I BAU HAMBURG

Your efficient partner for modern and effective bulk material handling

PLANT DESIGN - ENGINEERING - EPC-CONTRACTING

CEMENT - THERMAL POWER - MINERALS

Central Cone Silos

Single silos.
Ring silos.
Multicompart-
ment silos.
From 2 to
22 chambers,
diameters:
14 to 27 m.

EPC-Contracting

Piling.
Civil works.
Steel structure,
supply/erection.
Electrical/
mechanical
supply and
erection.

Marine Cement Terminals

Floating
terminals.
Mini terminals.
Silo systems.
Dome systems.
Flat storage
terminals.

Silo Conversions

Economic
modifications
with advanced
cutting-edge
technology.

Cement Carriers

Advanced
technology for
self-discharging
Cement Carriers
including the
Midship tunnel.

Components

The key for
a well
functioning plant:
Components,
all made
to measure.

Ship Unloaders

Stationary or
mobile types:
From the
5,000 class
up to the
60,000 class.

Spare Parts

High stock
availability:
Just-in-time
supply
of spare parts.
After-sales
Service.

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H/05/17/Dry Product Handling

I BAU HAMBURG

IBAU HAMBURG

Dry Product Handling

for flue gas cleaning and ash removal systems in thermal power plants

A HAVER & BOECKER Company

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Limestone and fly ash storage silos for RWE STKW Westfalen, Germany

Storage and conveying solutions for dry bulk material

IBAU HAMBURG is one of the worldwide leading companies supplying storage and conveying solutions for dry bulk material produced and used in flue gas cleaning systems of thermal power plants.

IBAU HAMBURG not only supplies systems and components for power plants, but also complete customised solutions for handling fly ash, pulverised limestone, quicklime and gypsum.

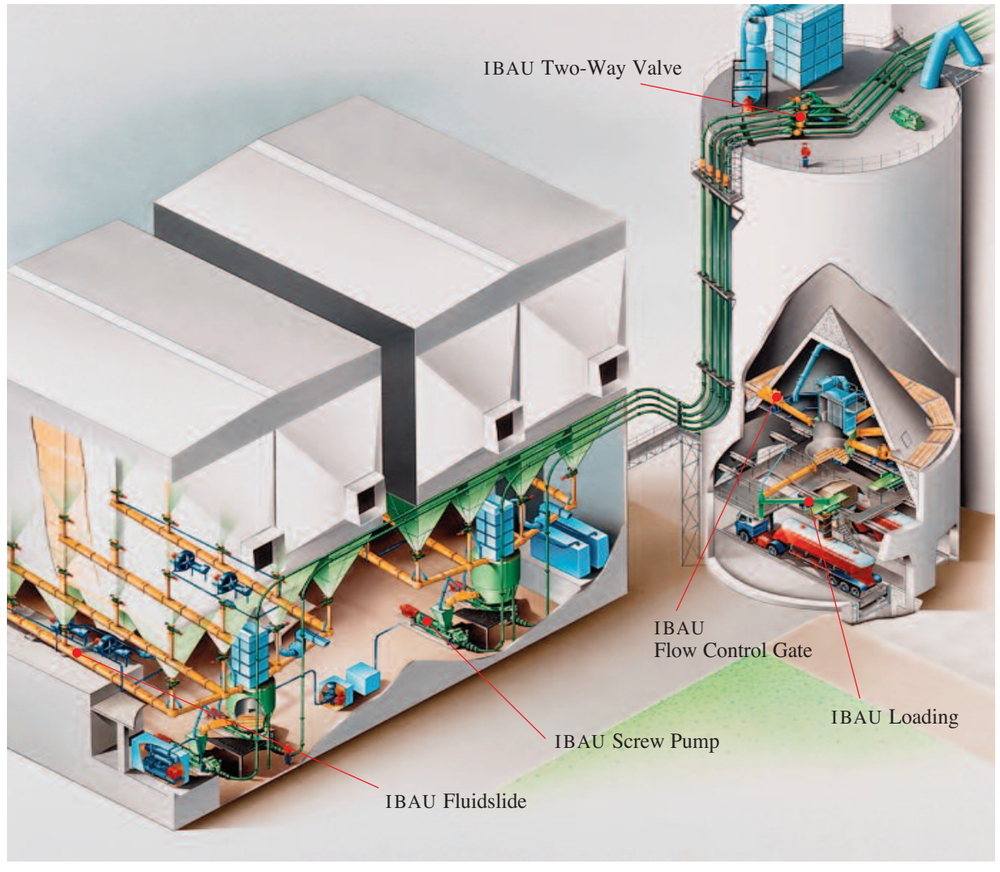
Main IBAU Components

Pneumatic conveying installations:

