



AML Anlagentechnik GmbH
Dry Mortar Plants

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3. Structure of a dry mortar plant
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5. Mixing technology
6. Performance calculation



Company

Markets

- Germany
- Russia
- Ukraine
- Poland
- Indonesia
- Schwitterland
- UAE

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Certified

AML is certified according to
DIN ISO 9001:2015
by TÜV Rheinland.



Place of jurisdiction: Stendal Local Court HRB 25000



What is Dry Mortar?

Differentiation in 2 Main Product Groups:

1. Sand-Cement Mixtures

- Usage: For indoor and outdoor areas
- Additives (Quartz sand / broken limestone):
Grain size: 0,3 – 8,0 mm
Proportion in mixture: 60 – 80 %
- Bulk density: 1,2 – 1,5 t/m³

2. Gypsum-based dry mortar

- Usage: For indoor areas
- Additives (Quartz sand / broken limestone):
Grain size: mostly < 1 mm
Proportion in mixture: significantly less
- Bulk technology: approx. 1,0 t/m³

**NOTE: Broken limestone/quartz sand have different bulk densities and wear behaviors.
Quartz sand mixtures are frost-resistant (common in cold countries).**



What is Dry Mortar?

Distinction in 2 Main Product Groups:

1. Sand-Cement Mixtures

Additional Raw Materials:

- Limestone / quartz powder
- Hydrated lime
- Marble aggregates
- Fly ash



2. Gypsum-based Dry Mortar

Additional Raw Materials:

- Various gypsum qualities
- Anhydrite
- Hydrated lime
- Limestone / quartz powder
- Marble aggregates



The number of raw materials defines the number of silos.

What is Dry Mortar?

→ Both Product Groups – Chemical Additives

- Only a small amount up to 5%
- Property improvement or customisation
- For better production, processing, and storage



Special Features of Gypsum-based Dry Mortar:

- Very small amount of additives
 - longer mixing time
- Usually larger mixer to keep the very small quantities manageable

- Quartz sand
- Limestone

- Production of dry construction materials

- Bags, Big Bags, and trucks

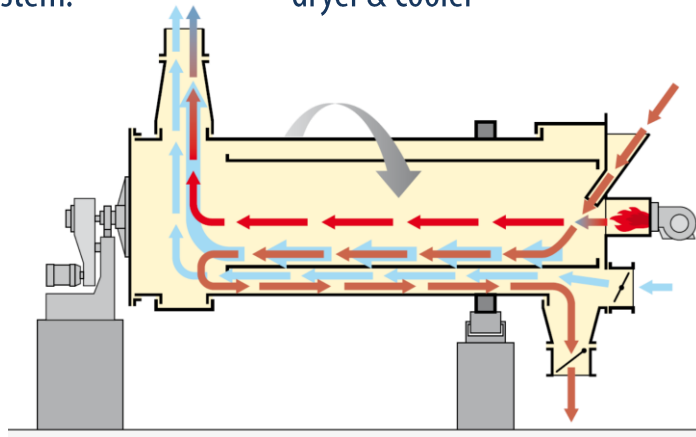
Processing of Quartz Sand

1. Drying & Cooling

Input moisture: 6%
 Output moisture: < 0,5 %
 preferably < 0,3%
 → Sieveability of the sand
 → Durability of the mortar (does not bind in the bag)

2 different systems: drum or fluid-bed dryers

Dual system: dryer & cooler



Output temperature: < 65°C
 → Additives lose their properties at high temperatures



Processing of Quartz Sand

2. Classification / screening of quartz sand

- Typical fractions in the dry construction materials industry:

0,00 – 0,31 mm

0,31 – 0,63 mm

0,63 – 1,20 mm

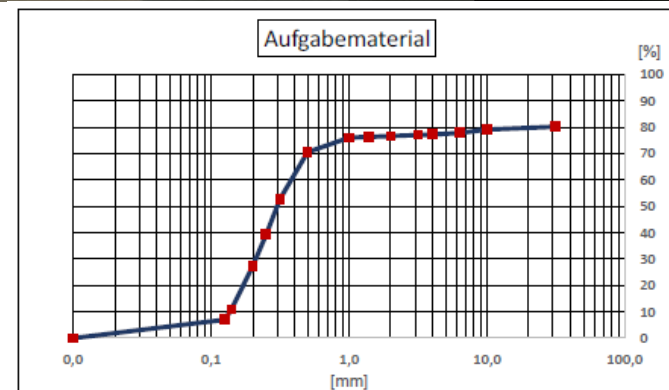
1,20 – 2,50 mm

2,50 – 4,00 mm

4,00 – 8,00 mm

- Installation of screening machines on a concrete foundation

Rückstand			Durchgang (gesamt)	
Sieb [mm]	Masse [g]	Anteil [%]	Sieb [mm]	Anteil [%]
31,5	147,8	19,83	31,5	80,17
10,0	7,85	1,05	10,0	79,12
6,3	9,35	1,25	6,3	77,87
4,0	4,66	0,63	4,0	77,24
3,15	1,53	0,21	3,2	77,03
2,0	2,9	0,39	2,0	76,65
1,4	2,05	0,28	1,4	76,37
1	2,58	0,35	1,0	76,02
0,5	41	5,50	0,5	70,52
0,315	132,32	17,75	0,315	52,77
0,250	99,73	13,38	0,250	39,39
0,200	90,1	12,09	0,200	27,31
0,140	121,6	16,31	0,140	10,99
0,125	29,43	3,95	0,125	7,05
0	52,53	7,05	0	0,00
total	745,43	100,00		



Processing of Limestone

1. Crushing of limestone

The process is defined according to the size of the input grain:

