

# 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



# 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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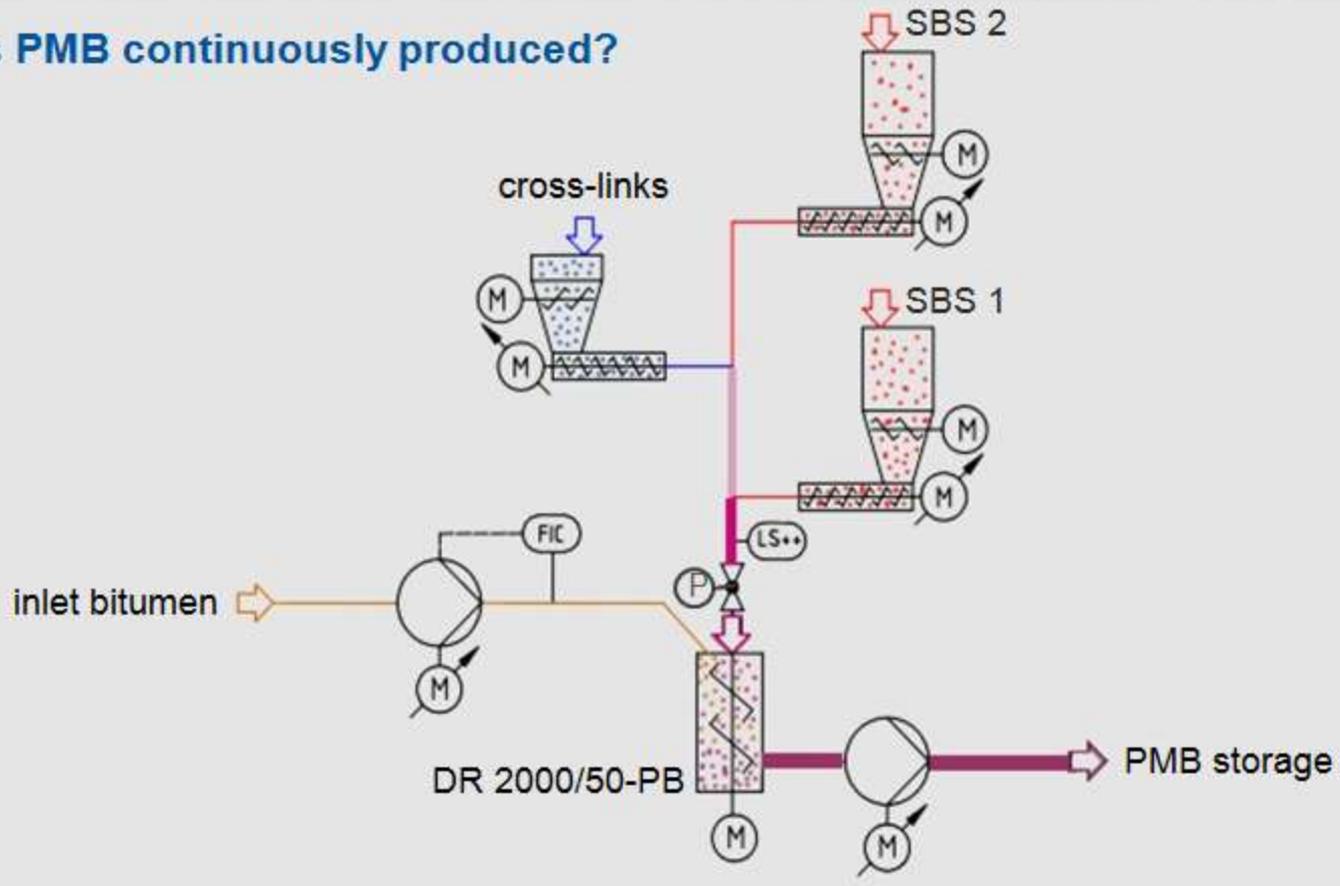
## What are polymers?

For modified bitumen mainly the following polymers are used:

