



# PRODUCT APPLICATION NOTES

Volume 58, No. 2 (rev 1)  
February 2011 – revised October 2011

## Using Gates Idler Hardware in Belt Drive Systems

Idler pulleys and sprockets can be valuable belt drive components. Gates idler hardware line now provides drive designers with increased flexibility and versatility. This PA Note will focus on idler usage in belt drive systems and the correct use of Gates idler products.

### How Idlers Are Used

Idler pulleys and sprockets can alter belt paths, make the belt clear obstructions, or apply belt pre-tension. Idlers may remain in a fixed location, or may be adjustable to allow belt pre-tensioning and take up.

Idlers may be applied to either the inside or backside of belts. Inside idlers may consist of sprockets, pulleys, sheaves, or flat pulleys. Backside idlers are generally flat. Gates specifies minimum recommended idler diameters for each belt type and section. Figure 1 below illustrates a drive system with an inside idler, and Figure 2 illustrates a drive system with a backside idler.

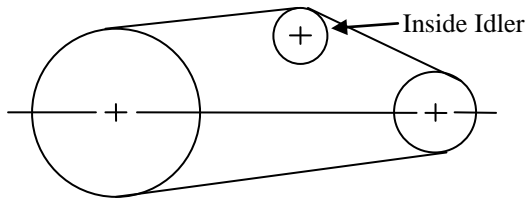


Figure 1 – Inside Idler

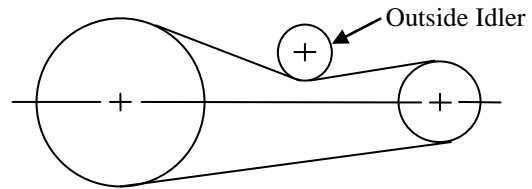


Figure 2 – Backside Idler

### Current Idler Components

Gates idler hardware components are summarized in Figures 3 thru 9 and Tables 1 thru 3.

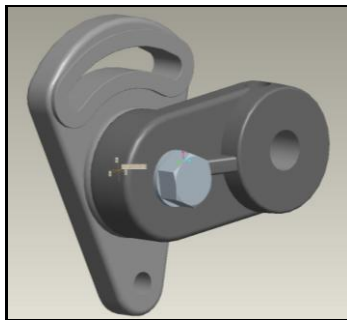


Figure 3 – Medium Adjustable Idler Bracket

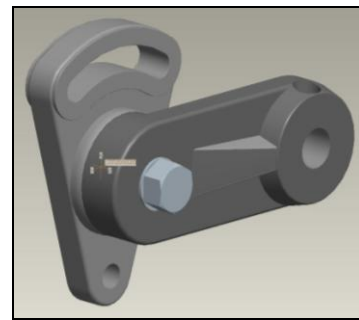


Figure 4 – Large Adjustable Idler Bracket

| Adjustable Idler Brackets |             |             |                         |                          |  |
|---------------------------|-------------|-------------|-------------------------|--------------------------|--|
| Part No.                  | Product No. | Weight (lb) | Arm Bolt Torque (lb-ft) | Set Screw Torque (lb-ft) | Use With   |
| 5-IDL-BRAK                | 7720-1005   | 2.80        | 50                      | 13                       | 1610-IDL-BUSH  |
| 10-IDL-BRAK               | 7720-1010   | 3.40        | 50                      | 13                       | 8M Pitch Idler Sprockets<br>4.25" OD Flat Idler Pulleys<br>20-IDLR-BUSH (SK)<br>2012-IDLR-BUSH<br>2517-IDLR-BUSH |
| 20-IDL-BRAK               | 7720-1020   | 11.20       | 160                     | 13                       | 14M Pitch Idler Sprockets<br>6.50" OD Flat Idler Pulleys<br>30-IDLR-BUSH (SF)<br>40-IDLR-BUSH (E)                |

