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BCInsight

Cutting conveyor maintenance costs

Hostile operating environments can severely corrode the metal rollers used in conveyor systems in fertilizer plants. Switching to polymer rollers instead extends the life of costly conveyor belts, as **Prasad Dhond** of Global Conveyor Systems explains.

The conveyor belt is one of the most expensive parts of the conveyor systems used in fertilizer plants. The rollers (idlers) on which the belt travels affect maintenance and wear and therefore play a particularly critical role in ensuring long belt life.

Fertilizer production exposes belt conveyors to heavy corrosion, chemicals and a wide range of temperatures. The resulting corrosion causes metal rollers to fail prematurely. This is costly as it results in plant downtime and the purchase and installation of replacement rollers. The hardening of material on roller surfaces can also make belts travel off-centre. Fortunately, a new class of rollers can effectively address such challenges by incorporating a high performance polyethylene (HPPE) shell.

The *HPPE Polymer Roller*, a patent-pending product developed by Global Conveyor Systems, combines an outer shell made from HPPE with a composite non-metal shaft (Figure 1). This roller overcomes several drawbacks commonly encountered when using other metal, HDPE and PVC rollers currently on the market.

Belt conveyors in fertilizer plants are typically used to handle raw materials such as phosphate rock, potash, gypsum and sulphur, as well as intermediate and finished products including NPK, MAP, DAP and urea. Materials transported by belt conveyors can spill onto the rollers causing two major problems:

- **Corrosion:** Belt conveyor rollers in fertilizer plants are prone to severe corrosion (Figure 2) causing premature damage to the roller shell. Traditional solutions for preventing corrosion, including rubber-lined metal rollers, HDPE or PVC rollers, have several draw-

backs such as higher-cost, shorter-life, heavier-weight and metal shafts (Table 1). HPPE polymer rollers, in contrast, effectively eliminate any chance of corrosion by combining an HPPE shell with a non-metal shaft.

- **Material build-up:** Fines present in transported materials stick to rollers and then harden to form an uneven

surface (Figure 3). The build-up of an uneven surface on rollers is particularly undesirable as it causes the belt to travel off-centre, ultimately leading to product spillage and damage to the belt. The HPPE rollers manufactured by Global Conveyor Systems are extremely smooth with a surface roughness of just 0.00022 µRa. This helps them resist any material build-up and so prevents belts from wandering.

Other Advantages

Conventional metal rollers, when seized or frozen, develop a sharp knife edge that can easily damage the top and bot-

Fig 1: Polymer roller with an HPPE shell and composite shaft



Fig 2: A corroded metal roller



Table 1: Comparison of HPPE polymer rollers with other available roller types

	HPPE polymer rollers	Metal stainless steel rollers	Metal carbon steel rollers	Other polymer rollers
Shell material	HPPE	Stainless steel	Carbon steel	HDPE or PVC
Shaft material	Composite (non-metal)	Metal	Metal	Metal
Typical weight (CEMA C return roller)	14 lbs	40 lbs	40.5 lbs	24 lbs
Resistance to corrosion	Excellent	Good	Poor	Good
Resistance to material build-up	Excellent	Good	Poor	Good
Life of roller	Very long	Long	Moderate	Moderate
Load bearing capability	Moderate (CEMA C, D)	High	High	Moderate

Fig 3: A return metal roller with material build-up



Fig 4: Seized metal rollers with sharp knife edges



tom cover of the entire belt (Figure 4), leading to costly downtime while the belt is repaired or replaced. Rollers with an HPPE shell, on the other hand, do not generally cause any damage to the belt during a seizure as they only develop rounded edges. HPPE rollers are also fitted with moulded ABS housings instead of the conventional steel end caps that can damage the belt when rollers seize.

HPPE polymer rollers generate 60% less noise than traditional metal rollers. This makes them ideal for noise-sensitive conveyor installations near populated

areas. The significantly lower weight of HPPE polymer rollers also makes them easier to handle and reduces the chances of worker injury during the installation of new or replacement rollers. Their lower weight also minimises power requirements of the conveyor system. Other polymer rollers on the market use HDPE shells which can wear easily, or PVC shells that are prone to cracking. Rollers with HPPE shells, by striking a balance between the properties of HDPE and PVC, offer a long life and a load capacity comparable to that of steel rollers.

HPPE polymer rollers manufactured by Global Conveyor Systems are successfully running in several fertilizer plants in India and North America. Plant managers have welcomed their benefits, especially the reduction in downtime and maintenance costs for their belt conveyors.

"Global's HPPE Polymer Rollers have helped us resolve a major corrosion issue and enhanced belt life by material not sticking to the rollers. Considering the good performance of these rollers, we are planning to procure HPPE rollers for all our conveyors," said Mr U.N. Mishra, associate vice president of engineering at Deepak Fertilizers and Petrochemicals Corp Limited in India.

In summary, rollers are a critical but often overlooked component of a belt conveyor system. HPPE polymer rollers allow fertilizer plant managers and maintenance engineers to run their conveyor systems at full capacity, yet keep the total cost of ownership to a minimum by lowering maintenance requirements and extending belt life. It is therefore true to say that using HPPE rollers can offer all the advantages of metal rollers without any of their usual drawbacks. ■



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