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

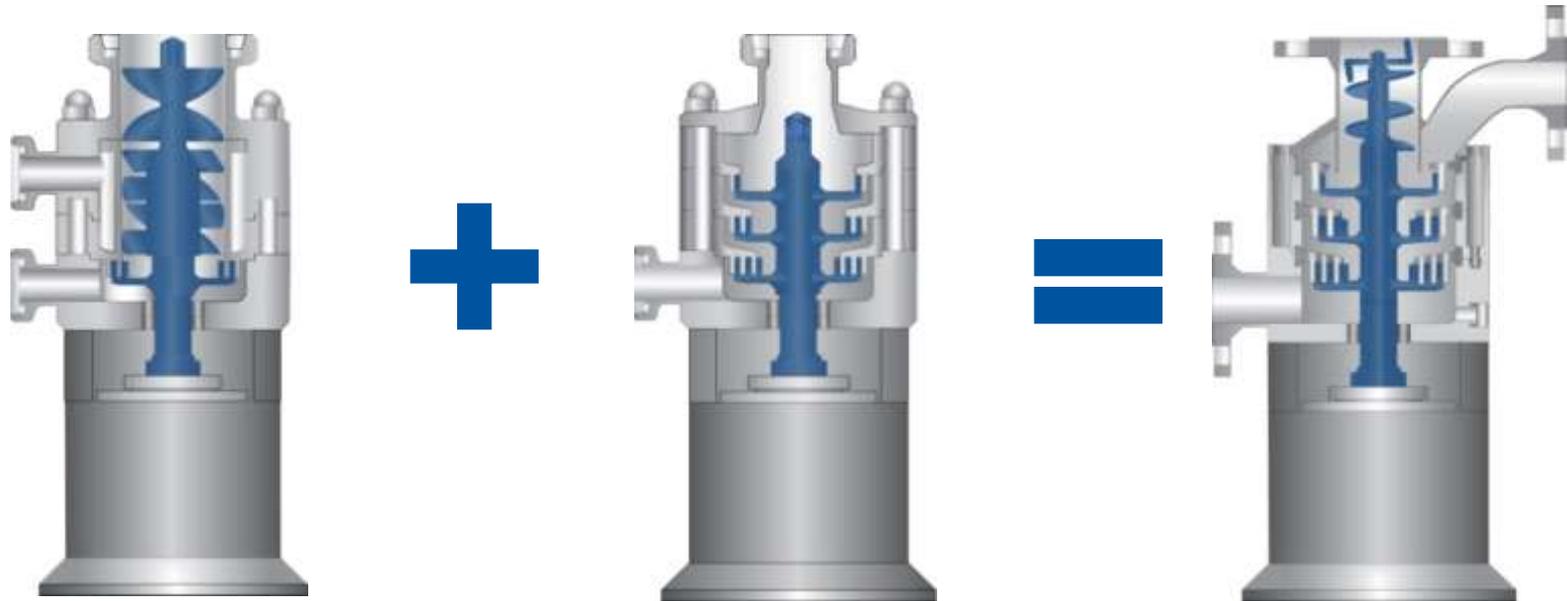
# Process

## 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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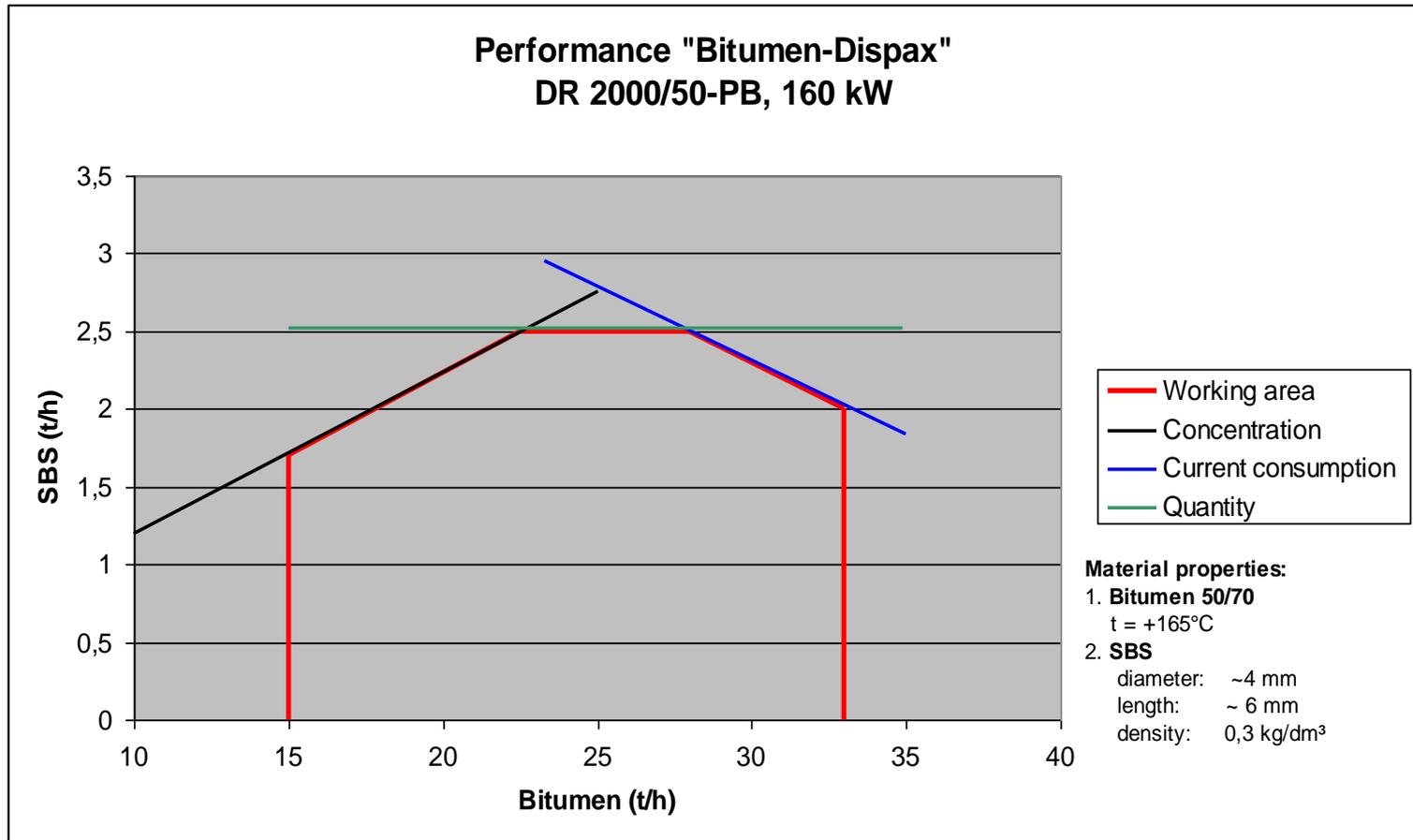


### Following sizes are available:

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

(PB = polymer bitumen)

# The machine



# 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: (at a bulk density of approx. 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.

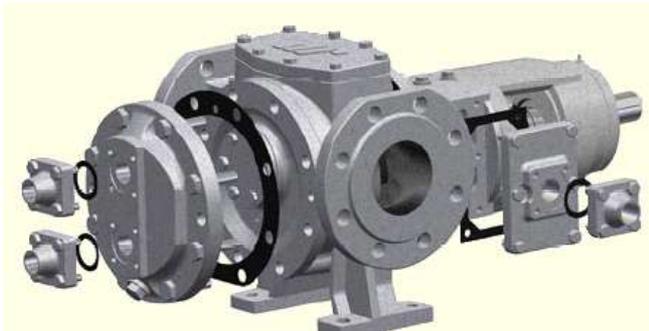
# PMB production plant

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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

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Throughput: approx. 10.000 to 30.000 l/h

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Power: 11 – 15 kW

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Material: cast steel

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

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**Bitumen heating tank with stirrer**  
to heat up the bitumen prior to the  
incorporation of polymer.

