



NIBA—The Belting Association  
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# Tech Note

Technical Notes from the Technical Committee, NIBA – The Belting Association

## #27 Flat Power Transmission Belting

### *General Uses*

#### **Transmit Power**

One of the basic tasks for transmission belting is for transmitting power from a source to a driven pulley. This is done through friction between the pulley and the belt, which is transferred through the belt's core or strength member by way of surface contact and tension.

#### **Conveying or Transfer**

A second basic task for power transmission belting is for the movement or conveyance of materials through various operations or actions. Some of the same belts that are often used for power transmission may be used for these conveying purposes. This transport or conveying is often accomplished by a series of narrow belts positioned side by side with a varying amount of space between them. In many instances the belts will hold the materials being transported between a top and bottom belt to prevent the conveyed product from slipping or skewing while being transported at high speeds. In other instances the belts may even run on edge holding an item vertically such as with an envelope placed between them as they transport it along a specific distance or length of run. Often power transmission belting will be used to transport items such as paper and/or paperboard through folding processes. The belting is used to transport, lift, and bend the materials over various forming devices to accomplish the folding task of the equipment. In many cases, the basic design of transmission belting is well suited for these high flexing, small pulley, and narrow width applications. Unlike general conveyor belting, power transmission belting is developed and designed with these specific application needs in mind where high stresses are placed on the belt carcass and the joined portion of the belt.

### **Types of Transmission Belting**

#### *Common constructions*

#### **Nylon Core**

One of the basic constructions is the oriented nylon core transmission belt. This is a solid extrusion of polyamide (Nylon) that is processed in such a way as to align the molecules of the extruded material for the greatest strength and flexibility. The strength in these belts comes from a combination of the orienting process and the various thickness of this core that is placed between the cover materials. The thicker the core the stronger and stiffer the belt becomes. Belts are commonly produced with working strengths of as little as 5 pounds per inch of belt width to more than 200 pounds per inch of width. These various strengths allow the belts to transmit small loads for tiny drives on delicate equipment all the way up to the heaviest of rock crushers and more. Nylon core belting is assembled in to continuous loops or endless belts by means of a solution or solutions. The belts are typically prepared by sanding of the surfaces into a wedge form or tapered joint. The nylon portion will be treated with a solution, which softens this hard nylon material. The cover materials will be treated with an appropriate solution, which will permit them to be adhered to each other. These solutions are



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then cured under heat and pressure using a commercially available splicing device. The nylon portion will actually be fused together and can retain 100% of the original strength of the extrusion when properly assembled.

## **Nylon core materials offer several unique advantages:**

1. Excellent shock absorbing characteristics for high impact heavy load situations.
2. Splices retain nearly 100% of the belt's load capacity.
3. Extremely durable and resist many abuses from typical applications and common hazards.
4. Commonly yield extended life over other alternate materials.

## **Thermoplastic Core**

One of the newer and innovative materials found today in transmission belting is the use of thermoplastic polymers. These basic building blocks take advantage of their unique characteristic of being thermoplastic, or “the ability to be melted under heat, combined, and re-solidified”. This means the materials can be severed or cut and put back together without the needs of adhesives or solutions. These materials are provided alone, and in combination with coverings and reinforcements. In some cases the lack of reinforcement is desired in that the belt can act much like a rubber band. It can be supplied short of the intended size by perhaps 2-6% and then stretched onto the equipment eliminating the need for expensive take-up devices, and in many cases improper adjustments by the installer. This is common in lightweight transport applications involving paper and document transport where the loads are particularly light, and where space for a take-up device is often limited. For more demanding requirements there are a variety of thermoplastic constructions with reinforcements ranging from working strengths of 5 pounds per inch of width to more than 400 pounds per inch of width. These materials are commonly melted back together using a simple cut angle on elastic materials, or an interlocking finger joint on the reinforced types using a commercially available preparation and joining system. These systems can provide the tools for cutting the materials and heating them to rejoin the ends for a continuous loop or endless belt. The tool will melt the material while holding it in a rail or mold during the process of heating and cooling. Unlike nylon core, the severance of the fabric reinforcement will reduce the belt strength substantially at this joint. Although it will not retain the strength in this area that a nylon core construction can, the advantages that can be obtained with these products cannot be ignored and are the direction of many of today's equipment builders and consumers.

