glass WORLDWIDE

Lehr belt cleanliness is critical

Thorsten Seidel addresses the importance of lehr belt cleanliness and discusses how best to minimise dust and dirt contamination.

The cleanliness of annealing and decorating lehr belts has been an issue for many years, formerly exclusively for pharmaceutical and cosmetic glass manufacturers but now also as a general requirement in glass container production. Improved materials have been adopted to reduce dirt and particles both inside and outside the lehr tunnel that may attach to the glass or even get into containers. This includes the use of stainless steel throughout the lehr tunnel, not only the heated zones. In addition, it became necessary to use stainless steel for the mesh belt itself and in almost any area of lehr belt contact.

Whenever high grade stainless steel mesh belts (preferably AISI304 or higher) come in contact with mild steel, they create slight surface 'corrosion', presented as brown/red dust film on the surface. It is not possible to prevent the complete rejection of contact between the stainless steel lehr belts and mild steel, unless rollers are made from stainless steel or are rubber-coated, for example. All types of belt support are already made from stainless steel.

In the past, other alterations have been made in the lehrs to minimise the carryover of dust by using filters on the air inlets and the combustion air intake of gas burners.

Complete belt brush assembly.

Nevertheless, the contamination of belt surfaces and the wear emanating from the contact of belt support to belt itself has not been achieved by such measures.

BELT BRUSHES

To help maintain cleanliness and minimise dust and dirt, as well as their negative effects, belt brushes started to be used but without optimal results due to the design and materials used for the belt brush itself. Pennekamp took this issue further and gained experience with different materials for bushing and polishing.

Effectively, the following materials have been trialed:

- Polyamide brushes.
- Stainless steel brushes.
- Silica carbide brushes (hard and soft).
- Polishing fibre rollers, not brushes.

The first example (polyamide brushes) failed to show much effect, with a strong possibility of making matters even worse. Brushes of this type have been installed but show only minor positive effects.

Stainless steel brushes are made from the same material as the lehr belt itself but were found to be too inflexible and therefore, could not reach 'within' the belt. Very thin wires are more flexible but do not have sufficient mechanical strength to remain straight and in shape.

Silica carbide brushes have shown the best result in terms of cleaning an old, used belt and/or maintaining its pristine condition.

Due to the different (old and new) belt conditions encountered, Pennekamp tested the material hardness and geometry of these brushes. It was found that the more rigid hard brush allows the cleaning of heavily contaminated (used) belts, under the condition of operating a counterwise rotation of the brush and allowing time. The removal of surface dirt and corrosion can easily take between four and six weeks but thereafter, the condition is good enough for claims of a 'clean' belt.

For new belts, Pennekamp recommends the use of much softer silica carbide brushes that allow sufficient flexibility to 'go' between spirals.

Side view with brush adjustment.

In addition, the 'polishing fibre roller' can be mentioned, which will only clean/polish the outer belt surface, the glass contact area. These brushes are used frequently within high quality pharmaceutical and cosmetic glass manufacture and for decorating processes.

It is not the brush alone that makes the difference, however. Dust and dirt that comes off belts should not simply be distributed within the area, contaminating the glass and equipment. The design of the brush drive and its housing has a major influence on keeping the dust and dirt within an enclosed area and allowing the settlement of such materials within catch trays. Therefore, the design used by Pennekamp allows the installation of a brush below the return belt on the open discharge table. The housing and shielding of the brush itself closes or minimises gaps where the dust may escape.

Deposits can settle and are collected within two catch trays, retractable to either side of the line. The whole brush station itself can also be removed to either side of the lehr for service tasks. In order to adjust the height and indirectly the pressure applied, a centralised crank handle is used to adjust and compensate for wear. It is not recommended to apply a counter force on the brush, using instead only the weight of the belt itself. Time and counterwise rotation will do the job.

These systems can be installed easily on existing lines, if space allows. The required length in the transport direction of the belt is approximately 600mm. The entire system is hidden within the lehr outside frame, comes complete with drive and support system for installation and requires only a power supply to be connected. ■

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