

YOUR LINK TO **MORE POWER**

POWER TO MOVE

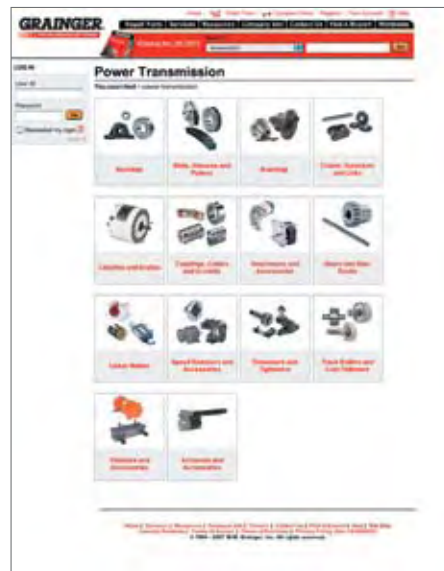
A GUIDE TO BELTS AND CHAINS

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POWER UP WITH THE RIGHT PLAN

Be Smart. Be Efficient.

Whether you're designing a new power transmission system or retrofitting an existing one, today's choices can impact how your plant operates tomorrow and for years to come. Key issues like initial cost, maintenance and downtime will determine which option offers the best solution for your unique needs.

Powerful choices for a more powerful facility

Like any other business investment, your power transmission system will be the result of a complex and careful analysis of your company's needs, operating conditions and overall budget.

Chain or Belt - Which is best for you?

Power transmission systems fall into two basic categories: chain-driven and belt-driven. Each design offers several key distinctions between them that make each type generally well suited to certain applications, environments and budgets.

- **Chain Drives** transmit power via interlocked metal links driven by sprockets. They offer a low initial cost, high-torque power transmission option for a wide variety of industries, including but not limited to bottling, automobile manufacturing, food and dairy and waste management.
- **Belt Drives** transmit power via a reinforced rubber belt with pulleys and/or sheaves at higher speeds with minimal upkeep, making them the first choice of textile manufacturers, lumber processors, petroleum producers and HVAC designers, among others.



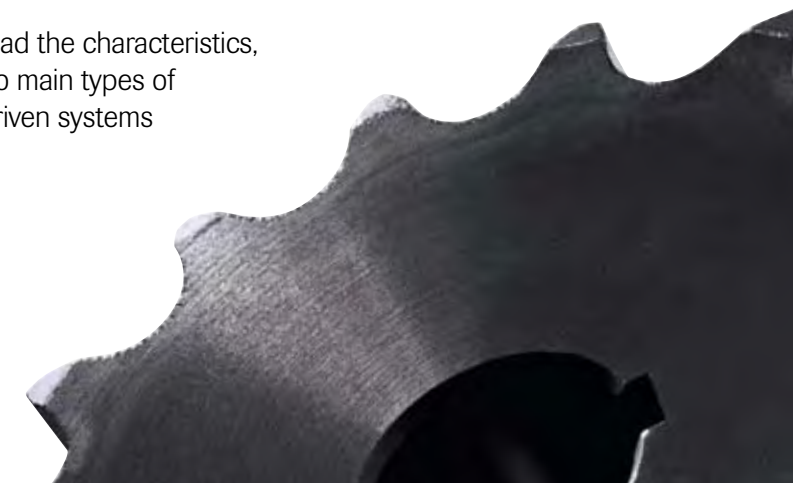
Choosing your drive system

When selecting a power transmission system for your facility, it's important to become familiar with the characteristics of both chain- and belt-driven options, as well as the benefits and limitations of each. No two facilities are the same, and neither are their power transmission needs. The right drive system can help maximize your productivity and efficiency.

- **Power vs. speed:** Your facility may require a system that can deliver high power and torque, or you may need to move lighter loads at higher speeds.
- **Initial costs vs. maintenance costs:** Your budget plan may allocate more funds for installation, or may require less up-front expense but allow for a higher maintenance budget for operations down the road.
- **Plans for growth:** Depending on the application, you may need to adapt, expand or otherwise modify your power transmission system in the near future, and require a certain amount of scalability built into your choice.

- **Downtime tolerance:** While any system will require periodic maintenance, your situation may be better suited to infrequent but lengthy downtime for maintenance. On the other hand, your facility's operations may benefit from more frequent but shorter maintenance interruptions.
- **Operating environment:** Before choosing a system, consider environmental elements like dust, oil, extreme temperatures or chemicals. Also, if employees will be working in close proximity to the system, operational noise levels can become a significant consideration.
- **Power efficiency:** Power consumption may be a critical operating budget factor. Some options are less expensive to install, but will cost more to run.

Keep these factors in mind as you read the characteristics, advantages and limitations of the two main types of power transmission available: belt-driven systems and chain-driven systems.



A CHAIN REACTION



Chain-driven systems

Chain is the preferred choice for power transmission applications that rely on high power and torque. Chain offers the advantage of working within the widest of temperature ranges, and is highly tolerant of shock loads.