< 60 mm: single-stage crushing process

60 – 200 mm: two-stage crushing process



1st stage: Impact mill



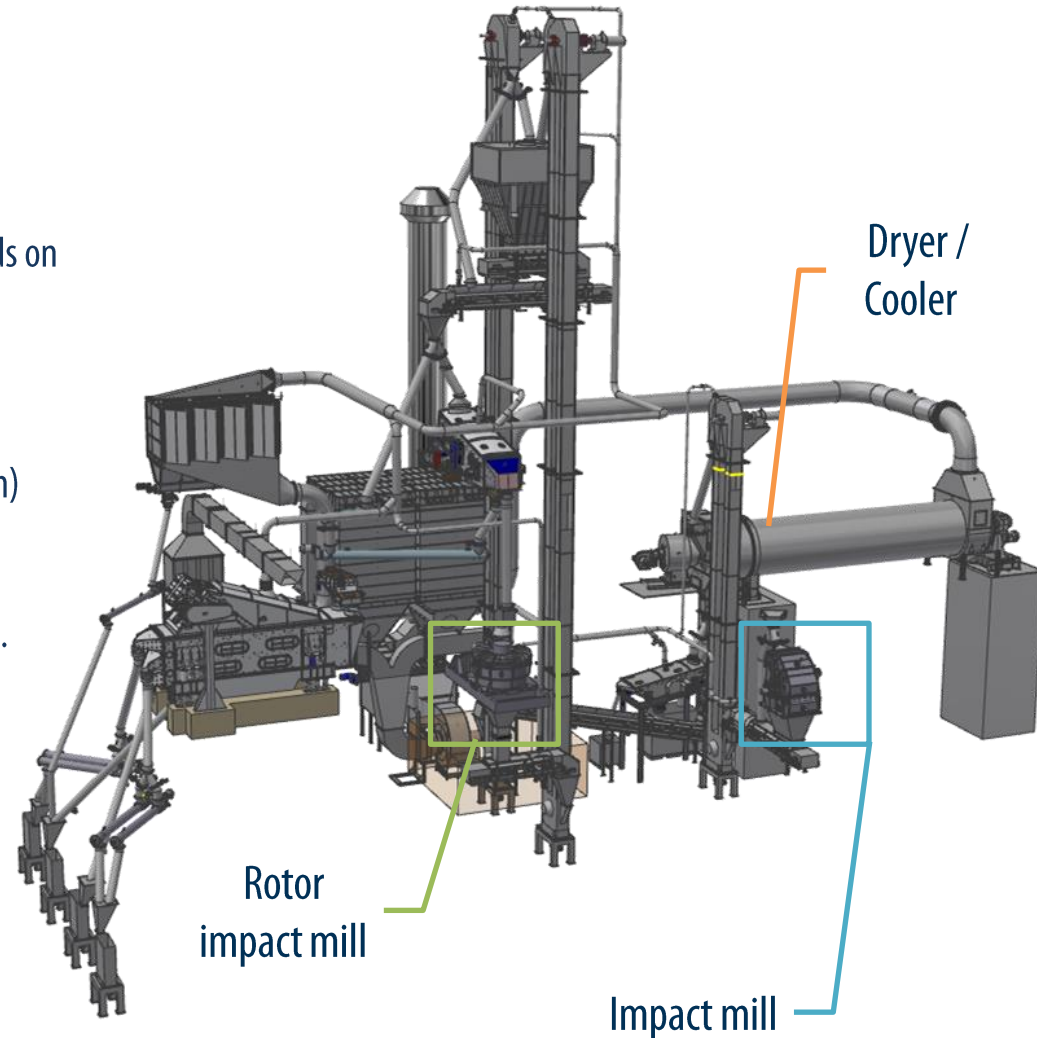
2st stage: Rotor impact mill



Processing of Limestone

2. Drying / Cooling of Limestone

- Processes similar to those for quartz sand
- But when drying takes place in the process depends on the material
- With inner moisture in the limestone:
 1. rotor impact mill (fine grain production)
 2. drying & cooling
- With only surface moisture (with grain size up to max. 60mm):
 1. drying & cooling
 2. rotor impact mill



Processing of Limestone

1. Classification / screening

- Fractions as for quartz sand

0,00 – 0,31 mm

0,31 – 0,63 mm

0,63 – 1,20 mm

1,20 – 2,50 mm

2,50 – 4,00 mm

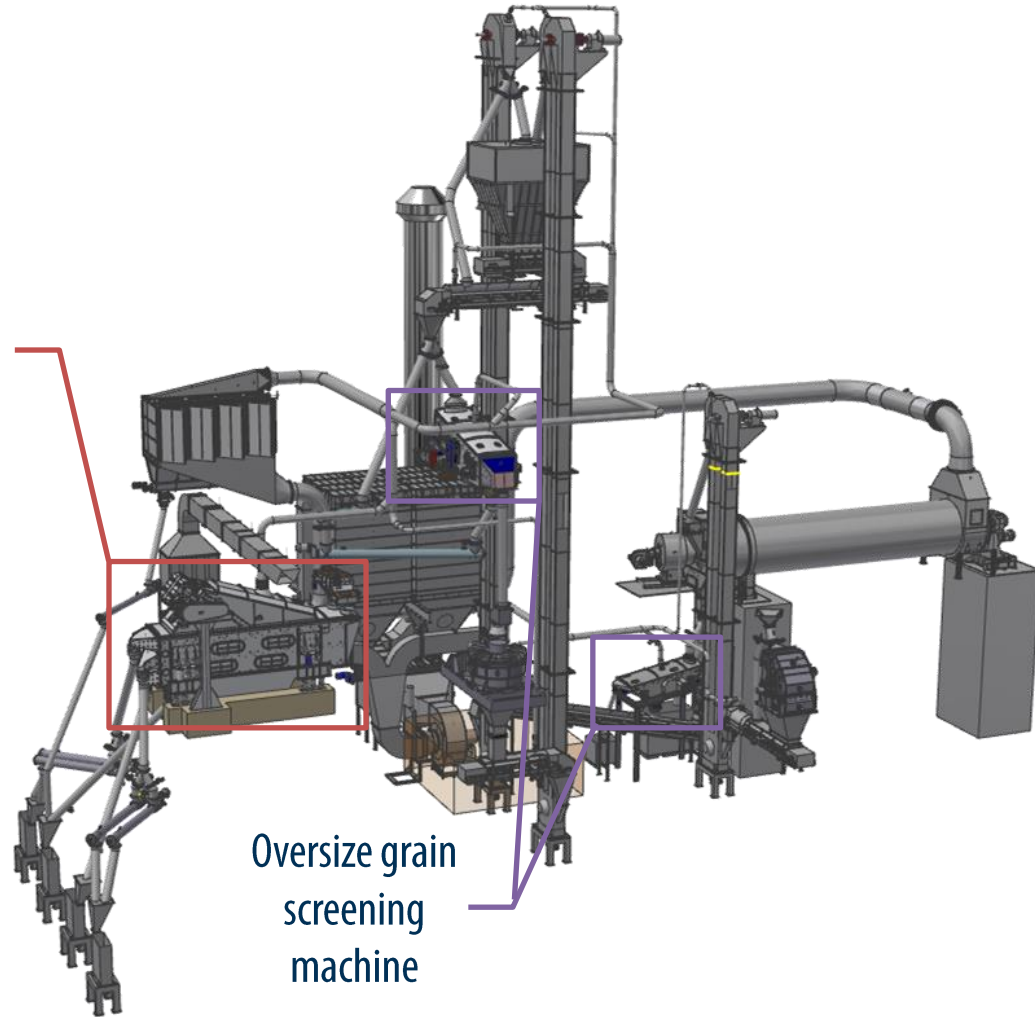
4,00 – 8,00 mm

- According to the screening machine manufacturer, the smallest separating cuts at 0,2 mm can be made on vibrating machines

- An air system (air classifier) is necessary for finer fractions



Screening machine



Oversize grain screening machine

Processing of Aggregates

- Aggregate processing can also be outsourced to the supplier
→ Delivery of the dry fractions

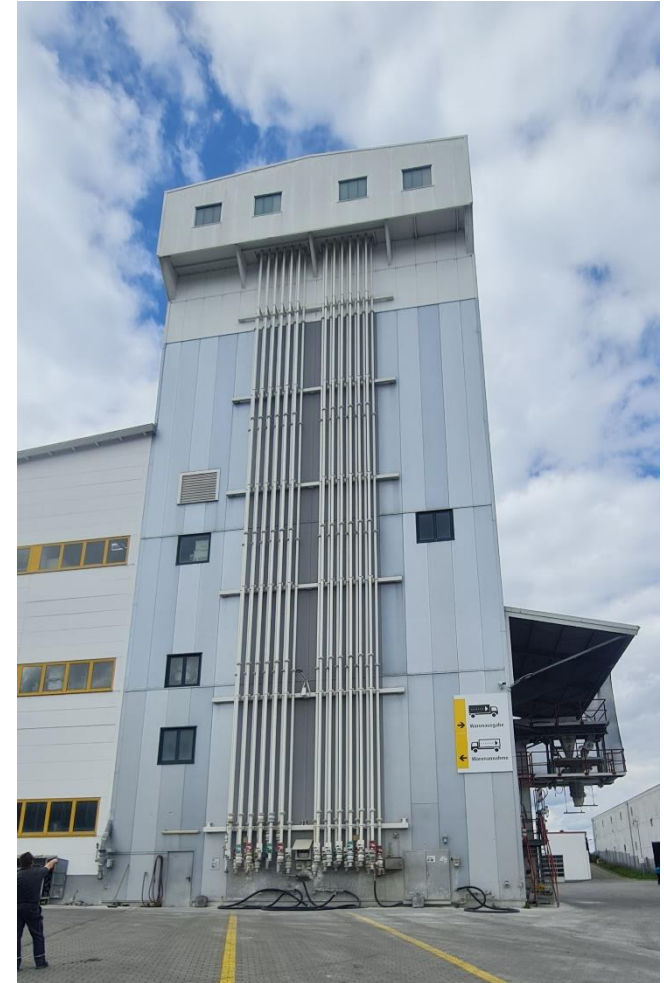
- Sand drying process is very energy-intensive