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Useful volume: 60 m<sup>3</sup>

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Stirrer power: 11 kW

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Material: carbon steel St 37

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Execution: incl. heating coils and  
insulation

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# Flow meter

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## High temperature flow meter

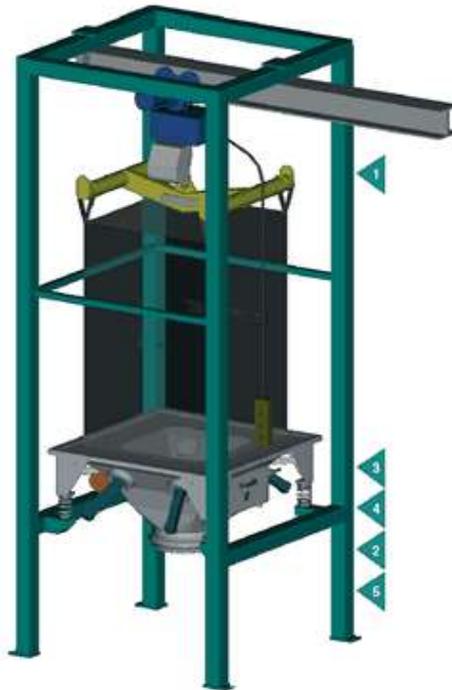
for measurement of the bitumen flow from the second pump to the disperser.

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

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# Solids dosing



## 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





## 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 pressure system



## Bitumen storage tank with stirrer

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

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Useful volume: ~ 100 m<sup>3</sup> each

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Stirrer power: 15 kW

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Material: carbon steel St 37

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Execution: incl. heating coils and insulation

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# 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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# Control

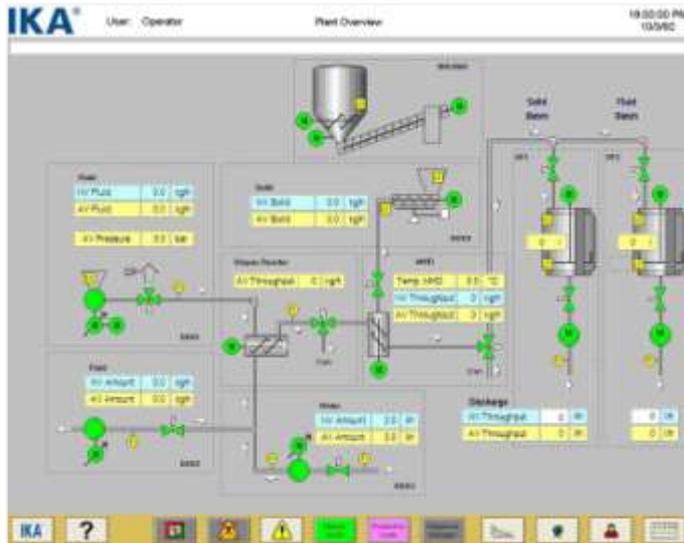
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## Electric control

The control system includes:

