

CONVEYING DRIVE RELIABILITY

**Leslie David,
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reviews how conducting
regular maintenance,
preventing waste
buildup, and using high
quality components can
enhance the reliability of
conveyor systems.

Figure 1. Installing a heavier belt can
increase absorbed motor power.

The reliability of any conveyor system first depends on the reliability of its power source. The best way to maximise throughput and minimise stoppage time is to understand and avoid the causes of potential drive motor problems.

Listening for problems

A healthy conveyor system should produce a consistent, steady sound. Excessive or unusual noises can indicate underlying mechanical issues that may lead to bigger problems if left unaddressed. Apart from audible signs, the most common indications of drive motor problems are overheating (motor temperature exceeding 80°C), increased electrical consumption, and unexplained tripped breakers. Common causes of these symptoms include worn or loose components, lack of lubrication, and misalignment, all of which can increase friction and consequent heat and accelerated wear, so identifying and resolving these issues and avoiding a reoccurrence is essential.

It's not what you expect, it's what you inspect

The drive motor should be regularly inspected for any visible damage and loose or missing bolts or screws, especially mounting bolts. Inspection also needs to include checks for blocked ventilation systems, debris or dust accumulation on the motor fan or radiator, and worn components – all of which place excessive strain on the motor.



Waste build up is a very common cause of avoidable wear and damage to conveyor components, so areas where product spillage occurs need to be routinely cleaned.

Another thing to watch out for are worn drum linings and corrosion from washdowns or exposure to chemical agents, which can damage electrical connections and motor casings. Last but not least, is the need to regularly lubricate bearings and gearboxes. Failure to do so increases internal friction, requiring higher motor current.



Figure 2. Unclean work environments are the most common cause of accelerated wear and damage.

