

Vee Belt Drives & Coupling Types

Website: www.ttetraining.ltd.uk



International Safety Awards
Awarded 2006
BRITISH SAFETY COUNCIL



Vee Belt Drives

Belt fitting, belt wear, belt material and belt alignment need to be set-up correctly to ensure the drive is reliable and long lasting.

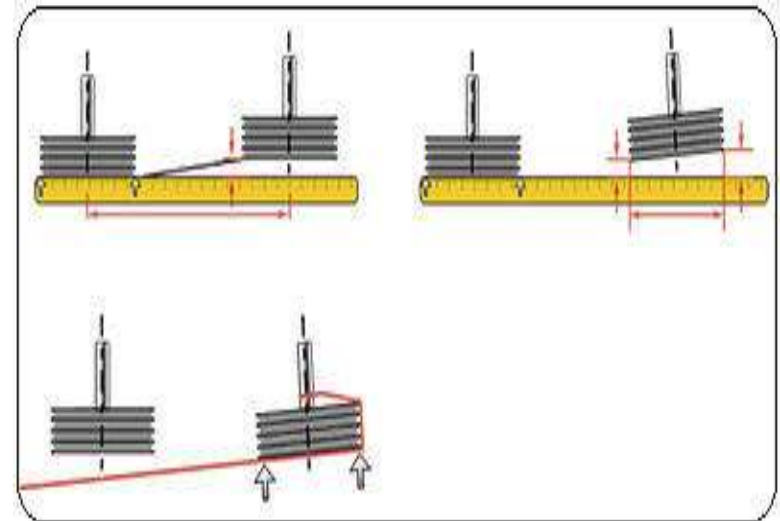
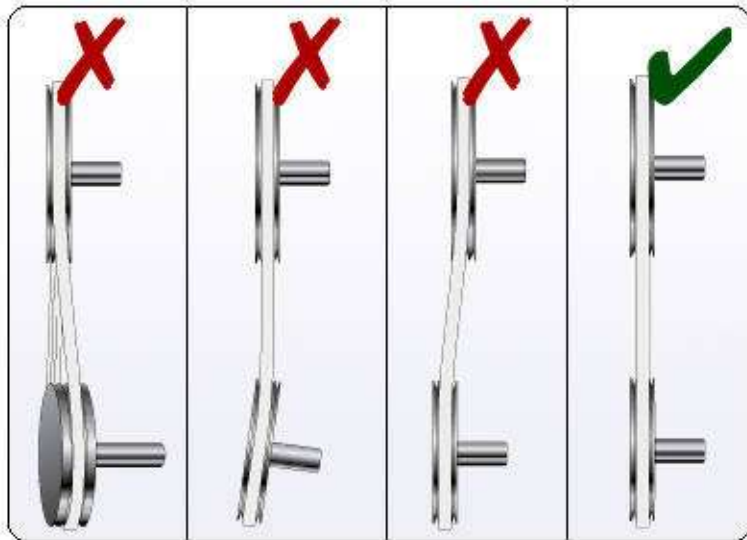
Ensure the following when fitting Vee Belts

All belt used in zoned areas need to be F.R.A.S. belts. (Fire Resistant Anti Static)

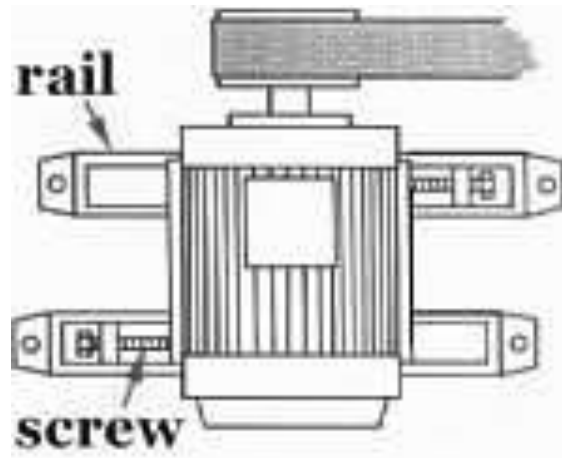
Always ensure that you change out a full set of belts, never replace one or two.

Also check that the set of belts you are fitting have the same batch number as this is the only way of ensuring each belt has the same length.

The maximum allowable pulley miss-alignment is $< 0.5\text{mm}$ per 100 mm of pulley separation. Always ensure that you have good alignment of the pulley's as shown.



Pulley alignment is crucial when driving through belts.