- Fluidslides
- Pressure vessels
- Screw pumps
- Rotary air locks
- Jet conveyors
- Pneumatic conveying with Fpipe
- Medium pressure conveying systems

Silo, storag, loading technology:

- IBAU Large-storage silos
- Steel silos with aerated bottom
- Bulk loading systems for pressure vessel trucks, rail wagons and ships
- Discharge systems for pressure vessel trucks, rail wagons and ships
- Wet ash loading systems



Fly ash removal system with fluidslides and conveying by IBAU Pumps to an IBAU Storage silo

Fly ash handling for coal-fired Power Plants

The fly ash is separated from the flue gas by ESPs or fabric filters.

IBAU HAMBURG finds the best economical and technical solution for the fly ash removal system, the storage silo system and the loading facilities by taking important layout data into consideration.

Fly ash removal systems:

Depending on the ESP-height and the distance to the storage facility, IBAU HAMBURG is able to choose between several different technical solutions.

Fly ash removal system with fluidslides

The fly ash is fed from each filter hopper by rotary feeders or pendulum flap valves to fluidslides. The fly ash is conveyed by theses fluidslides to an intermediate bin from where the ash is transported pneumatically either by IBAU Pumps or pressure vessels to the storage silo. These systems are very economical thanks to the low energy consumption and also 100% reliable in service.

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Fly ash removal system with multi-pressure vessel system

Under each hopper of the ESP, a pressure vessel is installed picking up the fly ash.

In case the vessel of a group of vessels is full, the group of vessels in one row is emptied simultaneously.

Pressure vessel conveyors:
Pressure vessels function according to the dense-phase flow principle with low conveying velocities of the material. Several vessels are connected to one conveying line. For different conveying quantities different pressure vessels sizes can be combined. The energy consumption is relatively low.

A multi-pessure vessel system is the ideal solution in case of a low height underneath the ESP hoppers and a long conveying distance to the storage silo.

Low material velocities inside the conveying pipe will cause low abrasion.

Pneumatic fly ash conveying system with IBAU Pressure vessels

Pneumatic conveying of FGD-Product by pressure vessels

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Fly ash removal system with IBAU Fpipe

The fly ash is fed from each filter hopper by rotary feeders to the Fpipe. The Fpipe conveys the fly ash either to the storage silo or to an intermediate bin in case there is a greater distance to the silo. The advantage of this system is a low height of the ESP and a low energy consumption.

