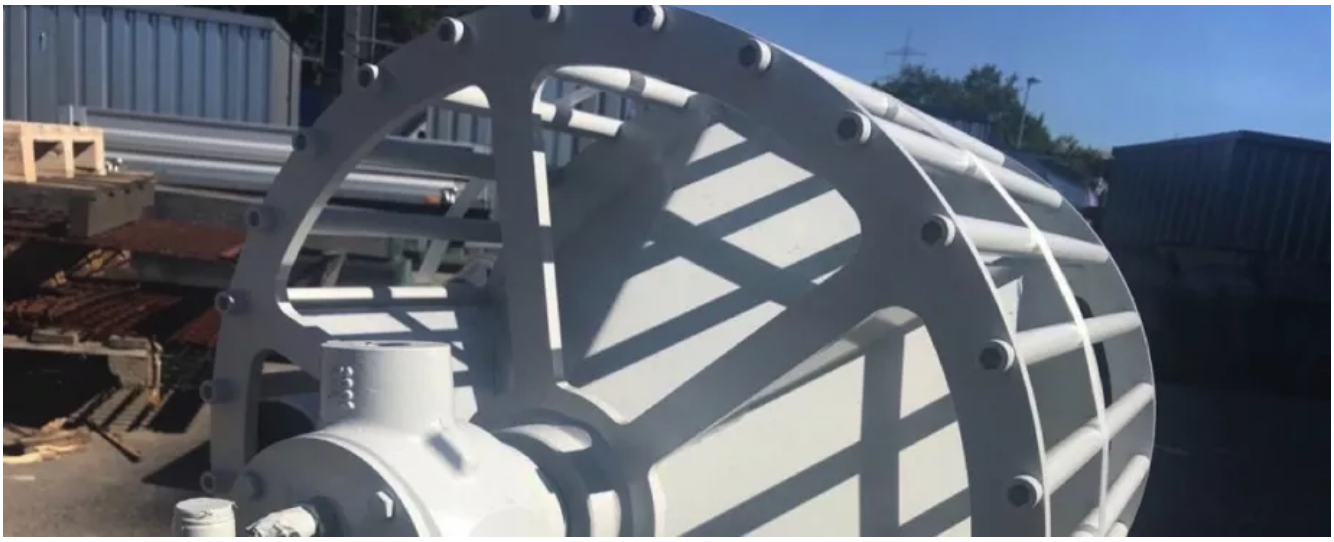


Case Study

BEUMER assists Cement Manufacturer in Modernisation of Bucket Elevators

Edited by on 21. Feb. 2022

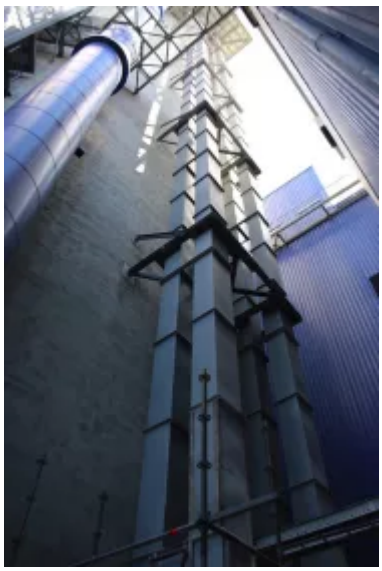
Outdated technologies often lead to increased maintenance, and that can rapidly become expensive. A cement plant owner faced this problem with his bucket elevators. An analysis carried out by the BEUMER Customer Support team made things clear: It is not necessary to replace the whole systems, but only components. The service experts were able to modernise the bucket elevators and make them more efficient, even if the systems were not from BEUMER.

“Right from the beginning, our three bucket elevators caused problems”, says Frank Baumann, plant manager at a medium-sized cement company based in Erwitte, North Rhine-Westphalia, near Soest, Germany. In 2014, the manufacturer also established a plant in Duisburg. “Here, we produce blast furnace cement, using a central chain bucket elevator as circulation bucket elevator for the vertical mill and two belt bucket elevators for the silo feeding,” describes Baumann.

The central chain bucket elevator on the vertical mill was unusually loud right from the beginning and there was also an immense chain vibration of more than 200 millimetres. Although the original supplier made several improvements, a high level of wear and tear was evident after only a short running time. “We had to service the systems more and more frequently”, says plant manager Baumann. Of course, this was expensive, on the one hand because of the downtimes, and on the other because of the spare parts.

Frequent Downtimes, high Costs

Due to the frequent downtimes on the vertical mill circulation bucket elevator, BEUMER Group was contacted in 2018. The system supplier not only supplies bucket elevators and modernises them if necessary, but also optimises existing systems of other suppliers.



With this modernisation, the cement manufacturer was able to increase the conveying capacity of the bucket elevators for the cement silo feed.

“In cases like this, operators of cement plants are often faced with the question of whether a completely new plant or a possible conversion would be the more economical and targeted measure,” explains Marina Papenkort, Area Sales Manager in the Customer Support division at BEUMER Group. Because modernisation can be worthwhile: “With our customer support, we help our customers to fulfil future performance and technology requirements in a cost-efficient way in the context of modernisations and modifications”, says Papenkort.

