Applications, Products, Success Stories

BELTING FOR THE LOGISTICS INDUSTRY

Presenters

Kim Millsaps
President

Nitta Corporation
of America

Rob May
Business Development
Manager-Logistics

Nitta Corporation
of America

3 Ways Belting Improves Distribution Center Efficiency

Introduction

3 Ways Belting Improves Distribution Center Efficiency

In large distribution centers, miles of conveyors are essential to moving goods out the door quickly. Speed and parcel orientation are of paramount importance, and the precise routing of individual packages is critical. Much attention and careful design go into the layout of a distribution center (DC): at various stages in the conveyor system, belts with unique properties are engineered to meet the specific function requirements of a particular station.

NIBA
The Belting Association®

3 Ways Belting Improves Distribution Center Efficiency

1. **Maintain conveyor speed and accuracy with belt properties that meet the requirements.**

   How important is the orientation of each container on the belt? The “Gapper” section is a series of MDR sections, no more than 2.0m in length, 4 or more sections, which are used to change the speed of the packages thus controlling the gap between boxes. This allows for the proper reading of the bar code label. Belts will be regularly cycled in a range from 0 to 200 to 600 feet per minute. Under these extreme conditions, application engineers calculate the effect of “G” force on products conveyed. A single basic belt type cannot meet all requirements.

   Within the same distribution center, different conveyor areas require different belt properties. For example, incline and feeding areas require a high coefficient of friction. All the while, strength and flexibility are of paramount importance. The load carrying capacity of aramid fabric (commonly known by one manufacturer as Kevlar) results in the best performing belts for the sortation conveyors found in every distribution center.

NIBA
The Belting Association®

3 Ways Belting Improves Distribution Center Efficiency

2. **Increase conveyor efficiency with a belt construction engineered for a specific function.**

   The “Gapper” sections of today’s DC conveyor systems consist of a series of short, individually powered segments that function to create physical space between individual parcels, enabling photoelectric scanners to read and identify each container and route it to a designated collection point for shipment to a particular destination.

   Due to the high cycle rate and speed requirements (0 to 600 feet per minute), a series of belts with elastic properties has been developed, the selection criteria for which include the calculation of load, friction coefficient and G-Force – all to precisely position the parcels being moved downline.

NIBA
The Belting Association®

3 Ways Belting Improves Distribution Center Efficiency

3. **Reduce total cost of conveyor belt ownership by solving and preventing problems.**

   A trained logistics belting specialist will know how to match core material, cover material and belt design to meet the specific needs of each part of a conveyor or machine, drawing on their extensive experience in all types of industrial belting and conveyor systems.

   Whether a distribution center requires help troubleshooting specific issues such as product positioning, tracking problems, intermittent slipping, cracking, scaling, etc., or needs a recommendation for a new installation or retrofit, these technical specialists can provide the needed expertise. They can consult with a distribution center manager to troubleshoot problem areas and identify opportunities to improve conveyor performance with specialized belting. Supporting this effort requires a wide selection of conveyor belting with a variety of cover materials to provide the strength, durability and special properties required for each application.

NIBA
The Belting Association®

Innovative Products for the Logistics Industry

ARAMID CORD BELTING AND FINGER-SPLICE ELASTIC BELTING

Aramid Cord Belts with Polyurethane Encapsulation

A key product innovation for the Logistics industry has been the development of a unique range of special purpose belts with a high load capacity aramid cord carcass strength member encased in polyurethane. These belts support high working loads, have a superior tension rating and have inherent resistance to belt stretch.

As belts stretch, they often must be shortened and re-spliced, which leads to lost production and marginalized system efficiency. A belt with substantial stretch resistance and high load carrying capacity rarely needs to be re-spliced due to stretch, making it the optimum delivery component on a system. In addition, a belt design where the aramid strength member is totally encapsulated by polyurethane means the belts do not fray or string (a leading cause of conveyor roller failure).

NIBA
The Belting Association®

Aramid Cord Belts with Polyurethane Encapsulation

Sortation & Strip-sort Conveyors

Modern distribution centers utilize sortation conveyors to route packages to a specific staging area for shipment. There are literally miles of these type belts in a DC – narrow width, high-strength conveyor belts, a critical component of an efficient delivery system. These systems are best suited to aramid cord flat belts with polyurethane and wear-resistant NBR covers.

