

# IKA® Technology for bitumen industry

**IKA®**



**designed**  
to work perfectly



# The IKA® fields of activity

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LABORATORY  
TECHNOLOGY



PROCESS  
TECHNOLOGY



ANALYTICAL  
TECHNOLOGY



**designed**  
to work perfectly

# The IKA® subsidiaries worldwide



# 1. Continuous production of Polymer modified Bitumen PmB



# Introduction

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## **What is polymer-modified bitumen?**

Polymer modified bituma (PMB) are mixtures produced from:

- bitumen
- and
- polymers

in which the polymers change the visco-elastic behaviour of the bitumen and thus make this binder more suitable for different stresses.

# Introduction

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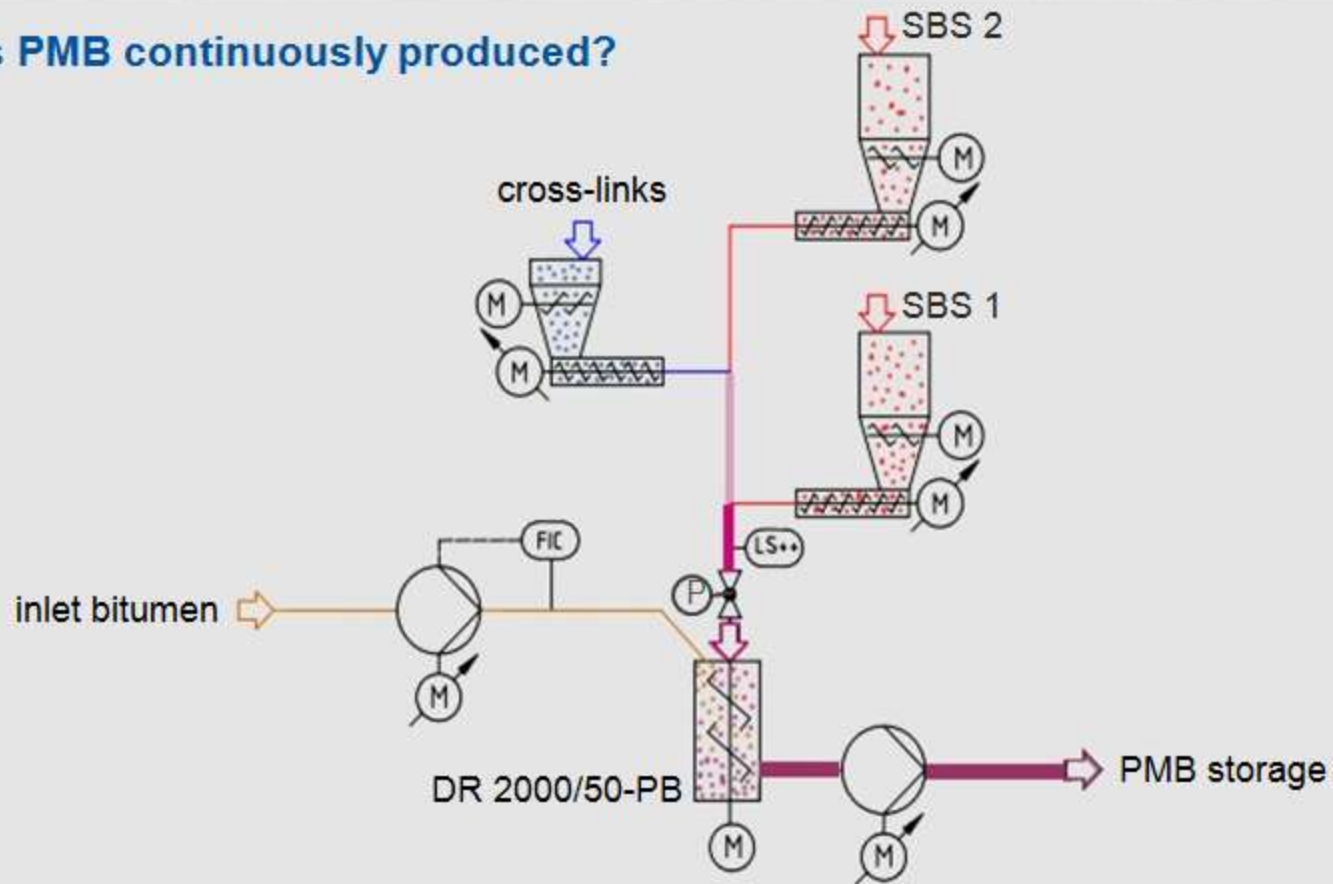
## What are polymers?

For modified bitumen mainly the following polymers are used:

- SBS - styrene-butadiene-styrene-copolymer
- EVA - ethylene-vinyl acetate-copolymer



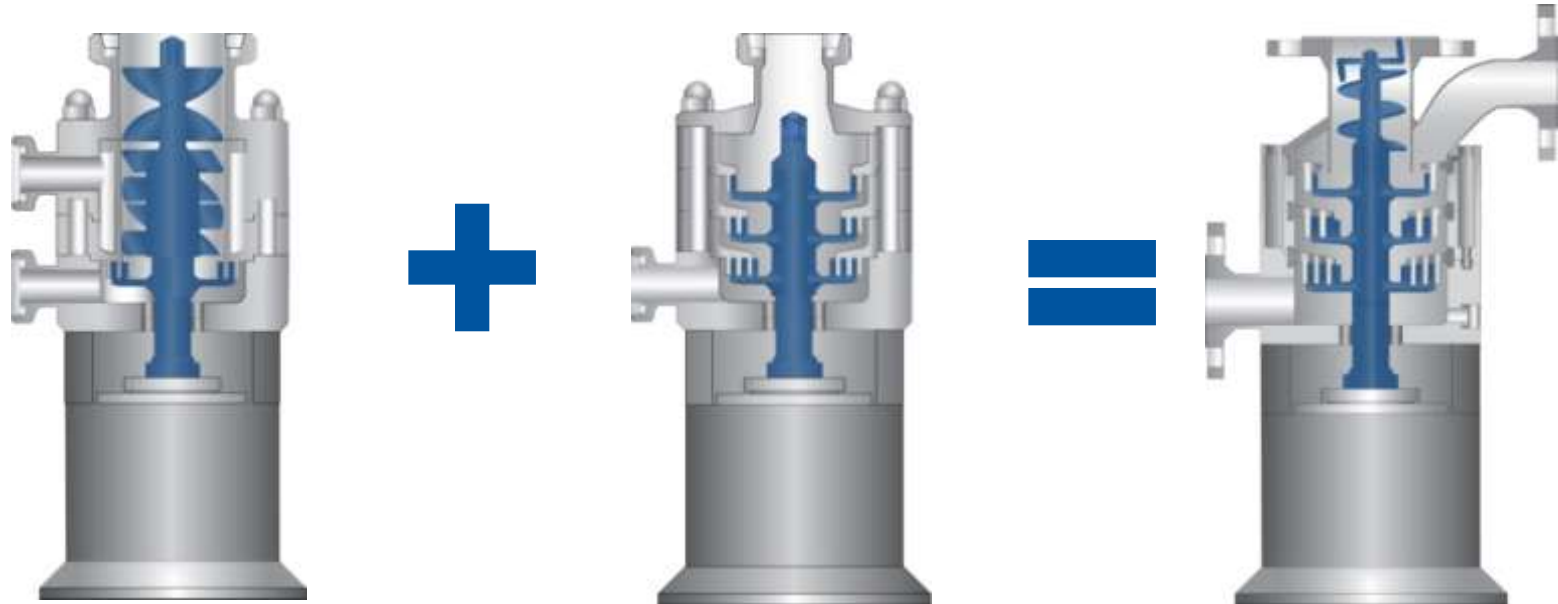
## How is PMB continuously produced?





