



# CHECKLIST: HOW TO GET THE RIGHT BELT THE FIRST TIME

Save Time, Money and Frustration with These Belt Design Considerations

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# Introduction



Selecting a belt that will meet your exact requirements is critical to ensuring peak operating performance while avoiding downtime and costly belt replacements. To select the right belt, there are a number of factors to consider — especially related to dynamic, environmental and application conditions.

It is not enough to simply confirm that a belt is properly sized. Cord type and structure, cover options and body compounds must all be thoroughly examined to ensure the belt will perform according to the needs of the specific application.

This guide is intended to help identify and address application criteria necessary to specify the right belt to deliver a highly efficient, reliable product.

## Application Criteria

The first step in selecting the right belt is to examine your product and process line; based on this assessment, you can determine how the product will need to be conveyed. It's crucial to examine the size, design, weight and material makeup, as well as the loading method of the products conveyed, in order to ensure the belt will hold up to general wear and tear within the application environment.

## Defining the Application

- Will you need general conveying or bi-directional conveying?
  - For example, if synchronization of the product being moved is important, a timing belt will likely be the right choice. In bi-directional synchronous conveying applications, certain tooth geometry performs much better than others.
- Does the product handling application synchronize with other parts of the conveying process?
  - Understanding speed and timing is important to align positional needs of other interface equipment with consideration to the available conveyor space and belt pitch.
- Is belt slippage desired or acceptable?
  - This information helps determine whether a synchronous or non-synchronous belt is applicable.
  - If a belt does not need to be synchronized, a flat V-belt, banded V-belt, or multi-rib V-belt might be an ideal option.
  - Conversely, if synchronized movement is a necessity, then a synchronous timing belt must be used. When very precise movement is necessary — particularly with bi-directional conveying — a certain type of synchronous belt tooth with minimal backlash may be best.
- What material will be conveyed?
  - Will the material be hot, cold, abrasive or fragile?
  - Whether the application requires a synchronous (timing) or non-synchronous (flat conveyor belt), many material options are available to address a wide range of environmental and dynamic movement needs.



## Defining the Application

- Is the application new or existing? If existing, what problem needs to be resolved?
  - For new applications: We begin developing your ideal solution by considering the right belt substrate, cord requirement, possible cover, anticipated cleat needs and other factors. Having a clear understanding of your application and target belt price is essential to determine which processes should be employed to design and manufacture the right belt for your application.
  - For existing applications: Understanding why a belt may not be delivering expected life is important. The goal is to improve performance by understanding the baseline conditions of an application. With such understanding and a broad range of belt and material options, improvements in handling efficiency may be easy to deliver. In these cases, it is helpful to supply current information on the current belt type (e.g., rubber or polyurethane, pitch, width) and reasons for failure. If possible, obtaining a used sample belt to examine factors like wear and breakage is always a good practice.
- Provide any special tolerances for length, width, and thickness
  - In some cases, standard tolerance may not be sufficient for your application. Understanding your specific needs helps us to determine factors such as belt material types and manufacturing processes.
- Consider drive dimensions:
  - What are the pulley diameters and center distance between shafts?
    - As belts come in many different sizes, thicknesses and strengths, understanding any limiting factor through the selection process is important.
  - Are there any space limitations?
    - Drive dimensions allow for calculation of the drive geometry, which will determine belt length and also provide the information necessary to ensure that the drive will fit in the required space.
  - What is the general environment of the application? What is the ambient temperature?
    - For example, knowing whether the temperature is high or low or if conditions are oily, wet or humid, can ensure the right type of belt compound is selected.
  - Are there requirements to meet certain certifications or standards (USDA, FDA, etc.)?
  - Is there a target price?
  - What is the desired delivery date? Is the project urgent?

## ✓ For General Conveying

- What is the conveyor speed?
- Is the conveyor horizontal or inclined? If inclined, what is the degree of the incline?
  - For some conveyors, it's possible to use a high-grip compound. If the incline is very steep, it may be necessary to add some type of cleat, profile or conveyor belt with a high-friction surface structure.
- How will the product be loaded?
  - For example, if a heavy item will be dropped onto the belt, creating a shock load or if a sharp item will be dropped onto the belt, creating potential damage, more durable material should be utilized to resiliently withstand the impact.
- What is the desired belt width?
  - In addition to our conveyor belts, Megadyne also offers "wide" synchronous belts for special applications, such as automotive metal stamping and diaper production.



## ✓ Bi-directional Conveying

- Is the belt joined by lacing, splice or mechanical clamp method?
- What is the acceleration profile speed?
- If a mass or carriage is attached to the belt, what is the weight of the component?
- Does shock loading occur at reversal?

