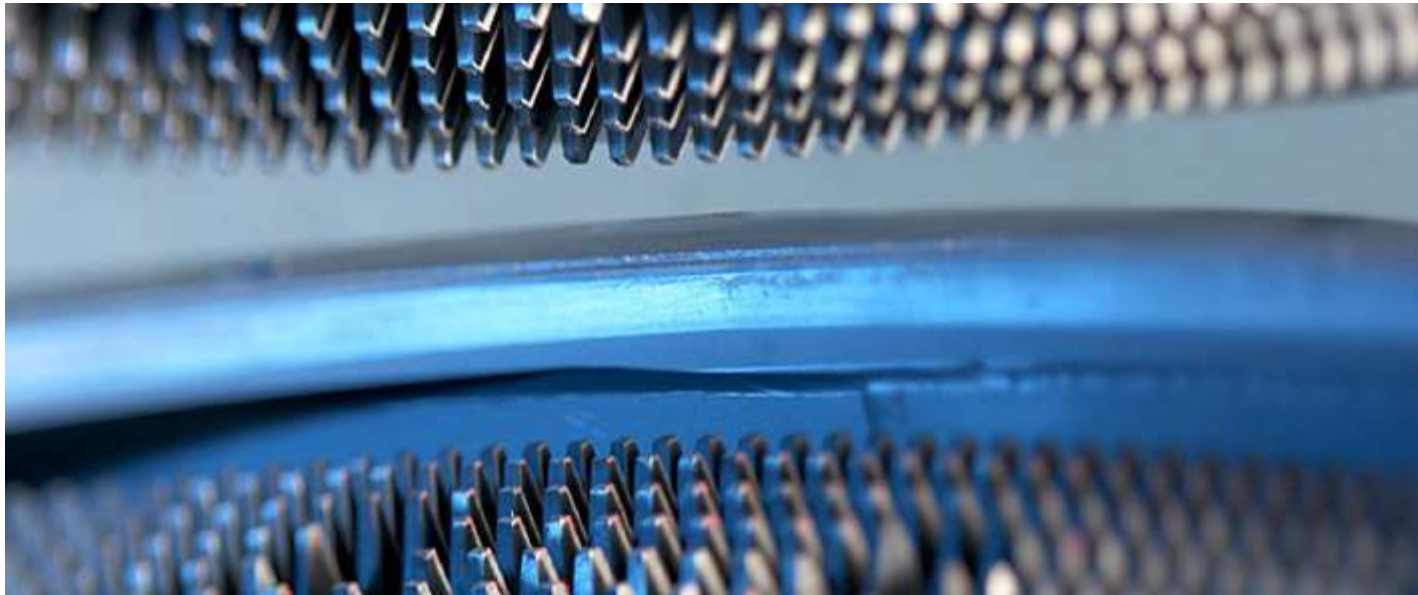
# Ultra High Dispersing

Advantages of high consistency for dispersing

High consistency increases apparent viscosity of pulp

→ Higher **shear forces** are generated inside disperser gap

