BE CAREFUL WHAT YOU WISH FOR

When planning to replace a rubber conveyor belt, the process of specifying, obtaining and then evaluating quotations from potential suppliers, whether they are a manufacturer, trader, service company or procurement company is full of hidden and very costly pitfalls. Requests for quotations regularly contain specifications that effectively put the buyer and their company at a big disadvantage. In this special feature, conveyor belt specialist Bob Nelson provides his best advice to help in the selection of belts that are not only the technically most suitable but equally, the best value for money.

AVOID 'NON-STANDARD' SPECIFICATIONS WHENEVER POSSIBLE

There are two common types of specification errors – over specification (including unnecessary demands) and specifications that require special, 'non-standard' production. As with all manufacturers, intermediaries and retailers, good stock management is essential in achieving a viable return on investment. In this case, costly rolls of slow-moving spec belts held in stock for prolonged periods is not good business. Conversely, long production runs of fast moving, popular specifications such as, for example, abrasion resistant 400/3 4+2 DIN Y (ISO 14890 L), is the most cost-efficient approach for both manufacturer and end-user.

The dilemma facing manufacturers is that the range of permutations of different tensile strengths; number of plies; cover type (abrasion, oil, fire resistant etc); cover thicknesses and belt widths is very long so it needs to be strictly controlled according to popular demand, leaving all other specifications requiring special (bespoke) production.

BEST ADVICE: My best advice is that wherever possible, avoid non-standard specifications by asking the manufacturer/supplier to provide a list of their standard stock items and available widths.

UNDERSTANDING MASS PRODUCTION

To optimise cost-efficiency and minimise waste and environmental impact, manufacturers also need to make belts as wide as possible (around 2000mm wide). Four of the most commonly used widths are 650mm, 800mm, 1000mm and 1200mm. This means that belt can be produced at 2000mm wide and then cut (slit) into, for example, one roll of 800mm and one roll of 1200mm or two rolls of 1000mm wide etc. It is important to understand that, regardless of the roll length, there is very little difference in production line set-up costs. This is why producing a 100m roll is significantly more costly per meter than producing, for example, a 400m roll.

BEST ADVICE: If buying a non-standard specification is unavoidable, always try to order a full roll (usually at least 200 meters) or a multiple of the required length to a total length that is economic for special production to minimise the cost per meter. Belt that is surplus to immediate requirements can be used to provide inserts for damage repair or, better still, act as a spare if emergency replacement is necessary.

CHOOSING THE OUTER COVERS

The biggest influence on the performance and longevity of a conveyor belt is the quality and resilience of its rubber covers. In quarrying and mining, the key rubber properties are usually resistance to abrasive wear, cutting, gouging and ripping & tearing. The wear properties of ALL abrasion resistant conveyor belts should be at least DIN Y standard (ISO 4649 / DIN 53516 test maximum 150 mm3 loss) to achieve reasonable economic longevity (lowest lifetime cost). If sharp, abrasive materials are being conveyed then higher-grade DIN X covers (maximum rubber loss under testing of 120 mm³] may be more suitable due to a higher resistance to cutting and gouging.

A quality manufacturer's DIN Y can often be more durable and more wear resistant than another manufacturer's DIN X or even DIN W.

Faced with continual surface wear and damage problems, increasing the cover specification may seem logical but not necessarily the best solution. One manufacturer's DIN Y (ISO 14890 L) can often be far more durable and wear resistant than another manufacturer's DIN X (ISO 14890 H) or even DIN W (ISO 14890 D), which are usually reserved for extreme duty applications. Laboratory testing regularly exposes instances of belts at the lower end of the price/quality spectrum claimed to be DIN X or DIN W, but which are actually below the DIN Y standard.

As previously mentioned, rubber quality is key. A highly experienced application engineer friend of mine recently proved the truth of this when he was inspecting a belt supplied by Fenner Dunlop in The Netherlands that was running on a particularly aggressive application in Finland. *"The top cover thickness was measured using an ultrasonic thickness gauge. Amazingly, only 7%, about 0.5mm, of the cover had worn away in 2 years and 3 months service".*

BEST ADVICE: Rather than blindly increasing the cover grade specification, simply change to a manufacturer with a tradition for high quality instead of manufacturers that produce belts designed to achieve a low selling price rather than a high standard of performance.