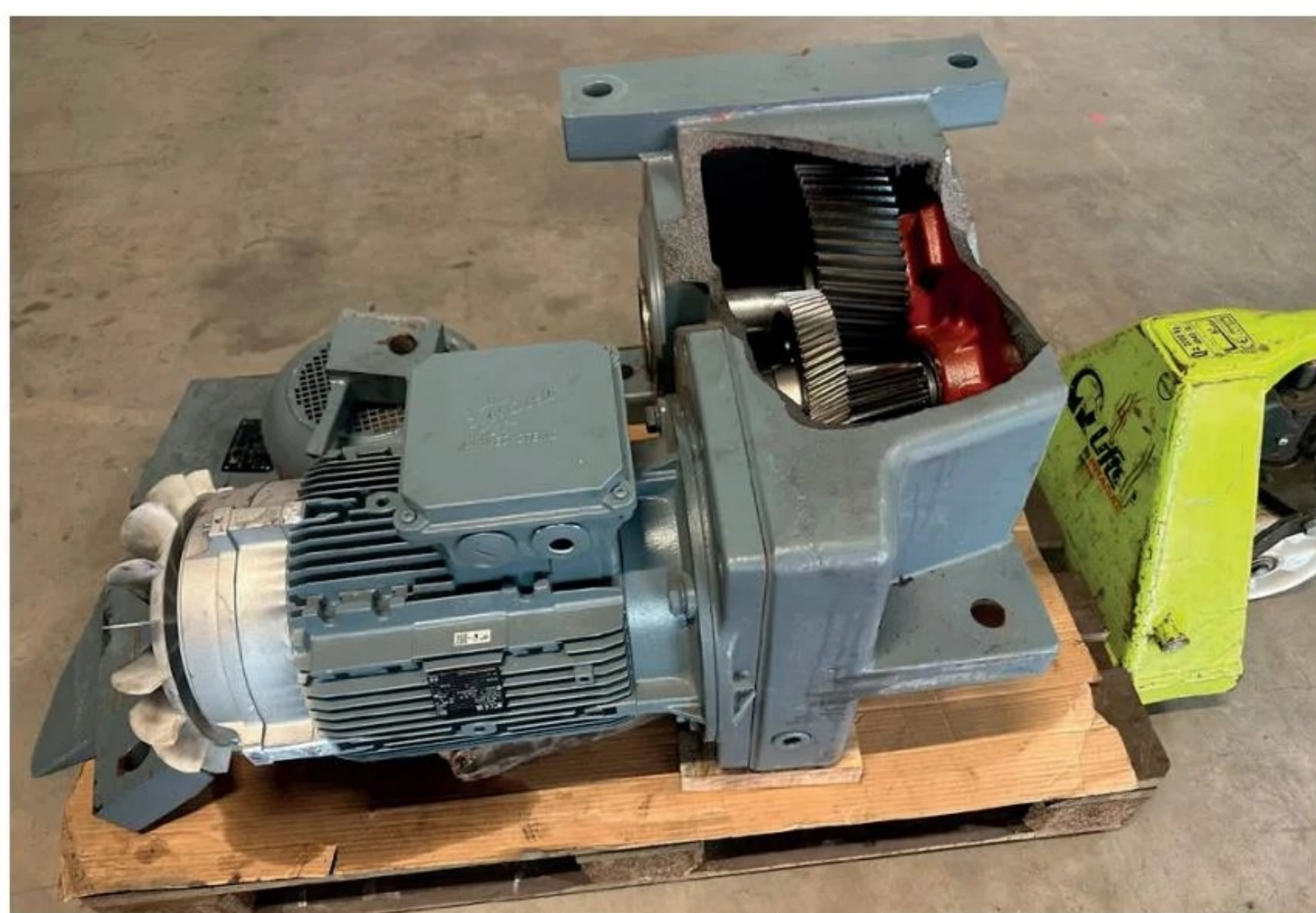


Figure 3. An overloaded drive motor can literally blow itself apart.



Figure 4. Belt slippage caused by waste matter increases strain on motor.

System overload

If a conveyor's maximum weight capacity is consistently exceeded, either in terms of volume and/or weight, then the motor is forced to draw higher amperage, leading to overheating and potential burnout.

Although running a higher throughput at equal speed will fill the belt more, greater volume means an increased weight load that may possibly exceed the power capacity of the motor. Excess weight will also compromise the tensile strength of the belt and the splice joint, which is its weakest point.

To calculate the maximum load requires the belt width, the trough shape, density of material, and the typical tonnage per hour. From the tonnes per hour and speed (m/sec.) you can calculate kilos per metre and a volume density (m^3/m). You can ask the manufacturer/supplier to help make this calculation, or alternatively you can make use of easy-to-use modern technology, such as the Fenner Dunlop Belt Buddy App – 'Capacity calculation for troughed conveyor' for the volumetric check and 'Motor power calculation for troughed conveyor' for the motorpower and tensile.

Belt slippage

A sure sign of an overloaded belt is a high-pitched screeching sound as it loses traction on the pulley and starts to slip. This creates extreme friction that heats up the pulley and strains the motor as it tries to move the load. Other common causes are inadequate belt tension, worn drum linings, waste matter between belt (unclean environment), and belt surfaces where the rubber has aged and become brittle.

Cracked and hardened rubber and a loss of flexibility is almost invariably caused because the rubber is not resistant to the effects of ground-level ozone (O_3) and ultraviolet light (UV). The most visible symptom is cracks in the surface, which create the additional problem of waste build-up on the drive motor and other components because dust particles penetrate the cracks and are then shaken out on the return run. Although resistance can be easily achieved when the rubber is made, more than 85% of belts sold in Europe, the Middle East, and Africa are not ozone and UV resistant because of price competition. Important tip: Always insist on resistance to ozone and ultraviolet light certification according to EN ISO 1431 test methods.

Seized or damaged rollers

If rollers seize due to debris or lack of lubrication, they create significant drag, forcing the motor to work that much harder to pull the belt while at the same time, causing excessive wear on the conveyor belt surface. The best and ultimately most economical way to avoid such problems are a disciplined maintenance programme and not using 'cheap', low quality components.

Experience consistently proves that a purchasing policy based on the low buying price of a component rather than its whole life cost is a false economy. Low-grade bearings and rollers are susceptible to premature wear and can seize up or disintegrate very easily, causing significant friction that can lead to motor burnout or extremely expensive belt damage.

As with conveyor belts, there can be huge price differences for components of seemingly the same specification, but low

priced components are low priced for a reason. Precision-engineered bearings and robust rollers are more expensive to make, but they are specifically engineered for prolonged use and requiring less power to operate. Exactly the same principle applies when buying drive motors and conveyor belts.

Misalignment

A misaligned belt that rubs against the conveyor structure creates excessive friction, which again puts unnecessary extra load on the motor and irreparably damages the belt at the same time.

Yet again, an unclean environment can cause material to stick to the belt and build up around the drive pulley, increasing the tension required to move the belt and adding an unnecessary extra strain on the motor.

Over-specified belts

When trying to solve rapid cover wear, rip, tear, and impact problems, a common mistake made is to increase the thickness of the covers, the number of plies and/or the tensile strength. Although a seemingly logical action, belts that exceed the belt specification the conveyor was designed for can increase the absorbed motor power as well as causing troughing and handling problems.

The only real solution to rip, tear, and impact damage is to fit a conveyor belt that has been specifically engineered to withstand the kind of punishment that would destroy a normal belt. The initial investment will understandably



Figure 5. Low-priced components are low priced for a reason – they do not last.

be bigger, but without doubt, it will easily be the most cost-effective solution.

Conclusion

When it comes to drive motor reliability, there are three equally important principles – regular maintenance (including thorough inspections), the prevention of waste build up that contaminates the motor and other key components, and last, but certainly not least, avoiding the short term ‘economy trap’ by only using high quality components including the conveyor belt, drums, pulleys, idlers, and rollers. The payback for following these three principles will far fewer stoppages, increased productivity and components that will provide the lowest lifetime cost. **GMR**