→ Higher **efficiency** in contaminant dispersing

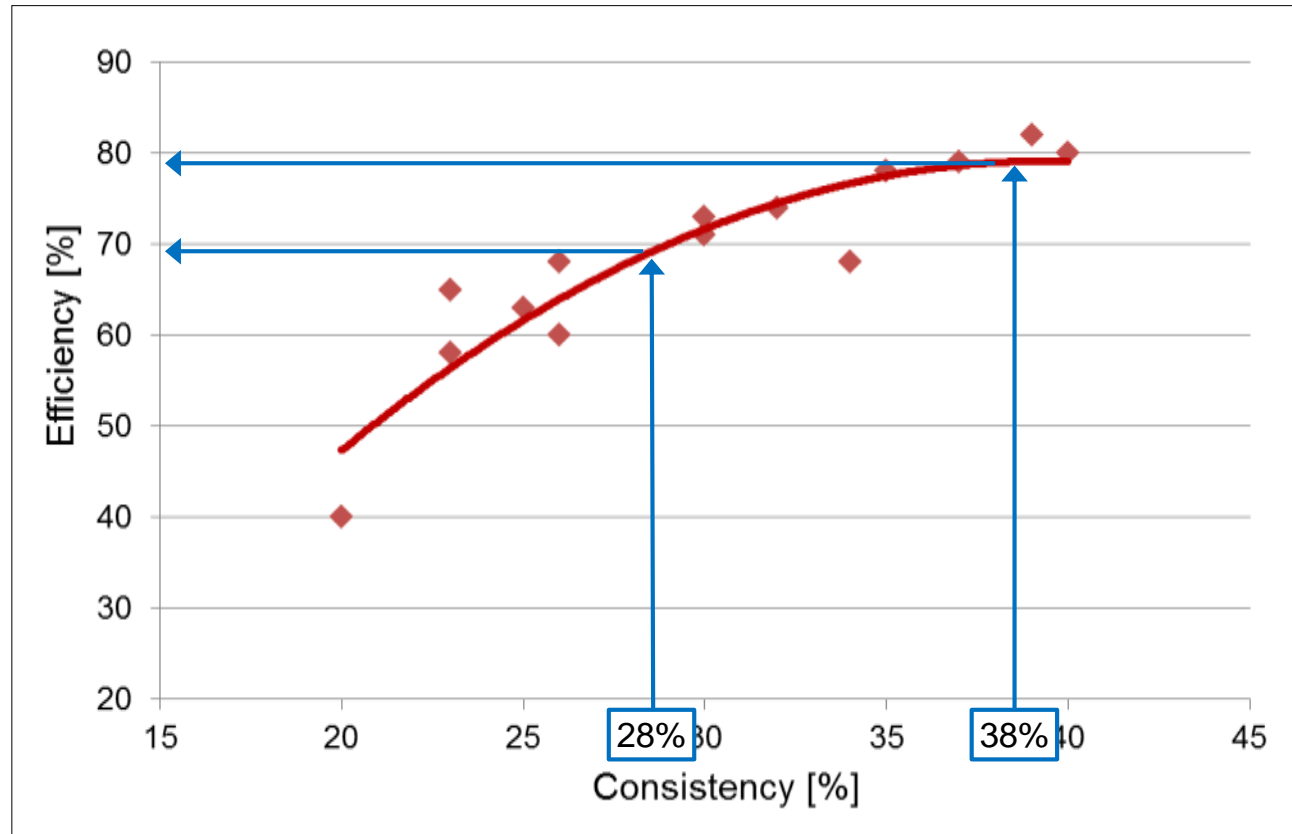




# Ultra High Dispersing

Advantage high consistency dispersing

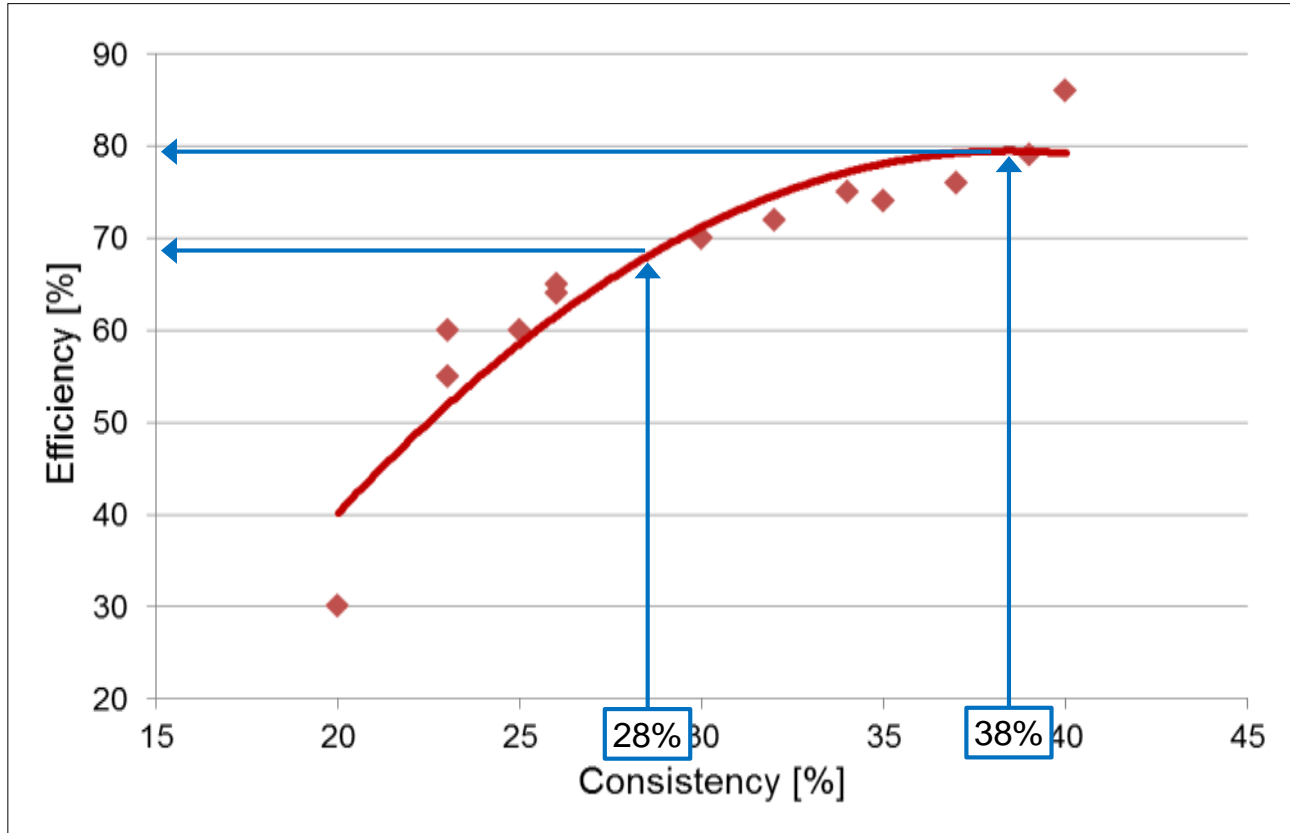
## Dirt



# Ultra High Dispersing

Advantage high consistency dispersing

## Stickies



# Ultra High Dispersing

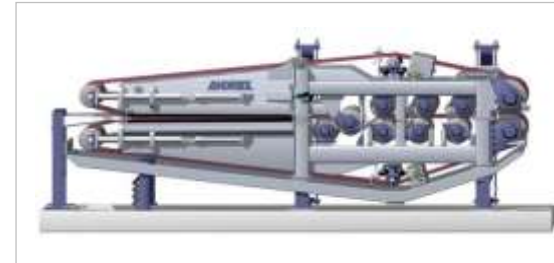
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# Ultra High Dispersing