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



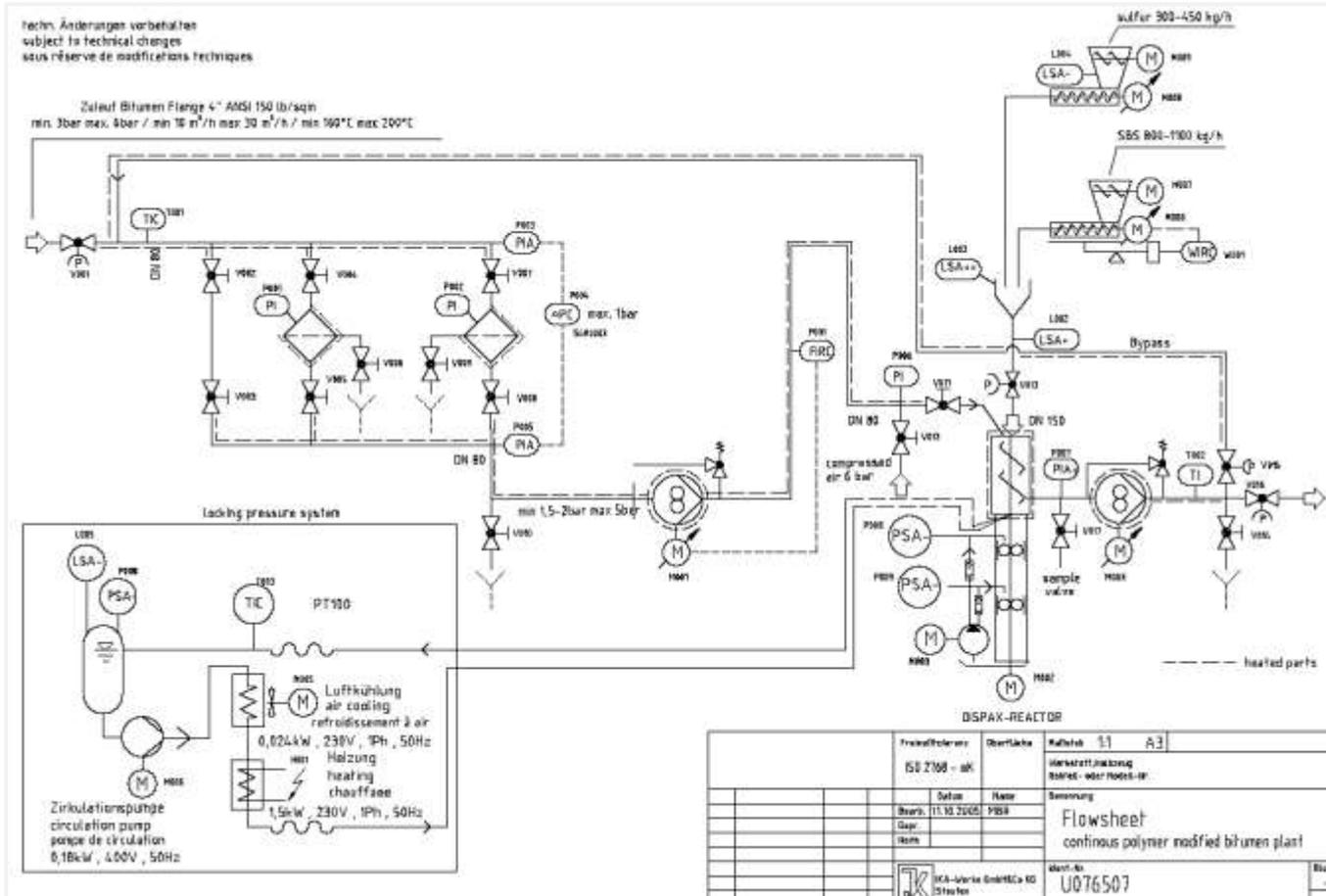
## Functions

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

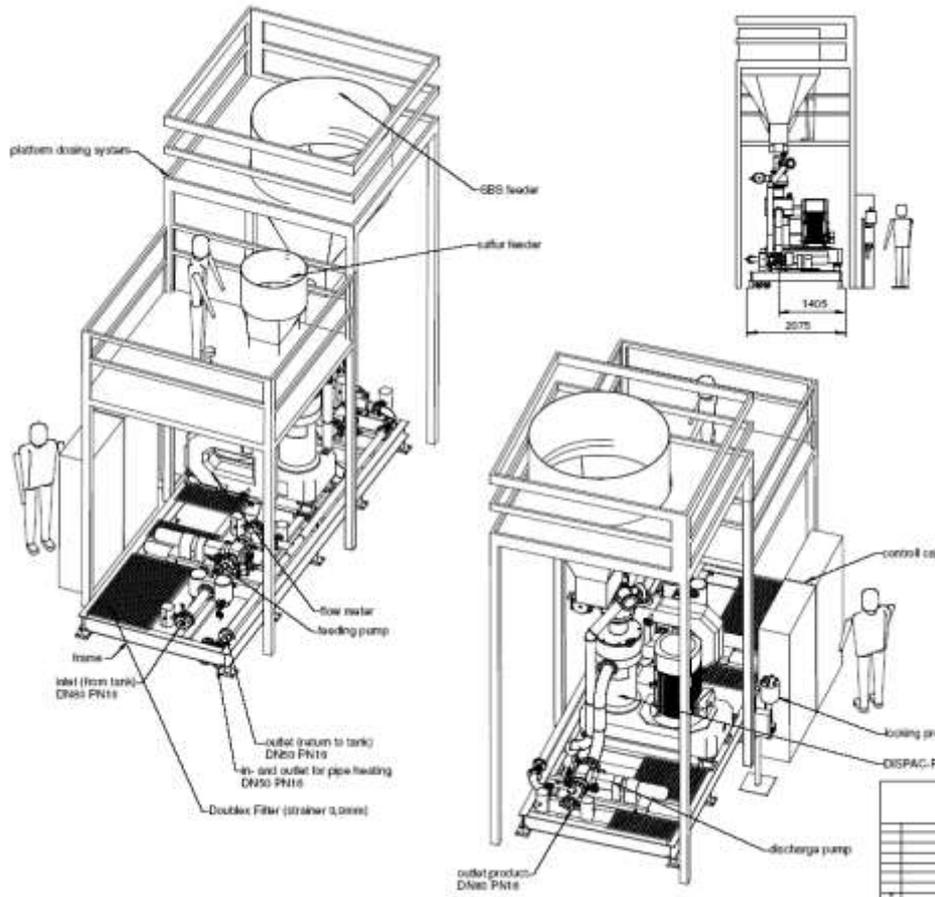
Following functions are available:

- 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

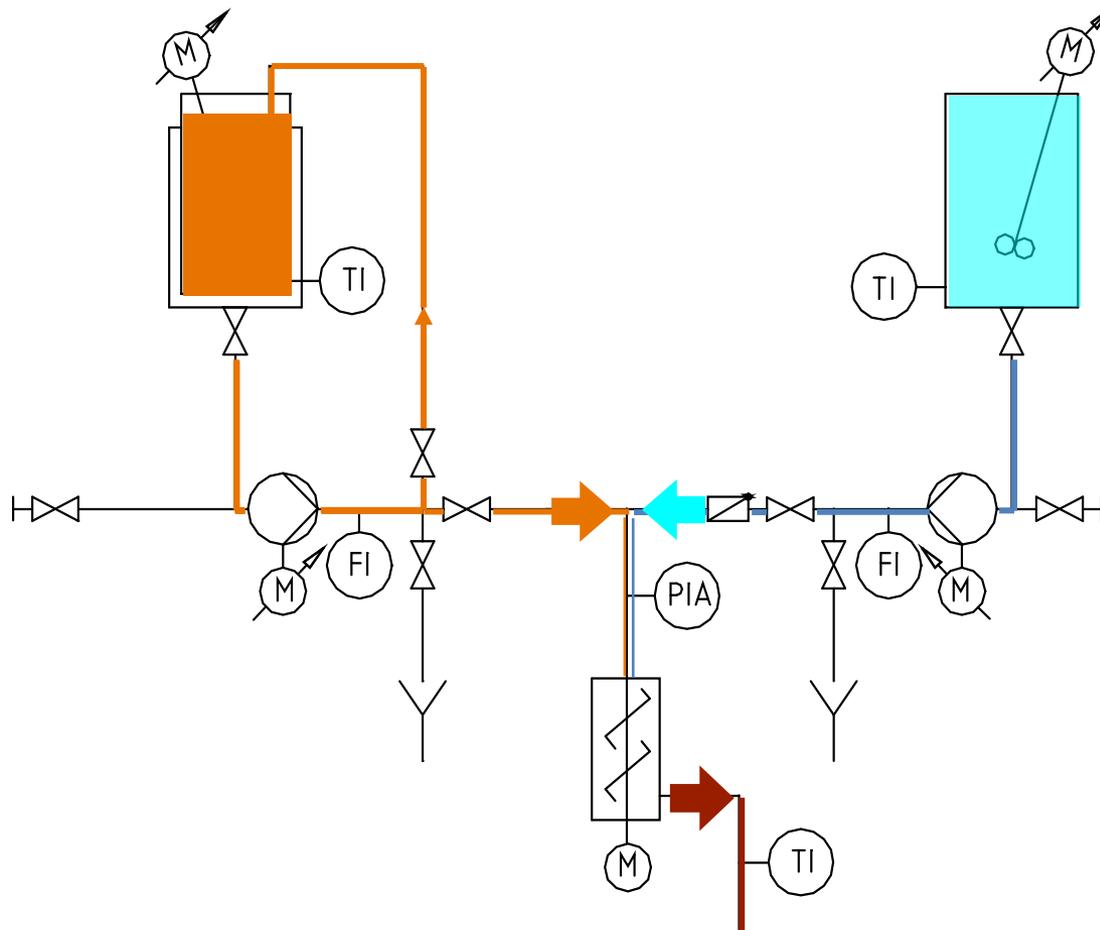
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## Benefits

