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Technical Article
Technical Article Content Pulled from the NIBA Belt Line Newsletter

PTFE COATED LIGHTWEIGHT BELTING

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WHAT IS PTFE?

Polytetrafluoroethylene (PTFE) coated conveyor belting is a small but important segment of the lightweight belting market. PTFE is sometimes referred to as Teflon, a trademark of DuPont. The generic name is PTFE. For a specific product, check with your supplier before promoting the product as Teflon coated. For this article we will use the generic term PTFE only.

WHERE IS PTFE BELTING USED?

PTFE coated fabric belting has a multitude of applications but there is a short list of properties that offers the user a guide to the question "Do I need a PTFE coated belt?" If the answer to any of the following nine questions is YES, then PTFE coated belting may be right for you.

- Is it a hot process? Most PTFE belts have a service temperature of 500 F. With proper belt design, higher temperatures are possible.
- Does the belt make direct food contact? Many PTFE coated belts are used to cook or process foods without the use of a pan or tray. This includes COLD processing of foods.
- Is a non-stick (release) surface needed? Hot plastics and rubber being transported through an oven are examples of products that need a non-stick surface at the exit of the oven.
- Is the process chemically aggressive? PTFE is VERY inert. It will not react with or contaminate the product being conveyed.
- Is the oven microwave or RF heated? PTFE coated fiberglass is virtually transparent to microwave energy, RF energy and dielectric heating.
- Is the product heated through the belt? Many solid (non-open mesh) belts slide over a heat source such as a hot platen. The heat must pass up through the belt to reach the product. A thin belt will pass heat faster. Some PTFE coated belts are as thin as .003 inches.
- Is the oven a hot air circulating oven? There are many PTFE coated open mesh belts available for ovens that require a large volume of air to pass through the belt.
- Is a low friction surface needed? PTFE belts are very slippery.

- Does the oven use UV curing instead of heat? PTFE is very resistant to degradation by UV light.

WHEN TO AVOID PTFE BELTING

We have listed the properties that make PTFE coated belts a good choice, but there are also applications that are **NOT** well suited for PTFE belts. Here are a few applications to look out for.

- Abrasive applications. PTFE is a soft plastic. It will be easily damaged by transporting products such as stone, sand, etc.
- Inclined transport. The slippery surface is not what is needed for inclines.
- Tobacco contact. PTFE is banned by most tobacco processors for any process that puts the tobacco (for smoking) in direct contact with the belt.
- Power transmission. This is a whole different type of belt. PTFE belting is a lightweight transport belt.
- Gamma (radiation) sterilization of food. PTFE breaks down when exposed to gamma rays.

WHAT MAKES PTFE BELTING DIFFERENT?

Proper application and good performance of a PTFE coated fabric belt depends on knowing how it differs from traditional belting. There are FOUR important differences;

SUBSTRATE

Fiberglass is the most common woven fabric used as a substrate upon which the PTFE is coated. Fiberglass is often chosen because it is economical and it will readily withstand the high temperatures needed for PTFE coating. The use of fiberglass also makes the belt more fragile. Special consideration in the design of the machine must be made to prevent damaging the belt

Other fibers are also used occasionally. These include Kevlar, Nomex and carbon fibers. This guide to PTFE belting focuses on PTFE coated fiberglass belting only

STRETCH / ELONGATION

PTFE coated fiberglass belts have almost zero stretch. This results in a belt that has excellent dimensional stability. The lack of stretch requires us to carefully consider how to track (guide) the belt. Crowned pulleys **DO NOT WORK** on PTFE coated fiberglass belts. Manually adjusting the take up roller also **DOES NOT WORK.**

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Tracking of smaller belts, under 4 (four) ft wide can be accomplished with a variety of edge guide attachments to the belt. Consult your belting supplier for more details. Belts over four ft wide and belts that move at high speed are recommended for use with an active tracking system. A good system will have an edge sensor and a steering roll to keep the belt centered on the machine.

THICKNESS

Most PTFE coated fabric belts are very thin. The thickest belts in this category are about 0.040 inches thick. Some belts are as thin as .003 inches. A thin belt is desirable when the process requires thermal transfer through the thickness of the belt. A thinner means higher speed and higher production. Thinner also means the belt is more fragile. Thin belts cannot be effectively tracked (guided) by pushing on the edge of the belt.

SLIPPERY

All PTFE coated fiberglass belts are coated on both faces. This leads to a belt that slides easily on the machine's support structure. It also means that the product being conveyed slides easily and is easily removed from the belt at the exit of the process.
The slippery surface also requires special attention be given to the design of the drive roller(s) and the guiding rollers. A future issue of NIBA's BELTLINE will offer a guide to tracking PTFE coated belts. For now, we suggest that you consult your belting supplier for more details.

BELT DESIGN

Selecting the correct material for the belt is only the first of three steps to a successful process. The second step is to design and fabricate the belt properly. The selection and design of the seams and edges is critical to success. There are many seam and edge selection choices...in fact....too many to list here. A future issue of NIBA's BELTLINE will have an article dedicated to belt design for PTFE coated belts. For now, consult your belt supplier for guidance on proper belt design.

The third step to a successful process is the design of the machine. A new machine design or a new process should involve the belting supplier at an early stage of process development. Machine design factors that affect the belt include:

- Can the belt be put on endless?
- What type of seam is needed?
- How will the belt be guided (tracked)?
- How will the belt be tensioned?

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- How will the belt be driven?
- How will the belt be supported?
- How will the product be put on and taken off the belt?
- How fast will the belt travel?
- What is the maximum temperature of the process?
- What is the process that happens on the belt?

THE FUTURE OF PTFE BELTING

PTFE coated belting has been around for over forty years. A lot has changed in the US during those 40+ years. Some industries have virtually disappeared. For example, laminators used in garment factories (called fuse presses) are almost entirely gone from the US. Large dryer ovens used to process wide textile roll goods are also nearly gone...to the Far East.

Fortunately there are new processes and new incentives to use PTFE belting. Here are a few trends to watch for.

- Non-garment laminators. These machines are nearly identical to the old fuse presses but they are often bigger and are processing materials for automotive interiors, medical products, paper products, solar power devices, flooring etc.
- Energy savings. Lightweight PTFE belting is being used to replace heavy metal, open mesh belts in several major industries that remain strong in the US.

  Energy saving is also the reason for switching from a hot (thermal) oven to a UV (light) curing oven.
- The green movement is already creating new opportunities for PTFE belting. Recycled materials are one of several industries that are growing and creating opportunities for PTFE belting
- Higher temperature processes are often needed to take advantage of new polymers. Higher oven throughput is also sometimes achieved by higher process temperature. PTFE belting offers a higher operating temperature than any other non-metallic belt.

In summary, we think the future is bright for PTFE belting. It is brightest for those who can change with the times.