

WP0113

Dodge® V-belt and synchronous belt drives: idler placement

Dodge Customer/Order Engineering

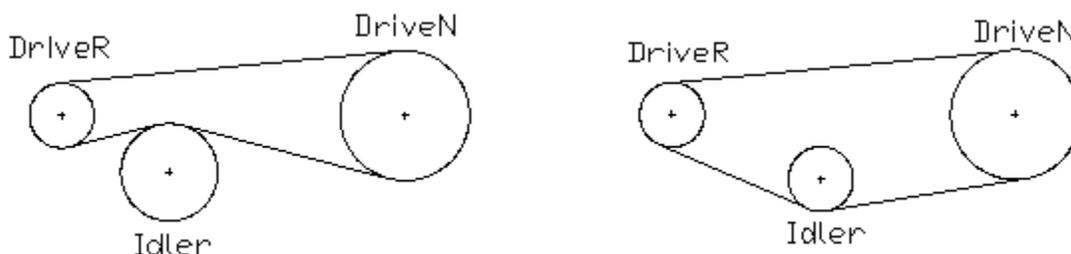
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Idler sheaves, sprockets, & pulleys are used for a variety of reasons on V-belt and synchronous belt drive systems. Some common uses of idlers are: to allow for tensioning of fixed center distance drives, to move the belt around an obstruction, to turn a corner, to increase the arc of contact on a particular sheave or sprocket, to reduce belt 'whip' in long spans, etc. Idlers impart additional bending stresses on belts and therefore, should only be used when absolutely necessary. When idlers must be used, placement of the idler within the drive is an important consideration.

Placement: Inside or Outside?

Idlers may be used on the inside or outside of a belt, depending on the drive characteristics. Inside idlers must be sheaves or sprockets, while outside idlers, except in the case of double-sided belts, are usually flat or crowned pulleys.



Inside idlers reduce the arc of contact of both sheaves/sprockets in the drive, reducing the horsepower carrying capability, but are recommended over outside idlers. Outside idlers impose reverse bending stresses on the belt, greatly reducing the life of the belt. Inside idlers can be smaller in diameter than outside idlers. Inside idlers should be no smaller than the smallest sheave or sprocket in the drive. Outside idlers should be no smaller than 1.5 times the smallest sheave or sprocket. Also, outside idlers generally have more limited take-up due to possible interference with the opposite span of the belt.

Outside idlers do have some advantages. Outside idlers are often flat face pulleys, which can be less expensive. Arc of contact is also increased with outside idlers, increasing the horsepower capacity of a drive.

Placement: Tight Side or Slack Side?

Idlers should be placed on the slack side of a drive whenever possible. Belt life is even more severely reduced with tight-side idlers. Also, belt tension can be maintained at a much lower idler tension force. This is especially true when spring-loaded or weighted idlers are used to provide constant belt tension. It is important to note here that spring-loaded or weighted idlers should not be used on reversing applications, where the slack side would become the tight side.

EXTERNAL/PUBLIC DOCUMENT

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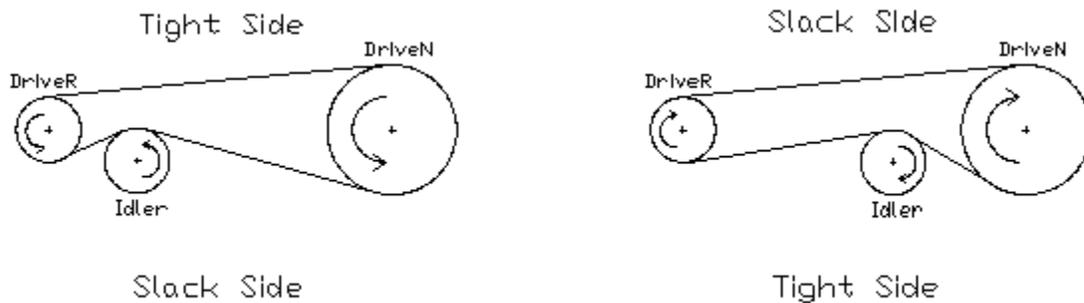
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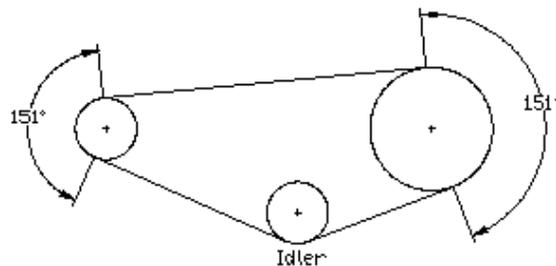
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Placement along the Belt Span

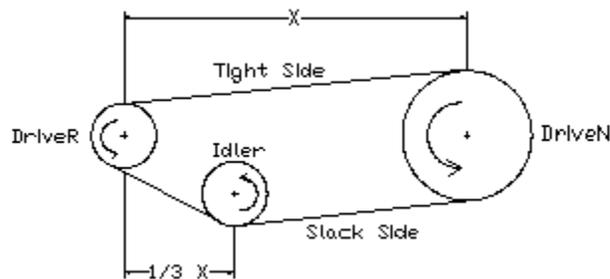
As a general rule, outside idlers should be placed as close as possible to the driver sheave or sprocket when on the slack side and as close as possible to the driven sheave or sprocket when on the tight side.



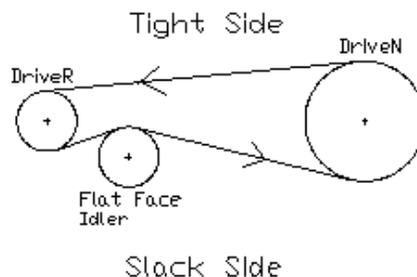
An inside, slack side idler can be placed anywhere along the span. The preferred position, however, is at a position that yields arc of contact angles on driver and driven sheaves or sprockets as equal as possible.



An inside, tight side idler should be positioned closer to the Driven sheave or sprocket. When vibration is a problem, the idler should be placed on the slack side one third of the way from the driver to the driven sheave or sprocket.



Whenever flat face pulleys are used as idlers on V-belts with long span lengths, they should be placed as far from the next sheave in the direction of belt rotation as possible. This is done to minimize the risk of the belt entering the next sheave in a misaligned state, because V-belts have a tendency to ride back and forth on a flat face pulley.



Idler Support

Idler design supports vary widely. Many power-transmission components manufacturers offer bracketed supports and TaperLock or QD idler bushings with internal pre-lubed bearings. Although more costly, some end users prefer to assemble their own idler supports with two flanged or pillow block bearings and a support shaft. These jack shaft arrangements offer greater flexibility when surrounding support structures are limited.

Idler loading is minimal due to a shallow wrap angle. The resultant load from minimal wrap is negligible. The result is tremendous bearing life. In fact, the life of the idler bearings is most often dependent upon the life of the lubrication within the bearing.

V-belts and synchronous belts require proper tensioning to achieve ideal operation. Idlers provide a great tensioning alternative to provide that tension to machine equipment.