“Typical challenges of our customers include performance improvements, adaptations to modified process parameters, new materials, optimisation of availability and extension of the maintenance cycles, designs easy to maintain as well as reduced noise levels”. In addition, all new developments with regard to Industry 4.0, such as belt monitoring or continuous temperature monitoring, are included in the modifications. BEUMER Group offers everything from one single source, from technical dimensioning to assembly on site. The advantage is to have only one contact and thus to benefit from reduced organisational and coordination expenses.

The profitability and especially the availability play a crucial role for customers, because modifications are often an interesting alternative to new constructions. In case of modernisation measures, as many components and structures as possible are kept in many cases also the steel structure. This alone reduces material costs by approximately 25 per cent compared to a new construction. In the case of this company, the bucket elevator head, the chimneys, the drive unit and the bucket elevator boot could be reused. “In addition, the assembly effort is lower, and so the downtime is usually much shorter,” explains Papenkort. This leads to a faster return on investment compared to a new construction.

Heavy Duty for coarse-grained Material

“We retrofitted the central chain bucket elevator to a high-capacity belt bucket elevator type HD (heavy duty),” reports Papenkort.

Belts with wire-free zones, and to which the buckets are fastened, are used for this type of bucket elevators just as with all BEUMER belt bucket elevators. In case of products from competitors, often the steel cords are cut through when mounting the buckets.

The ends of the steel cords are divided into individual strands in the U-shaped part of connection, twisted and cast with white metal.

Thus the steel cords are no longer covered, which might result in moisture penetration and, as a consequence, lead to corrosion and damaged supporting cords. “That’s not the case with our systems. The tensile strength of the bucket

elevator belt is completely kept,” explains Papenkort.

Another important factor is the belt clamping connection: The rubber of the steel cord ends is first removed on all BEUMER steel cord belts.

The technicians divide the ends into individual strands in the U-shaped part of the belt clamping connection, twist and cast it with white metal.

“Thus, the customer benefits from a huge time advantage,” says Papenkort. “After casting, the junction is completely cured after a very short time and the belt is ready for use”.

For a steady Running of the Belt

In order to enable a steady running of the belt and to extend the service life in view of the abrasive material, the BEUMER team exchanged the existing segmented laggings of the drive pulley by specially adapted ones equipped with ceramic. These are crowned for a steady straight run.

The drive pulleys are equipped with segmented laggings. A steady running of the belt
BEUMER Group GmbH & Co KG)

The design, which is easy to maintain, enables to quickly replace the single segments of the segmented lagging through the inspection hatches. Thus, it is no longer necessary to exchange the complete drive pulley. The segmented laggings

are rubberised, with linings made of full ceramics or steel. The choice depends on the material conveyed.

The buckets are mounted with forged segments and screws on the back side of the belt.

The buckets are adapted to the crowned shape of the drive pulley and thus lie flat on, which considerably increases the service life of the belt. Their shape allows for smoother running and therefore less noise generation.

Depending on the intended use, the operator receives the buckets in the design that suits him best. They can for example have a rubber bottom or be made of high-quality steel.

The proven BEUMER HD technology impresses with a special bucket connection: In order to prevent coarse-grained material from penetrating between bucket and belt, the bucket is provided with an elongated back plate, which can be mounted flush to the bucket elevator belt.

In addition, with the HD technology, the buckets are mounted firmly to the back of the belt with forged segments and screws. “All the screws would have to get lost for a bucket to tear out,” explains Papenkort.

To keep Everything running straight

The parallel take-up device ensures that the take-up pulley is limited to parallel movement.

In order to achieve a permanently correct tensioning of the belt, BEUMER mounted an external parallel take-up device without product contact in Duisburg, which ensures that the take-up pulley is limited to parallel movement. The tension bearing is designed as inner bearing in a completely encapsulated construction. The bearing housings are filled with oil.

“A part of our HD technology is the cage-type foot pulley which is easy to maintain. The bars are hardened due to the abrasive material conveyed and screwed into the cage-type foot pulley to enable a rapid replacement. The take-up pulley is equipped with a double deflection cone, which reliably prevents damage to the belt caused by jammed bulk materials,” explains Papenkort.

Satisfaction led to follow-up Order

“This modification enabled us to increase the availability of our vertical mill circulation bucket elevator and to be more competitive on the long term,” Frank Baumann says happily. “Compared to a new investment, it was possible to reduce our costs and we were operating faster.

At the beginning we had to convince ourselves more than once that the retrofitted circulation bucket elevator was in operation, because the noise level had changed drastically and we were not familiar with the smooth running from the previous chain bucket elevator”.

To avoid caking, the take-up pulley is designed as cage-type foot pulley and is provided with a double deflection cone. For this order, the screwed and hardened version of the cage-type foot pulley has been used.

The company was so enthusiast about the retrofitting that it commissioned BEUMER Group to optimise also the other two bucket elevators with regard to the

conveying capacity. Also in this case, the operator complained about continuous off-tracking, buckets hitting the shaft casing and difficult maintenance conditions. “In addition, we wanted to further increase the throughput of the mill and were therefore interested in greater flexibility regarding the conveying capacity of the bucket elevators,” explains Baumann. In 2020, the Customer Support of the system supplier also solved this problem. “We are completely satisfied,” states Baumann. “In the course of the retrofitting, we could also reduce the energy consumption of the bucket elevators”.