The plan view of the motor and pulley arrangement shows a slide rail system that stops the motor from slewing as the belts are tensioned, thus maintaining parallel pulley alignment. (Note that the orientation of the rails)

Advantages of a Belt Drive System

Easy and economical installation.

No lubrication required.

Clean & low maintenance.

Elasticity of belts helps shock load dampening.

Quiet, smooth operation.

Long life expectancy when well designed.

Good mechanical efficiency.



Important Facts about V-Belt systems

Ability to slip upon overload, resulting in a fail-safe drive.

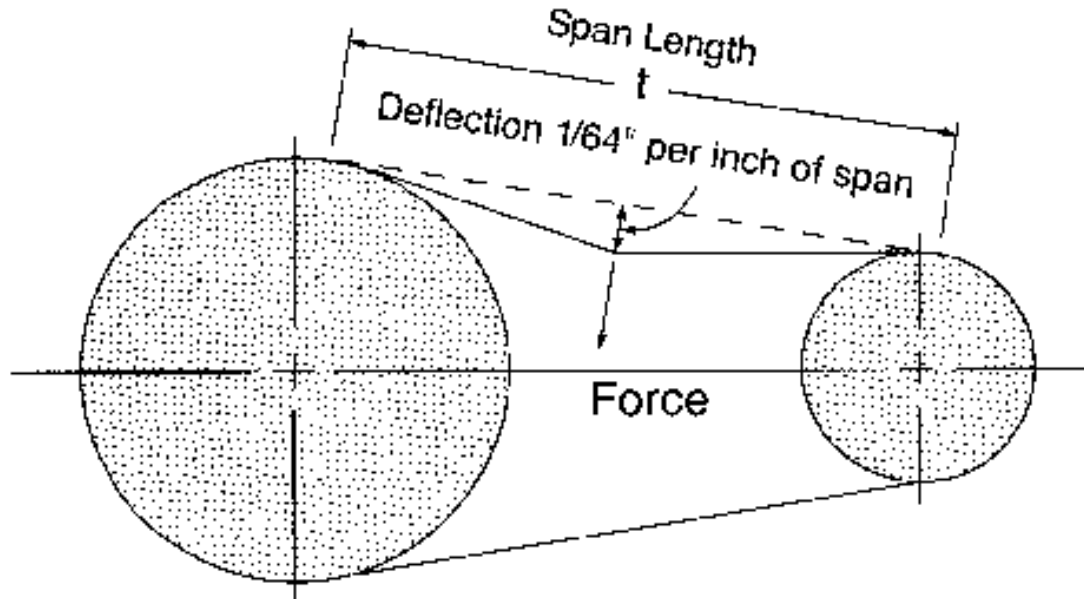
Generally 5% slippage.

Multiple belt systems never slip against each other and therefore belt should never be wound on under tension.

A belt drive system should never be lubricated as it depends on friction to transmit power, in contrast with chain or gear systems.

Too much tension can cause excessive wear on belts & bearings.

Too little tension allows slippage, loss of power & additional wear.



Wherever possible a Vee Belt Tension Tester should be used

Installation Procedure

Clean all surfaces (grooves, taper hub, shafts, etc.

Verify alignment

Proper Belt tension

Check tension after 48 hours

Checking Pulley Vee for wear

Worn grooves cause one or more belts to ride lower than the others, resulting in premature wear of belts & reduced performance levels (see Figure below)

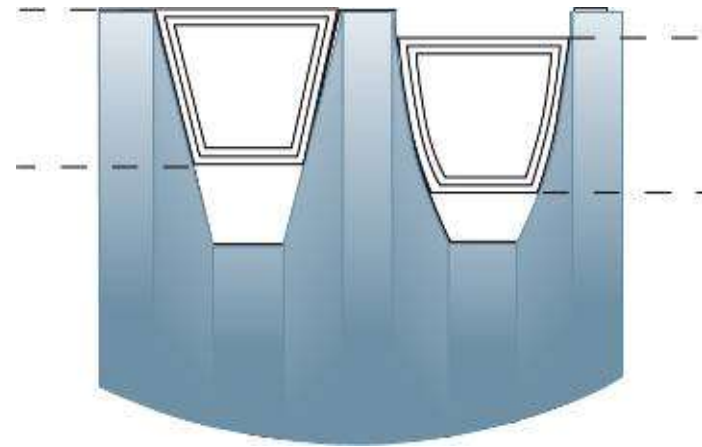
If wear is premature, could be caused by misalignment.

Signs of wear:

One or more belts are slack while others are tight?

Bottom of the groove is shiny?