Live Roller Applications

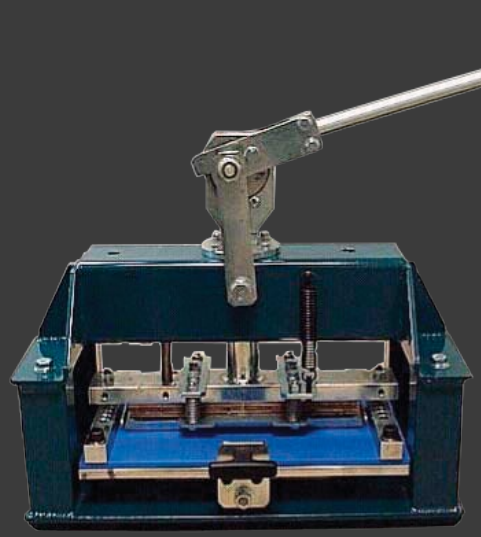
Another critical conveyor component in distribution centers, these belts convey boxed goods down-line 100 meters or more to staging points for shipment to retail centers or consumers. A variety of aramid cord belts can be used here to provide reliability and performance, with the selection tailored to the application depending on load carry capacity and top cover options (polyurethane or NBR) required.

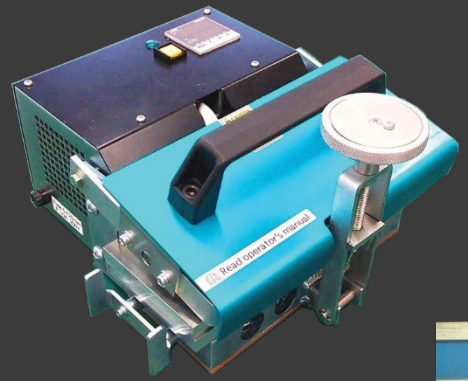
NIBA
The Belting Association®

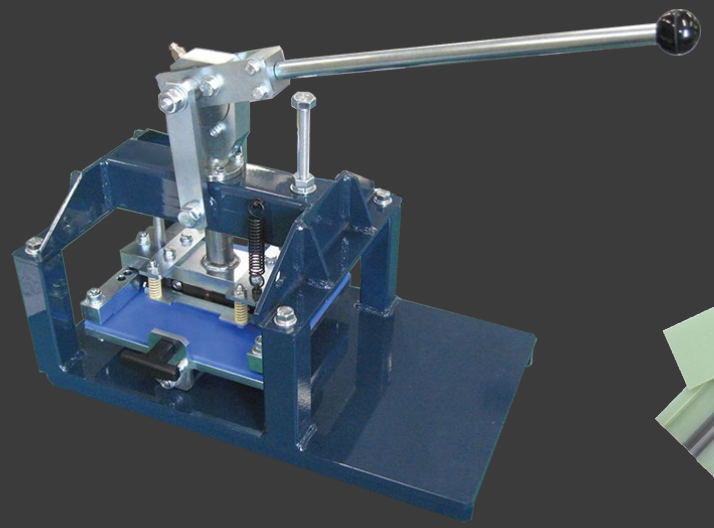
Aramid Cord Belts with Polyurethane Encapsulation

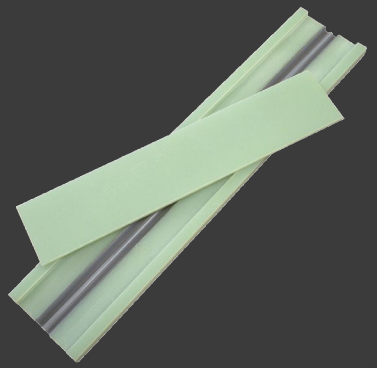
Endless Vulcanization

Aramid cord belts, designed to be vulcanized endless using finger-splice tools, will offer optimum installation and long, reliable service life – much more so than mechanically fastened (i.e., laced) belting.