# The machine

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The Bitumen DISPAX® DR-PB was developed as a combination of the in-line powder incorporation machine MHD and the three stage DR high shear disperser.



# The machine

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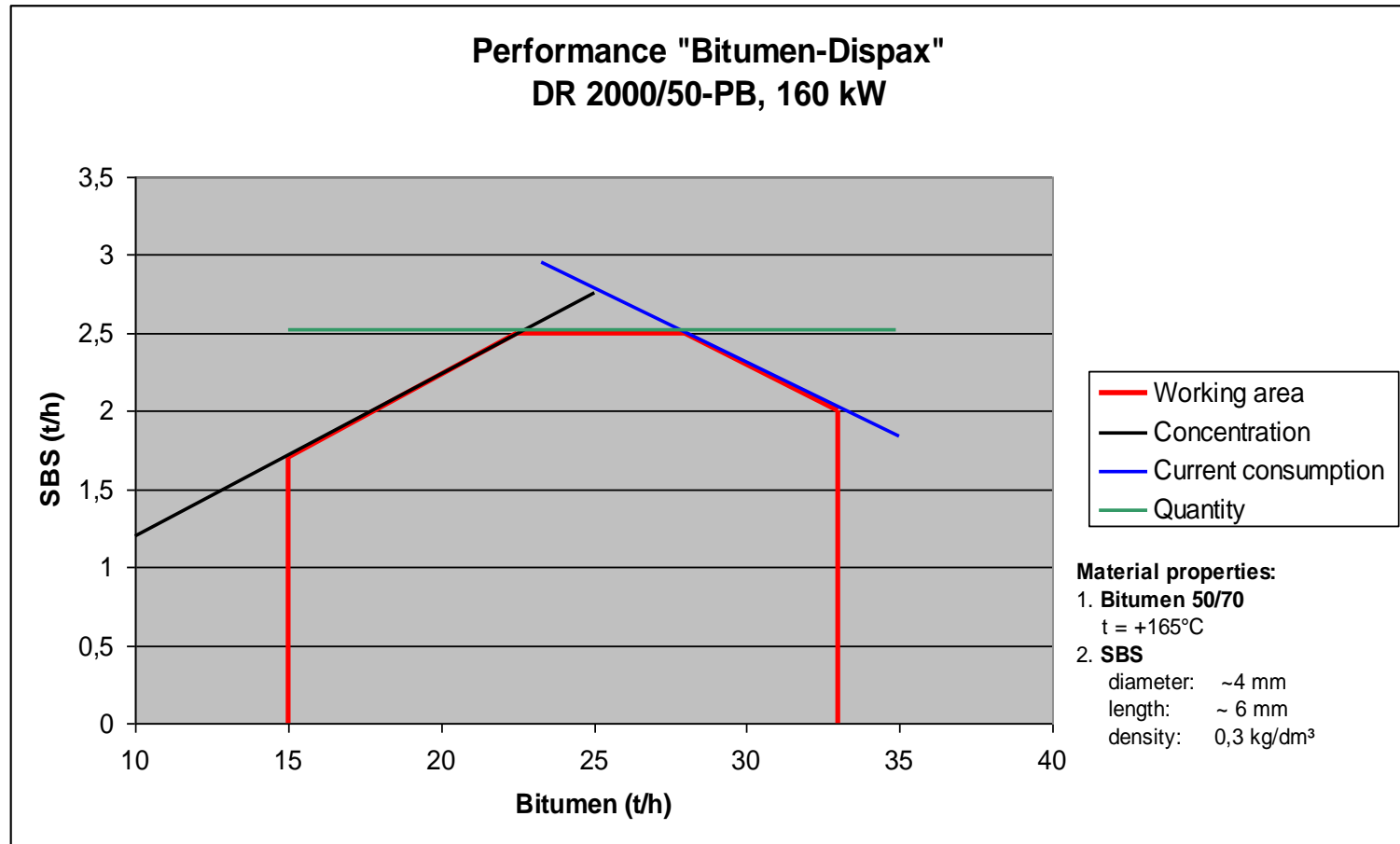


## Following sizes are available:

- DR2000/10 - PB
- DR2000/20 - PB
- DR2000/30 - PB
- DR2000/50 - PB

(PB = polymer bitumen)





# The machine



## Technical data

|   | DR 2000/10-PB | DR 2000/20-PB | DR 2000/30-PB | DR 2000/50-PB |
|---|---------------|---------------|---------------|---------------|
| Power:  | 18,5 kW       | 45 kW         | 75 kW         | 160 kW        |
| Throughput:   | 2,5 t/h       | 6 t/h         | 15 t/h        | 35 t/h        |
| Max. throughput bitumen:  | 2.500 l/h     | 6.000 l/h     | 15.000 l/h    | 35.000 l/h    |
| Max. throughput polymer:<br>(at a bulk density of approx.<br>0,3 kg/dm <sup>3</sup> ) | 400 l/h       | 900 l/h       | 3.700 l/h     | 8.000 l/h     |

Viscosity of final product: approx. 200 - 1.000 mPas

Delivery height: max. 10 m (ca. 1 bar)

Content of polymer: 0,1 - 15%

## The machine

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DR 2000/50-PB

# The trial plant

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A complete trial plant for bitumen production type DR 2000/10-PB is available for trials at site.



# The PMB production plant

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We offer stand-alone machines and complete PMB production plants with capacities of up to 35 t/h of PMB.