Belts wear out quickly?

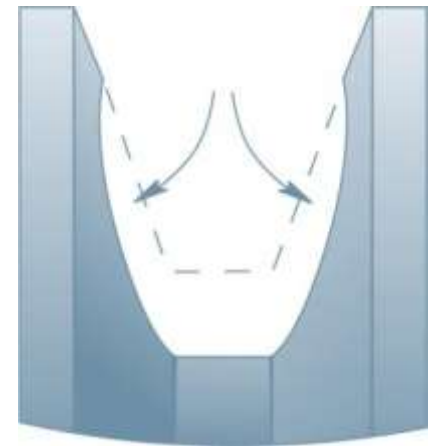


How to check for wear quickly?

Using a suitable belt gage is an inexpensive tool that can be inserted in the groove until the rim touches the flange. If more than $\frac{1}{32}$ " wear, replace the sheave (see Figure opposite).

The cost of replacing the part is soon offset by the number of belts that will be quickly ruined by rounded sidewalls.

Resulting belt problems – touching bottom and slipping, reduced wedging action & less gripping power.



Cogged Vee Belts

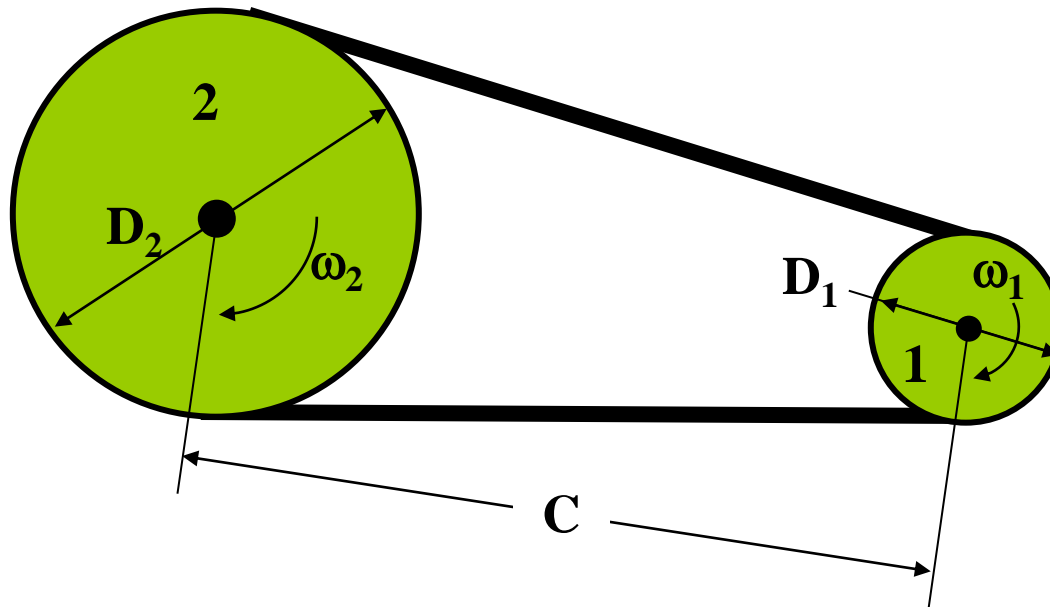
Cogged Belts

These are used where a tight radius is required in the drive system. It allows the belt to maintain its Vee section profile as it passes over a small Vee drive pulley, thus improving contact and reducing surface embrittlement on the sides of the belt caused by slippage.