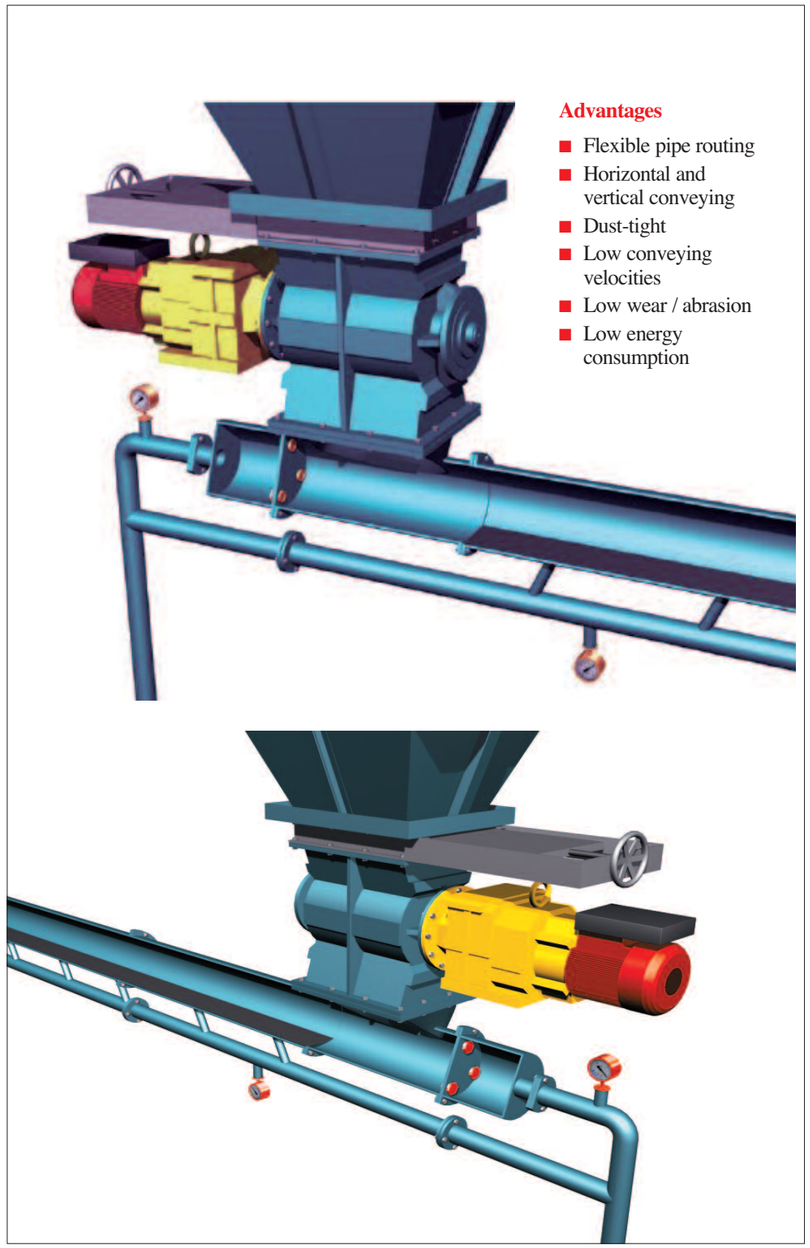
Material transport via IBAU Fpipe

So far, there are mostly two methods set for the pneumatic transport: the energetical favourable fluidslide transport and the flexible pneumatic transport through conveying pipes.

The new Fpipe methods combine the advantages of both conveying systems and eliminate the disadvantages of e.g. the downward fluidslide slope at the fluidslide transport or the relatively high energy consumption for a conventional pneumatic conveying system.

With the Fpipe method, the material is conveyed in a dense flow with conveying speeds of 3-10 m/s. In order to avoid plug forming in the conveying line, the material is fluidised in the conveying line just as it is done in a fluidslide system. The system allows a conveying capacity of up to 400 t/h with an air speed of 3 m/s at the beginning of the conveying line.

The conveying air is being reduced by factor 2 in comparison to a lean-phase conveying as well as the pressure loss in the conveying line and the energy consumption for the conveying.



Advantages

- Flexible pipe routing
- Horizontal and vertical conveying
- Dust-tight
- Low conveying velocities
- Low wear / abrasion
- Low energy consumption

Fpipe Conveying system

IBAU Fpipe for a fly ash removal system of an ESP

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Fly ash storage silos:

Depending on the required storage capacity, IBAU HAMBURG chooses the best technical and economical silo system.

IBAU HAMBURG supplies pneumatic systems for the storage of fly ash, pulverised limestone, burnt lime, hydrated lime and FGD-products at power plants. They function according to the "first-in/first-out" principle.

Lower capacities of up to approx. 2,500 t, usually are stored in steel silos.

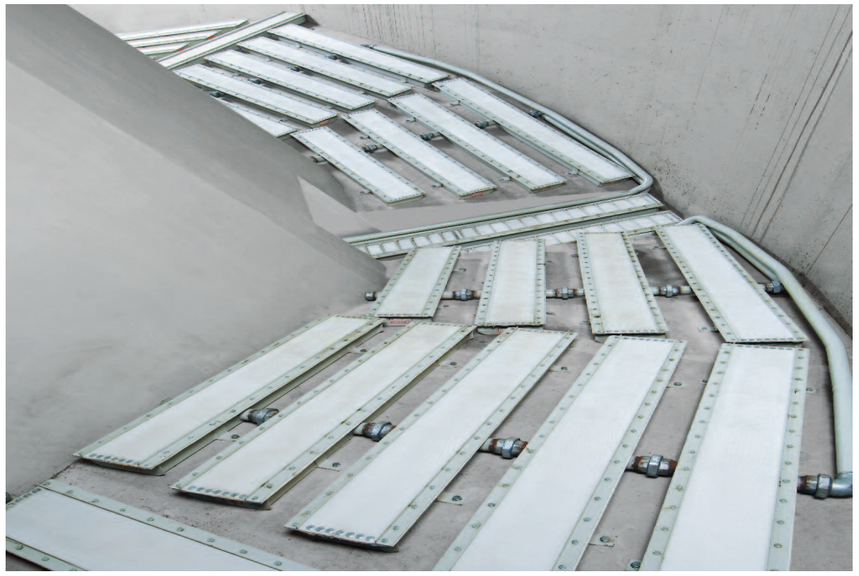
IBAU Central cone silos: These silos have proven their worth time and again and are the industrial standard for storage volumes of up to 30,000 m³.