Practical tip: Always cover the raw sand / limestone storage area

→ Pre-drying of the material → Initial moisture decreases

ATTENTION:

Investment costs for the processing of aggregates represent a significant cost factor.



/// Mixing Plants

4 Plant Types:

1. Small plant / Container

Plant capacity: 10 – 15 t/h

2. Horizontal plant

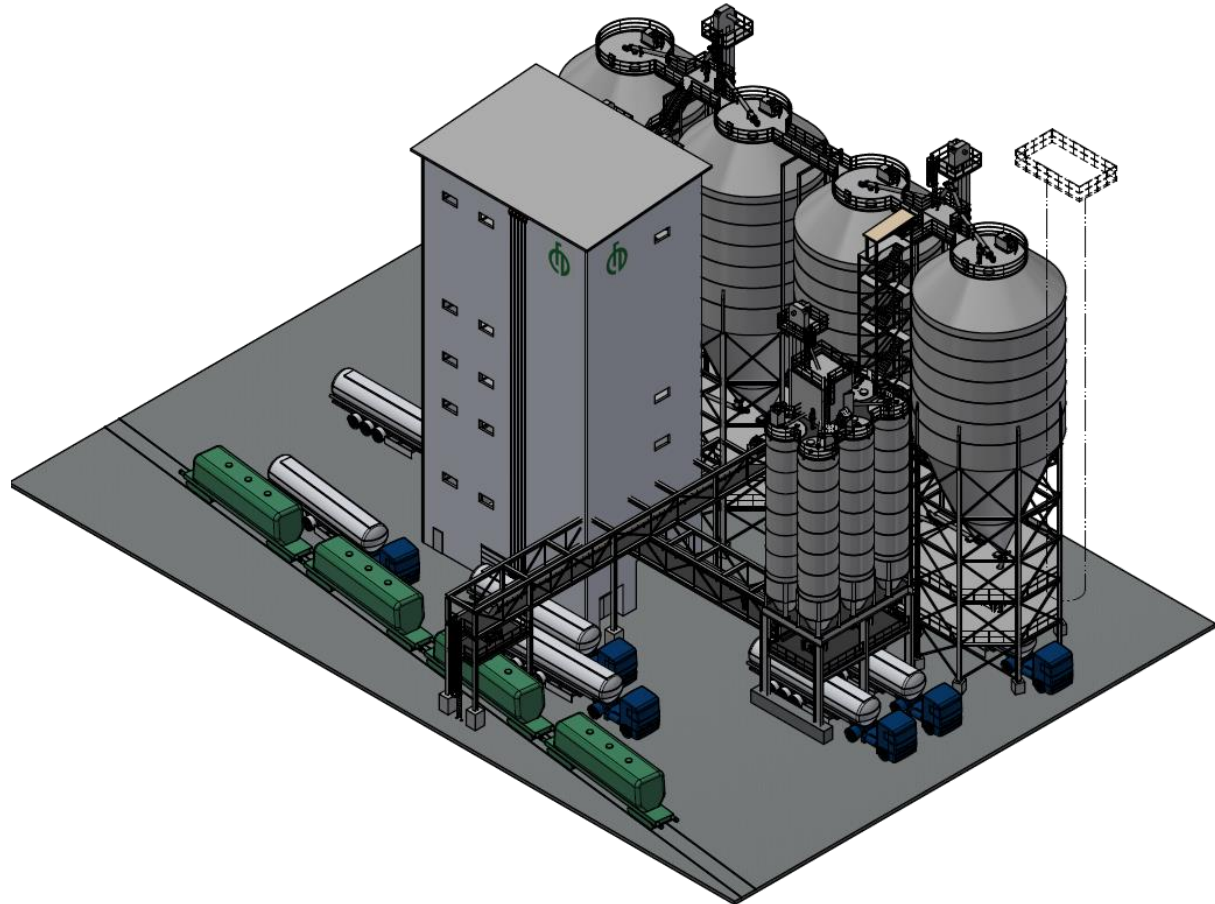
in case of height limitation

3. Mixing tower

For high plant capacities

