WILL LOWER RUN-OUT IMPROVE MY CONVEYOR PERFORMANCE?

CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION
Conveyor Pulley Committee
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Conveyor pulleys with low run-out during operation are more balanced, operate smoothly, and distribute the belt load more evenly. This helps to extend the life of pulleys, belts and other critical components in a conveyor system. For this reason, CEMA has specified that all welded steel conveyor pulleys adhere to a specified circular run-out. The run-out tolerance specified in CEMA standards, excludes the effect of lagging applied to the pulley face. For run-out specifications over the lagging, consult your conveyor pulley manufacturer.

Since the early 1960s, CEMA drum pulleys have adhered to diameter variations, which provides the permissible diameter tolerance. Diameter variations refers to the allowable range of diameters as measured at the midpoint of the face width. This measurement is independent of the run-out on the pulley and essentially allows the pulley to be slightly smaller or slightly larger than the nominal pulley diameter. Typically, the pulley diameter is measured around the circumference using a diameter tape measure.

In 1987, CEMA required drum pulleys to adhere to a specified circular run-out tolerance. Circular run-out is the amount a given feature varies with respect to a datum when the part is rotated 360 degrees. For conveyor pulleys, the datum is generally the centerline or axis of the pulley shaft. Per CEMA B105.1, the run-out is measured at the midpoint of the pulley face with a dial indicator. The dial indicator is held stationary while the pulley and shaft are rotated on a set of rollers or gauge blocks, see Figure 1.

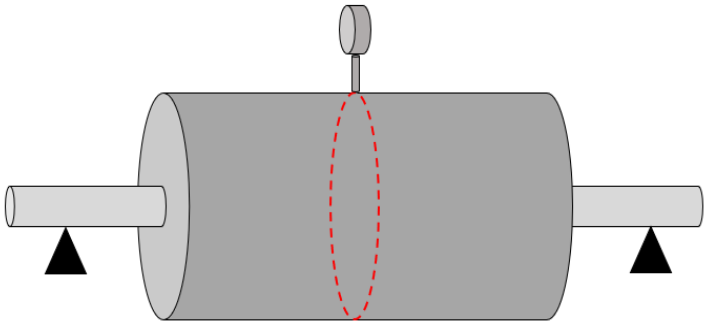

Figure 1: Circular run-out measurement on conveyor pulleys

The difference between the highest value and the lowest value on the dial is referred to as the total indicator reading, TIR. The measured TIR is the pulley's circular run-out at the measured location. The run-out of the pulley is not affected by the diameter tolerance as the pulley is rotated 360 degrees during examination. Table 1 shows the CEMA recommended maximum permissible run-out on a bare drum pulley.

Table 1: Maximum permissible run-out per ANSI/CEMA B105.1

Diameters in (mm)	Maximum Total Indicator Reading (TIR) in (mm)
8 (203) thru 24 (610)	0.125 (3.18)
Over 24 (610) thru 48 (1219)	0.188 (4.75)
Over 48 (1219) thru 60 (1524)	0.250 (6.35)

Controlling run-out on drive pulleys is especially important. When torque is applied to the drive pulley shaft, the OD of the pulley stretches the belt, thus applying belt tension. Assuming negligible run-out on the drive pulley, the tension in the belt will only vary due to material loading. If the pulley run-out is excessive, as shown in Figure 2, the belt tension will stretch and contract as the pulley rotates. This unnecessarily overloads the belt and pulley, thus decreasing the fatigue life of these components. Other effects of excessive run-out include: ineffective belt cleaning, material spillage, and increased noise and vibration.

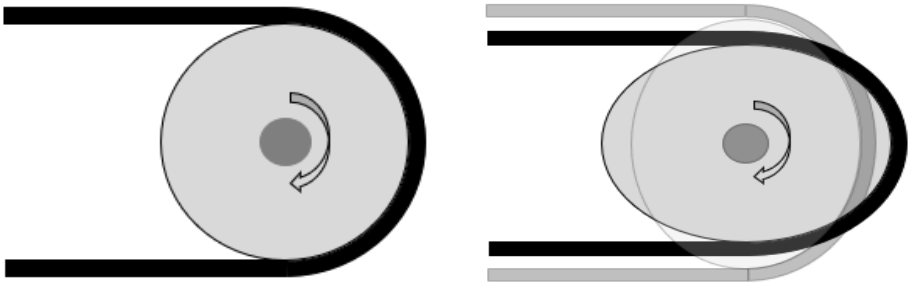

Figure 2: Drive pulley with no run-out (Left) excessive run-out (Right) [exaggerated]

The pulley run-out is affected by the components of a pulley assembly. Components such as bearings, bushings and shafting introduce run-out as well. These values stack up when measured on the pulley rim. Considering the way circular run-out is measured, run-out imposed by shafting, bushings and pulley construction are typically included in the run-out limits. Excessive run-out may be caused by improper installation of bushings and bearings, or a bent shaft. Due to variations in bearing attachment methods, bearings are not explicitly included in pulley run-out tolerances. For tighter tolerances or for more information on circular run-out, consult your pulley manufacturer.

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