Table 1 – Adjustable Idler Brackets

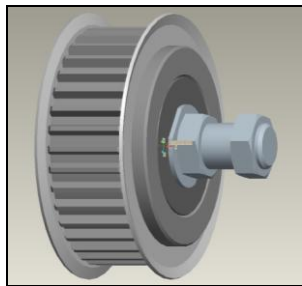


Figure 5 – Idler Sprocket

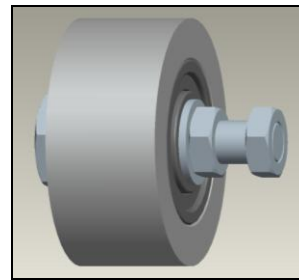
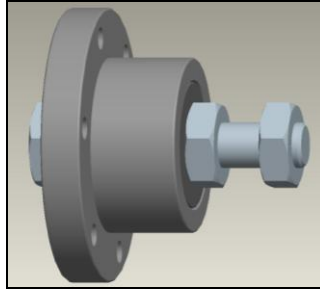


Figure 6 – Flat Idler Pulley

| Idler Sprockets & Pulleys (Integral Shaft Included)                      |             |              |             |                |                                  |                                 |             |
|--|-------------|--------------|-------------|----------------|----------------------------------|---------------------------------|-------------|
| Part No.   | Product No. | Size         | Weight (lb) | Bearing Number | Bearing Jamb Nut Torque (lb-ft)* | Install Jamb Nut Torque (lb-ft) | Use With    |
| <b>Poly Chain® GT® Carbon™ Sprockets</b>                                 |             |              |             |                |                                  |                                 |             |
| 12-IDL-SPRK  | 7720-1500   | 8MX-32S-12   | 3.80        | 6304           | 10 ±1                            | 40                              | 10-IDL-BRAK |
| 21-IDL-SPRK  | 7720-1510   | 8MX-32S-21   | 3.88        | 6304           | 10 ±1                            | 40                              |             |
| 36-IDL-SPRK  | 7720-1520   | 8MX-36S-36   | 5.14        | 6306           | 10 ±1                            | 40                              |             |
| 62-IDL-SPRK  | 7720-1530   | 8MX-36S-62   | 9.69        | 6306           | 10 ±1                            | 40                              | 20-IDL-BRAK |
| 20-IDL-SPRK  | 7720-1600   | 14MX-30S-20  | 12.55       | 6308           | 15 ±2                            | 50                              |             |
| 37-IDL-SPRK  | 7720-1610   | 14MX-30S-37  | 13.46       | 6308           | 15 ±2                            | 50                              |             |
| 68-IDL-SPRK  | 7720-1620   | 14MX-34S-68  | 26.03       | 6310           | 15 ±2                            | 50                              |             |
| 90-IDL-SPRK  | 7720-1640   | 14MX-34S-90  | 32.18       | 6310           | 15 ±2                            | 50                              |             |
| 125-IDL-SPRK   | 7720-1630   | 14MX-34S-125 | 36.45       | 6310           | 15 ±2                            | 50                              |             |
| <b>PowerGrip® GT® 2 Sprockets</b>  |             |              |             |                |                                  |                                 |             |
| 20-SPK2-IDL  | 7720-1740   | P32-8MGT-20  | 1.10        | 6304           | 10 ±1                            | 40                              | 10-IDL-BRAK |
| 30-SPK2-IDL  | 7720-1750   | P36-8MGT-30  | 2.00        | 6306           | 10 ±1                            | 40                              | 20-IDL-BRAK |
| 40-SPK2-IDL  | 7720-1850   | P30-14MGT-40 | 12.00       | 6308           | 15 ±2                            | 50                              |             |
| 55-SPK2-IDL  | 7720-1860   | P34-14MGT-55 | 15.60       | 6310           | 15 ±2                            | 50                              |             |
| <b>Flat Pulleys for Poly Chain® GT® Carbon™, PowerGrip®, and V-belts</b> |             |              |             |                |                                  |                                 |             |
| 4.25x1.25-IDL-FLAT   | 7723-4125   | 4.25 x 1.25  | 5.20        | 6304           | 10 ±1                            | 40                              | 10-IDL-BRAK |
| 4.25x2.00-IDL-FLAT   | 7723-4200   | 4.25 x 2.00  | 7.50        | 6304           | 10 ±1                            | 40                              |             |
| 4.25x3.00-IDL-FLAT   | 7723-4300   | 4.25 x 3.00  | 10.60       | 6304           | 10 ±1                            | 40                              |             |
| 4.25x4.00-IDL-FLAT   | 7723-4400   | 4.25 x 4.00  | 13.60       | 6304           | 10 ±1                            | 40                              |             |
| 6.50x1.75-IDL-FLAT   | 7723-6175   | 6.50 x 1.75  | 17.10       | 6308           | 15 ±2                            | 50                              | 20-IDL-BRAK |
| 6.50x2.75-IDL-FLAT   | 7723-6275   | 6.50 x 2.75  | 23.00       | 6308           | 15 ±2                            | 50                              |             |
| 6.50x4.25-IDL-FLAT   | 7723-6425   | 6.50 x 4.25  | 33.00       | 6310           | 15 ±2                            | 50                              |             |
| 6.50x5.75-IDL-FLAT   | 7723-6575   | 6.50 x 5.75  | 45.00       | 6310           | 15 ±2                            | 50                              |             |
| 6.50x7.50-IDL-FLAT   | 7723-6750   | 6.50 x 7.50  | 57.00       | 6310           | 15 ±2                            | 50                              |             |