## Attachments

### Tracking Guides

- Would a guide be helpful to track the belt?
  - Does sidelading onto the belt move the belt sideways?
  - If required, what size guide is needed? K6 or K13?
  - If wide belt conveying with belt synchronization is required, hybrid belts may be the optimal solution. A hybrid belt offers both conveying and synchronization and is available in dimensions up to 1000mm wide.
  - For quieter tracking, our new QST self-tracking belt may be a suitable option. Alternatively, a timing belt acting as tracking guide could also be used.

### Cleats

- Cleats (also known as lugs, profiles, or attachments) are used to hold, stabilize, position, or transport product. Cleats are available in a weld-on style or a mechanically attached style using false teeth.
  - Would a cleat designed to provide product separation, indexing, actuation, or positional holding be beneficial for the movement of the product being conveyed?
  - How many cleats will be needed?
  - Will a 2D shape cleat work or is a more complex shape needed?
    - Megadyne offers CNC cleats in addition to in-house molding; the process used is dependent upon the quantities required and shape design requested.
  - Where will the cleat be welded - always over the tooth, between teeth or a combination of both?
  - Does the cleat require repositioning or frequent replacement?
  - Provide a sketch of the desired profile and include critical dimensions like height, width and thickness.
  - Be sure to review pulley sizes to ensure weld-on cleats will stay securely on the belt.





## Covers

- Custom covers can be added to Megadyne belts to improve product handling and offer enhanced performance for applications in which:
  - High or low friction is desired.
  - Non-marking of the product conveyed is essential.
  - Heat resistance is required.
  - Wear resistance is needed for abrasive material being conveyed.
  - Compressibility is necessary for fragile product handling.
    - In these scenarios, soft foam covers can be applied for a cushioning effect.
  - Products moved must be offloaded easily without sticking.
  - Is the belt on a level plane or an incline?
  - What best describes the cover need?
    - High-friction
    - Low-friction
    - Ease of release
    - Shock absorption
    - Compressibility
  - Is a specific thickness and/or tolerance required?

## ✓ Modifications

Megadyne can perform many different belt modifications to increase friction, allow for vacuum and provide pocket placement of products and materials conveyed.

### What modifications are required?

#### ● Grinding

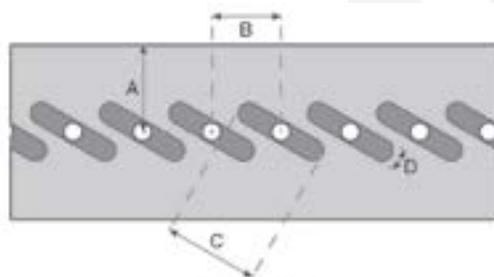
- Assess what type of finish, thickness and tolerance are required.
- The bottom of the belt or timing teeth may be ground with grooves or slots to assist in tracking guidance.

#### ● Routing/profile grinding

- Provide a sketch with dimensions of any routing that is required.
- Profiling to the shape of a product helps maximize grip and control, subsequently minimizing crushing. This is frequently done for tube pulling applications, rubber and cable pulling.

#### ● Holes/perforations

- These can be added to both synchronous and non-synchronous belts.
- Provide a sketch with hole diameter and pattern, indicating tolerances when required.
- Holes are often used on belts in vacuum applications to provide positive holding power for lightweight products such as paper and plastic film. For vacuum applications, Megadyne can produce urethane timing belts with special cord spacing to ensure cords are not cut during the perforation process.



#### ● Grooving

- Provide a sketch, including design, pattern and tolerances.

#### ● Custom shapes

# Checklist: How to Get the Right Belt the First Time

## Modifications

- Pockets
- Saw tooth shape
- Vacuum countersinks
- Notching/knife cut
  - This is ideal for applications requiring stress relief and better longitudinal flexibility around smaller pulley diameters.
  - This can also provide profiles for high-precision indexing or positioning.
- Fabric added to tooth side or backside of belt
  - Low-friction fabric can be applied to reduce the coefficient of friction between the belt and running surface while reducing noise.
- Tooth removal
  - Teeth can be removed from a synchronous belt to assist in tracking and provide a smooth-running surface for slider beds. This can also be done as a means to create a vacuum seal.
  - Nylon reinsertion of the belt drive-side allows for low-friction movement.

## Base Belt Types

For most product handling applications, a standard “base belt” product is used as a substrate, and value-added operations (e.g., covers, modifications, attachments, etc.) are performed to customize the belt for a particular application.