Belt Drives

Uses friction to transmit power



Speed = $D_1 / D_2 \times \text{R.P.M. of driver} = \text{R.P.M. of driven}$

Belt Drive Basics

Speed Ratio = 2.5

4"
1750 rpm

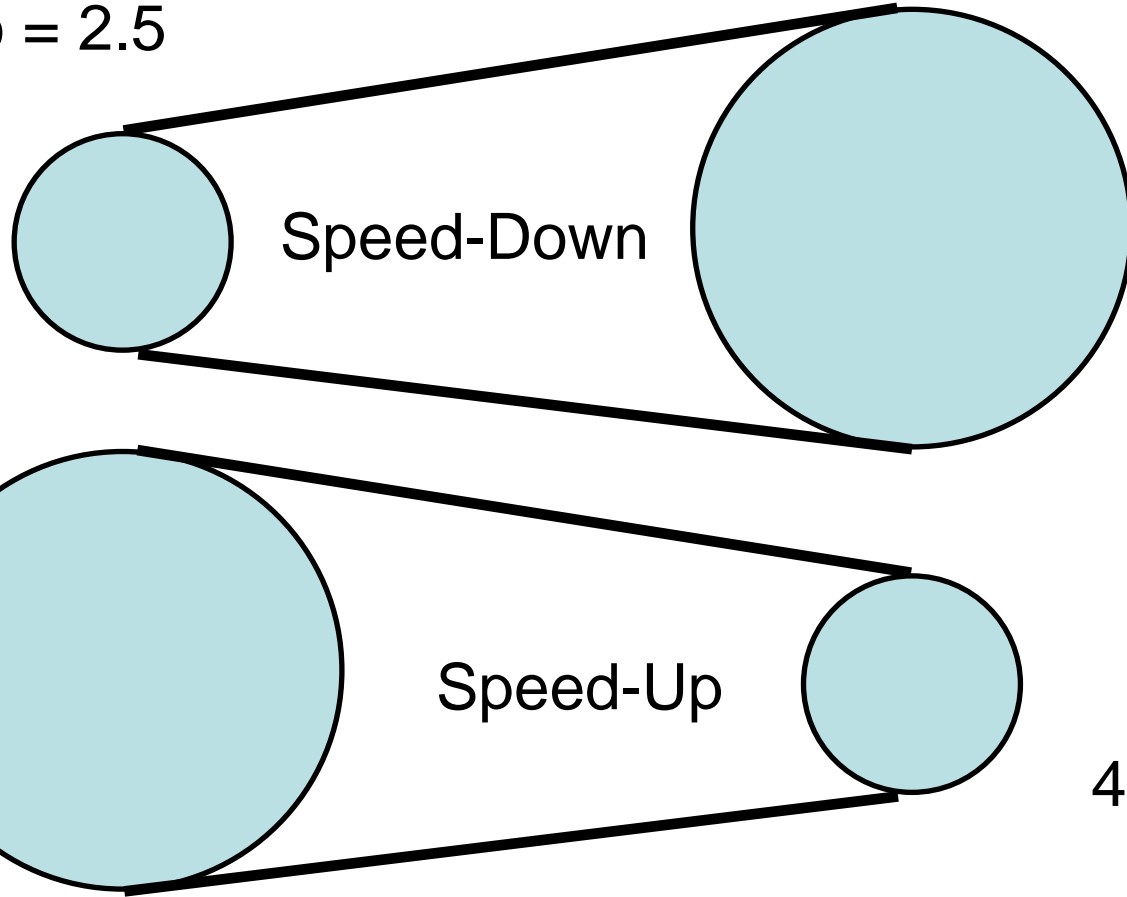
Speed-Down

10"
700 rpm

10"
1750 rpm

Speed-Up

4"
4375 rpm



Main Advantages

- No lubrication required
- Clean & low maintenance
- Low-stretch tensile cord nearly eliminating the need for re-tensioning
- Eliminate noise problems of chain drives
- Long life expectancy when well designed
- Smooth engagement of belt with pulley allows high speeds
- Less weight compared to chain and gear drives for same horsepower requirements
- Can operate in wet environments

SYNCHRONOUS BELT DRIVES



THREE CATEGORIES OF SYNCHRONOUS DRIVES:

A) Synchronous Belt Drive

B) Gear drive

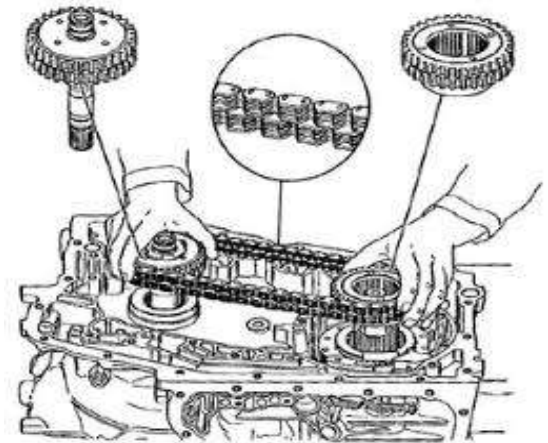
C) Chain drive



A



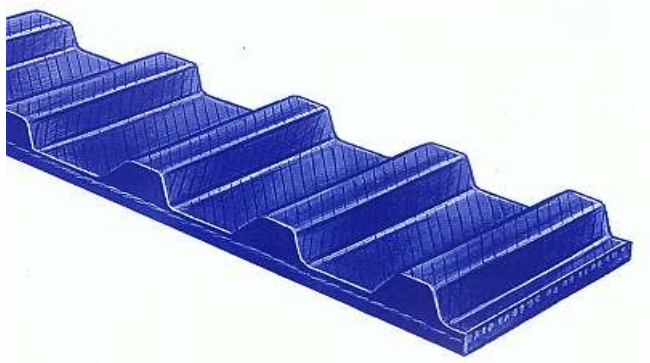
B



C

Toothed Timing Belt Drives

Standard/Trapezoidal Synchronous belt



H.T.B. High Torque Belt/ Curvilinear Synchronous Belt



Installation of Timing Belts

Prior to installation, the drive centre distance should be reduced so that the timing belt can be installed without force.