\* **Note:** Bearing jamb nut has been factory set to preload bearings. Do not change nut position or torque level

Table 2 – Idler Sprockets and Pulleys

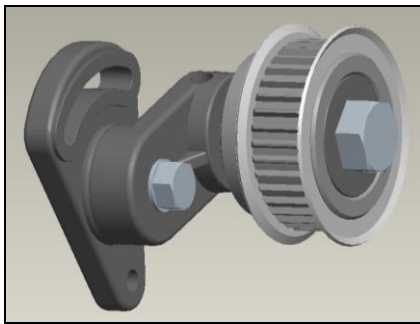


**Figure 7 – QD Style Idler Bushing**

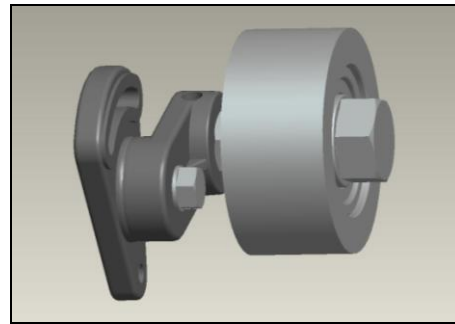
| Idler Bushings (Integral Shaft Included) |             |      |             |                |                                  |                                 |             |
|--|-------------|------|-------------|----------------|----------------------------------|---------------------------------|-------------|
| Part No.                                 | Product No. | Size | Weight (lb) | Bearing Number | Bearing Jamb Nut Torque (lb-ft)* | Install Jamb Nut Torque (lb-ft) | Use With    |
| <b>QD Type</b>                           |             |      |             |                |                                  |                                 |             |
| 20-IDLR-BUSH(SK)                         | 7720-1120   | SK   | 11.00       | 6304           | 10 ±1                            | 40                              | 10-IDL-BRAK |
| 30-IDLR-BUSH(SF)                         | 7720-1130   | SF   | 8.60        | 6206           | 15 ±2                            | 40                              | 20-IDL-BRAK |
| 40-IDLR-BUSH(E)                          | 7720-1140   | E    | 8.62        | 6306           | 15 ±2                            | 40                              |             |
| <b>TL Type</b>                           |             |      |             |                |                                  |                                 |             |
| 1610-IDLR-BUSH                           | 7720-2610   | 1610 | 1.30        | 6003           | 10 ±1                            | 40                              | 05-IDL-BRAK |
| 2012-IDLR-BUSH                           | 7720-2012   | 2012 | 2.30        | 6204           | 10 ±1                            | 40                              | 10-IDL-BRAK |
| 2517-IDLR-BUSH                           | 7720-2517   | 2517 | 3.90        | 6304           | 10 ±1                            | 40                              |             |

\* **Note:** Bearing jamb nut has been factory set to preload bearings. Do not change nut position or torque level.

