

### MOBILE TUBE CHAIN CONVEYOR FOR BULK MATERIAL HANDLING

The industry often requires the dust-tight loading of bulk materials into silo trucks, containers, freight cars, big bags, or bags. Often, this loading is performed manually or by means of permanently installed systems that do not allow for a change of venue.

Another challenge in the field of bulk materials handling is the wide variety of materials. Cement, carbon dust, flour, grain, animal feed, or sugar – all materials have very different characteristics. The loading systems must be designed in a way that fine dust is conveyed just as smoothly as coarse materials. These product properties should be taken into consideration when choosing the materials for conveyor components, since highly abrasive bulk materials can cause massive wear on the conveyor in the areas of contact and can thus drastically reduce the lifetime of the conveyor system. Apart from the problem of separation of the bulk material, dust is set free, wherever bulk material is reloaded. Therefore, operational safety is another important aspect. Especially dust-developing and explosive materials bear a higher risk of accidents. Another issue gaining importance for the operators as well as the manufacturers of conveyor systems is the environment and the corresponding EU directives, namely IPPC EU "Directive 96/61/CE Integrated Pollution Prevention and Control" (9/24/1996).

One possible solution is offered by Schrage Conveying Systems, Friedeburg (Germany). Their flexible conveyor system, the mobile tube chain conveyor, is definitely an excellent alternative to conventional systems.

### EASY OPERATION AND MANIFOLD POSSIBILITIES

The mobile tube chain conveyor is a mechanical continuous conveyor and basically consists of a tube chain conveyor mounted onto a movable transport cradle, feed hopper, piston compressor, dust particle filter, switch cabinet, and loading system.

The main components of the tube chain conveyor are the drive station, the feed hopper, e.g. as a big bag discharge unit, conveying and return path, as well as conveyor chain.

With the conveyor mounted onto the transport cradle, it is no problem to move the entire system to the desired position near the silo truck, where it is then secured by means of wheel locks. Next, the loading system is connected to the silo truck. The loading head can be shifted sideways in order to compensate for inaccuracies in the positioning of the vehicle.



Loading of bulk material into a silo truck using a mobile tube chain conveyor

Upon lowering the hopper onto the filling spout, the locking cone of the loading head will drop further and at the same time opens the material discharge spout.

The loading system seals off the connection to the silo truck by means of an inflatable seal collar and is also equipped with a filter to guarantee dust-free loading by means of a vacuum. The dust sucked out of the silo truck is reintroduced into the bulk material flow during loading and any filtered off material can also be reintroduced into the material flow by means of a bypass. This creates a completely closed cycle, in which hardly any material is lost.

The device is operated by means of a suspended push-button switch. Due to the variable lowering depth of the locking cone with the filling meter level, it is possible to adjust the filling level individually.



Loading unit for bulk material during docking to the filler neck

After placing the big bag onto the feed hopper, the flap is opened manually and the loading process starts. Again, dust-free loading is possible due to an integrated dust suction device at the feed hopper as well as a specially developed seal system between big bag and hopper.

The conveyor chain of the tube chain conveyor is equipped with evenly spaced conveyor discs. The bulk material falls through the feed hopper and into the spaces between the conveyor discs. The sprocket wheel in the drive unit pulls the conveyor chain with the bulk material through the conveyor path toward the loading system. Material feed and dust suction are separated.

The integrated rotating paddle detector reliably switches off the material feed to the loading head as soon as the tank is full. After the big bags have been emptied, the loading system can be detached and the silo truck can be repositioned or changed.

The empty big bag can be evacuated by means of an additional hose.

## HIGHLY FLEXIBLE BULK MATERIAL CONVEYOR SYSTEM

The tube chain conveyor design can be adapted to exactly match the conditions on site, since the system components as well as the numerous auxiliary components can be combined in many ways. The only requirements are a power outlet and an even, hard, and stable base.

Depending on the desired capacity, the mobile conveyor is available in five different sizes. The conveyor denominations (115, 135, 160, 200, and 270) indicate the corresponding tube diameter. With these different sizes of tube diameters, it is possible to convey material with a grain size of up to 100 mm, a bulk density of more than 7 t/m<sup>3</sup>, and flow rates up to 80 m<sup>3</sup>/h.