4. Special solutions

Dry mortar plant in a „warehouse“



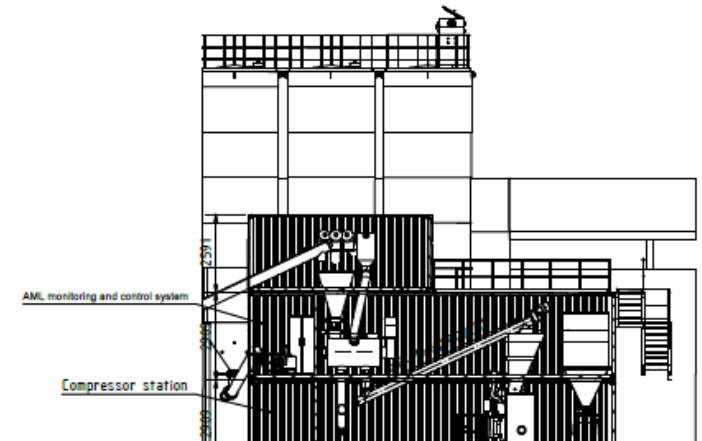
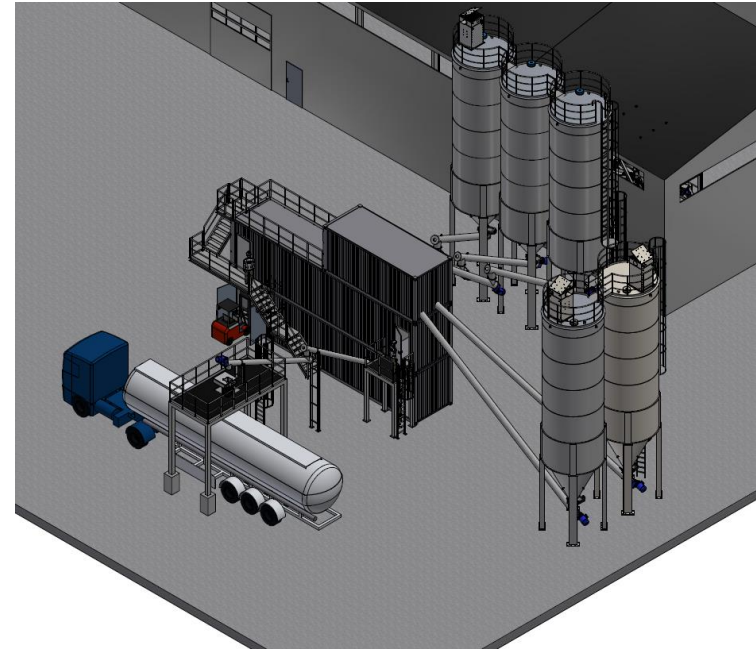
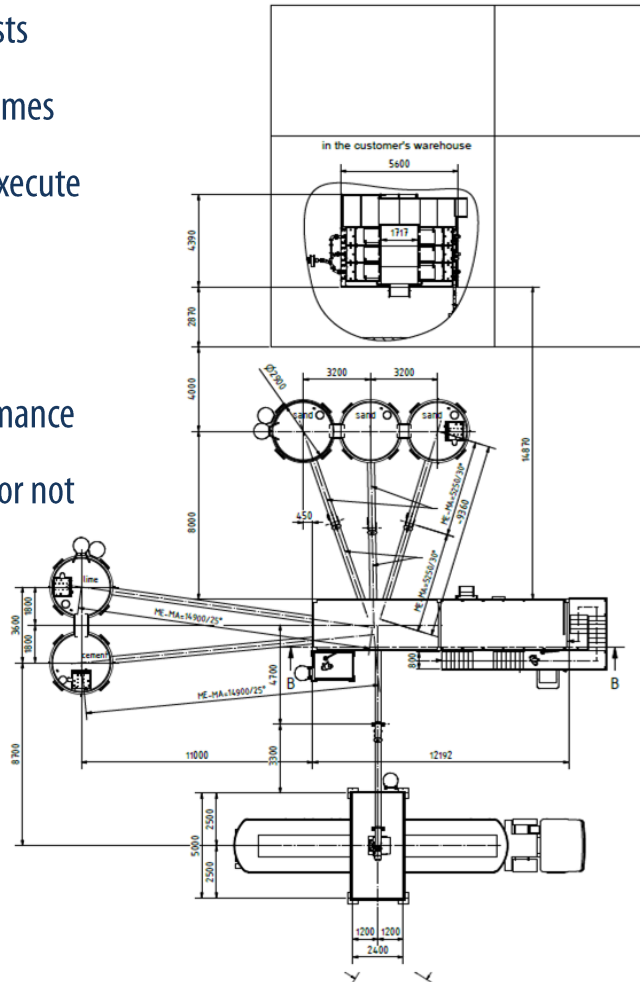
Container Plant

Advantages:

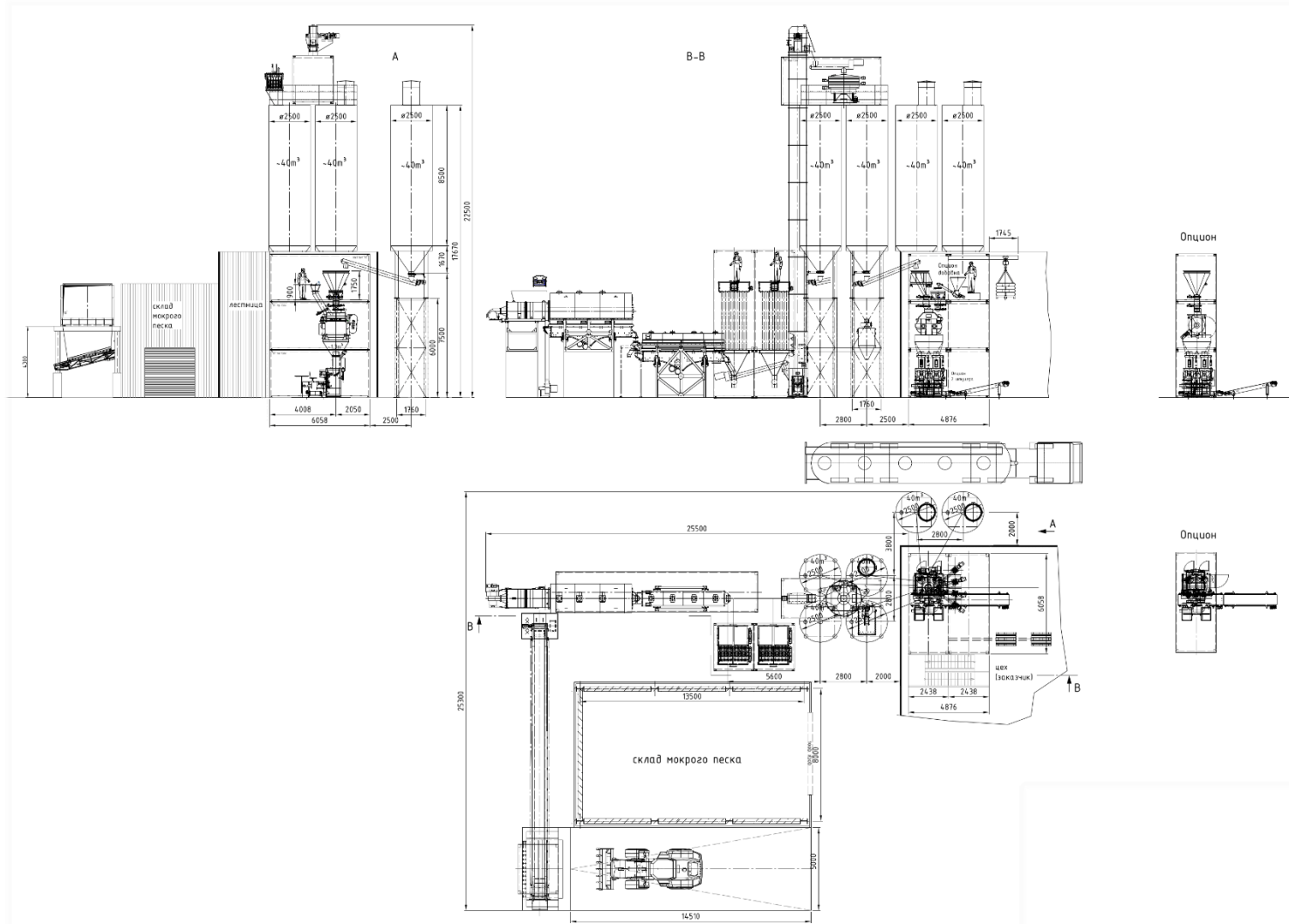
- Low investment costs
- Short installation times
- Relatively easy to execute

Disadvantages:

- Low system performance
- Poorly expandable or not expandable at all



Container Plant



Horizontal Plant

Advantages:

- Lower investment costs than mixing tower
- Lower construction height

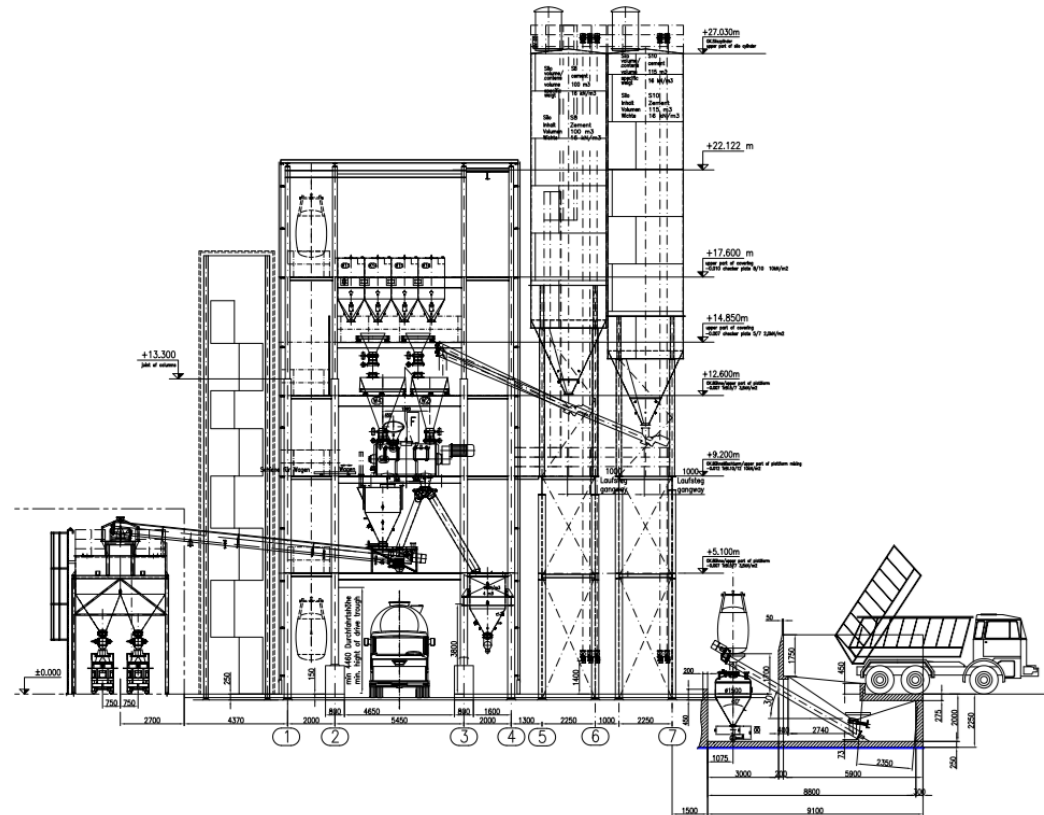
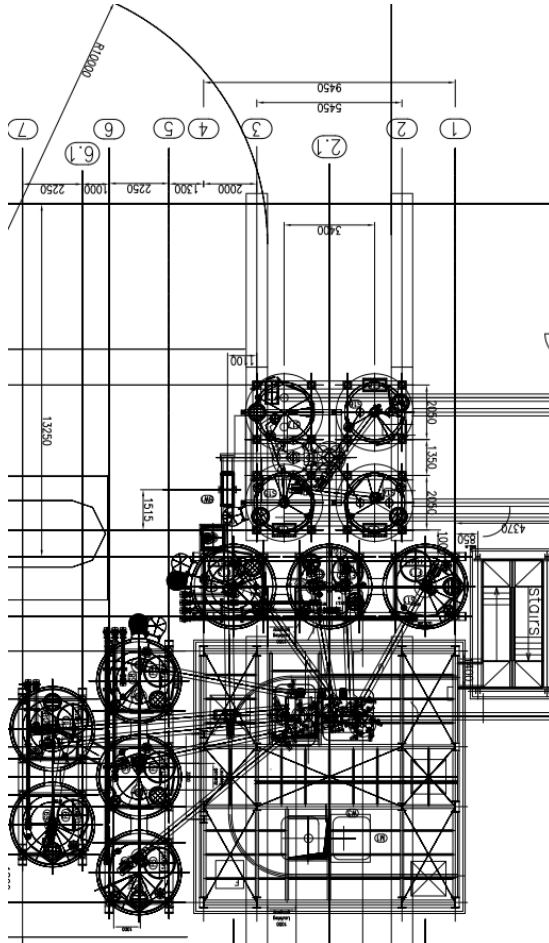
Disadvantages:

- Higher energy consumption
- Higher wear and tear on conveyor equipment



Horizontal Plant

Reduced height: 25 - 30m



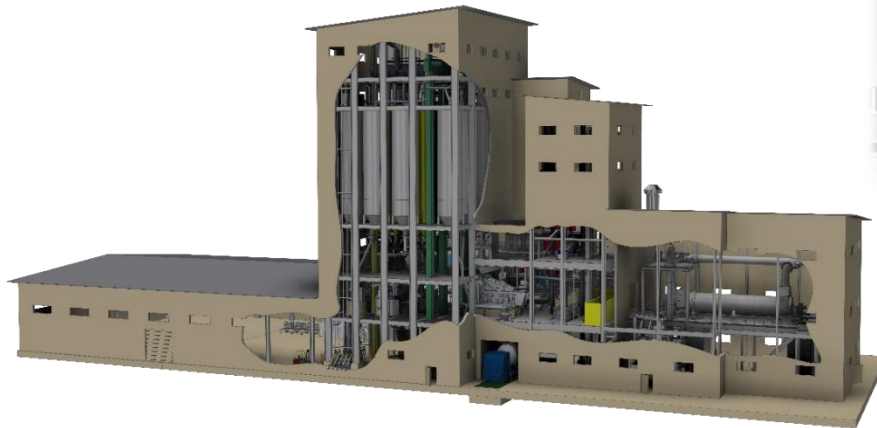
/// Mixing tower

Advantages:

- Energy-optimized
- High to very high plant performance
- Many options for expansion / extension

Disadvantages:

- High investment costs, especially for steel construction / foundations:



Special Solutions

Dry Mortar Plant in a „Warehouse“



Client: Rethmisch GmbH,
Möllenhausen / Germany

Projekt scope:

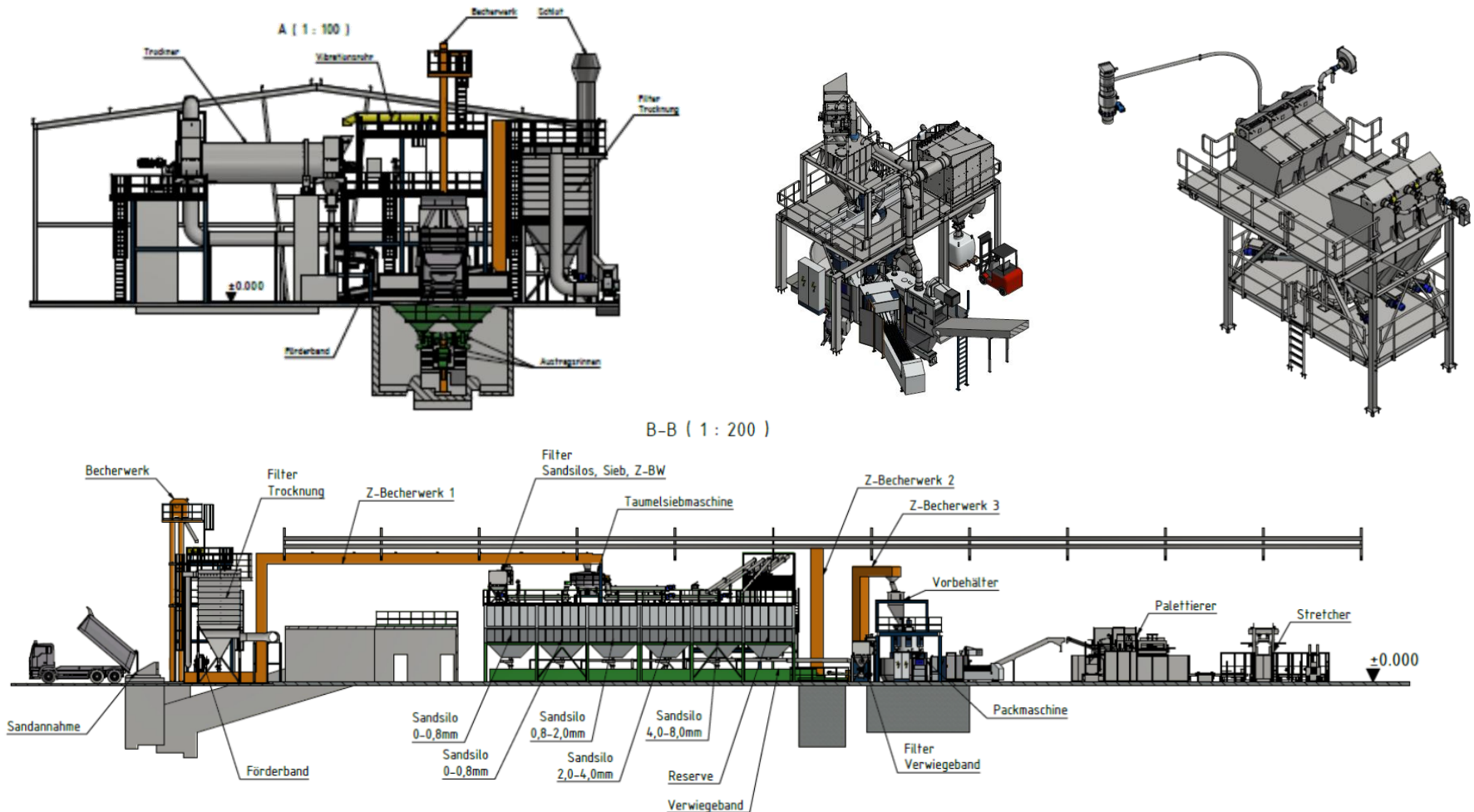
Modification of an existing concrete batching plant to a dry mortar plant with a capacity of 30t/h

Fertigstellung: Juli 2021



Special Solutions

Dry Mortar Plant in a „Warehouse“



Special Solutions

Dry Mortar Plant in a Warehouse

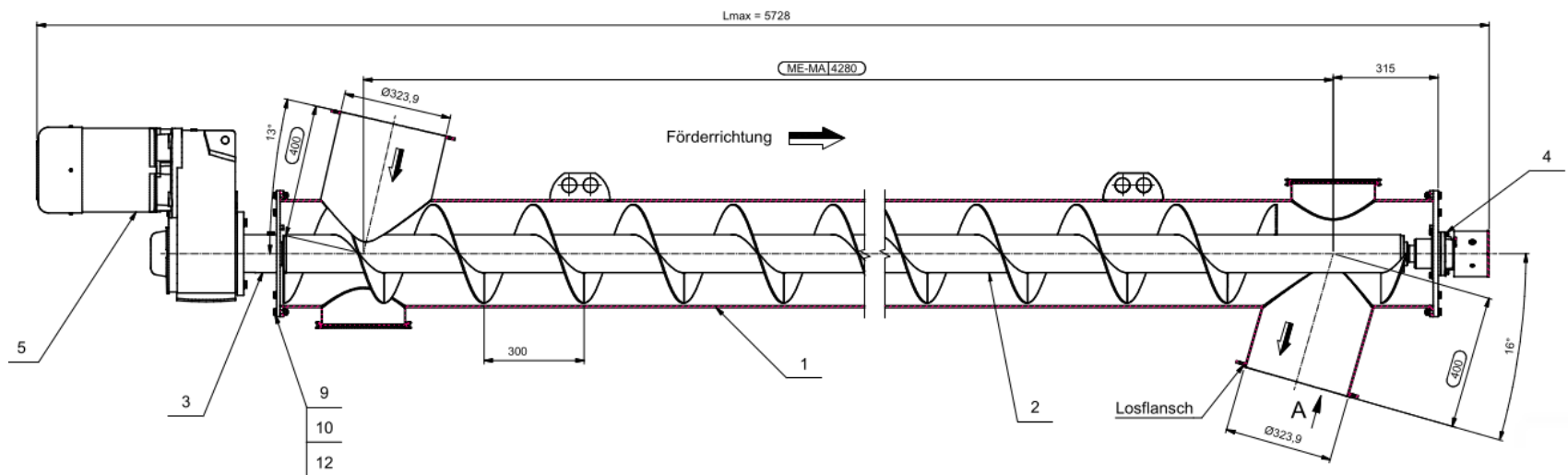




Conveying technology in dry mortar plants

Tubular screw conveyors:

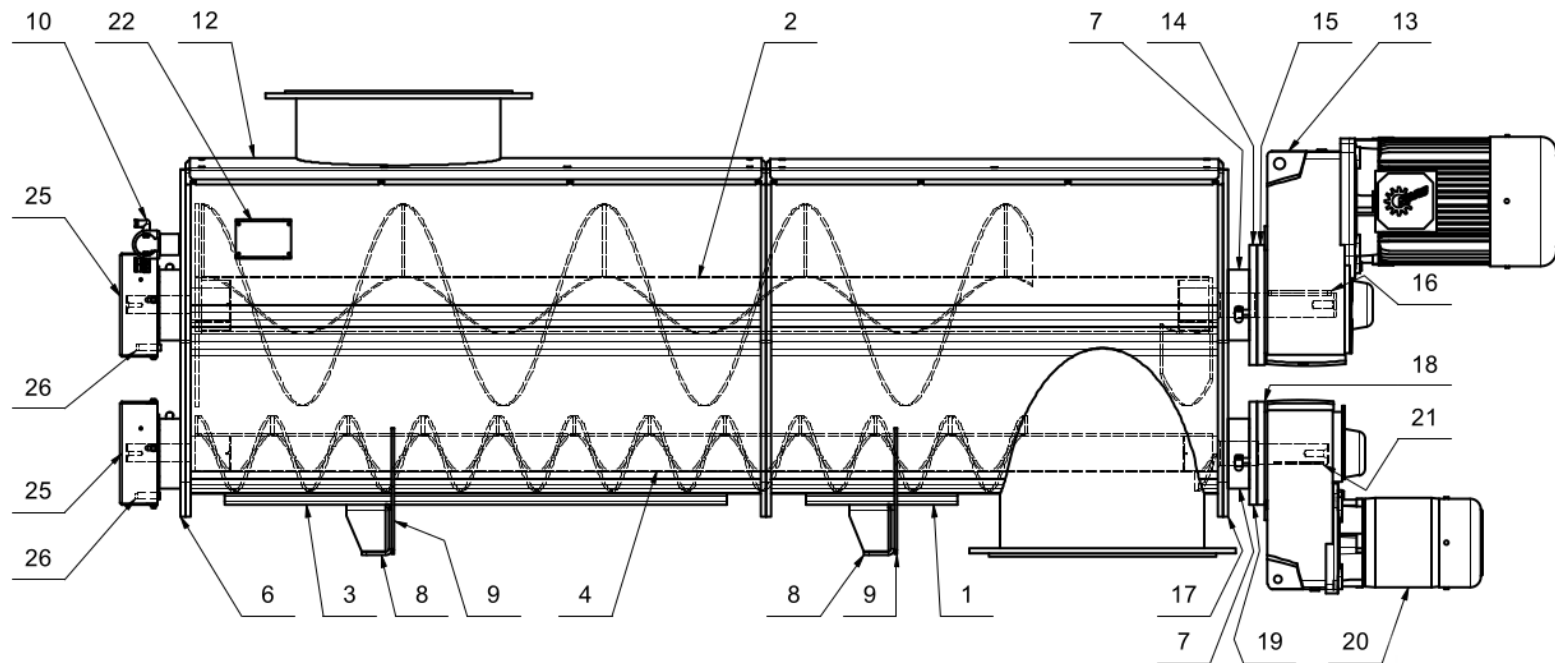
- Raw materials
- Not suitable for frequent material changes – Cleaning
- No complete emptying
- No dust generation