# PMB production plant

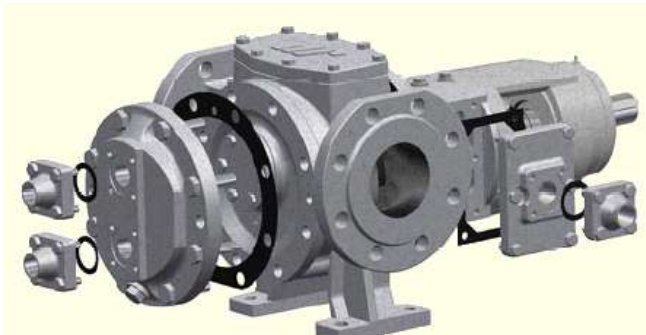
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## **Complete IKA® PMB production plants consist of the following components:**

- Bitumen heating tank, with stirrer
- Pumps
- Filters
- Flow meter
- Solids dosing
- Bitumen DISPAX-REACTOR®-PB
- Heated pipelines
- PMB storage tank, heated with stirrer
- Electric control



# Bitumen pumps



## Gear pumps

- to fill the bitumen heating tank
- to feed the hot bitumen in the continuous disperser
- for pumping of the PMB to the storage tanks

|             |                              |
|-------------|------------------------------|
| Throughput: | approx. 10.000 to 30.000 l/h |
|-------------|------------------------------|

|        |            |
|--------|------------|
| Power: | 11 – 15 kW |
|--------|------------|

|           |            |
|-----------|------------|
| Material: | cast steel |
|-----------|------------|

|                |  |
|----------------|--|
| Specification: | incl. a heating jacket and directly mounted safety valve |
|----------------|--|



## Bitumen heating tank with stirrer

to heat up the bitumen prior to the incorporation of polymer.

|                |                                    |
|----------------|------------------------------------|
| Useful volume: | 60 m <sup>3</sup>                  |
| Stirrer power: | 11 kW                              |
| Material:      | carbon steel St 37                 |
| Execution:     | incl. heating coils and insulation |

# Flow meter

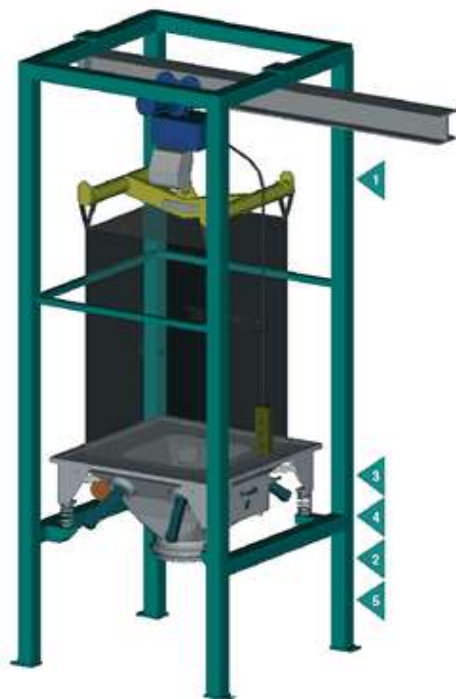
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## High temperature flow meter

for measurement of the bitumen flow from the second pump to the disperser.

|                      |                    |
|----------------------|--------------------|
| Measuring principle: | Coriolis           |
| Throughput:          | up to 30.000 kg/h  |
| Specification:       | carbon steel St 37 |



## Solids dosing unit

for gravimetric continuous dosing of the SBS granules into the disperser DR 2000/50-PB

|                |  |
|----------------|--|
| Feed rate:     | 200 up to 2.200 kg/h   |
| Material:      | stainless steel AISI 316 or better                                       |
| Specification: | with 1.500 ltr dosing vessel, disaggregator and analogue weighing system |



# Disperser



## High shear dispersing machine type **DISPAX-REACTOR®-PB**

for continuous wetting, mixing and dissolving  
of the SBS into the hot bitumen.

|                 |  |
|-----------------|--|
| Total capacity: | up to 30.000 ltr/h                                 |
| Motor power:    | 160 kW   |
| Material:       | stainless steel AISI 316Ti                         |
| Specification:  | incl. double jacket and locking<br>pressure system |



## **Bitumen storage tank with stirrer**

for storage of the finished polymer modified bitumen (PMB) prior to loading.

|                |                                    |
|----------------|------------------------------------|
| Useful volume: | ~ 100 m <sup>3</sup> each          |
| Stirrer power: | 15 kW                              |
| Material:      | carbon steel St 37                 |
| Execution:     | incl. heating coils and insulation |

# Heating unit

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## Heating unit for thermal oil

for heating of the complete plant, i. e.:  
tanks, pumps, double jacketed  
bitumen pipelines, dispersing machine.

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|                   |        |
|-------------------|--------|
| Heating capacity: | 700 kW |
|-------------------|--------|

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|                             |       |
|-----------------------------|-------|
| Max. operating temperature: | 280°C |
|-----------------------------|-------|

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|                |                      |
|----------------|----------------------|
| Pump delivery: | 50 m <sup>3</sup> /h |
|----------------|----------------------|

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## Electric control

The control system includes:

- programmable logic control (PLC)
- control of all process streams
- safety interlocks
- weighing system
- motor control centre incl. the frequency converters

