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Technical Article
Technical Article Content Pulled from the NIBA Belt Line Newsletter

Problems Related to Excessive Counterweight on Heavy Duty Belting

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It is a common scene, played out in plants throughout North America every day. A plant changes out a high-tension conveyor belt... the one that brings the rock out from the pit to the surge pile.

Before the plant purchased the belt, the plant manager consulted the original equipment manufacturer's data sheet where it showed a running tension of 680 lbs. An 800 lb.-rated belt was recommended. The pulleys and transition distances were acceptable for that 800 lb. belt to be run on the system, as originally designed.

After initially tracking the belt empty, the plant begins to convey material. The belt then "slips" at the drive. The lead maintenance technician inspects the situation. The technician knows that a conveyor belt slips due to insufficient traction between the belt and the drive pulley. He then decides that the easiest course of action is to add counterweight. The current counterweight is a large concrete block that weighs 14,000 lbs. However, in the "bone yard," there is a larger block . . . one that weighs 25,000 lbs. The change is made, and the slip problem appears to be solved.

As time passes, the belt begins to degenerate into a series of problems. Belt stretch concerns surface first. Then, transverse carcass breaks appear . . . along the edges, and within the belt itself. Splices begin to fail, and fail repeatedly. A closer examination of this belt suggests that its junction integrity may now also be in doubt. The plant manager immediately calls the distributor wanting answers, and a new belt!!

What happened? The technician had good intentions. However, he overlooked one important question, "Can you add TOO much counterweight to a belt?" The impact of increasing counterweight is often overlooked. With *low*-tension belts (ones that typically operate well below rated tension), reasonable counterweight increases would have a minimal effect on belt performance. However, when dealing with *high*-tension belts, it is critical to reflect on all possible consequences before adding any *additional* tension.

Counterweight is a major component of the working tension of a belt. In the case of our belt problem, the increased weight to 25,000 lbs. raised the actual working tension for 680 lbs. (or 85% of the belt's rated working strength) to 907 lbs. (or 114%). Increasing counterweight tension can seriously affect system performance. Many of the conveyor's components, including the belt, may then be of marginal design—or possibly, even under-designed! In our case, these "inflated" counterweight tensions contributed directly to additional stretch. It also resulted in transition distances that were too short, and pulley diameters that were too small, both contributing to the carcass breaks and the premature splice failure.

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Many variables can cause belt slippage, and most can be addressed without adding more weight to the take-up. For example, the drive pulley lagging may be worn, and/or hardened, and in need of replacement. The counterweight carriage may be misaligned, damaged, or even "bottoming out," preventing it from moving freely, as is needed to maintain proper system tension.

No matter what problem you are dealing with, it is always wise to identify the reason for the problem before treating the symptom. In the case of belt "slip," adding more counterweight tension than is actually required is seldom a good idea!