## **Advantages of thermoplastic joinable types:**

1. No adhesives required
2. Eliminates need for careful handling of adhesives and maintenance of MSDS information for those adhesives.
3. No expired solutions to contend with or storage requirements.
4. Easily joined without attention to quantity of adhesives and methods of application through simple butt joins and /or interlocking finger joints for excellent strength retaining qualities.



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5. Field preparation and splicing is simplified and can be done often in minutes rather than hours.
6. Consistency of joint can solve vibration or other related issues
7. Downtime can be reduced tremendously
8. Low elongation or stretch accommodates small take-up devices.
9. Often very flexible and energy efficient

## **Covers Available for Transmission Belting**

Many covers are available for conveying and drive applications ranging from those with low friction to those with extreme grip for high surface friction. These are just a few of the basic cover selections available and the characteristics of each.

### **Belting Covers**

1. Textile fabrics – Offer a protective covering on non-used belt surfaces, or a low friction surface for easy transport over stationary support plates, as well as for reducing the chance of product damage when used on the conveying surface.
2. Leather – Offers sufficient grip for an efficient drive while providing good performance in wet, dirty environments as well as the added safety and equipment protection through permitted slippage in the event of extreme equipment overload or sudden jams.
3. Rubber – Offers grip for efficient drive or for a secure hold on a transported product.
4. Thermoplastic covers – Offers a variety of friction surfaces from low to high with easy joining qualities because of their re-melting characteristics.

## **Added Features Available for Transmission Belting**

### ***Accessories and Modifications***

Many applications require more than just a standard belt to get the job done. Some applications may call for added grip, increased wear resistance, special surface configurations, guide mechanisms, and other special requirements. Following is a list of some of the common “additions” to transmission belting.

### **Belting enhancements:**

1. Natural and Synthetic solid covers for added wear and grip in various hardnesses from 20 to more than 80 Shore A.
2. Perforations for vacuum applications to enhance product holding.
3. Natural and Synthetic foams for compression and handling requirements in very soft to extremely hard constructions.
4. Various tracking guide shapes and configurations in standard and custom styles.



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5. Custom grooved and contoured surfaces for handling uniquely shaped parts such as in custom extrusions and cable pulling applications, or for added traction and grip.

## **Applications for Transmission Belting**

### *Common Industries*

**The applications for transmission belting are vast. Here is just a sampling of the many industries in which one will find it used**

- Industry / Application
- Paper Production / Drives
- Paper Converting / Transport including sheeting, stacking etc
- Paper Box Folding / Transport and Folding
- Printing & Graphics / Transport, folding etc
- Direct Mailing & Mail Processing / Transport, Inserting, Extraction
- Textile Production / Drives
- Wood Processing Industries / Drives on molders, planners, saws, drills, lathes, etc
- Flour Milling / Drives on mill stands
- Packaging Industry / Strapping, Filling, Orienting, etc
- Poultry / Feather removal drives
- Paper Tube Production / Tube winding
- Wire & Cable Production / Drives, Capstans, Pull belts etc

## **Trouble Shooting Transmission Belting**

### **Common dilemmas and solutions**

Most problems associated with transmission belting are easily corrected. Here are some of the most common problems and possible solutions.

#### Dilemma / Possible Solution

Slipping on drive / Properly re-tension to factory specifications for the material used.

Mistracking / Check for or apply proper height crown in recommended manufacturer's configuration and properly re-tension.



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Lacing failure / Lacing is poorly suited for many transmission belts. Proper endless installation can provide significant increases in life and the latest field equipment can make such remote installation easy and efficient.

Stretching beyond equipment take-up / Pretension prior to installation or extend take-up provisions. Check that proper belt selection has been made to adequately perform the function required.

Customer's belt does not fit, measurements differ from production / Check that customer is measuring in same manner as production, example, inside circumference. An outside circumference can amount to several inches of difference on thicker constructions.

*Transmission belting is used in a vast array of applications with many variations in operation and demand. Knowing as much about the past problems and history of the application can be the single most important part in a successful factory evaluation and recommendation.*