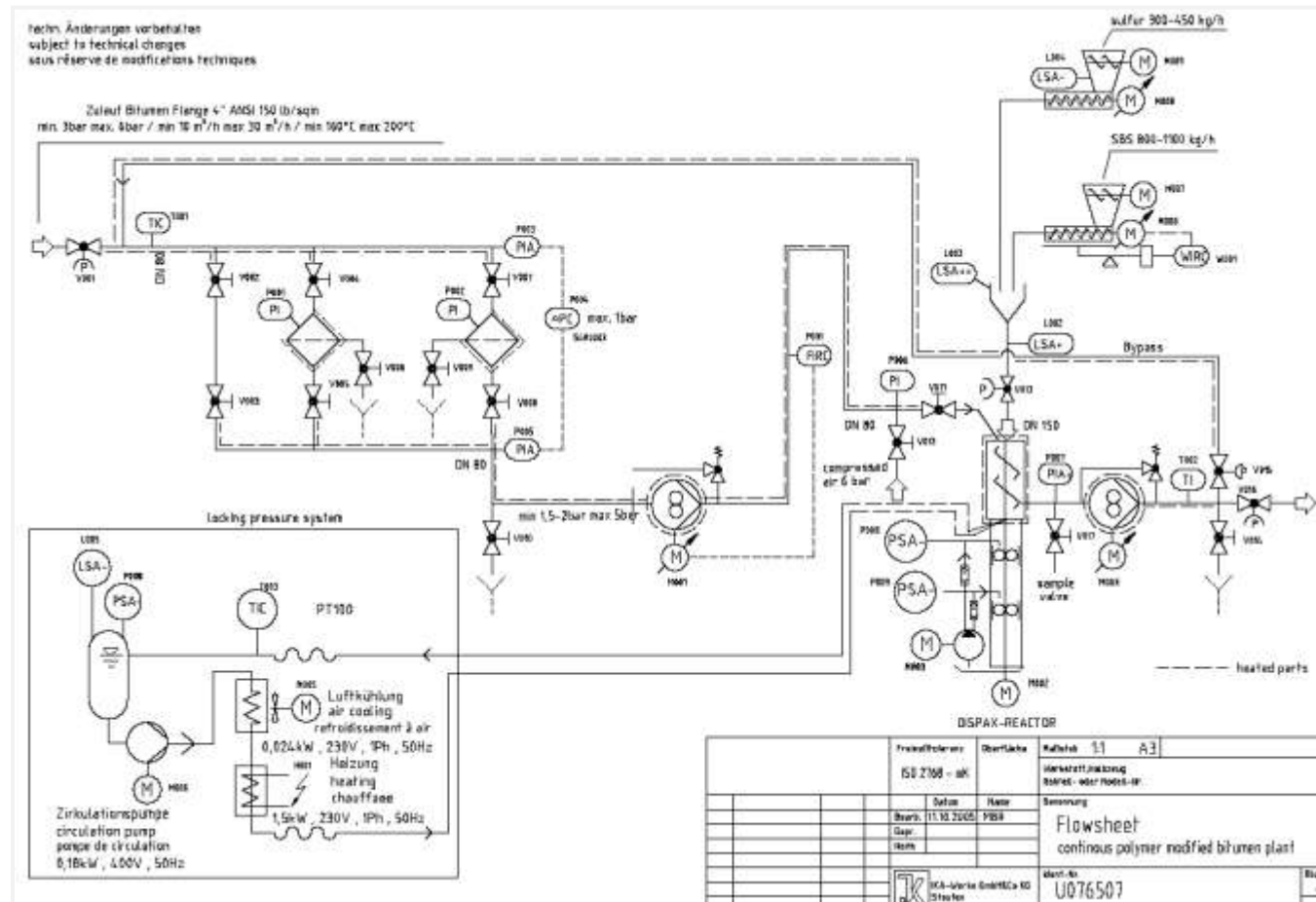


The plant is operated via a Human Machine Interface (graphical operator terminal with touch screen).

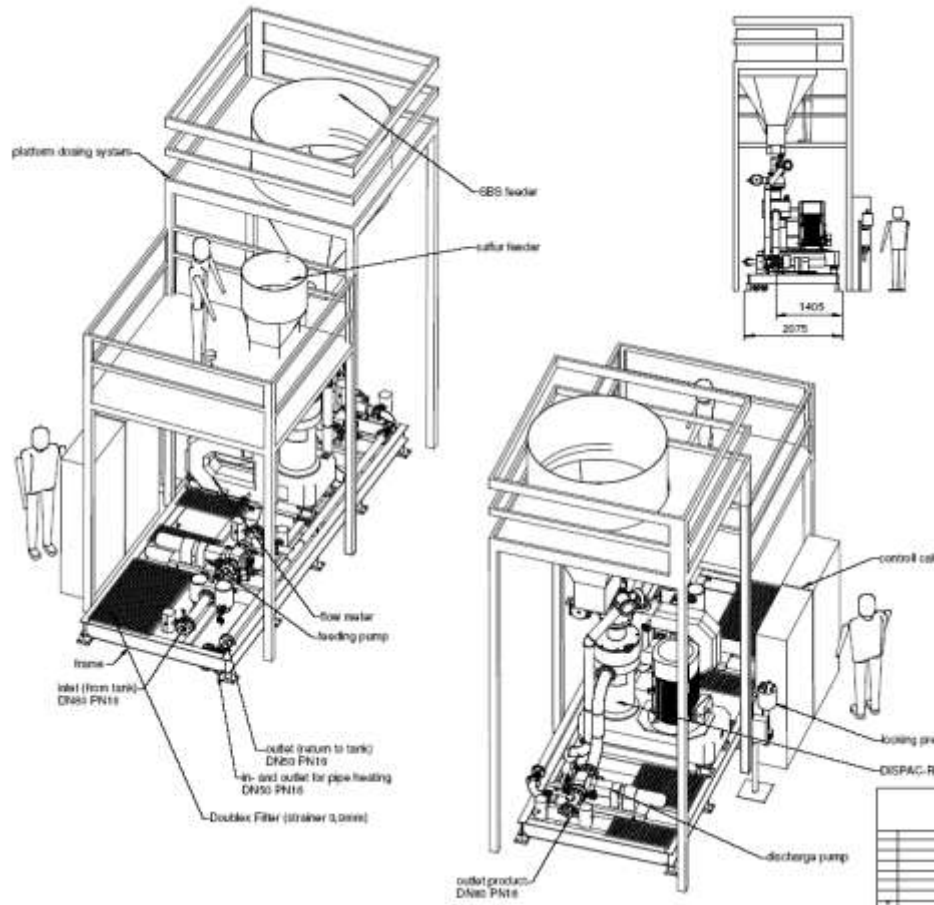
Following functions are available:

- Automatic/manual control
- Limit value adjustment and control
- Alarm handling
- Safety interlocks

# PMB production plant: Flow sheet



## PMB production plant DR 2000/50-PB



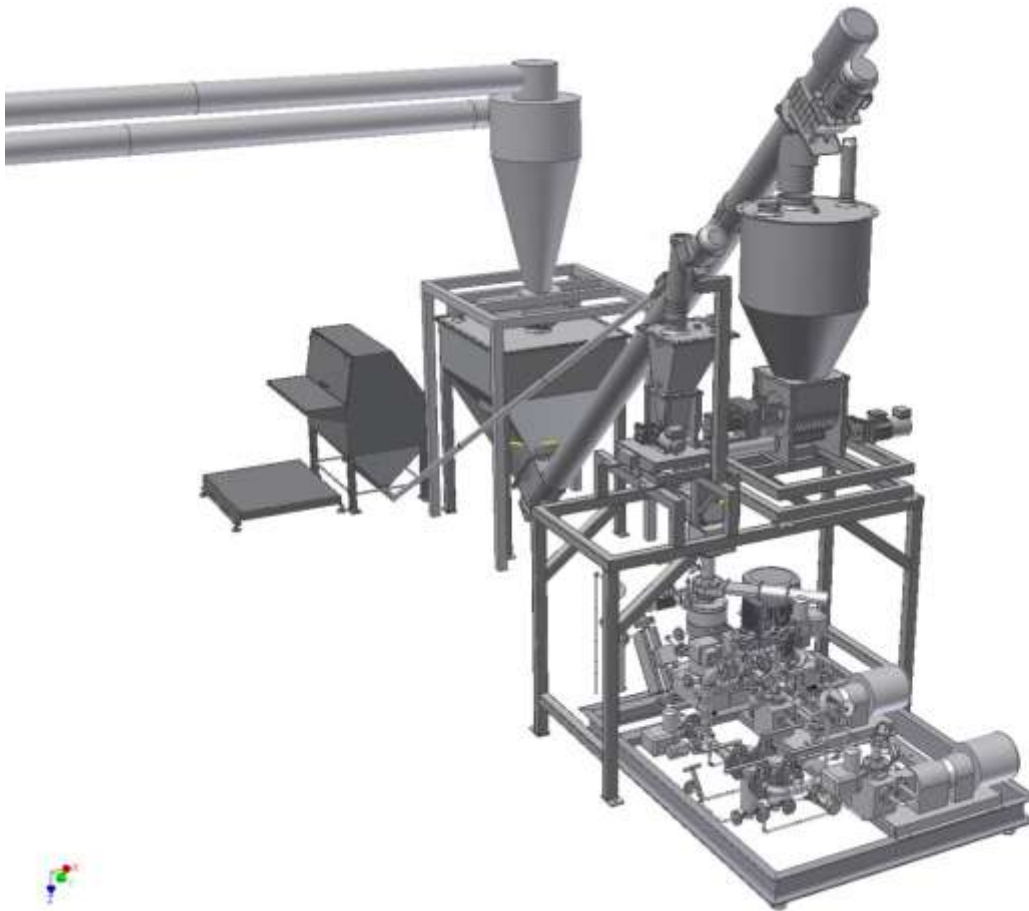
# PMB production plant DR 2000/50-PB

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# PMB production plant DR 2000/20-PB