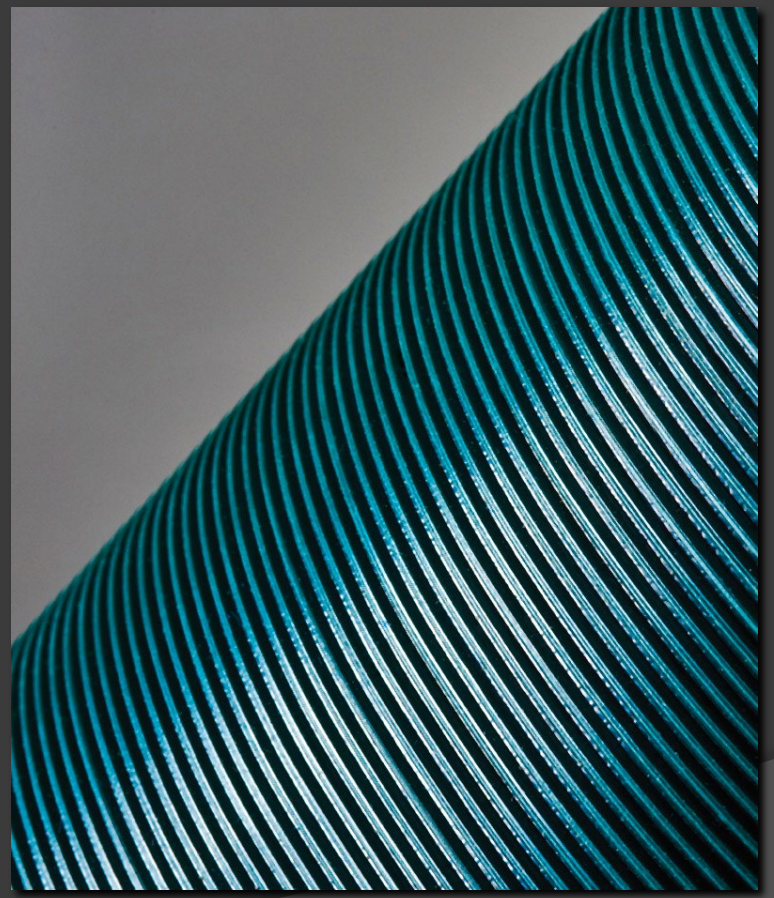






Modern DCs and Elastic Type Belts

Modern distribution centers operate on a scale unheard of just ten years ago. The evolution of belt and equipment design to accommodate the movement and increased belt speeds of hundreds of thousands of parcels each day is truly impressive. A generation of elastic belts with up to 10% elongation capacity, requiring no take-up adjustment and operating at speeds exceeding 600 FPM, are commonplace.



NIBA
The Belting Association®

Logistics Applications

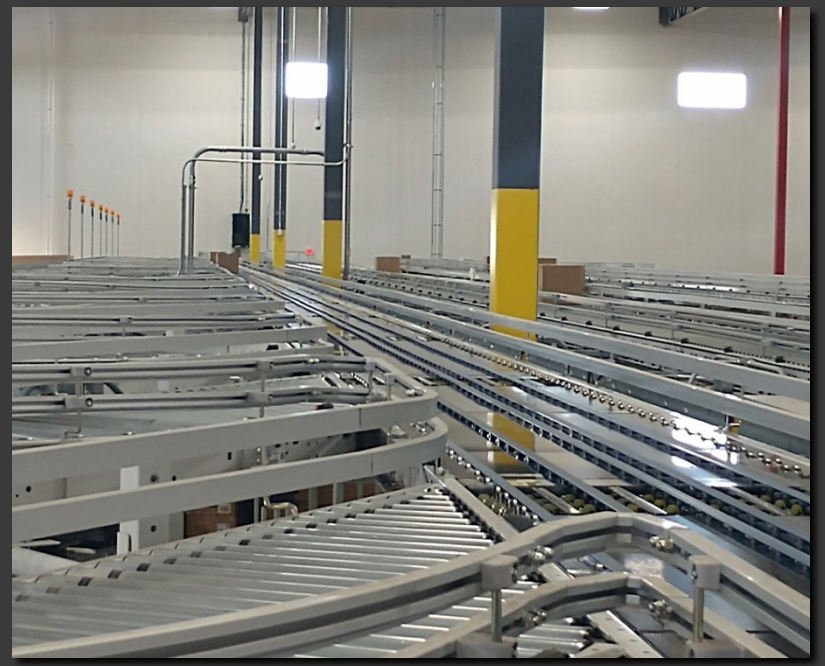
Distribution Centers

Linear and Circular Sortation Systems

Distribution centers are configured with linear or circular sortation systems, or a combination of the two.