**Table 3 – Idler Bushing Hardware**



**Figure 8 – Idler Sprocket Assembly**



**Figure 9 – Idler Pulley Assembly**

Figures 8 and 9 illustrate an idler sprocket and an idler pulley mounted to adjustable idler brackets. When installing idler assemblies, adjustable idler brackets should be mounted to rigid structural members. These structural members may be user fabricated or already be in place.

### **Flat Idler Pulleys**

Flat idler pulleys were recently added to the idler hardware product line, and are fully compatible with adjustable idler brackets. Pulley diameters and widths were selected for use with as many different belt types as possible. Flat idler pulleys can be used with both synchronous and V-belts of appropriate belt sections. While they are intended to run against the backside of belts, they can also be applied to the inside of appropriate belt sections. Table 4 illustrates the belt sections that the new flat idler pulleys may be used with.

| Belt Sections                  | 4.25" OD Idler Pulleys |                |                |                | 6.50" OD Idler Pulleys |                |                  |                |                |
|--------------------------------|------------------------|----------------|----------------|----------------|------------------------|----------------|------------------|----------------|----------------|
|                                | 4.25 x<br>1.25         | 4.25 x<br>2.00 | 4.25 x<br>3.00 | 4.25 x<br>4.00 | 6.50 x<br>1.75         | 6.50 x<br>2.75 | 6.50 x<br>4.25   | 6.50 x<br>5.75 | 6.50 x<br>7.50 |
| <b>Poly Chain® GT® Carbon™</b> |                        |                |                |                |                        |                |                  |                |                |
| 8mm Pitch                      | 8M-12<br>8M-21         | 8M-36          | 8M-62          |                |                        |                |                  |                |                |
| 14mm Pitch                     |                        |                |                |                | 14M-20                 | 14M-37         | 14M-68<br>14M-90 | 14M-125        |                |
| <b>PowerGrip® GT® 2</b>        |                        |                |                |                |                        |                |                  |                |                |
| 5mm Pitch                      | 5M-15<br>5M-25         |                |                |                |                        |                |                  |                |                |
| 8mm Pitch                      | 8M-20                  | 8M-30          | 8M-50          | 8M-85          |                        |                |                  |                |                |
| 14mm Pitch                     |                        |                |                |                | 14M-40<br>14M-55       | 14M-85         | 14M-115          | 14M-170        |                |
| <b>Timing</b>                  |                        |                |                |                |                        |                |                  |                |                |
| L (3/8") Pitch                 | L050<br>L075           | L100           |                |                |                        |                |                  |                |                |
| H (1/2") Pitch                 | H075                   | H100<br>H150   | H200           | H300           |                        |                |                  |                |                |
| <b>Super HC®</b>               |                        |                |                |                |                        |                |                  |                |                |
| 3V/3VX V-belts                 | 1 - 2                  | 3 - 4          | 5 - 6          | 8              |                        |                |                  |                |                |
| <b>Classical</b>               |                        |                |                |                |                        |                |                  |                |                |
| A/AX V-belts                   | 1                      | 2              | 3              | 4              |                        |                |                  |                |                |
| B/BX V-belts                   |                        |                |                |                | 1                      | 2 - 3          | 4 - 5            | 6              | 8              |

Table 4 – Idler Pulley Usage with Industrial Belt Sections

### Applying Idler Assemblies to Belt Drive Systems

Adjustable idler assemblies are designed to be highly versatile, with two different means of adjustment. Adjustment can be made by pivoting the base flange about the bracket pivot point along the adjustment slot, or by pivoting the idler bracket arm on the base flange. Figure 10 illustrates this “double adjustability”.