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# PMB production plant

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## Technical conditions

### Bitumen characteristics:

- Temperature min. +160°C to max. +190°C
- Viscosity at working temperature max. 400 mPa·s
- No impurities

### Polymer (SBS-Polymer) characteristics:

- Bulk density min. 300 to max. 450 kg/m<sup>3</sup>
- Particle size length max. 6 mm, diameter max. 4 mm
- No impurities, especially no metal

### Cross-links characteristics:

- Bulk density min. 800 to max. 1.100 kg/m<sup>3</sup>
- Particle size length min. 1 mm, max. 5 mm
- No impurities, especially no metal



# PMB production plant

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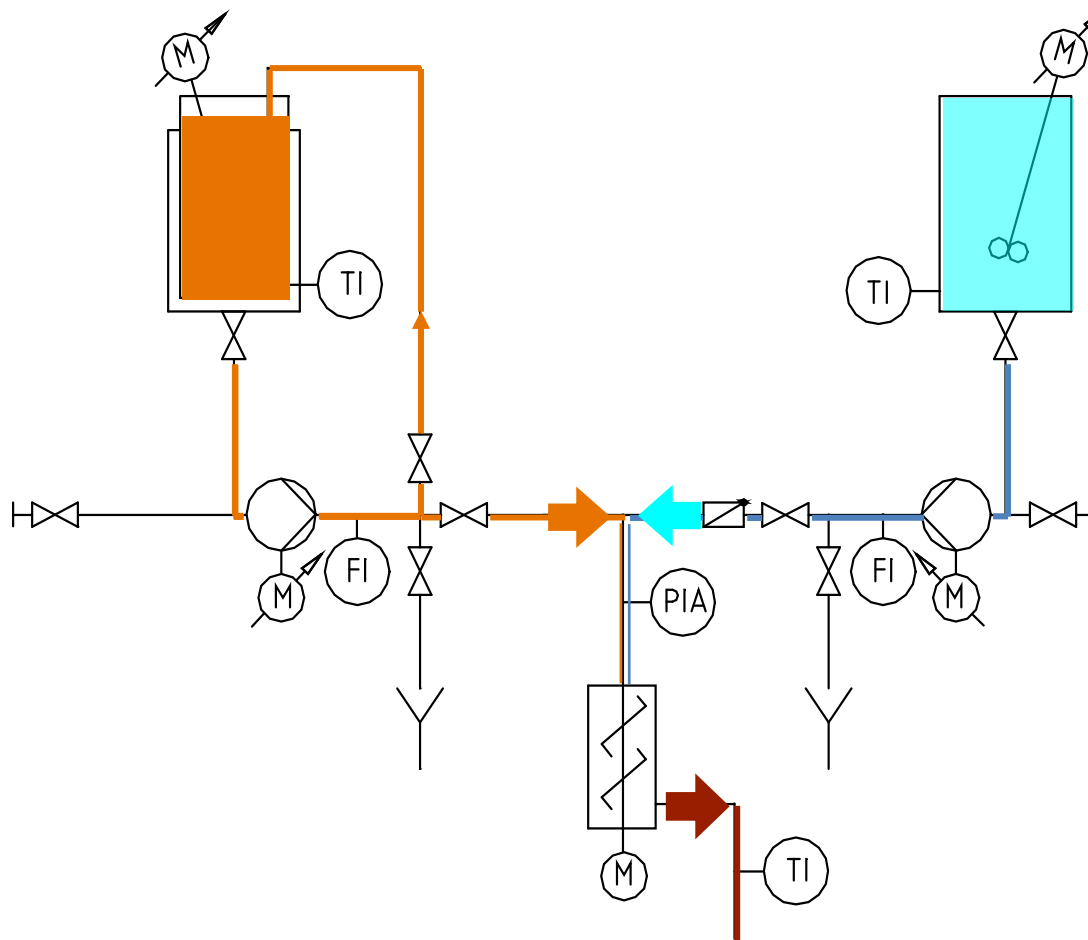
## Benefits

- Direct mixing and dispersing in one machine
- Constant quality of the final product
- Less process steps
- Less time consuming
- The ability to produce different quantities with varying SBS concentrations
- Reduction of (expensive) SBS while maintaining constant quality of the PMB
- Higher flexibility regarding production quantities
- Less space requirement for machines and storage

## 2. Production of bitumen emulsions



# Bitumen emulsion plant



# Bitumen emulsion plant

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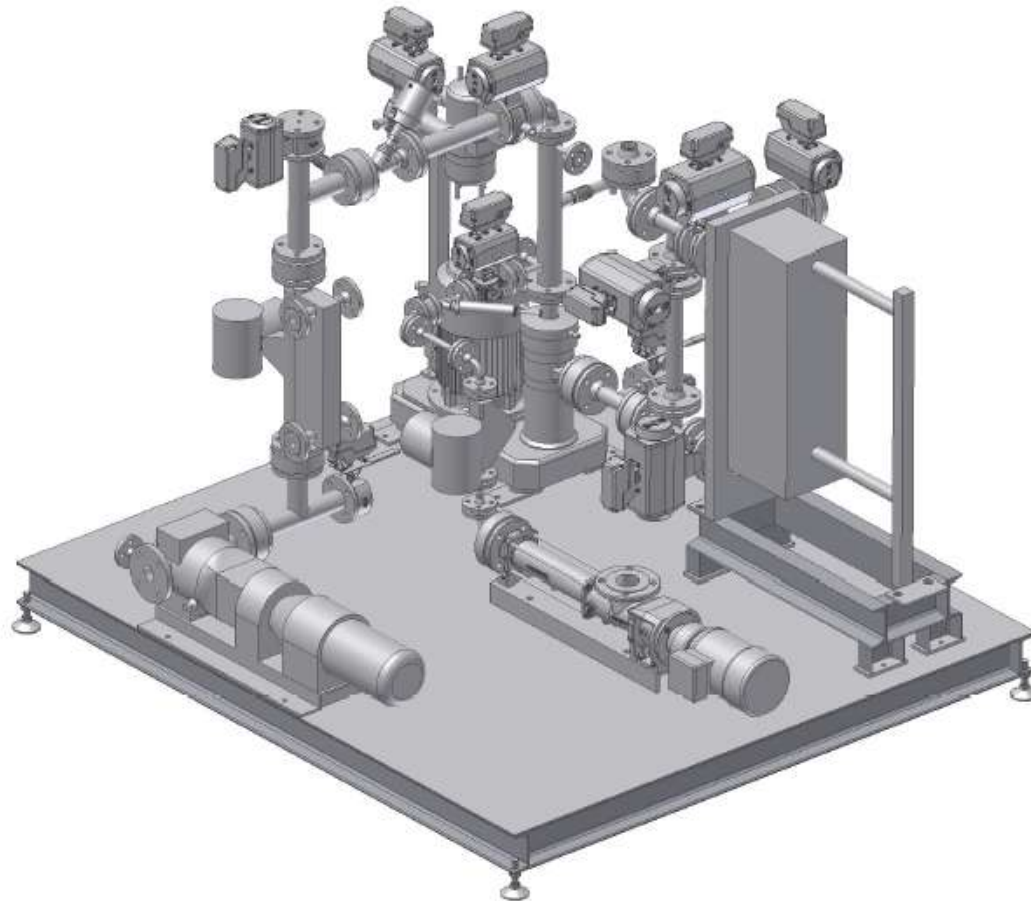


