



A Tomkins Company

# White Paper

## Review true costs when selecting drive system components

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### Introduction

Plant maintenance managers and design engineers have basically three broad options when making a drive conversion or when designing a new power transmission system. The options are roller chain drives, V-belt drives and synchronous belt drives. Each has its own advantages and disadvantages. During the selection process, Gates Corporation engineers recommend that maintenance managers and design engineers compare the true costs of the drive before making a final decision.

### Roller chain drive cost considerations

The popularity of chain drives stems from the ability of these drives to transmit high torque levels in a small package, at relatively low cost, while utilizing readily available stock components.

While initial costs of roller chain drives can be quite low, the cost of maintaining these drives can be substantial. In addition to lubricant costs, labor expenses are a major portion of the maintenance budget. To keep equipment running, chain drives require lubrication and retensioning on a regular basis. Depending on the drive application, a regular maintenance schedule may require shutting down the drive or stopping the manufacturing production. In both situations, productivity is lost or reduced.

Unlubricated chain drives often wear rapidly due to friction in the roller joints. Even properly lubricated chains running at higher speeds tend to throw off lubricants, which can contaminate products, and make it difficult to maintain proper lubrication on the load bearing surfaces. Consequently, chain drives do not typically provide long trouble free service.

### V-belt drive cost considerations

V-belts are often used as single, matched sets or in joined configurations. They are an excellent choice for versatile and reliable power transmission at low overall cost. Their forgiveness also allows them to handle shock-loaded applications.

The components of a simple V-belt drive are relatively inexpensive to purchase, install, replace and maintain. After they are installed properly and tensioned to the belt manufacturer's recommended values, these drives require very little service, except for retensioning during the normal maintenance schedule.

V-belt drives that are well designed and maintained are 93 – 95% efficient. However, if a V-belt's tension is not properly maintained, the efficiency can drop by as much as 10 percent.

### Synchronous belt drive cost considerations

Synchronous belts work on the tooth-grip principle. Round, square or modified curvilinear belt teeth mesh with grooves on sprockets to provide positive power transmission on high-torque applications with high and low speeds.

Because of this non-slip feature, and because they are clean running, synchronous belt drives do not incur the expenses and downtime associated with retensioning and lubrication.

Currently, the most technically advanced synchronous belt is Gates Poly Chain® GT® 2, made of a polyurethane body and aramid fiber reinforcement.



**Synchronous belts are a cost saving alternative to roller chains and V-belts.**

These materials resist abrasion, chemicals and the caustic washdown solutions used in the food handling/processing industry.

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They are designed to boost productivity and profitability by eliminating maintenance downtime, drive failures, replacement, lubrication, product contamination, noise and environmental cleanup – all at a significantly lower life cycle cost than roller chain drives.

Poly Chain GT2 belts will outlast roller chain by 3-to-1, and Poly Chain GT2 belt drive systems now have equivalent capacity to roller chain drives in the same width.

A properly designed Poly Chain GT2 synchronous belt drive can provide an estimated continuous 98% efficiency without the maintenance required of roller chain and V-belt drives.

Synchronous belts are sensitive to misalignment and should not be used on systems where it is inherent to the drive operation. Misalignment leads to inconsistent belt wear and premature tensile failure due to unequal tensile member loading.

Until recently, Gates Poly Chain GT2 belt drive system components were considerably more expensive than roller chain drive components.

However, according to Gates newly published ratings, Poly Chain GT2 systems have an average ratio only 1.3 higher than comparable roller chain systems.

Considering the small difference in acquisition cost for most applications, the Poly Chain GT2 belt drive system is a better value because of its performance advantages, productivity enhancement and maintenance savings.

### Conclusion

A synchronous drive system has many cost-saving advantages for plant maintenance managers and design engineers.

In the MRO market, synchronous drives can greatly reduce day-to-day operational costs, and increase production output compared to the downtime and lost productivity resulting from all-to-frequent maintenance and replacement of roller chain and V-belt drives

Drive system design engineers who select a synchronous drive, such as the Gates Poly Chain GT2 belt system, can give their products a competitive edge in the marketplace by providing end-user customers with better performing, longer

lasting, cleaner, quieter, and maintenance-free products that will operate at a significantly lower overall cost.

To determine the true costs of roller chain and synchronous drives, go to Gates new cost savings calculator at [www.gates.com/polychain](http://www.gates.com/polychain).

**Poly Chain GT2 Cost Savings Calculator**

Follow the two easy steps below to calculate your payback.

1. How many roller chain drives are in your plant?

Cost Factors	Cost Per Drive		Total Cost		Assumptions
	Roller Chain	Poly Chain	Roller Chain	Poly Chain	
Installation Costs	\$95.19	\$122.93	\$951.90	\$1,229.30	
1st Year Maintenance Costs	\$127.04	\$0.00	\$1,270.40	\$0.00	
Downtime Costs	\$1,560.00	\$500.00	\$15,600.00	\$5,000.00	
Other Costs	Not Quantified	Not Quantified	Not Quantified	Not Quantified	
1st Year Cost of Ownership	\$1,803.48	\$844.18	\$18,034.80	\$8,441.80	
3rd Year Cost of Ownership	\$4,177.56	\$865.96	\$18,034.80	\$8,441.80	

First Year Plant Cost Savings Potential: **\$11,593.00** When will you break even? **0.36 years**

2. Above are your calculations. Click the linked items for details.

### Additional resources

Gates Belt Preventive Maintenance and Safety program provides user tips ranging from inspection to installation of V-shaped and synchronous belts. Also included is information on reducing downtime, controlling parts replacement costs and increasing energy savings. To schedule a free belt preventive maintenance seminar at your facility, download a copy of Gates 48-page "Belt Drive Preventive Maintenance and Safety" manual, or sign up for Gates free weekly "Belt Tips" email service, go to [www.gates.com/beltpm](http://www.gates.com/beltpm).

For quick and easy drive design assistance, OE engineers should use Gates free DesignFlex<sup>®</sup> software at [www.gates.com/designflex](http://www.gates.com/designflex).

To locate a Gates power transmission distributor in your area, go to [www.gates.com/distributors](http://www.gates.com/distributors).

For information about a free Gates plant survey or for drive design assistance, call 1-800-777-6363.

For technical assistance from Gates Power Transmission Product Application engineers, call 303-744-5800, or email [ptpasupport@gates.com](mailto:ptpasupport@gates.com).