For the design of the tube chain conveyor, the properties of the corresponding bulk material, especially the bulk weight, product temperature, and flow behavior, are taken into consideration. It is thus possible to select different materials and wall thicknesses as well as project-specific designs, depending on the material to be conveyed.

Due to its movable design, the mobile tube chain conveyor can be used in many different ways. Often, it is used for product turnover directly at the production site, where bulk material needs to be loaded onto a means of transport or storage, e.g. for loading from big bags onto trucks or bulk material containers. Various loading systems are available and are interchangeable and it is possible to choose an adaptor for filling big bags or bags.

There is nearly no limit regarding the type of bulk material. The tube chain conveyor can be used with virtually any condition of aggregation ranging from dusty to grainy or even slightly sticky materials to be conveyed. This also includes particularly challenging goods, e.g. very compacting powder and dust, such as powdered clay, color pigments, activated carbon, preservatives, fillers, etc.

In order to transport products from the food industry, a food version without any dead space is available, just like a version that fulfills all the ATEX requirements, e.g. for the chemical industry.

The mobile conveyor system is used in almost any kind of industry, e.g.:

- Food industry: Flour, milk powder, corn starch, tea, sugar, salt, pepper, malt, etc.
- Agriculture: Cereals, coffee beans, nuts, malt, beans, mustard seeds, seeds, etc.
- Building materials industry: Sand, soil, cement, chalk, clay, plaster, calcite, etc.
- Animal feedstuff industry: Wheat, barley, oats, rye, corn, peas, millet, pellets, etc.
- Chemical industry: Synthetic granules, laundry detergent, fertilizer, pesticides, etc.
- Fuel industry: Pellets, wood chips, carbon powder, animal meal, fluff, etc.

### CLEAN AND EFFICIENT LOADING DEVICE

In general, clean, dust, gas, and pressure tight transportation of all free flowing and pourable bulk materials is guaranteed, depending on the design. Due to its closed design, this handling technology is particularly suitable for fast and dust-free loading of challenging and sensitive materials. A large variety of bulk materials can be loaded anywhere quickly, easily, and free of impurities. The very low level of grain destruction allows for a particularly gentle handling of the bulk materials. Even explosive products can be conveyed safely with a corresponding system design. Almost any transportation problem is solved flexibly and effectively.

The mobile tube chain conveyor as an efficient means of loading saves time, reduces costs for logistics, and is characterized by fast startup, high availability, and economical operation.

The conveyor is also almost maintenance-free; only the chain tension and the wear parts have to be checked at the inspection doors at large intervals. Easy and safe handling guarantees accident-free and reliable operation.

The mobile tube chain conveyor has the following advantages:

- Dust, gas, and pressure-tight handling of bulk materials
- Flexible application possibilities
- Conveyance of highly abrasive, toxic, explosive, slightly sticky, or even chemically aggressive bulk materials
- Very low energy consumption
- Explosion pressure shock resistance and non-transmission of internal ignition
- ATEX compliant design available
- Very little maintenance required
- Long life and low wear
- Small space requirements
- Low grain destruction and gentle transportation of goods
- Design with nearly no dead space and high degree of self-cleaning
- Homogeneous container filling (no separation)
- Restart possible even in filled state
- High degree of residual emptying, thus allowing product changes without high cleaning efforts

### **ECONOMIC AND ENVIRONMENTALLY SOUND OPERATION**

Being a closed system, the tube chain conveyor loads any kind of material absolutely free of losses and dust-tight and in case of the regular handling of bulk materials, such as for dust or granules, its high throughput leads to considerable cost and time savings. It is characterized by a long lifetime and an excellent cost-performance ratio. The system guarantees an economic and also environmentally sound operation, minimizes the risk of accidents during the loading of toxic or explosive materials and provides a high degree of operational safety.

The problem of supplying the customer with a mobile and flexible loading or reloading system, which can be adapted to specific products and customer demands, has been optimally solved by Schrage conveying Systems with their mobile tube chain conveyor.