## Dispersing Systems

### Dewatering machines applied

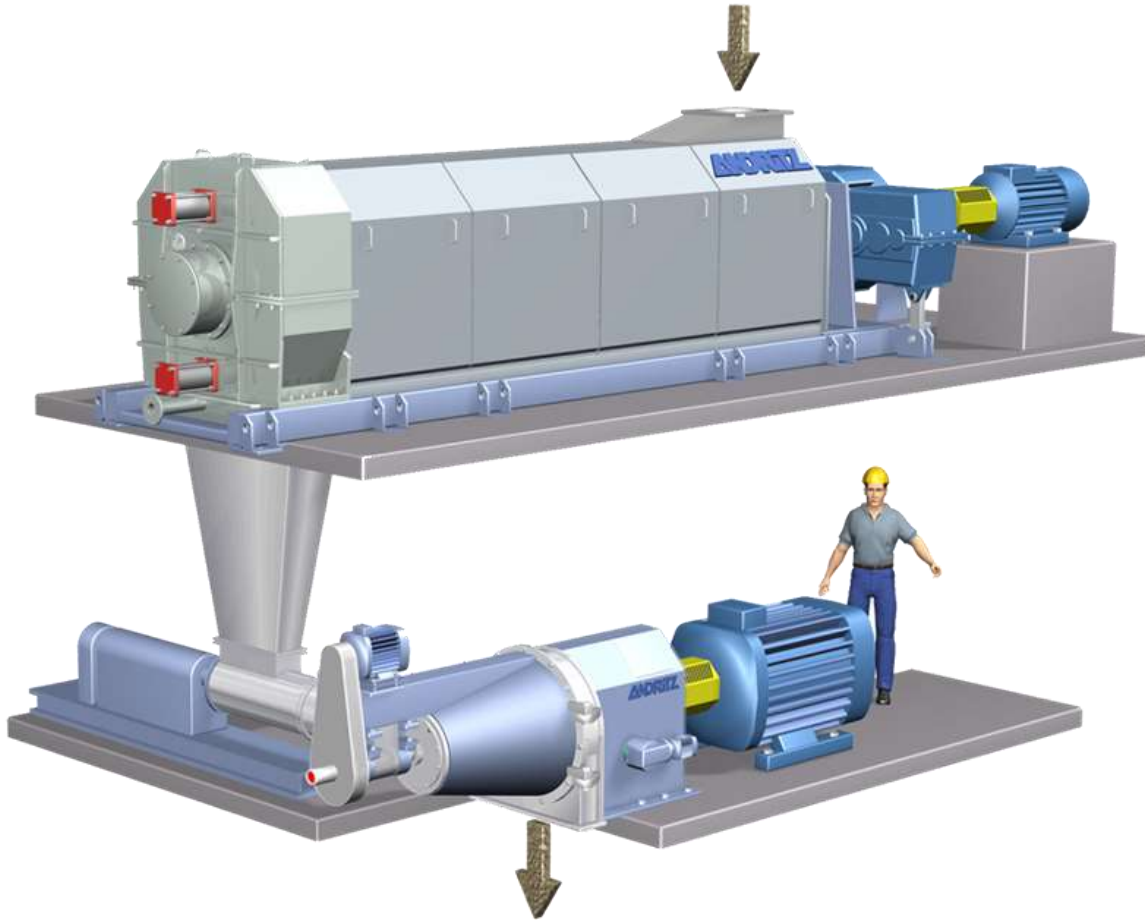
- Twin-wire press:
  - Up to 40% consistency
  - Large footprint
  - Higher investment costs
- Screw press
  - Up to 30% consistency
  - State-of-the-art dewatering equipment