Linear Sortation System Components

- **Merge** – Facilitates a steady flow of loads
- **Induction** – Minimizes gaps between loads and maximizes the flow onto the sorter
- **Sorter** – Diverts items to one or two sides
- **Shoe Conveyor** – Parallel divert sortation with “shoes” that slide across tubes or slats
- **Take-away** – Moves items away from the sorter
- **Controls** – Tracks items and ensures accurate flow



NIBA The Belting Association®

Linear and Circular Sortation Systems

Functional Areas of a Circular Sortation System

Circular sorters provide the advantage of creating multiple logical sorters with increased performance and flexibility. They can connect many functional areas of the warehouse: receiving, storage, order fulfillment, consolidation and shipping.

1. **Feeding-in** – Weighing, measuring, assigning
2. **Preparation** – Aligning, separating, merging, accumulation (slug belts)
3. **Identification** – Recognition, defining of destination
4. **Distribution** – Onloading and throughput
5. **Discharge** – Buffer, chute and workstation

In addition, the operating strategies, the organization and the sorter control are among the essential elements of the system.

NIBA
The Belting Association®

Process Overview

- **Input Stage**
  a. Telescopic loaders
  b. Picking station
- **Merging / Gapping**
  a. Merge system
  b. Accumulation
  c. Gapping, acceleration
- **Identification**
  a. Checkweigher, scale
  b. Scanner labeling

Process Overview

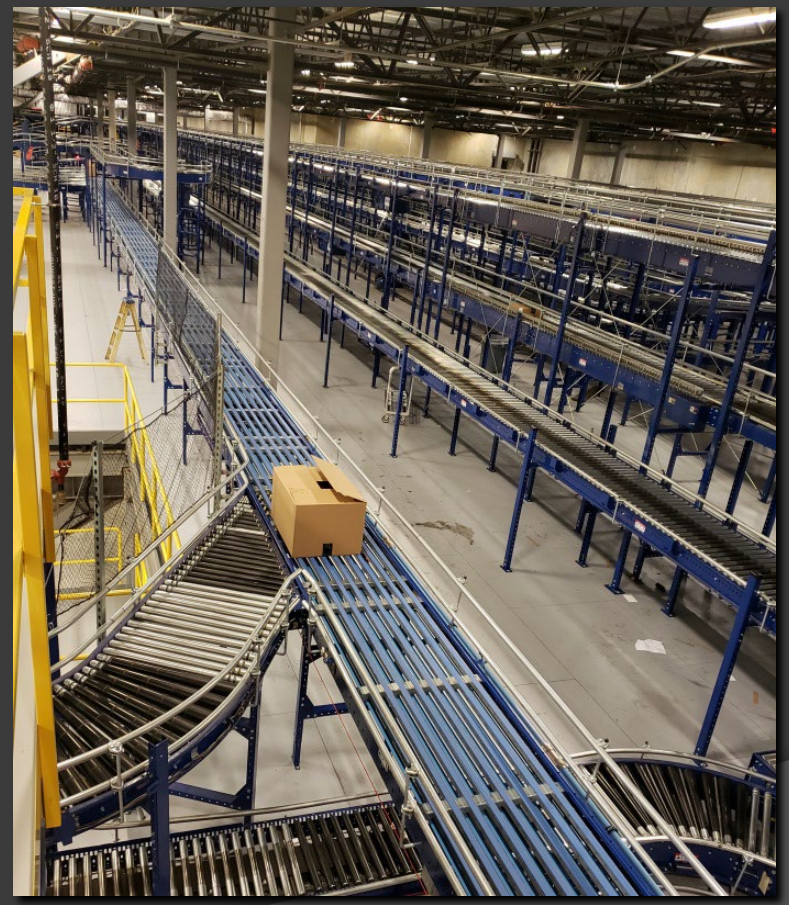
- **Induction to Sorter**
  a. Metering
  b. Induction unit – multi-strand
  c. Induction unit – single belt
- **Sorter**
  a. Cross belt sorter
  b. Belt diverter
  c. Pop-up sorter
  d. Shoe sorter
- **Outfeed, Final Stage**
  a. Deceleration
  b. Outfeed system
  c. Telescopic Conveyor

Process Overview

- **Conveyor Sub-systems, Modules**
  a. Line belt
  b. Live roller conveyor
  c. Power turn
  d. Incline/decline conveyor
  e. RAT belt (Right Angle Transfer)
  f. Z-conveyor (swan neck conveyor)
  g. Pallet shrink wrapping