High speed IKA Colloid Mill  
with adjustable gear gap



# Bitumen emulsion plant

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## Bitumen emulsion plant

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EPB 2500



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# Bitumen emulsion plant

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**IKA®**



EPB 2500

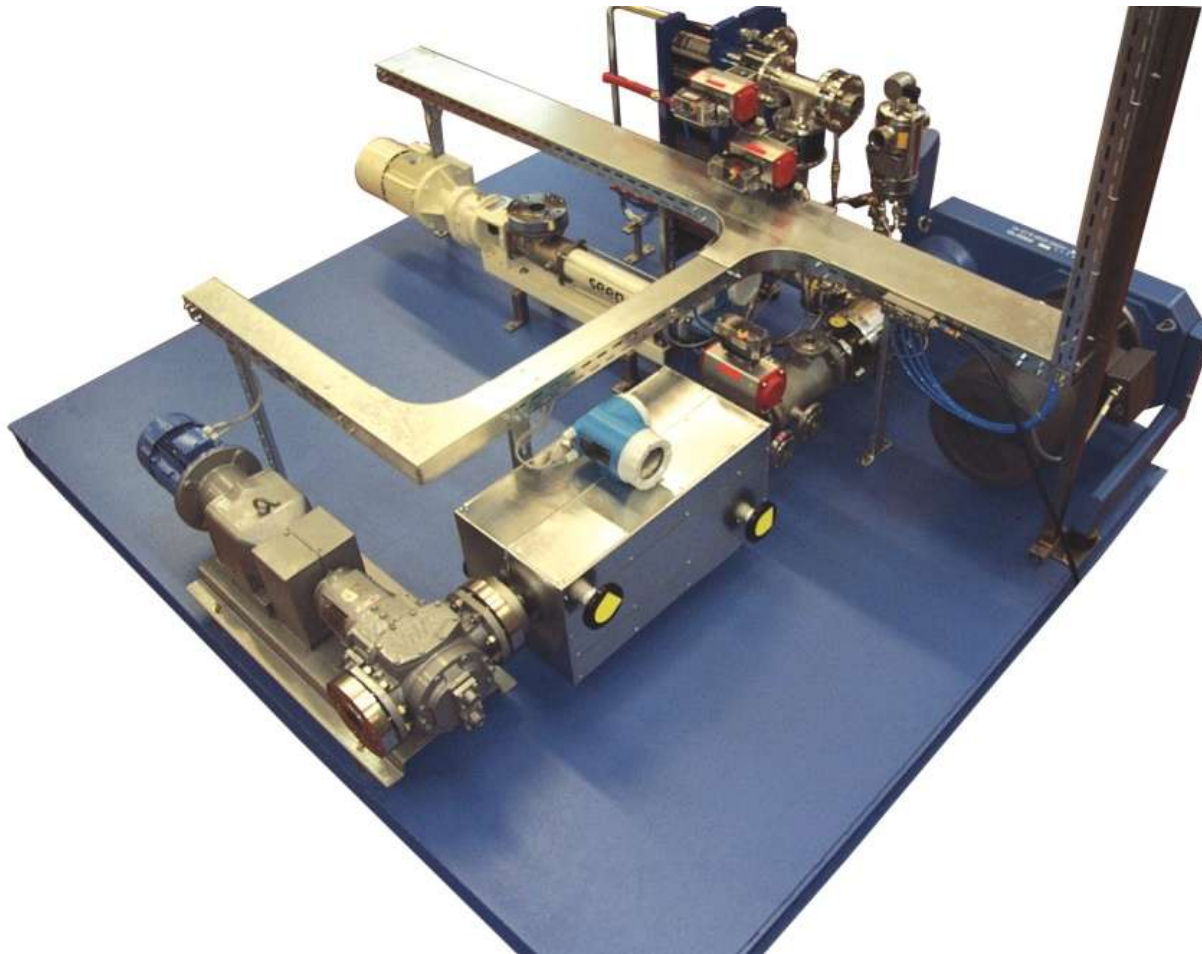


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# Bitumen emulsion plant

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EPB 7500



