Th. Scholten GmbH & Co. KG

Wear protection solutions in cement plants

Cement plants are among the industrial plants that suffer the most from high wear and its costs. The crushing, blending and the constant material transport of the hard raw material cause massive damage to the plant systems. Abrasion, impact, erosion, temperatures and fatigue stress the manufacturing process. For more than 70 years Th. Scholten GmbH & Co. KG has dedicated itself to the fight against wear in machinery and plant systems in the cement industry...

Wear is the permanent loss of material from the surface of a solid body due to mechanical causes. A distinction is made between different types of wear, which are summarised and explained in the tribological system, the theory of friction and wear. The most common types of wear are corrosion, abrasion, adhesion and impact wear.

It should be noted that wear is never to be considered individually, but always occurs in a so-called wear combination. This encompasses the interaction between the main body, counter-body and enveloping factors such as corrosion and temperature. Abrasive wear (the scoring action of the sliding or flowing goods parallel to the component surface) and impact wear (due to gravity, centrifugal or other forces), cause the largest material losses on surfaces and corresponding damage to machinery and equipment.

Factors that influence the wear of material on the component surface include the materials selected and the structural design of the plant's components. Furthermore, the properties of the bulk material (e.g. grain fraction, sharpness, moisture content and chemical aggressiveness), as well as the operating conditions such as conveying speed, throughput volume and drop height, also affect how rapidly components will experience wear.

All of these factors need to be precisely analysed and the wear protection system must be adapted accordingly to ensure the best resistance and component lifetime. This starts with the plant construction and ends with cement plant maintenance. Here, experience is of great value, as cement plant operators often have to learn the hard way and pay dearly for cheap solutions, since these may only achieve inadequate service life.

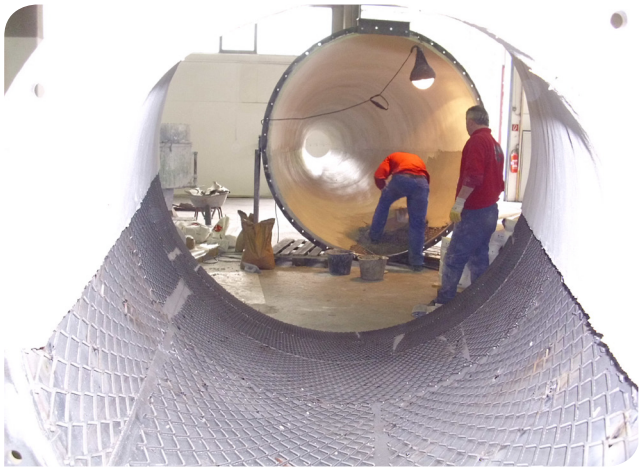
In addition, special responsibility applies here, in advance, to cement plant manufacturers. Some of these can lean towards economical solutions that are not necessarily fully thought through with regards to wear. Universal solutions are rarely the right path and ultimately cost cement plant operators more in the future than seeking out the most cost-effective solution from the outset.

From raw material processing and clinker production to actual cement production, almost all areas of a cement plant are affected by wear. In particular, the addition of blast furnace slag or fly ash dramatically increases wear. Particularly affected here are material transfers, chutes, mill housings and their classifiers as well as pneumatic conveying systems.

Th. Scholten GmbH & Co. KG supports almost all major cement manufacturers and plant builders

Right: Impact wear is a factor in many parts of a cement plant.

Far right: Chute with alumina-ceramic tailored component lining.



Above: Project in Germany: Wear-resistant lining of cyclone with SC-WearStop®.

Above right: SC- WearStop® being applied to a component at the Th. Scholten factory in Wülfrath, Germany.

using its experience and mature wear protection systems. From consulting to delivery to final assembly, Th. Scholten GmbH & Co. KG covers all important areas of customer service.

In order to create the optimal wear protection system for the customer, the following factors are important:

- Precise analysis of the interaction of wear factors;
- Years of practical experience with other wear problems. (Wear and wear behaviour are not mathematically precisely determinable, as too many factors and mutual dependencies influence it);
- The creation of an individual concept, thanks to the knowledge of the individual materials and their targeted application.

For the protection of operating equipment against abrasive and impact wear in cement plants, Th. Scholten GmbH & Co. KG utilises, among others, the following materials.

- **SC-cast basalt:** The most widely used wear protection material with an excellent price / performance ratio. Mohs hardness of 8.
- **SC-hard ceramic:** Inexpensive wear protection, with excellent surface texture, which is often used to prevent adhesion. Mohs hardness of 7.
- **SC-alumina ceramic:** High-tech material with maximum service life. Available in a variety of formats and as tailored linings. Mohs hardness of 9.
- **SC-zirconia ceramic:** Ceramic blend with high alumina content. Good thermal-shock resistance. Mohs hardness of 9.
- **SC-silicon carbide ceramic:** Excellent properties for use in high-temperature applications. Highly resilient and available in a variety of formats. Mohs hardness of 9 to 9.5.
- **SC-WearStop®:** Wear protection material with excellent price / performance ratio. Flexibly adaptable to all plant systems. Joint-free installation of 15-50mm thickness. Mohs hardness of 7.5 based on the different material components.

SC-WearStop® is a ceramic cement mortar that can be applied to your plant components in Scholten's Wülfrath facility as wear protection. However, it can also be delivered in the form of bagged material for on-site processing. The company also offers complete assembly, in which specialist installers come to the plant site and apply the wear protection according to the client's requirements.

All materials are also offered in combination with elastomers for optimal use in the impact area. The combination of substrate and wear protection material has proven to be an economical solution in many cases.

In principle, all materials from Th. Scholten GmbH & Co. KG can be combined with one another in order to offer the customer the optimal wear protection system, taking into account the economic efficiency.

Conclusion

Wear is an expensive problem in cement production and it will never be possible to completely eliminate these costs for a cement plant. Nowadays however, due to the clever use of suitable wear protection materials, significant cost savings are possible.