Advantages of chain drive:

- Installation is relatively inexpensive and requires less physical space than belt-driven systems.
- Maintenance and repair parts are readily available and are easily stored for long periods of time.
- The stretch-resistant design and zero slippage afforded by sprockets allows chain systems to handle the heaviest of loads.
- Materials are highly resistant to the effects of oil, dirt, moisture and corrosive chemicals.
- Links can be quickly repaired, modified, added or removed without affecting other components of the system.

Limitations of chain drive:

- Maintenance includes costly and frequent attention to chain lubrication, alignment, tension and drive component wear. **TIP: A chain tensioner can minimize vibration and wear of your system components.**
- Noise levels of chain-driven systems are generally higher than similar belt-driven systems, though recent advances have mitigated this factor.
- Long-term use will eventually elongate the chain and wear the sprockets, requiring the periodic replacement of both components and the associated downtime. **TIP: Lubrication can help maximize chain life.**
- Speed and flexibility limitations mean the chain is not well suited to operate at higher RPMs.



STAY IN THE LOOP

Belt-driven systems

Belt drives transmit power via a reinforced rubber belt matched with a pulley or sheave. Belt drives fall into two main subcategories:

- **V-belts** are so named for their tapered cross-section. This belt type offers an efficient transfer of power of up to 98%*. Some feature notched inner surfaces that allow them to operate at a reduced radius.
- **Synchronous belts**, or timing belts, have notches on one or both faces, seating firmly on a meshing pulley surface for as much as 99% efficiency.* This option is preferred when input and output shafts must remain synchronized and when energy efficiency is required.

Advantages of belt drive:

- Compared to chain systems, maintenance procedures are less frequent and associated periodic downtime can be reduced.
- Unlike chain-driven power transmission systems, belts do not require any kind of lubrication to operate.
- Belt-driven systems are considerably quieter to operate than chain systems, making them an attractive choice for many workplaces.
- Operation is generally smooth, even under shock surges.
- Sheaves and pulleys experience less wear than chain-driven sprockets, and are generally less expensive to replace. **TIP: A sheave measurement tool can help identify proper depth of a sheave and worn sheaves.**

* Selecting the Right Drive System—Costs and Performance, www.gates.com ©1999-2007 Gates

Limitations of belt drive:

- Belt-driven systems are typically more expensive to install than chain.
- Worn belts can break, and unlike chain-driven systems that can be mended by replacing links, belts cannot be repaired and must be replaced instead.
- If not tensioned correctly upon installation, the belt slippage can quickly reduce operating efficiency and system life. **TIP: A belt tensioner tool can help maintain proper tension and prevent creep or slippage.**
- Environments with extreme temperatures, high moisture levels or the presence of some chemicals can damage some belt systems.
- Belt systems may require more space to operate, and cannot match chain's reduction power or smaller operating radius.
- Operating temperatures are generally limited to between -40 and 130 degrees Fahrenheit.* **TIP: A belt temperature measurement tool can monitor the system and make adjustments to avoid excessive heat.**



GET POWERED UP **TODAY**



A final word on chain-driven systems

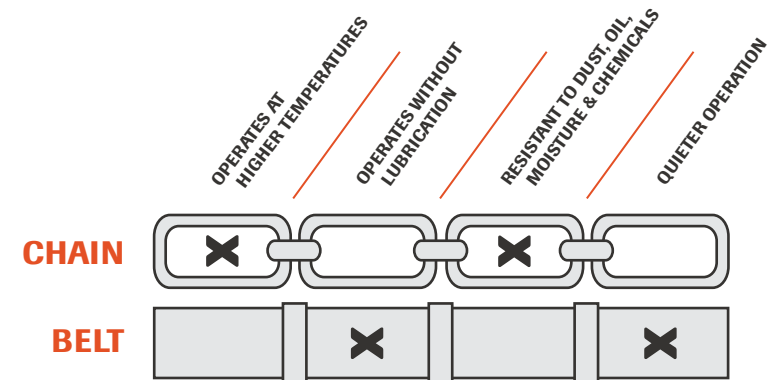
Chain-driven systems deliver tremendous power while using fewer moving parts, due to the fact that toothed sprockets allow for higher reduction ratios and a slip-proof drive. In addition to being the more economical to install, chain is the most environmentally tolerant choice, resistant to many hostile conditions including temperature, moisture, dust and airborne chemicals. It is also the most flexible choice, permitting expansion, reduction, repair or modification simply by the addition or removal of individual links rather than wholesale replacement.

The bottom line on belt-driven systems

Belt-driven power transmission systems permit much higher operational speeds and require less frequent and less costly maintenance. V-belts and synchronous belts each offer a reliable means of maintaining peak operational efficiency – up to 99%*- with slower-wearing pulleys and sheaves instead of sprockets that require periodic replacement. The quieter operation of a belt drive also makes it the superior option for those settings that require close proximity to employees.

*Selecting the Right Drive System–Costs and Performance, www.gates.com, ©1999-2007 Gates

Environmental & operational considerations for choosing chains or belts



Whatever your particular power transmission needs, the correct application of the right chain- or belt-driven power system can help your facility maintain peak efficiency.

Sources: Selecting the Right Drive System–Costs and Performance, www.gates.com, ©1999-2007 Gates
Belt and Chain Drives, *Power Transmission Design Magazine*, 1997