They are equipped with a pneumatic discharge bottom and provide for metered and maintenance-free material discharge.

The advantages of this silo system are:

- Less concrete works
- Cost and time saving by using prefabricated cone elements
- Less energy consumption
- Emptying rate of up to 99%
- Less maintenance works
- Trouble-free operation

Loading terminal with steel silos



Typical discharge section of an IBAU Silo

IBAU Fly ash storage silo in a coal-fired power plant

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

IBAU storage silos with IBAU Ship loader for fly ash

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Fly ash loading systems:

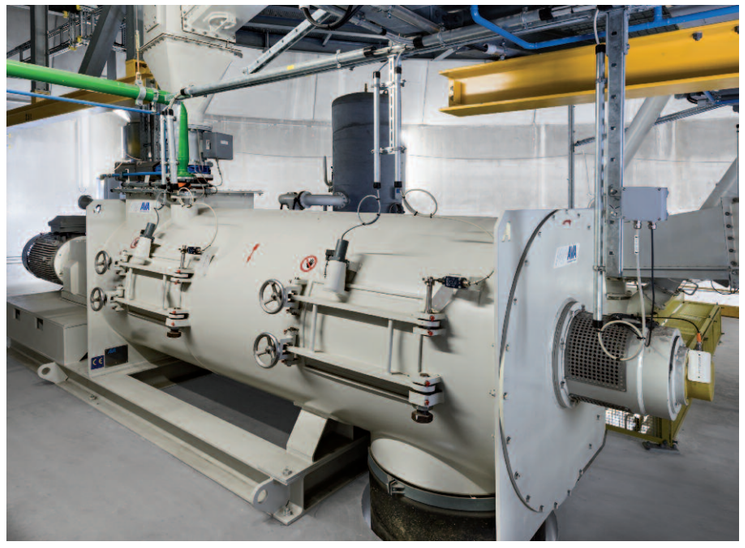
The loading system can be stationary or mobile. IBAU offers a wide variety of fly ash loading systems. The fly ash can be loaded dry into truck vessels, rail waggons or ships.

The wet ash loading system consists of a humidifier and a downstream arranged open type loading chute for dispatching the material onto open trucks, open railway wagons or ships.

IBAU has delivered such loading systems for Gemeinschaftskraftwerk Mannheim, RWE, E.ON, Austrian Energy and many other customers in the Power Plant Industry.

These loading systems allow the Power Plant customers to distribute the fly ash to further markets and to reduce the deposit of a valuable by-product.

Mobile truck loading system for dry fly ash



Humidifier for a wet ash loading system

Ship loading system for dry fly ash

Combined dry ash and movable wet ash loading system

Ship loading systems

Bulk material such as fly ash, gypsum or FGD-product can be loaded directly onto ships by means of pneumatic conveying systems. This technical solution requires separate dedusting equipment on the ships.

Higher loading capacities will be reached special ship loading chutes. The bulk material will be stored in a separate bin, which will be discharged pneumatically by airslides. A loading chute at the end of the airslide charges the ship with the bulk material.

Ship loading systems can either be moveable or stationary.

Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Pulverised lime-stone, burnt lime and hydrated lime handling for dry and wet FGD Plants

IBAU HAMBURG supplies the material handling system for dry and wet FGD plants including unloading from rail wagons, trucks or ships, the silo storage and the dosing system to the slurry tanks.