Conveying technology in dry mortar plants

Tubular screw conveyors with cleaning helix





Conveying technology in dry mortar plants

Rotary Valves

- Metered discharge from containers
- End of filter systems

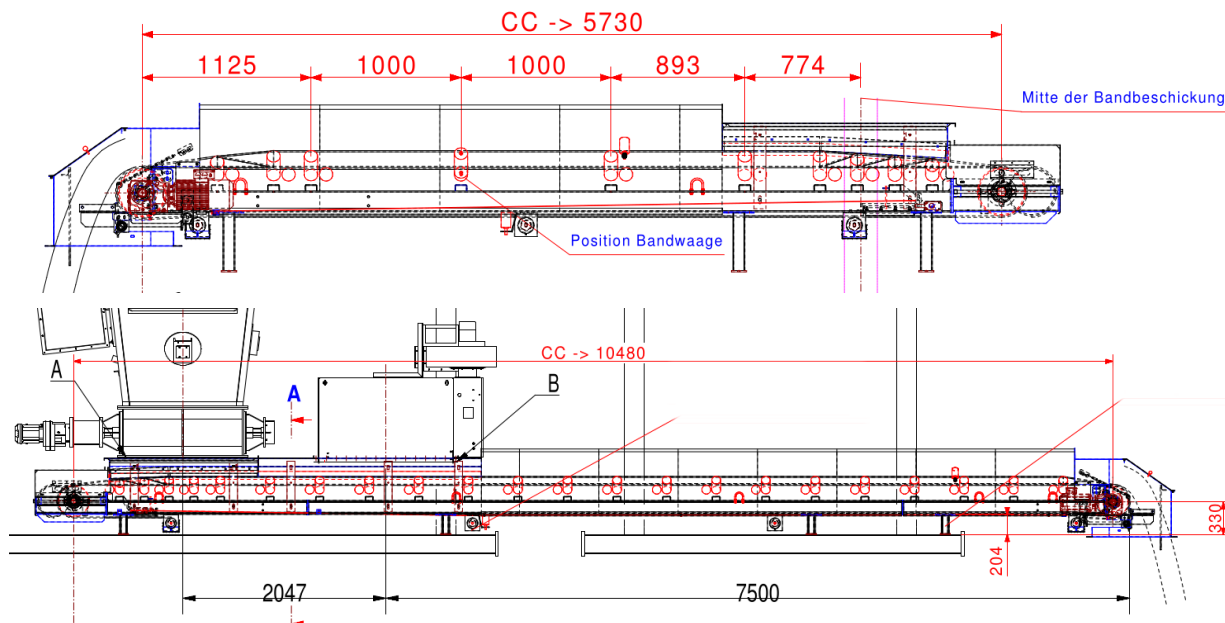




Conveying technology in dry mortar plants

Conveyor belt

- Dusts heavily – dust removal from product feed and discharge
- Not 100% sealed
- Preferable for wet sands
- Choose a small roller spacing for dry mortar transport → otherwise, segregation (demixing)

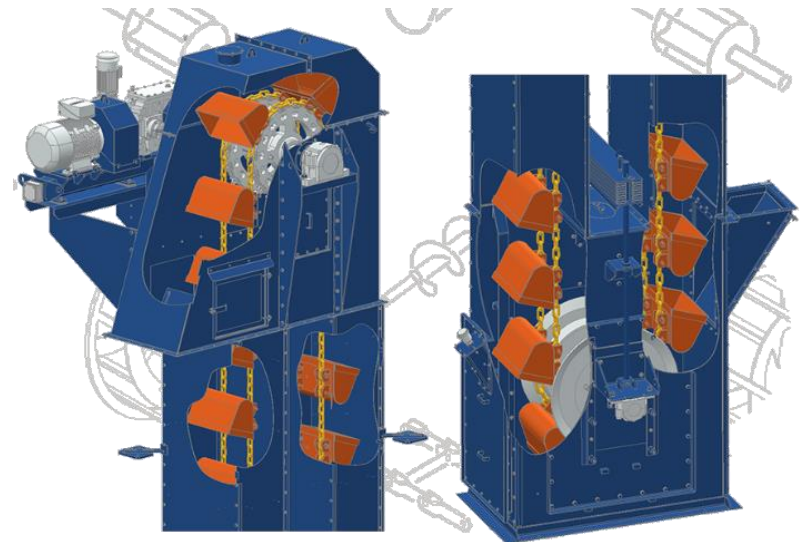
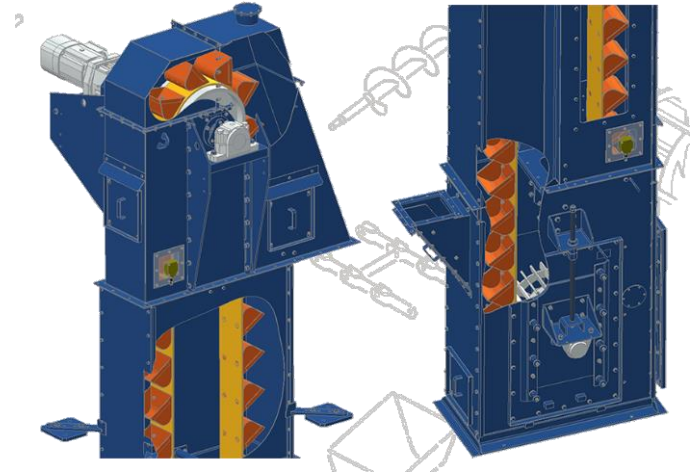
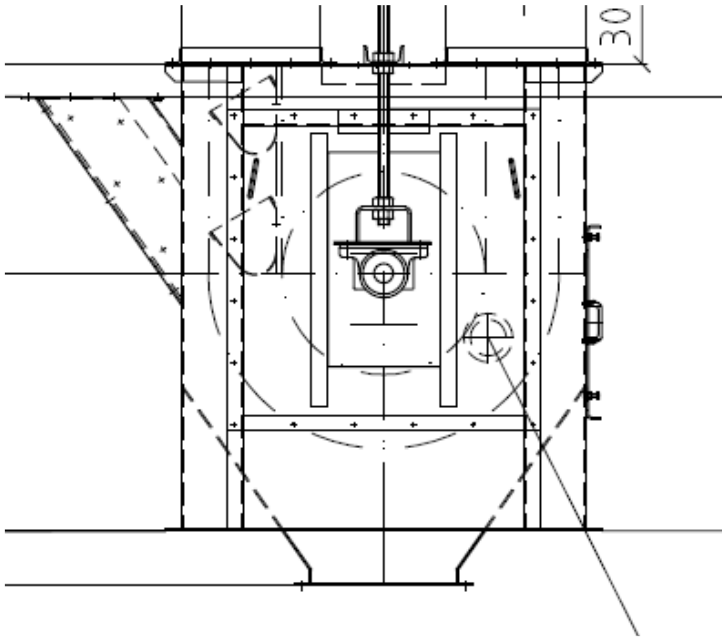