▶ To close the consistency gap, **additional dewatering capacity** is needed

# Ultra High Dispersing

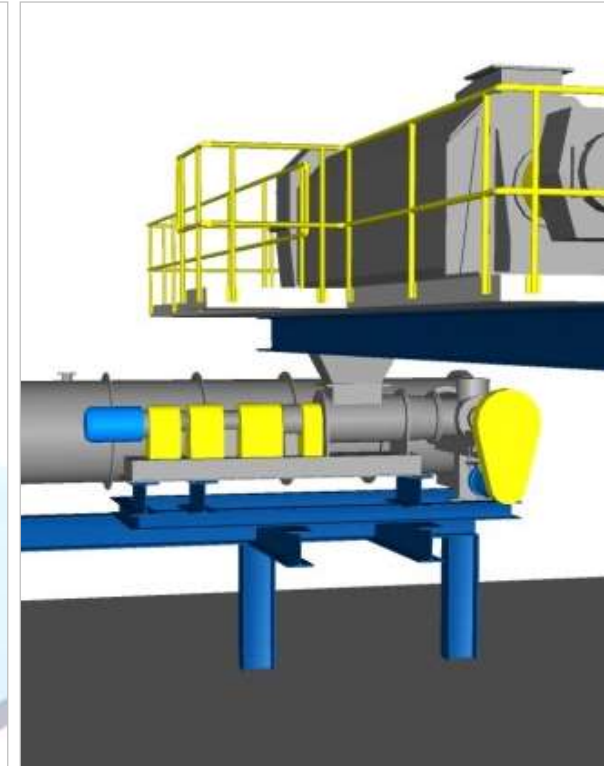
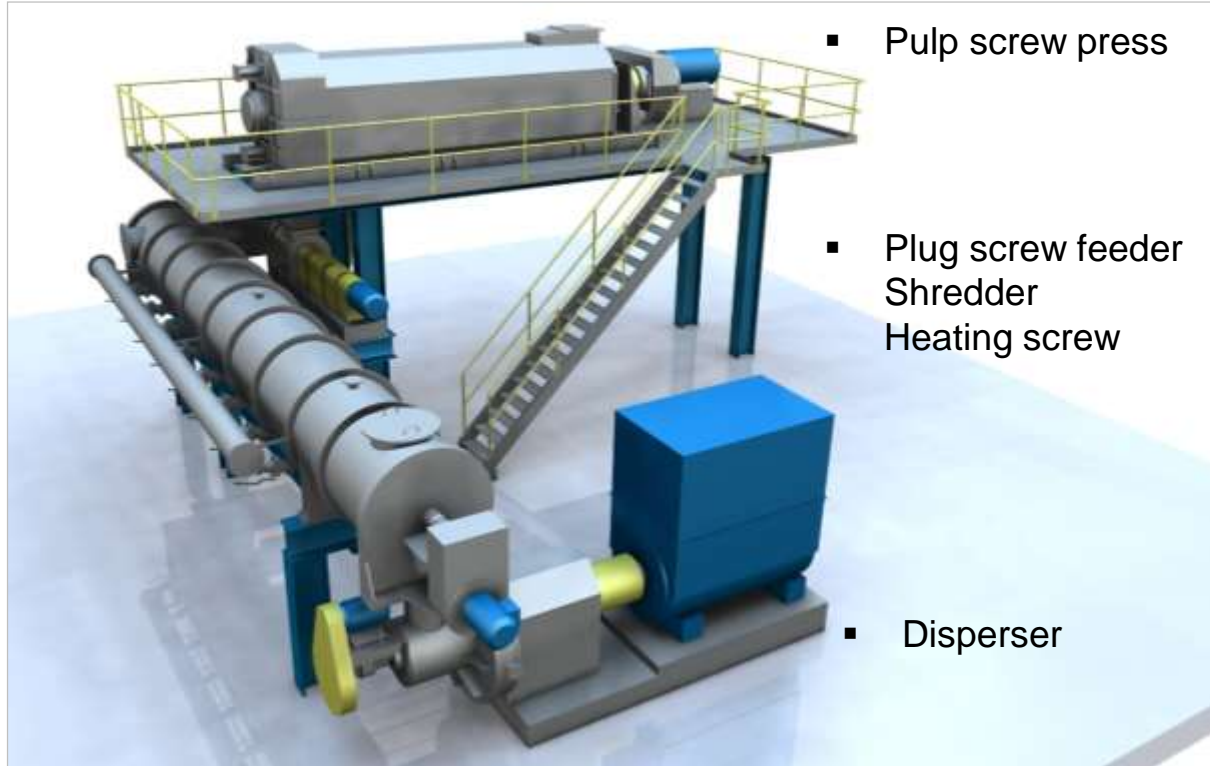
## Compact dispersing systems