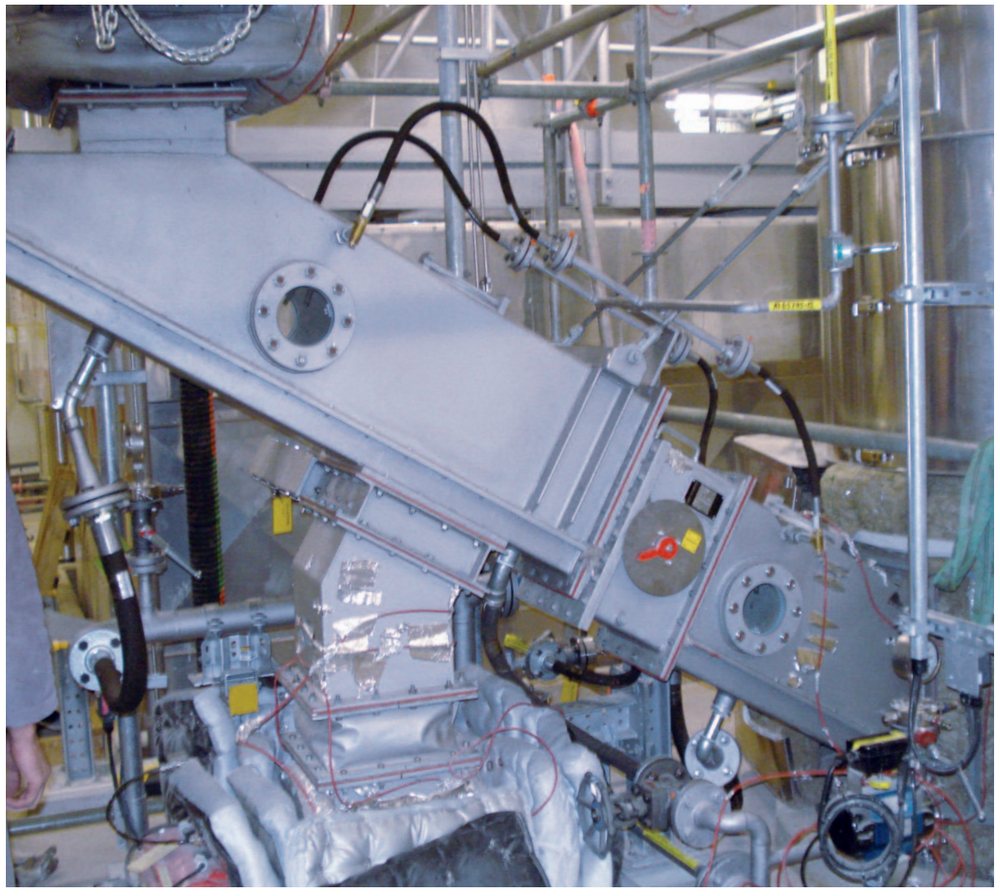
Unloading systems:

The Lime is unloaded from trucks, rail wagons or ships.

The unloading capacity can be increased by installing a separate conveying air compressor.

Unloading station for trucks

Unloading station for rail wagons



Feeding system of hydrated lime into the flue gas scrubber

Storage and conveying systems for dry FGD plants

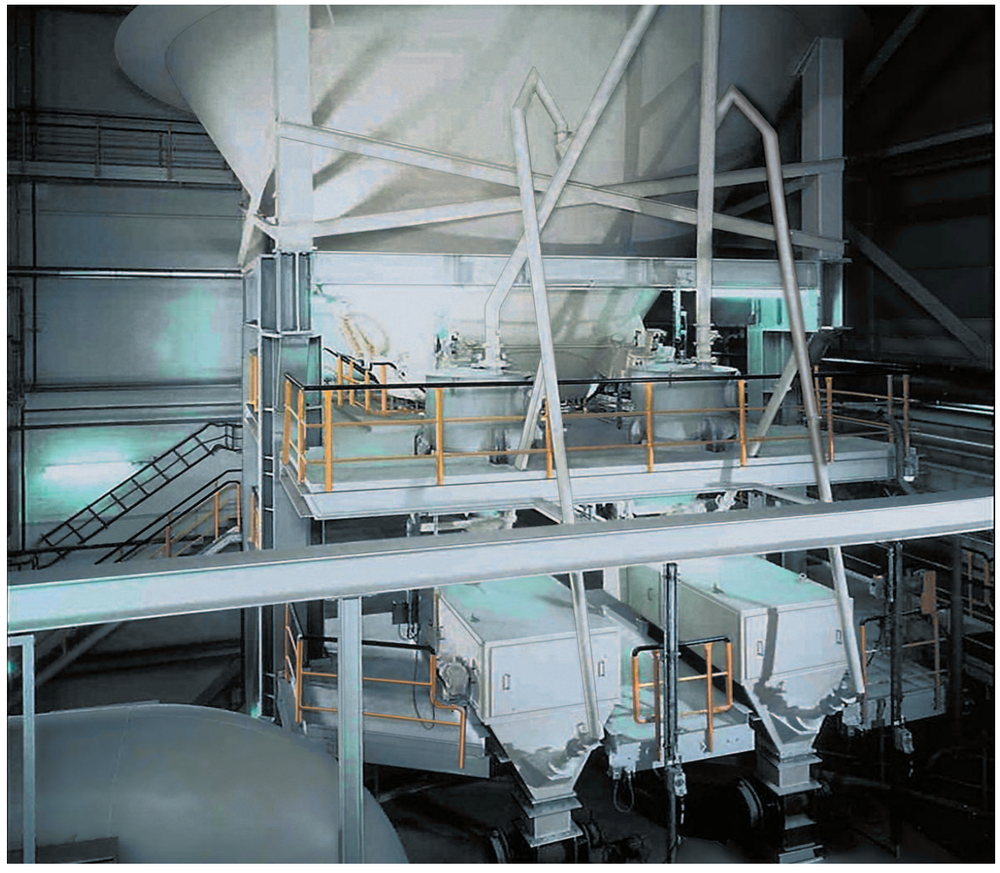
IBAU HAMBURG is one of the worldwide leading suppliers for storage and conveying systems for dry FGD plants for coal-fired, biomass and waste-fired power plants.