designed  
to work perfectly

# Bitumen emulsion plant

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EPB 7500



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to work perfectly

# Bitumen emulsion plant

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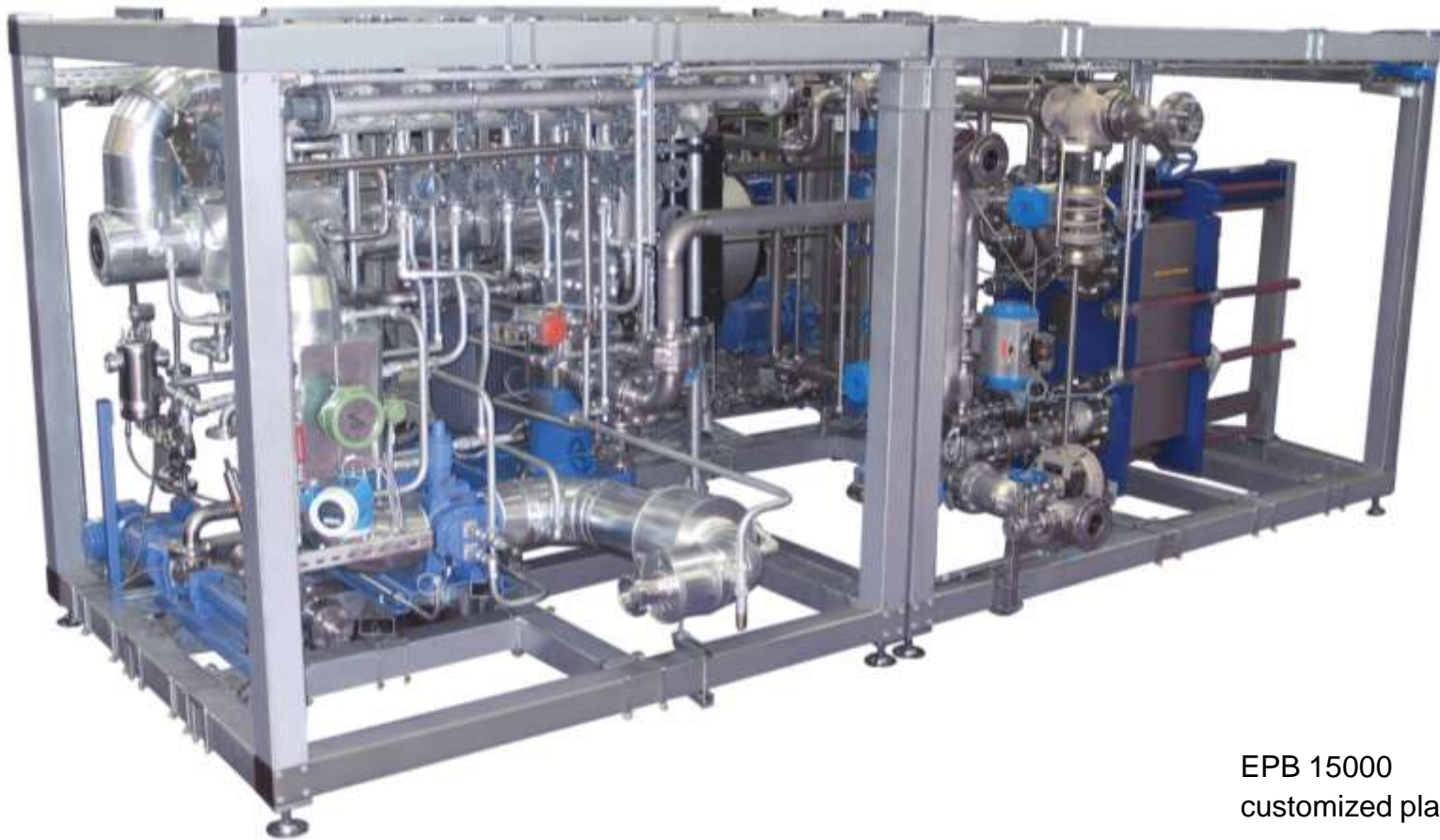


EPB 15000



# Bitumen emulsion plant

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EPB 15000  
customized plant

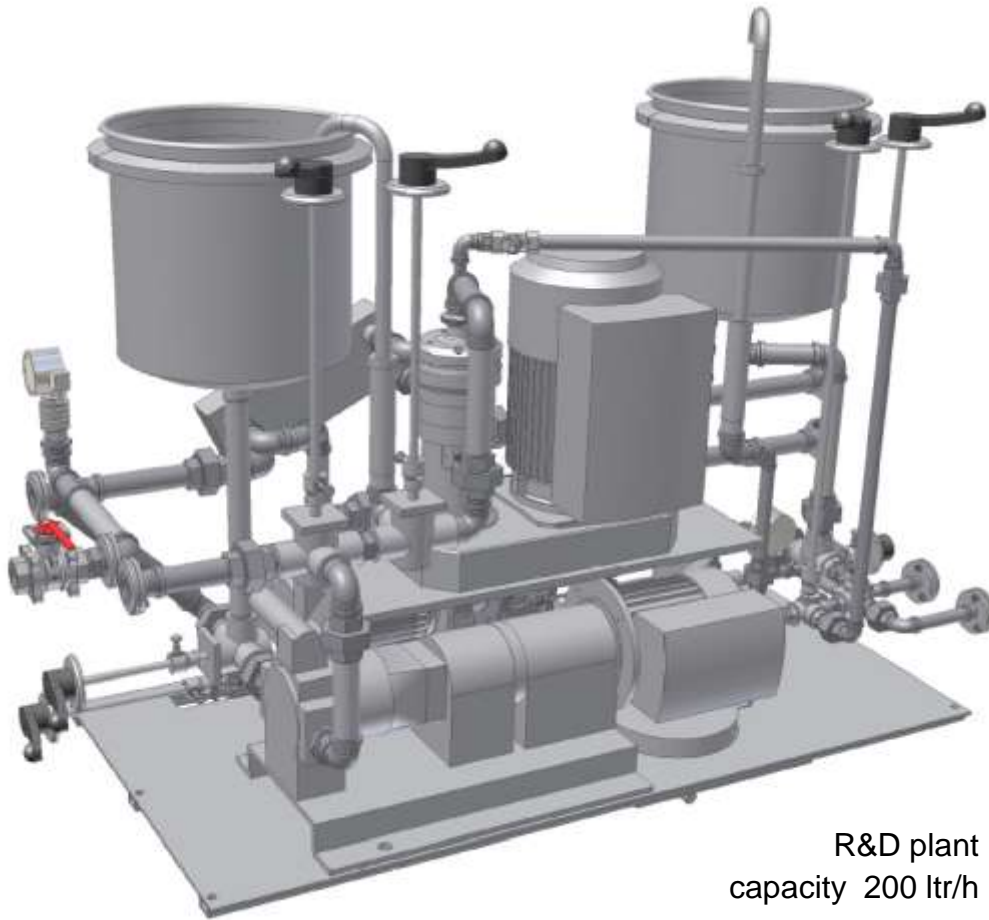


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# R&D bitumen emulsion plant

