

WP0252

Dodge® synchronous belt drives: converting from V-belt drives requiring flywheel effect

Dodge Customer/Order Engineering

06-19-2017



There is emphasis today to convert V-belt drives to synchronous belt drives due to the many advantages that synchronous belt drives offer. However, some applications, such as those where slip is necessary or applications where a flywheel is required, should be selected with care.

A flywheel is primarily an energy storage device. It absorbs rotational energy and stores it when the supply of energy is more than the demand and releases energy when the demand is more than the supply. This behavior is known as the flywheel effect and helps to moderate fluctuations in machine operation. Pulleys with extra inertia are sometimes required for proper operation of the driven equipment. Some applications, such as punch presses, pumps, crushers and paper mills are subjected to torque loads which are not uniform during the cycle. With a flywheel, a smaller drive motor can be used to achieve smoother operation.

As mentioned above, a flywheel absorbs energy and stores it when the supply of energy is more than the demand and releases energy when the demand is more than the supply. Inertia of a sheave or sprocket is calculated by WR^2 , where "W" is the mass and "R" is the distance from the rotational axis to the center of mass. Therefore, to increase inertia, either weight needs to be increased or the diameter needs to be increased. Increasing the diameter would have a greater effect than increasing weight since length is squared in the equation. However, the diameter of a sheave is normally decided by application parameters and various other factors. Therefore, the inertia of a sheave or sprocket is generally increased by increasing the rim thickness or width.

Though the flywheel absorbs a lot of the torque fluctuations or shock loads in an application some of these fluctuations do get passed on to the driven equipment. For this reason, a higher service factor should be used in these applications.

Frequently, when a V-belt drive is converted to a synchronous drive, large V-belt sheaves are replaced by smaller and lighter synchronous sprockets. This reduces flywheel effect, which may be needed for the application. In such a case one would have to use wider sprockets than the belt, increase the diameter of the sprockets, or make special sprockets with higher weight to increase the inertia. However, doing so may take away the advantage of converting to a synchronous drive.

Therefore, care is required when converting such applications from V-belt drives to synchronous belt drives.

For any questions please call us at 864-284-5700 or e-mail us at DodgeEngineering@abb.com.

EXTERNAL/PUBLIC DOCUMENT

ABB Motors and Mechanical Inc.

6040 Ponders Court

Greenville, SC 29615

Phone: +1 864 284 5700

Email: DodgeEngineering@abb.com