Usually, the burnt lime is hydrated and the hydrated lime then fed to the scrubber.

The dry FGD product is recirculated back from the bag filter hoppers to the scrubber while a certain percentage of the FGD product is discharged and fed into the storage silos.

Bulk materials, such as hydrated lime and FGD product, require a special treatment due to their special characteristics.

IBAU HAMBURG provides the perfect technical solution to guarantee a troublefree operation.



Dosing system to a slurry tank by weigh feeders

Silo discharge and dosing system to slurry tanks:

The pulverised lime stone or hydrated lime is discharged from the silo and dosed volumetrically by rotary feeders or screw conveyors into the slurry tank.

The accuracy can be improved by using special flow meters such as weigh feeders or solid flow meters.

The density of the suspension inside the slurry tank is measured.

In case a certain density is reached, the dosing process is stopped and the suspension of water and lime is fed into the scrubber.

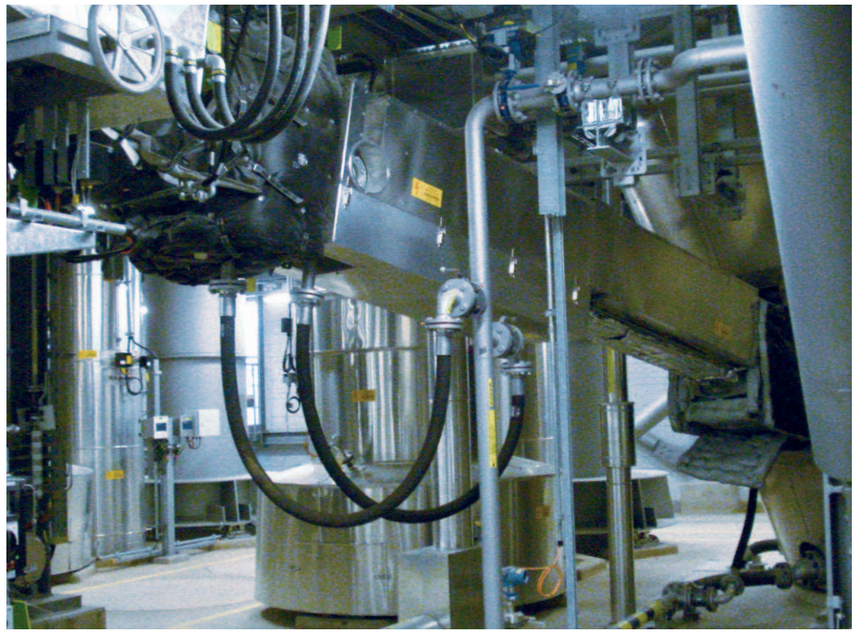
Dry product handling for flue gas cleaning and ash removal systems in thermal power plants

Recirculation

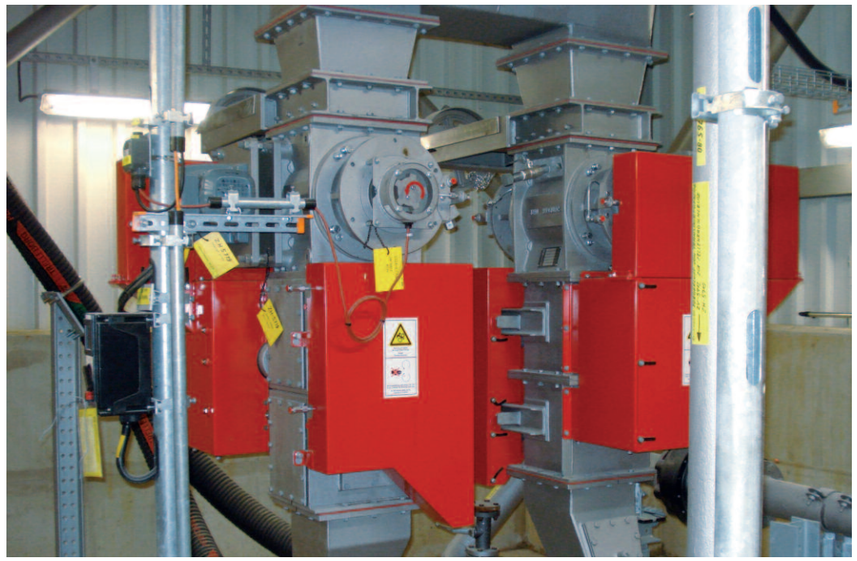
The dry FGD product includes a high amount of hydrated lime which has not yet reacted with the sulphur dioxide.