COVER TYPES

When experiencing repeated stoppages for cover surface repairs, rip and tear damage and ultimately, premature replacement, a common practice is to fit belts with thicker covers and heavier carcasses. This is almost invariably a costly mistake because simply using more of the same material is not the answer. The same applies to fitting low-priced 'sacrificial' belts.

The most economical solution all round is to fit a conveyor belt that has been specifically engineered for the purpose. The best one's are proven to last up to 400% (or more) longer than conventional multi-ply belts because they have a combination of top-quality, highly resilient rubber and highly specialised inner-ply fabrics with up to five times

Specially designed super-tough belts often last up to 400% longer than conventional belts.

Sealed edges are usually perfectly adequate

the resistance to rips and tears compared to conventional multi-ply belts. The initial buying price will be higher, but the cost will be many times lower over the working life of the belt, with the added benefits of far lower 'below the line' costs for repairs and downtime.

BEST ADVICE: Always choose belts that are specifically engineered for the conditions they need to cope with, especially on conveyors prone to rip, tear and impact damage.

SPECIFYING THE CORRECT TYPE OF BELT EDGE

In my experience, unnecessarily specifying belts with moulded edges is probably the most common over-specification and one that has a significant impact on belt costs, repairs, maintenance, lost production and lead times. Originally, (more than 40 years ago) moulded edges were necessary because cotton was used as the reinforcing fabric in multi-ply belts. A moulded edge (fully covered in rubber) was therefore essential to prevent moisture penetrating the cotton fabric and causing it to rot. Apart from steel cord and steel-reinforced belts, the introduction of synthetic ply fabrics using polyester and polyamide means that this problem barely exists. Despite this, many conveyor operators (and their buying departments and procurement companies) continue to specify moulded edges, even though they do not provide any structural advantage and can be prone to damage if the belt wanders off-track.

The first signs – small cracks appear on the surface of the rubber.

Nowadays, the most commonly used type is the 'cut & sealed' edge or simply 'sealed edge', which prevents moisture being drawn into the carcass by capillary forces. Although the synthetic fibre plies are barely affected, moisture can potentially cause vulcanising problems when making splice joints. For this reason, never order a belt with a raw edge. Provided that the belt is also resistant to ozone & ultraviolet, a sealed edge also enables a belt to be used in very wet conditions and better suited for long-term storage outdoors.

The importance of not over-specifying the type of belt edge comes back to the need to manufacture belts at the optimum width and length. This is why the vast majority of rubber multi-ply belting held in stock by manufacturers and other suppliers has sealed edges. Moulded edges can only be created when a belt is manufactured to an exact width so if, for example, a belt that is 1000mm wide is specified with moulded edges then the manufacturer cannot achieve optimum production efficiency, which must therefore be reflected in the selling price.

BEST ADVICE: Rather than specifying the edge type, always choose the most economical the supplier can offer, being either moulded edge or cut and sealed edge.

OZONE AND ULTRAVIOLET RESISTANCE.

Finally, resistance to the damaging effects of ozone and ultraviolet light is something that should, without exception, be part of any specification. At low altitude ozone (O3) becomes a pollutant that attacks the molecular structure of rubber, causing a seriously damaging reaction known as ozonolysis The first visible sign is when cracks start to appear in the surface of the rubber. Further attacks then occur inside the freshly exposed cracks, which continue to grow steadily until they complete a 'circuit' and the rubber starts to fail.

Ultraviolet light from sunlight and fluorescent lighting has a similar effect because it produces photochemical reactions that cause oxidation of the rubber surface resulting in a loss in mechanical strength and wear resistance. This is known as 'UV degradation'. The combination of ozone and UV seriously reduces the operational lifetime of a rubber belt. Although easy to prevent, surveys show that some 90% of belts sold in Europe, the Middle East and Africa are not protected. This is because the necessary anti-ozonants have been omitted because of cost.

BEST ADVICE: Never order a conveyor belt without first obtaining written confirmation from the supplier/ manufacturer that the belt being supplied is fully resistant to ozone and UV according to EN ISO 1431/1 procedure B testing over a 96 hour period.

CONCLUSION

Old habits die hard as they say. But simply ordering the same specification that you have ordered before without thinking of the possible implications can waste a lot of time and money.

AUTHOR

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