- 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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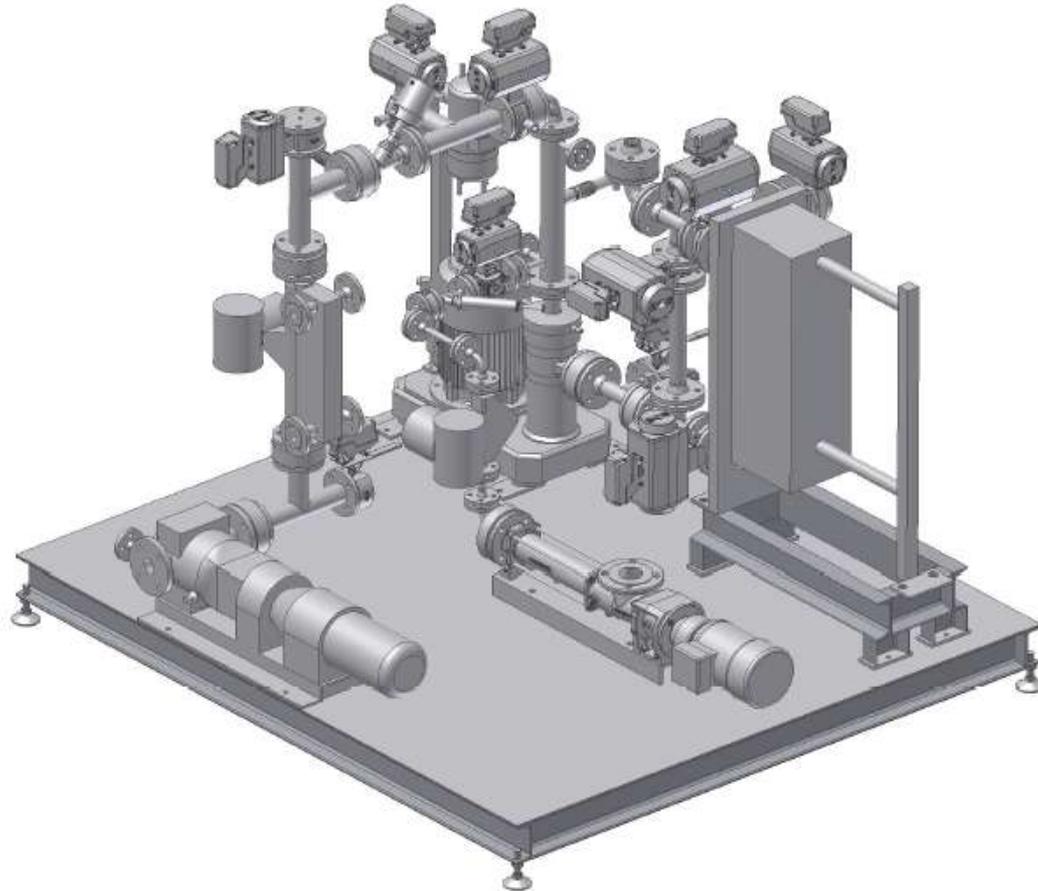