Conveying technology in dry mortar plants

Bucket elevators

- Not for different grain sizes (if possible)
- Cleaning the sump is usually difficult



/// Mixer types

Single-shaft mixer



Twin-shaft mixer

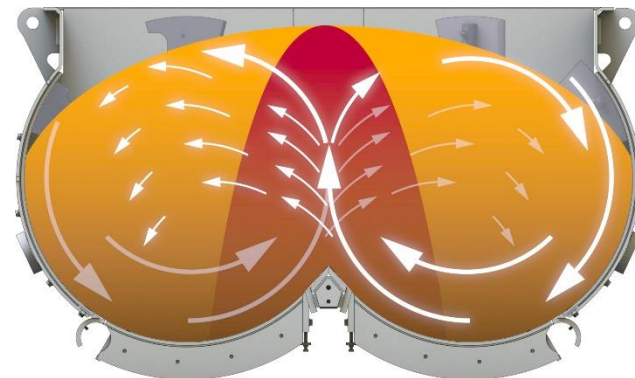
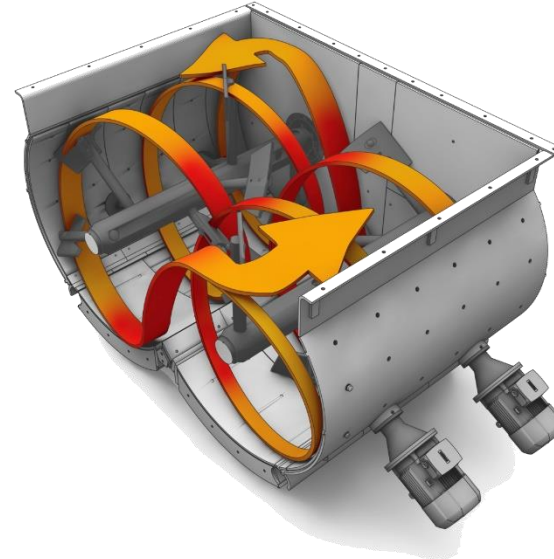


/// Mixer types

Single-shaft mixer



Twin-shaft mixer



Mixer types

Single shaft-mixer

Advantages:

- Common mixing principle → Wide range of sizes
- Small sizes also available
- Lower investment for small sizes
- Various discharge systems:
 - Spout discharger
 - Fast discharger
 - Residue free discharger

Disadvantages:

- High rotation speed
- Increased material destruction
- Vibrating

Twin-shaft mixer

Advantages:

- Robust design as standard
- Low rotation speed
- Low introduction of vibrations into the steel structure
- No destruction of "soft" raw materials (e.g., perlite, marble aggregates)
- Good price/performance ratio for large mixer volumes
- Short mixing times due to square shape

Disadvantages:

- No spout discharge possible
- Only one German supplier
- No small sizes available

■ ■ ■ Packaging of final products

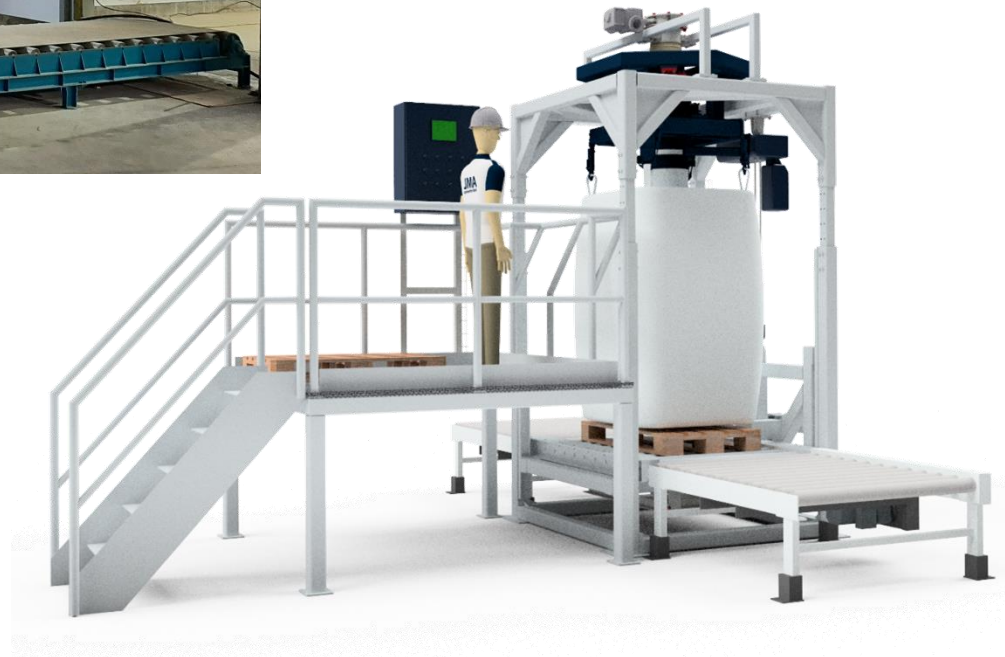
Packing machines

Please contact a colleague from Haver & Boecker!



/// Packaging of final products

Big-Bag-Filling

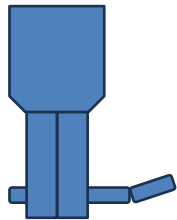


/// Packaging of final products

Bulk-Loading

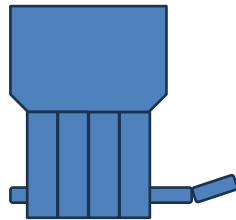


Dry mortar plant according to packer size



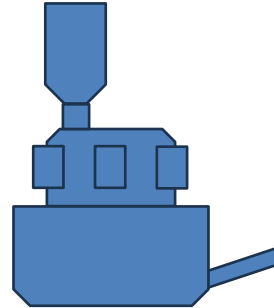
1/2 spout PM
6 / 12 t/h

Container or mini
Dry mortar plant



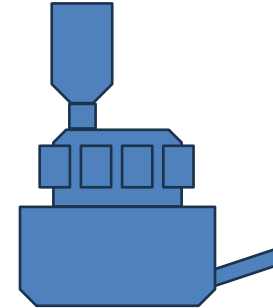
4 spout PM
25 t/h

Row Dry mortar
plant



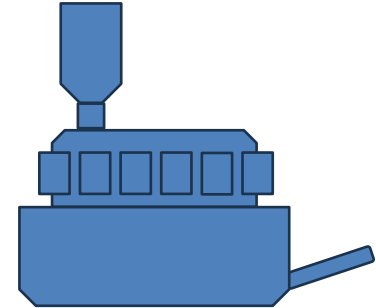
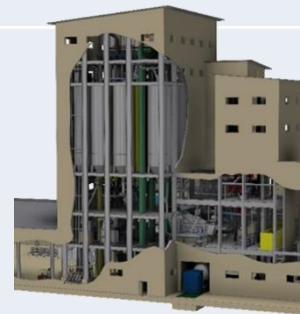
6 spout PM
40 t/h

Row or Mixing
tower Dry mortar
plant



8/10 spout PM
55 / 70 t/h

Mixing tower
Dry mortar plant



12 spout PM
85 t/h

Mixing tower
Dry mortar plant





Thank you for your attention