Therefore, the product from the filter discharge is recirculated back to the scrubber in order to reduce the consumption of hydrated lime.

A certain percentage of the product is discharged and conveyed pneumatically to the FGD product silos.



Recirculation system from filter to the flue gas scrubber



Medium pressure conveying system in a FGD plant

Silo discharge with loading chute for FGD product

Highly qualified service and maintenance personnel

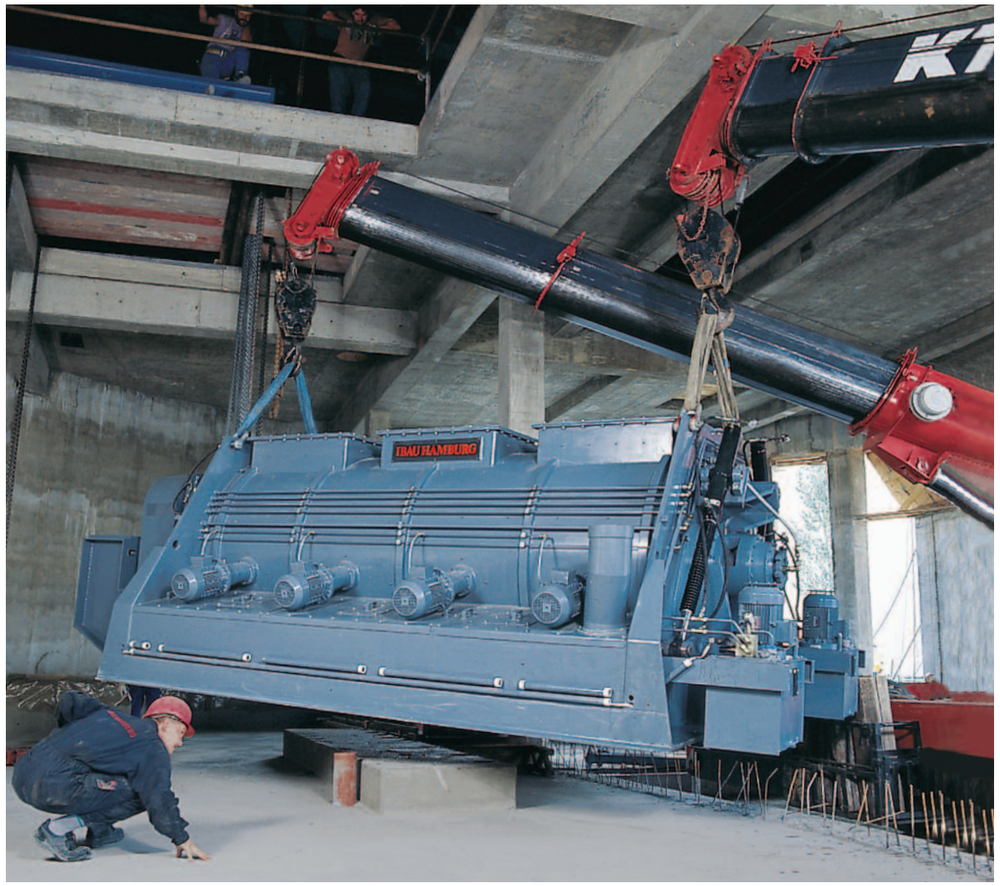
Maintenance

Components and systems perform best when they are in ideal operating conditions.

Our supervisors are aware of the sensitive points and mechanical details of our equipment.

In order to keep your equipment in best condition, we recommend frequent inspections by IBAU HAMBURG site technicians, and the appropriate preventive maintenance.