High speed IKA Colloid Mill  
with adjustable gear gap



# Bitumen emulsion plant

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## Bitumen emulsion plant

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EPB 2500

# Bitumen emulsion plant

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**IKA**®

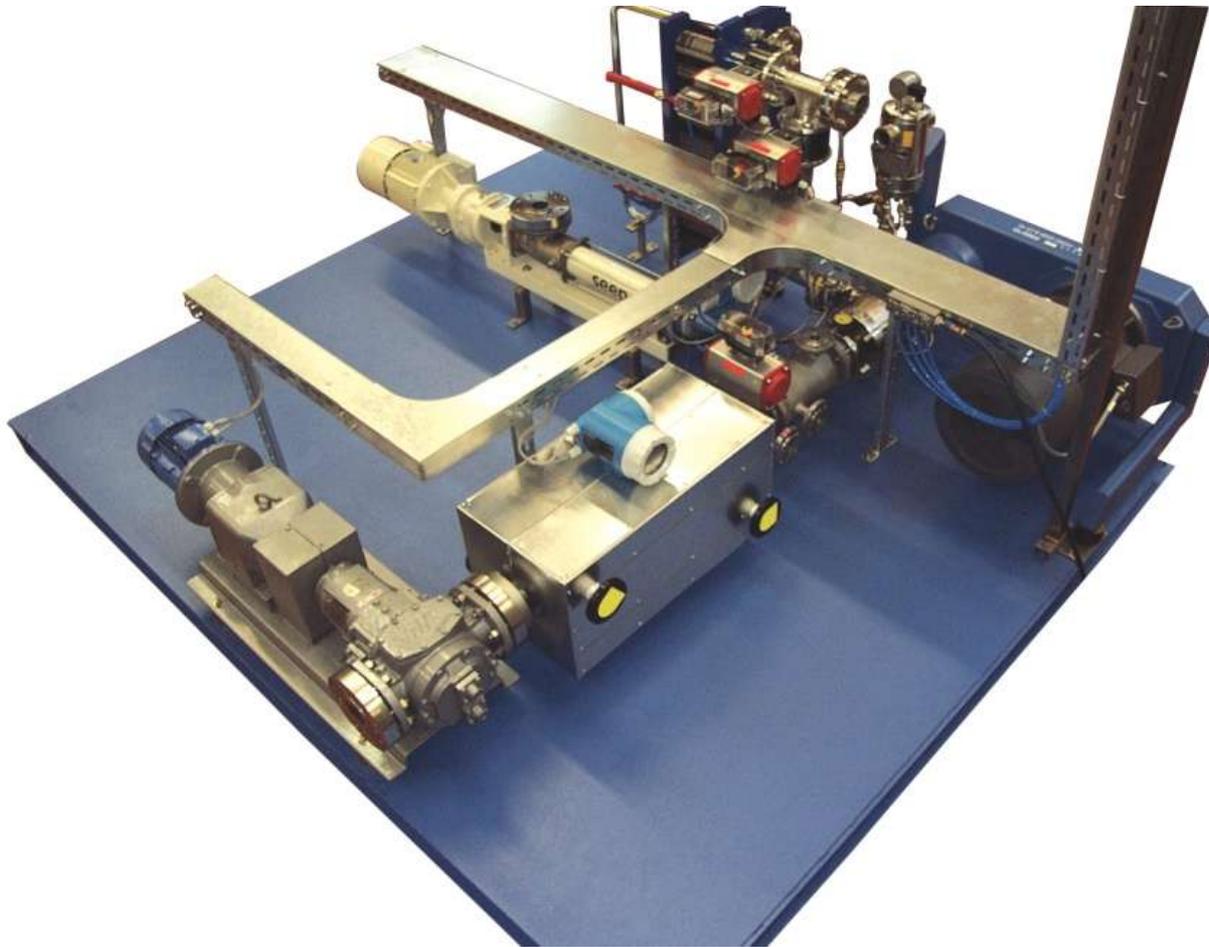


EPB 2500

# Bitumen emulsion plant

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**IKA**®



EPB 7500

## Bitumen emulsion plant

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EPB 7500

## Bitumen emulsion plant

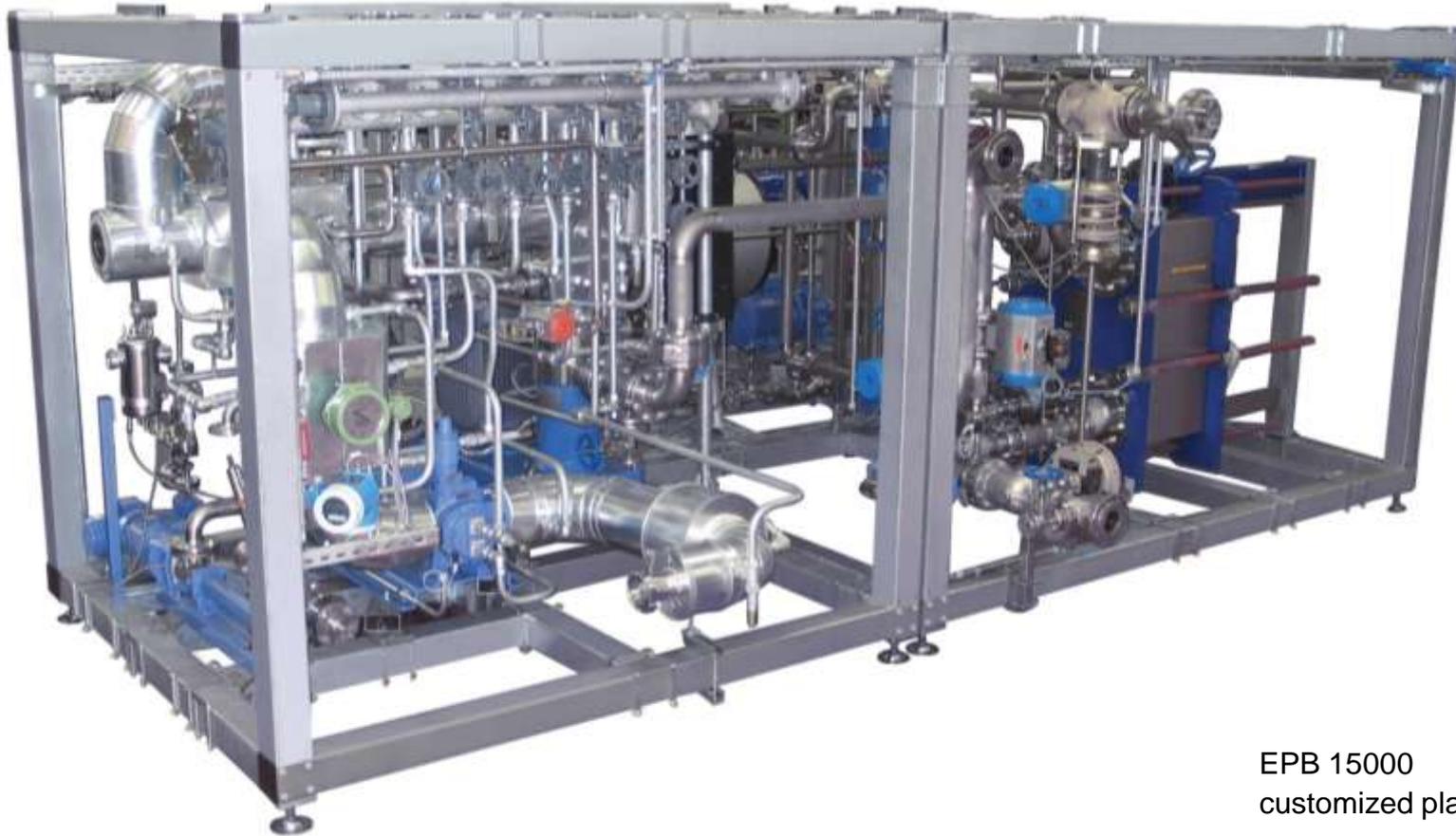
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EPB 15000

