

Conveyor Pulleys

“Why Is Balance So Important?”



Conveyor Pulley Committee

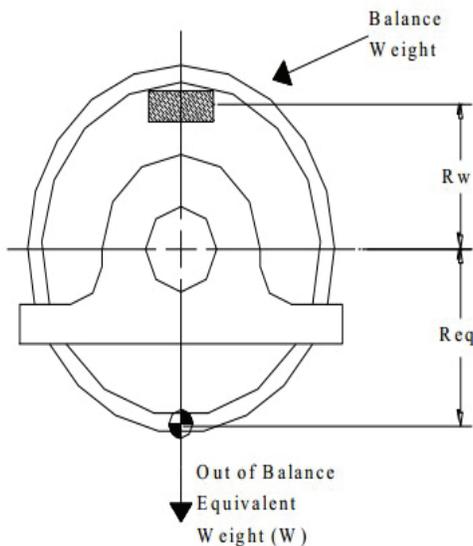
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Balance, especially on rotating components, is a topic discussed in many types of applications. When we talk about balance of rotating components, particularly conveyor pulleys, there are two questions which come to mind.

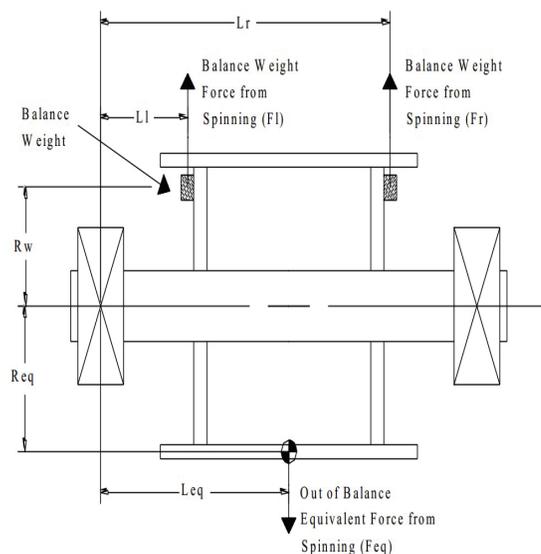
Why is balance important? And, if I need to balance my pulley, to what grade should I balance it?

Pulley balance, or more importantly imbalance, is broken into dynamic and static. Static, which is more common, is used to prevent the pulley from rotating due to the force of gravity. When a pulley is out of balance, there are areas of the drum which are heavier than others. These “heavy spots” tend to want to sit at the bottom of the pulley due to the pull of gravity. If a conveyor is stopped, and the heavy spot is at the top of the pulley, it may rotate so that this heavy spot is now at the bottom of the pulley. This is dangerous when personnel may be near the pulley performing maintenance, especially when working between the pulley and the conveyor belt. For this reason, static balance is often requested on larger pulleys where this phenomenon poses a greater hazard.

A static imbalance will also influence the effective weight of a pulley as it rotates. This should be considered when the pulley is located on a cantilever structure where a varying vertical force could cause a swaying deflection in the structure. A swaying structure is prone to failure, just like a wire will eventually break when bent back and forth enough. This swaying deflection could reach the natural frequency of the structure at a certain pulley rpm, which would cause the deflection to compound with each rotation. This balance occurs along the axis of the shaft only, as shown in the diagram below.



Static Balance Diagram



Dynamic Balance Diagram

Dynamic balance is not as common for most pulley applications. Dynamic balance is critical in high rpm applications, typically over 1000 rpm. In this scenario, the imbalance weight (or force) on the pulley may be enough to cause the pulley to vibrate the structure or components attached to the pulley. This is due to the inertia of the out of balance weight, which exerts forces on the pulley and the mounting structure. In this application, the pulley must be balanced using a machine, to ensure the pulley is both balanced around the circumference, as well as along the face, or axially. Dynamic balance is important for pulleys in high speed applications where the surrounding structure may be prone to vibration. Typically, conveyor pulleys do not meet these requirements.

The balance grade is simply the amount of weight the pulley is allowed to be out of balance. Pulleys are typically balanced according to ISO 1940/1. The grade is selected based on the application and speed the pulley will be turning.

For further detail on pulley balance and its usage, contact your pulley manufacturer.

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