If this is not possible, the timing belt must be installed together with one or both of the timing belt pulleys.

Installation with the use of the force is NOT permissible at any time.



Main Advantages

No need for expensive drive enclosures

No need for lubrication systems

No need for tensioning devices

No adjustment needed due to stretch or wear

No worn sprocket replacement

No ongoing maintenance costs for roller chain

COUPLINGS

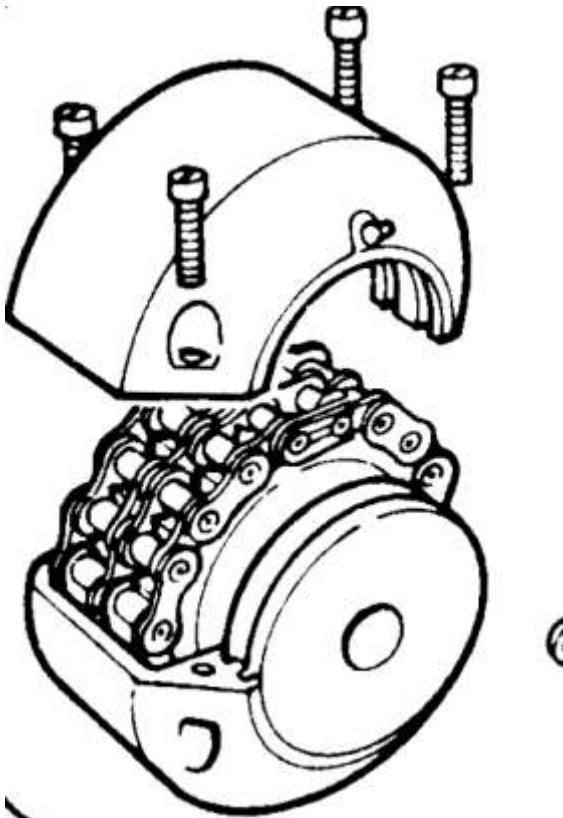
Drive Couplings

A coupling is used to connect two in-line shafts to allow one shaft (driver) to drive the second shaft (driven) at the same speed.

A coupling can be rigid or, more normally, it can be flexible allowing relative radial, axial or angular movement of the two shafts. (Note: Flexible couplings are not an excuse to accept poor alignment)

Unlike the clutch the coupling transmission is not designed to engage-disengage as a normal operation

Chain Coupling



Bibby Coupling



Gear Coupling



Metastream Flexible Coupling



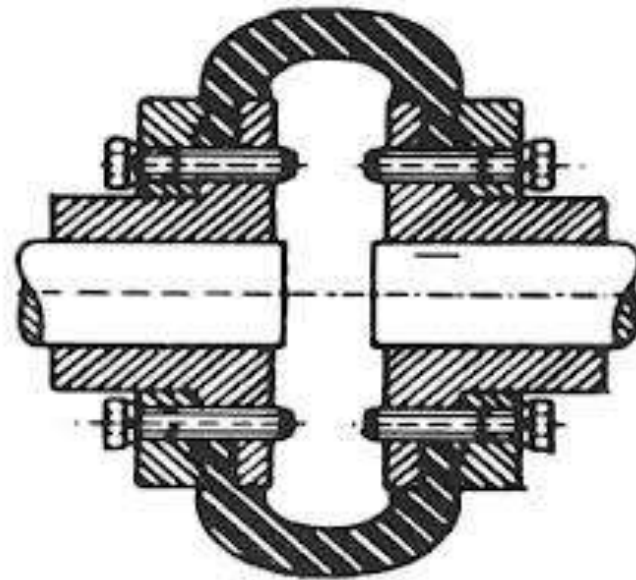
Fluid Coupling



Pin and Bush Coupling



Tyre Coupling - External



Disc or Flexible Membrane Coupling



Spider Coupling



Universal Coupling and Constant Velocity



ANY QUESTIONS?