## Bitumen emulsion plant

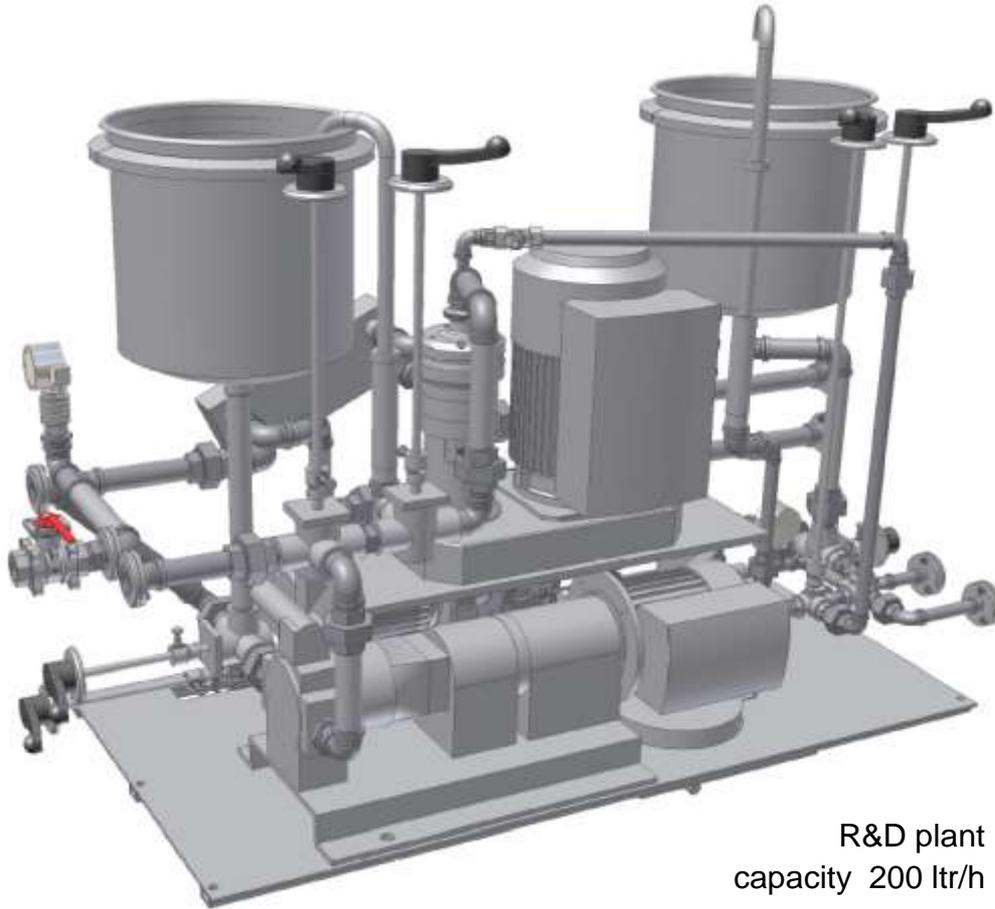
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EPB 15000  
customized plant

