



WR² Or The Flywheel Effect

PA NOTE

In rare instances, success may turn to failure. The replacement of a V-belt drive with a synchronous drive such as Poly Chain® GT®, may lead to premature motor or belt failure. Some large V-belt drives have very heavy driveN pulleys which act as a flywheel. Replacing this pulley with a smaller, narrower, and overall lighter synchronous drive can remove this flywheel effect.

The flywheel is primarily used to oppose and moderate any fluctuation of speed in machinery. Pulleys with extra flywheel, or extra inertia, are sometimes required for proper operation of the driveN machine (punch press, pumps, crushers and paper mills for example). Shafts in many different kinds of machinery are subjected to torque loading that is not uniform throughout a work cycle. Using a flywheel, a smaller driving motor can be used and also achieve a smoother operation.

To maintain a steady-speed of driveN machine, the external torque, T, must be constantly adjusted to equal transmitted torque, TT. In such a situation, a motor could suffer fatigue effects. Inserting a flywheel into the drive system, or a pulley with a large WR², will allow the peaks and valleys to be reduced. This is because of the flywheel's ability to absorb energy over periods when T is greater than TT, and to deliver back into the system such excess energy when T is less than TT.

Inertia of a sprocket is proportional to WR² (weight times the square of the radius of gyration), and so either weight or diameter can be increased. Increasing the diameter has more effect (radius squared) but diameter is usually fixed by application. Therefore, the usual means of providing more WR² is by making the sprocket rim thicker or wider than normal.

Although flywheels absorb much of the torque fluctuations or shock loads in a drive, some of these fluctuations will be passed on to the belt. This is why there is a high service factor attached to these type of machines.

When replacing large pulleys with sprockets, be very careful you do not remove a designed in flywheel effect. Ask questions and look at the drive, if possible, to make sure there is not a concern for a high WR². If there is a concern, you may have to use a wider sprocket than the belt, a larger diameter, or a special sprocket to increase the weight and thus the WR². With synchronous drives you can use narrower widths with resulting lower motor (driveR) bearing loads, space savings, and cost savings. The savings, however, may be wiped out by having to use larger or special sprockets.