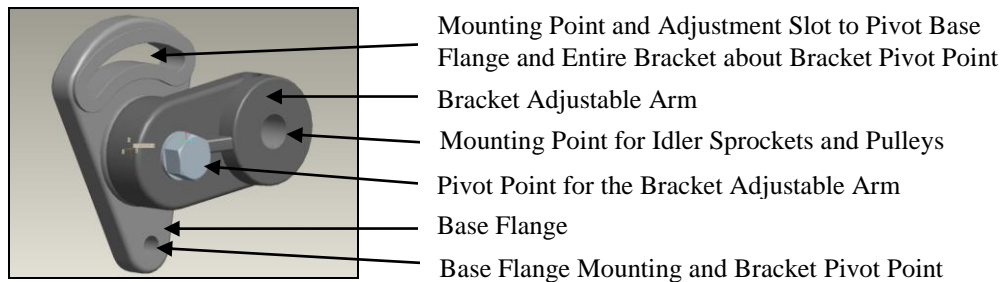


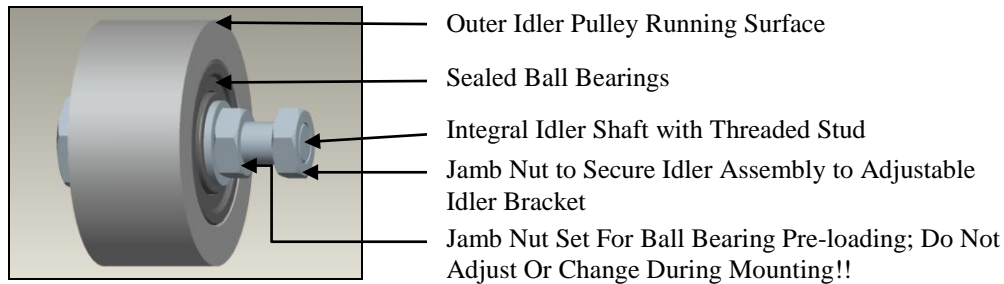
Figure 10 – Adjustable Bracket Adjustability

**Adjustable Bracket Mounting:** The base flange of adjustable brackets should be mounted securely to ridged structural members and placed so that it can pivot throughout the entire adjustment range. A minimum of Grade 5 mounting bolts are recommended and should be tightened to the torque level recommended for the selected bolt size.

**Bracket Adjustable Arm Adjustment:** With the base flange position set and movement limits known, the bracket adjustable arm should be positioned so the idler pulley or sprocket will apply force against belts for pre-tensioning. Allowance for belt installation should also be considered in the bracket adjustable arm position. If necessary, the bracket adjustable arm can be shifted to allow for belt installation and then reset to the original position. The bracket adjustable arm should be tightened against the base flange using the bolt torque values in Table 1.

**Belt Tensioning:** External force must be applied to the base flange of the adjustable idler bracket so the idler pulley applies force against belts. With the adjustable idler bracket applying appropriate belt tensioning force, both flange-mounting bolts should be tightened securely. The belt tension level can be monitored by using either the force-deflection method or the Gates Sonic Tension Meter.

**Idler Pulleys and Sprockets:** Idler pulleys and sprockets contain integral sealed ball bearings and a shaft for mounting to adjustable idler brackets. No lubrication or maintenance is necessary. Major idler pulley components are illustrated in Figure 11 below:



**Figure 11 – Idler Pulley and Sprocket Components**

When installing idler pulleys and sprockets, the inner bearing jamb nut should not be altered. The torque level is factory set for proper bearing preloading, so bearing performance may be adversely affected if adjustment is made. If disassembly cannot be avoided, bearing jamb nut torque values are included in Table 1.

When assembling idler pulleys and sprockets with adjustable idler brackets, first thread the two jamb nuts together and finger tighten. Then thread the idler stud directly into the bracket adjustable arm. The second jamb nut is used to secure the idler stud to the bracket adjustable arm, and is intended to remain adjacent to the bearing jamb nut. Torque values are included in Table 1.

### **Support for Designers**

Both drawings and solid models of Gates idler hardware components are available for download at [gates.com/partview](https://gates.com/partview) in a variety of file formats. In addition, adjustable idler brackets are now included in Gates Design IQ™ drive design software. To access them, right click on a pulley, select “Idlers”, and then left click on “Double Adjustable Idler”. Select the specific adjustable idler bracket size and it will appear on screen with double adjustment and pivoting functionality. This simplifies the drive design and idler placement process considerably with real-time and true-scaled adjustment. Idler pulley and sprocket sizes must be set manually.

A full line of idler hardware improves versatility in belt drive design and allows design engineers to design with greater flexibility. Contact Gates Application Engineering for technical assistance at [ptpasupport@gates.com](mailto:ptpasupport@gates.com) or (303) 744-5800.