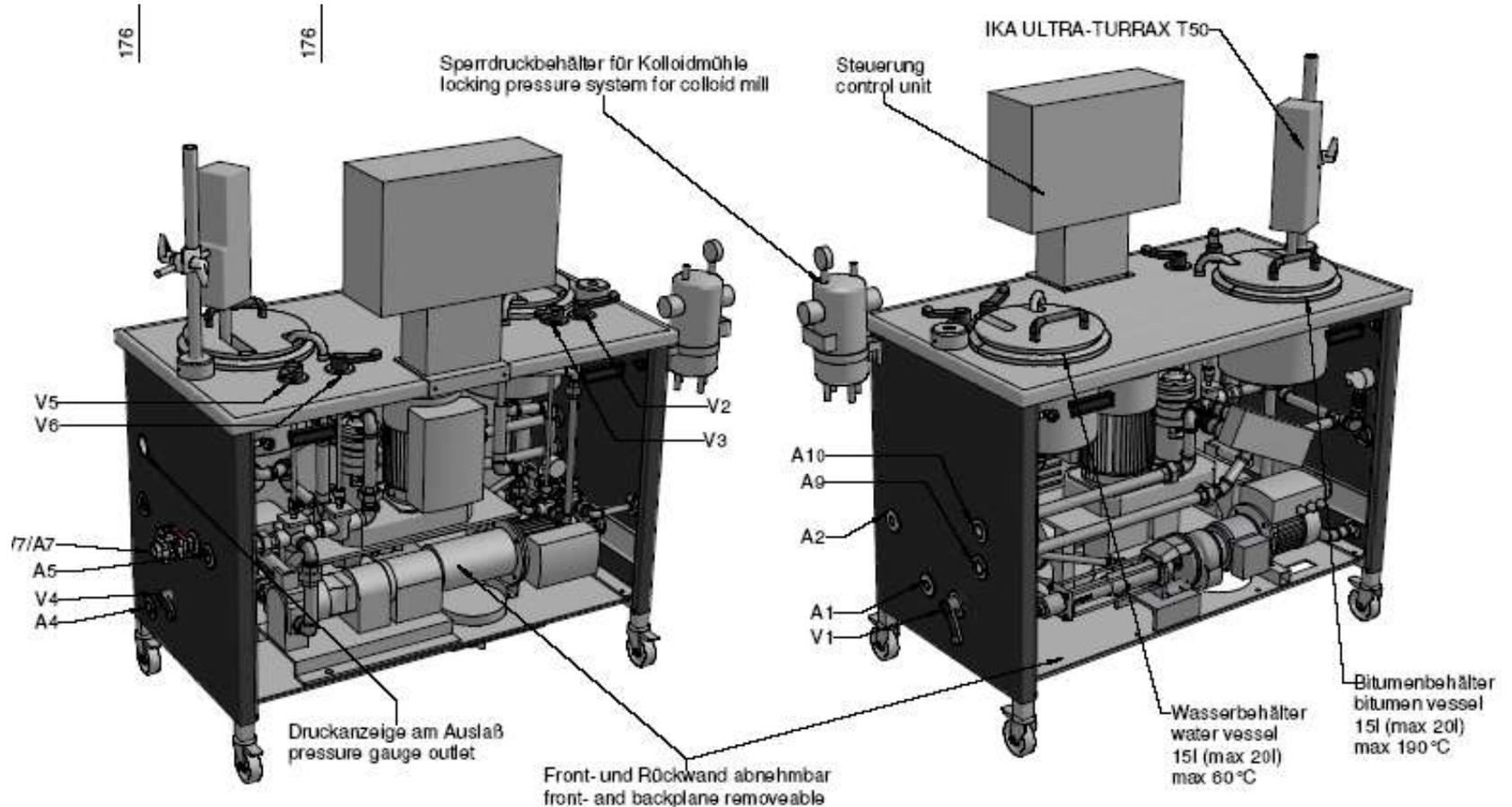
# R&D bitumen emulsion plant

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R&D plant  
capacity 200 ltr/h

# R&D bitumen emulsion plant



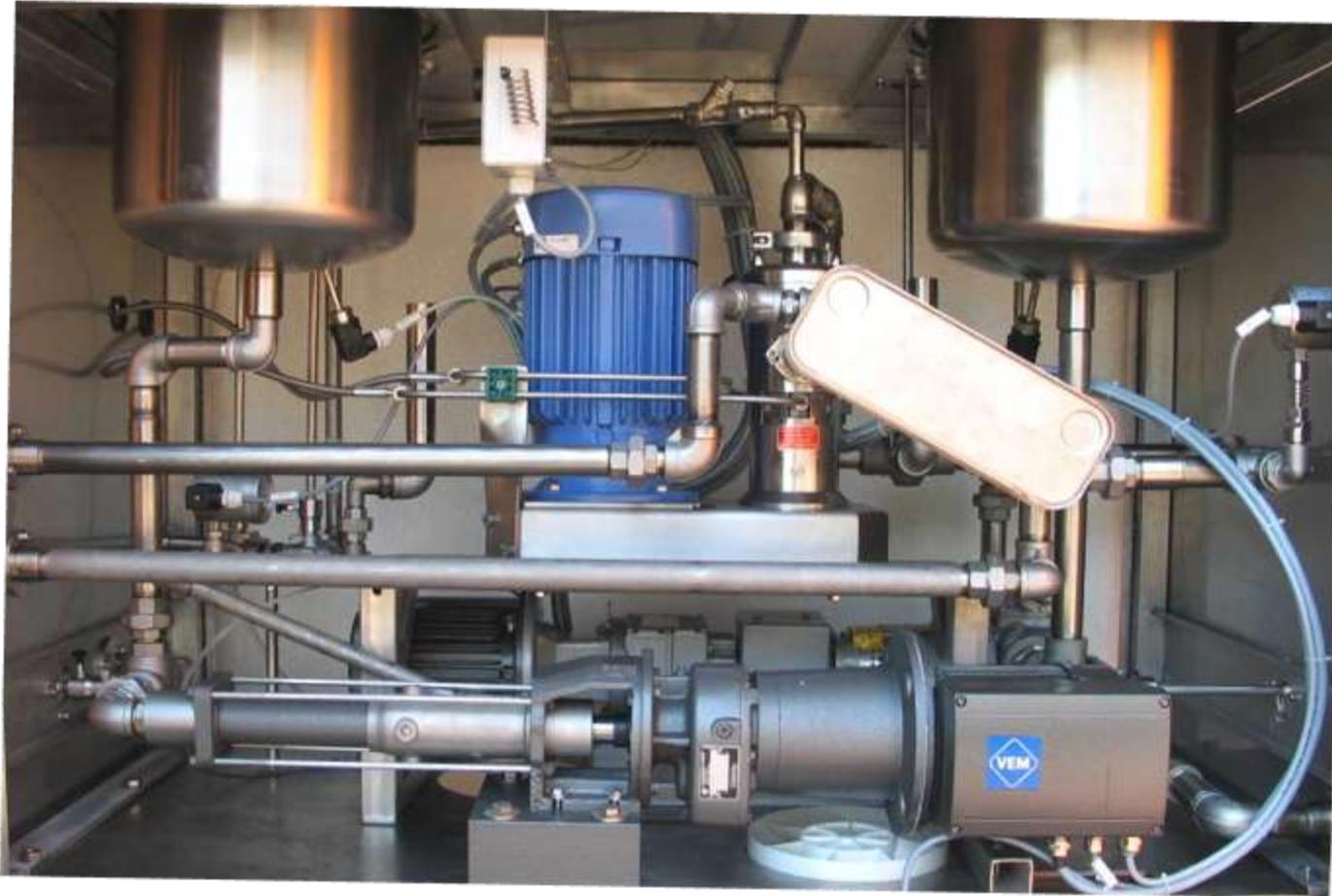
## R&D bitumen emulsion plant

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## R&D bitumen emulsion plant

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# 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