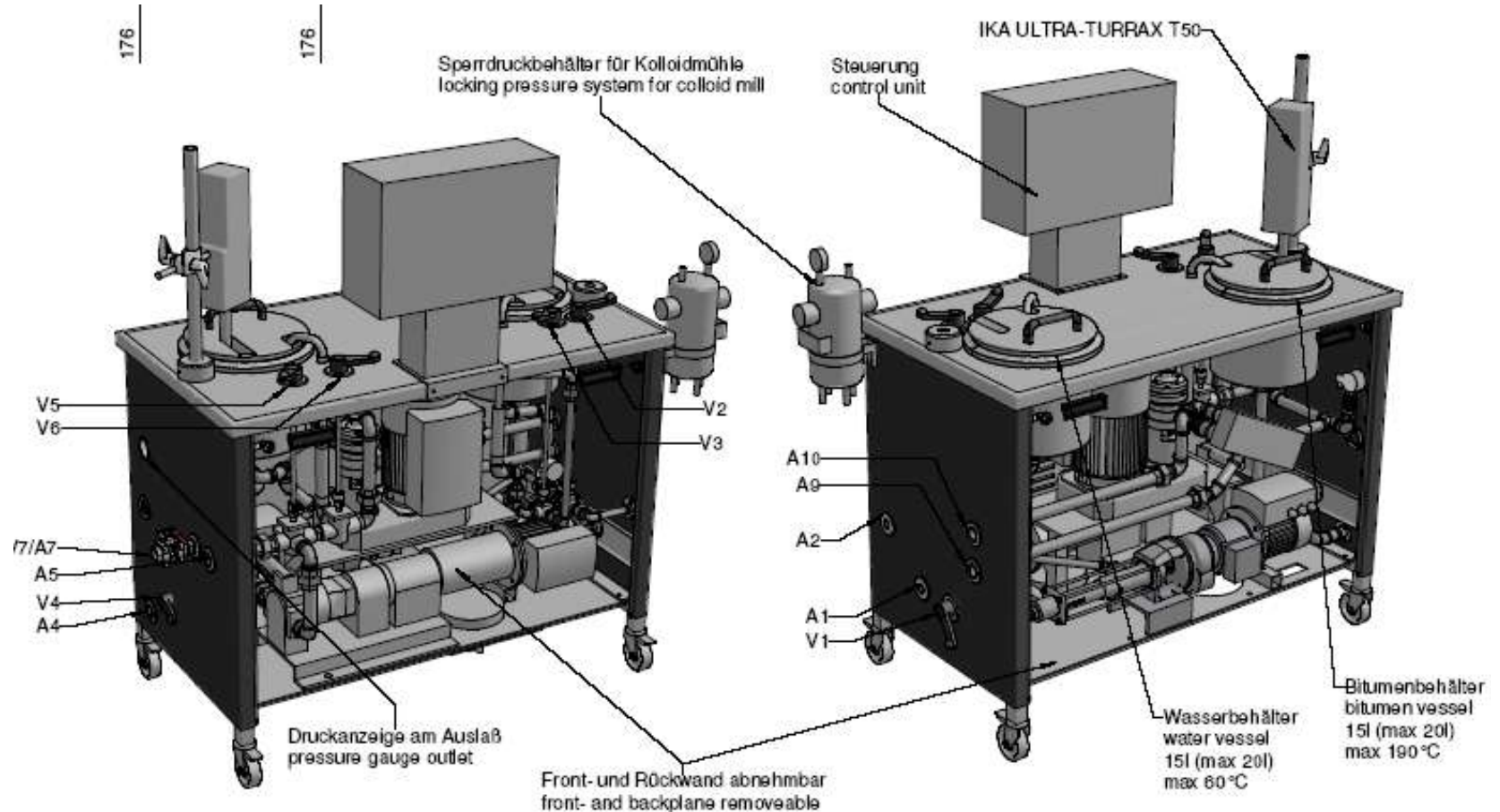
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R&D plant  
capacity 200 ltr/h



## R&D bitumen emulsion plant



# R&D bitumen emulsion plant

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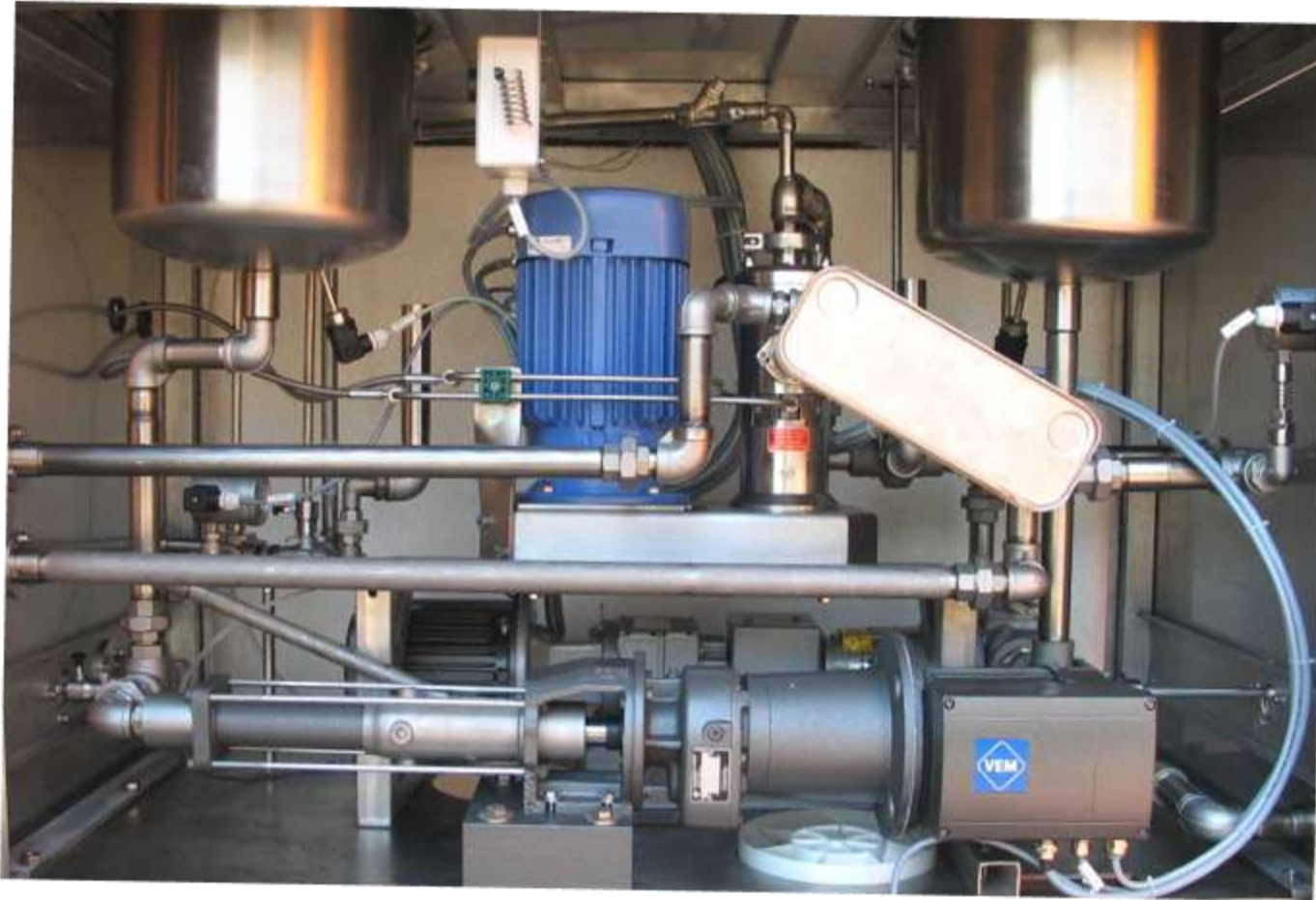


designed  
to work perfectly



# R&D bitumen emulsion plant

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designed  
to work perfectly

# R&D bitumen emulsion plant

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# Bitumen emulsion plant

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## Benefits

- Improved emulsion stability is attained by a narrow particle distribution
- Specialty emulsions with up to 75 % binding material mass can be produced
- Particle sizes of 2.0 micron to 2.2 micron d(50) are typically achieved
- Mixing at temperatures over 100 °C is possible