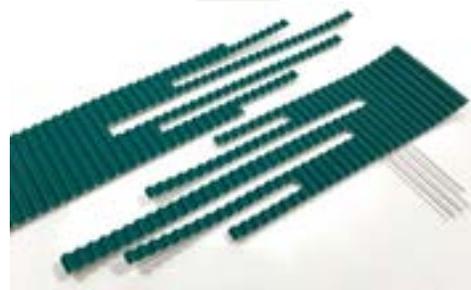
Armed with the information laid out in the previous sections of this guide, users will be able to determine the ideal base belt construction for the application at hand. Some popular options are listed below:

- Rubber Timing Belts
  - Endless
  - Open end
    - Steel or fiberglass cord



## Base Belt Types

- Polyurethane Timing Belts, such as Molded Endless Megapower and Megapower FC (food contact): These belts are made with thermoset urethane using a dedicated mold and offer precise length and thickness.
  - Open end polyurethane
    - These thermoplastic urethane belts can be joined endless and manufactured to your desired length requirement
    - Mechanical pin splicing of endless belts is possible with our PPJ (progressive pin joint) process. This allows for rapid belt installation and reduces downtime.



***PPJ is easily installed, as it does not require special tools or machinery disassembly.***

It also ensures quiet operation because there are no metal parts in contact with the pulley. PPJ is compatible with existing belts. This unique solution is strong enough for most conveying applications and can be used with most pitches. However, one must derate the belt strength at the joint.

- Truly Endless Polyurethane-Flex: A special production process allows for thermoplastic extrusion of high-strength, long, endless belts. Flex belts provide the strength and reliability of a molded endless belt, but are made from thermoplastic urethane in lengths up to 74.4 feet. Truly endless belts are an option when a joined endless urethane belt is not strong enough to support the load that needs to be moved.
  - Integrated guides available
  - Provides the most positive form of synchronous motion with dynamic true tracking
  - Used for conveyors with long center distance, for which true tracking is critical
  - Ideal for side-loading or unloading applications



# Checklist: How to Get the Right Belt the First Time

## Base Belt Types

- Rubber V-belts
  - Available in all popular cross-sections
  - Wrapped or raw edge
  - Banded
- Poly-rib — rubber and polyurethane serpentine belts
- Conveyor belts
  - TPU
  - PVC
  - Fabric
- Flat rubber and polyurethane belts
  - Extruded
  - Knit-type
  - Woven-type
  - Cast



## Base Belts — Alternative Materials

### Belt Compound Options

Our range of belt compound options, outlined below, offer a range of advantages:

- Rubber
  - Anti-static
  - Low- or high-temperature
  - Low-noise
  - Silicone-free
  - Non-marking
  - High- and extra high-temperature
  - Extra-thickness backings

## Base Belts — Alternative Materials

- Polyurethane
  - Oil and wear resistant
  - Microbial-resistant
  - Hydrolysis-resistant
    - For drives in wet or humid environments
  - FDA-compliant
  - Silicone-free
  - Low or high temperature compatible
  - Custom colors
  - Various durometers

## Alternative Cord Options

- Polyurethane synchronous belts
  - Kevlar — Used in metal detection applications; an ideal option for food-related applications
  - High-power — Offers 25% more strength than standard steel
  - High-flexibility — Ideal for use on sub-minimum diameter pulleys and severe reverse-bending applications
  - High-power and high-flexibility — Offers 25% higher strength than standard steel, plus great flexibility
  - Stainless steel — For use in water/corrosive environments
  - Fiberglass — Offers high strength for power transmission applications (Megapower Only)
- Poly-rib
  - Nylon — For use on fixed-center distance drives; eliminates the need for idlers
- Rubber synchronous belts
  - Steel (open-end synchronous belts)

## Working With Megadyne



This guide only skims the surface of the countless options available for product handling belts. Megadyne's wide-ranging material, processing, and customization options allow us to meet the exact needs of any application, no matter how unusual or complex.

With our expertly skilled team, state-of-the-art equipment and ongoing material research initiatives, Megadyne is proud to be a premier provider of customized belting solutions — delivering tomorrow's solutions today! [Contact the team today!](#)

# About Megadyne

Founded in 1957 in Mathi, Italy, Megadyne is a leading global manufacturer and fabricator of power transmission, product handling, materials handling and linear positioning belts, hose and metal products.

With manufacturing operations in Europe, Middle East and Africa (EMEA), Asia Pacific (APAC) and the Americas, Megadyne is well poised to be your partner. From a broad selection of materials and processes, we service over 20 major industries offering high quality product, outstanding service, technical support and state of the art logistics to ensure we develop the right product for your application and have it at the right location when you need it.

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