- Pulp screw press
- Plug screw feeder
- Disperser

# Ultra High Dispersing

## Pressurized dispersing systems



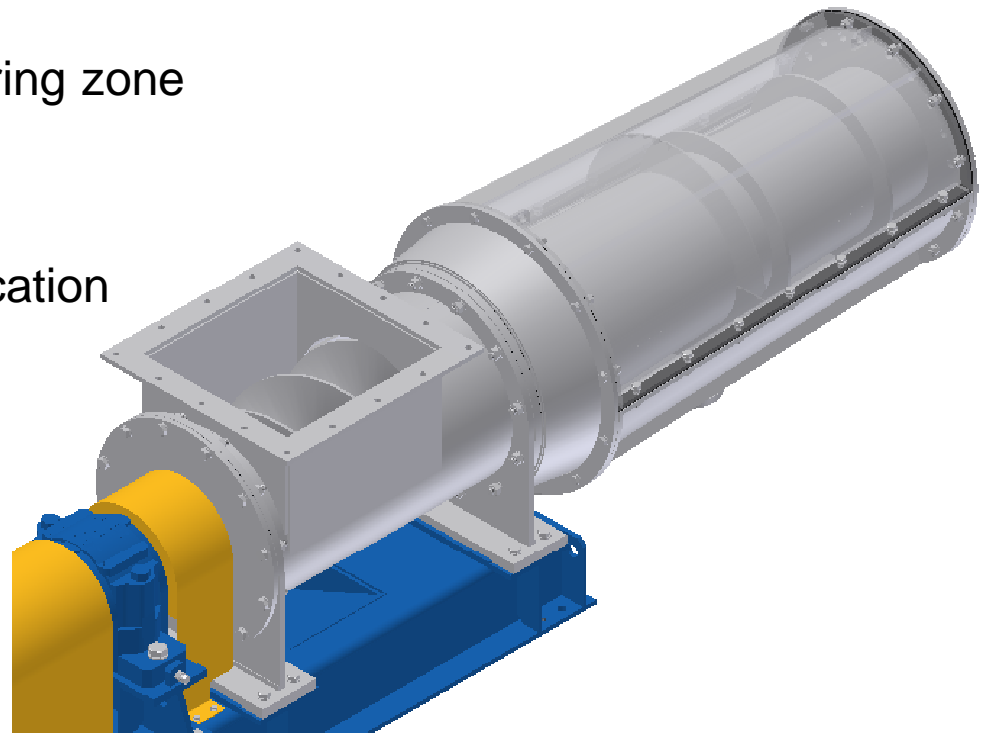
# Ultra High Dispersing

## Dewatering plug screw feeder

### Features

The plug screw feeder is used as **additional dewatering equipment**

- Conical plug zone utilized as dewatering zone
- Large dewatering surface available
- No additional equipment needed
- ANDRITZ patent for dispersing application



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# Ultra High Dispersing

Great variation of plate designs for tailor-made optimization

## Durapulse

with V-tooth design and feeder bars



# Ultra High Dispersing

Great variation of plate designs for tailor-made optimization

## Multipulse

with V-tooth design



# Ultra High Dispersing

Great variation of plate designs for tailor-made optimization

## Optipulse

Variation of tooth angle for pumping or holdback



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# Ultra High Dispersing Savings

Example: 300 t/d MOW

Steam savings of 33% 150,000 €/year

Bleaching Chemicals 140,000 €/year  
1% H<sub>2</sub>O<sub>2</sub> instead of 1.4% H<sub>2</sub>O<sub>2</sub>

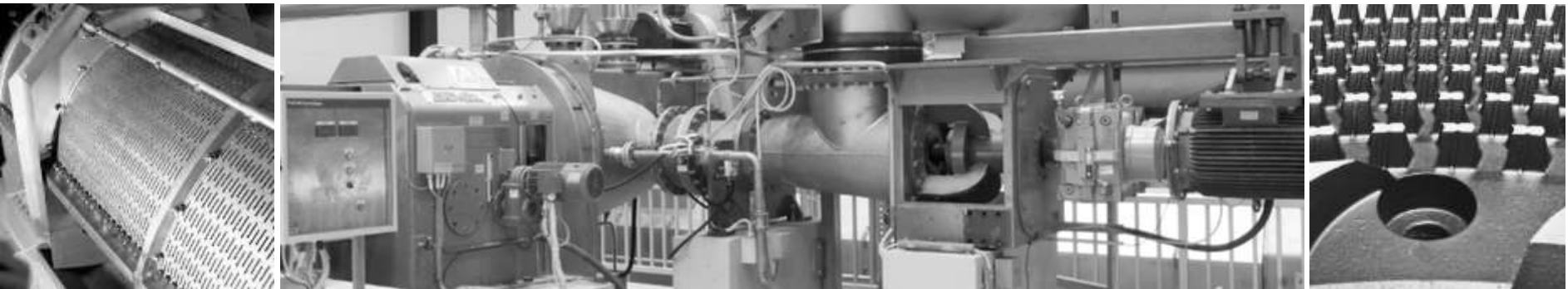
**▶ Total savings 290,000 €/year**

# Ultra High Dispersing

## Conclusions

### Advantages

- Reduced **steam demand**
- Improved **bleaching response**
- Reduced **COD**
- Improved **dispersing efficiency**
- Minor additional **investment**
- Lower **operating costs**
- **Dewatering plug screw feeder** also for rebuilds and capacity increases



# **ANDRITZ**

## **Pulp & Paper**

**Thank you for your attention**