- Visual inspection
- Functional testing
- Optimum adjustment of process parameters



Installation of an IBAU Mixer

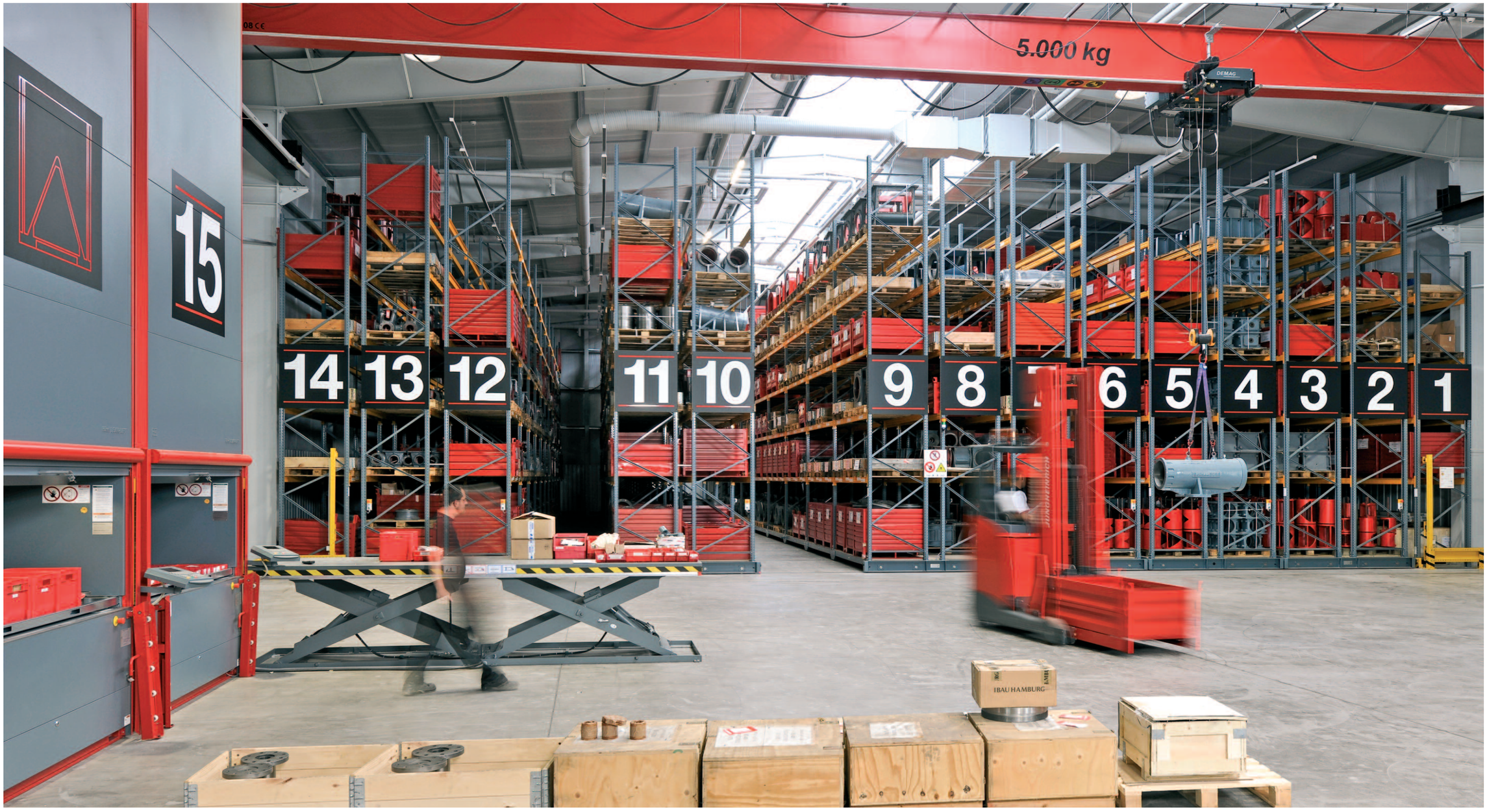
Supervision

After system equipment has been delivered by IBAU HAMBURG, our specialists travel to the plant site in order to perform the relevant plant services.

Commissioning is the process of ensuring that our systems are installed, functionally tested and operated in conformance with the design. A system that has not been properly commissioned often causes problems later on. Our skilled engineers are experienced in providing commissioning and supervision services for new as well as existing systems. We can be on site during configuration and test, start-up, operation, shutdowns, trouble shooting and maintenance.

Adjustment of the settings

Highly qualified service and maintenance personnel



IBAU – Warehouse and assembly shop on more than 5.000 sqm, pre-assembled components and spare parts for fast delivery – **the real just-in-time solution**