The new generation of conveyor skirting

In many bulk materials handling plants, reducing the dust from conveyor transfer points subsequently reduces the risk of an employee's exposure to Silica dust. The litigation costs associated with this condition rival that of asbestosis, costing billions of dollars.

By Charles Pratt, Kinder and Co

Silicosis is a disabling, non-reversible and sometimes fatal lung disease caused by inhalation of silica dust. Silica is the second most common mineral in the earth's crust and is a major component of sand, rock, and mineral ores. Overexposure to silica dust can cause scar tissue to form in the lungs, which reduces the lungs' ability to extract oxygen from the air we breathe.

Changing out or adjusting skirting on conveyors is a costly job for many bulk material plants across the globe. This is an issue affecting many aspects of business. Today administration time required for simple jobs like changing or adjusting skirting is extreme. Also a major problem for many plants is belt tracking which is often caused by material escaping from worn skirts.

With ever increasing production rates there is a greater requirement for plants to run 24 hours a day, 7 days a week. In particular the power generation industry requires long run times between short scheduled maintenance windows. In many cases SBR rubber is not lasting the distance resulting in spillage, airborne dust, tracking issues, premature failure of idlers, belt damage etc.

There are many high wear resistant materials plants have available to combat wear such as ceramics, heat-treated or hardened steels. However these materials can be unforgiving when used in skirting applications if run close to or contacting the conveyor belt surface. The misunderstanding within the industry in distinguishing the difference between polyurethanes and polyethylene's and witnessing plants use materials such as old conveyor belt, Ultra high molecular weight polyethylene (UHMWPE), natural rubber etc, to skirt their transfer points prompted Kinder and Co. to research the most economical and belt friendly skirting material available. Ruling out materials that were hard and or abrasive, it chose four materials to analyse.

- SBR Rubber 60 DURO SHORE A (most commonly used)
- Natural Rubber 60 DURO SHORE A
- Linatex Natural Rubber 60 DURO SHORE A
- Argonics Polyurethane 69 DURO SHORE A

Test Results

Friction

The most important of the three tests due to its potential to transfer heat along skirted areas causing premature belt damage, is the skirting materials coefficient of friction value.

The polyurethane sample had the lowest friction value in all four tests, that is 64 per cent lower than SBR rubber.

Reducing friction between skirting and the conveyor belt surface is arguably the most important step in eliminating excessive skirting wear and belt damage. Conveyor belts are often replaced solely due to the skirting wearing a groove completely through the belts top cover exposing the ply carcass and results in tearing, spillage, belt tracking issues etc.

Some rubber skirting is porous which allows dust to adhere to the contact surface forming abrasive grit, which then wears a groove in the conveyor belt.

Polyurethane being non porous restricts the amount of dust being trapped under the skirt's surface.

Abrasive Resistance

The test method used was NBS Abrasion (ASTM D1630) Chemtura Laboratory test facility, USA.

The results show that Linatex natural rubber whilst achieving a high wear resistance is not preferred as a conveyor skirting material due to its high friction coefficient. Linatex was not used in a case study for this reason.

The polyurethane sample was 326 per cent more resistant to wear than SBR rubber. This should not be confused with the true wear resistance of the materials tested due to the field situation allowing for friction between the belt and the skirting.

Case Study

• Gladstone Operating Port Authority, Gladstone, Queensland

A trial was conducted at the RG TANNA Coal terminal to properly test the performance of polyurethane against the most commonly used skirting material SBR rubber. The conveyor transfer point from the wharf conveyor to the ship loader was chosen as the test area.

Conveyor 6B-6BX Transfer point specifications

- 6000 TPH
- 5.2 m/s
- 2400mm Rubber conveyor belt width

The results showed the polyurethane skirting outlasting the SBR rubber by six times so far.

High wear resistance combined with a low coefficient of friction is the ideal combination for a skirting material. Polyurethane produced the best results in the laboratory and field tests. Though the abrasive test results show polyurethane is 3-4 times more abrasive resistant than SBR rubber, once the friction factor was added in a real world scenario we concluded that the polyurethane lasted 6-10 times longer than SBR rubber. This difference in wear rates is due to the polyurethanes very low friction value. The abrasive resistance test ASTM D1630 simulates abrasion by means of grit and not the contact between the conveyor belts.

Further case studies have showed that as the belt speed increased the wear rate of SBR rubber increased exponentially. However polyurethane remained more constant due to the lower friction value.

The author would like to thank the Gladstone Port Authority (RG Tanna Coal Terminal) for making themselves available for the trial to take place on site.

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