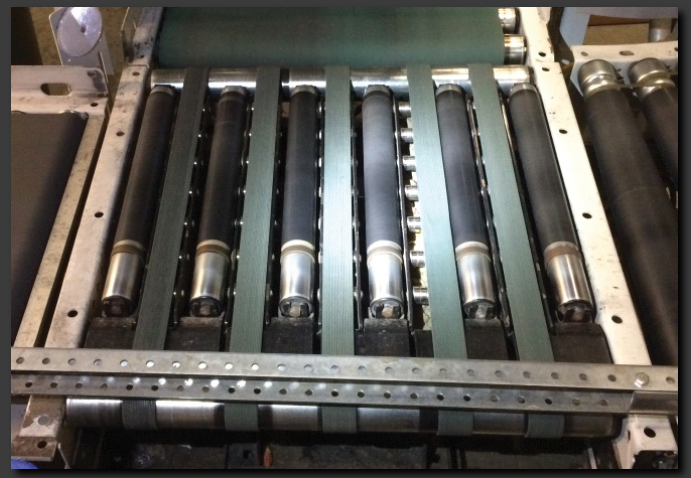
Sortation Applications

- **Strip Belt Sorter / Narrow Belt Sorter**
  (Linear Sortation)
  - Transportation on belt surface
  - Efficient belt on roller (BOR) design
  - High strength aramid cord flat and v-guide endless belts



Sortation Applications

- **Right Angle Transfer (RAT)** *(Linear Sortation)*
  - 90-degree divert function
  - Ribbed PVC / Coated Fabric Conveyor Belt
  - Finger-Splice Elastic Belt with Ribbed Top Cover
  - Finger-Splice Fabric Type Belt
  - Polyester rubber-covered PT belts (9mm width) also used
- **Pop-up Wheel Sorter / Pop-up Belt Divert Sorter** *(Linear Sortation)*
  - Wheels or conveyor section elevate to divert product 90° to the direction of travel
  - Works with cartons and totes
  - Take-away conveyor or chute
- **Steerable Wheel Sorter** *(Linear Sortation)*
  - Steerable wheels
  - Sorter easily relocated on modular design
  - Works with cartons and totes



NIBA The Belting Association®

Gapping / Induction / Merge Applications

Induction Sub-Systems

- Minimizing carton gaps and maximizing throughput

The efficiency of the induct subsystem optimizes the performance of the entire sortation system.

Merge Sub-Systems

Merge sub-systems ensure constant product flow by coordinating and monitoring all infeed and funneling functions. Cartons are consolidated and moved from the merge area onto the induction conveyor leading to the sorter.

Multiple lines are consolidated onto a single output conveyor.

NIBA
The Belting Association®

Gapping / Induction / Merge Applications

- **Brake Belt**
  - Finger-Splice Elastic Belt with Ribbed Top Cover
- **Meter Belt**
  - Conveyor Belting
    - PVC / Coated Fabric
    - Ribbed PVC / Coated Fabric
  - Finger-Splice Belting
    - Elastic Type
    - Elastic w/ Ribbed Top Cover
    - Elastic w/ Mini-RT Top Cover
- **Segmented Belt on Roller (SBOR) / Motorized Driven Roller (MDR)**
  - Finger-Splice Belting
    - Elastic Type
    - Elastic w/ Ribbed Top Cover
    - Elastic w/ Mini-RT Top Cover
- **Gapping Units**
  - Ribbed PVC / Coated Fabric Conveyor Belt
  - Finger-Splice Belting
    - Elastic Type
    - Elastic w/ Ribbed Top Cover
    - Elastic w/ Mini-RT Top Cover

Incline/Decline & Telescopic Conveyors • Palletizers

- **Incline/Decline Conveyor Belt**
  - Conveyor Belting
    - PVC / Coated Fabric
    - Ribbed PVC / Coated Fabric
    - RT PVC / Coated Fabric
  - Finger-Splice Elastic Belt with Ribbed Top Cover
- **Telescopic Conveyor**
  - Conveyor Belting
    - PVC / Coated Fabric
    - Ribbed PVC / Coated Fabric
    - Fabric / Fabric
- **Palletizer**
  - Stretch Wrapper
  - Nylon Core Belt with NBR Covers

NIBA
The Belting Association®

Belt Types for Common Logistics Applications

	Conveyor Belting				Finger-Splice Belting				Aramid Cord Belting		Nylon Core Belting
Application	**PVC / Coated Fabric**	**Ribbed PVC / Coated Fabric**	**RT PVC / Coated Fabric**	**Fabric / Fabric**	**Elastic Type**	**Elastic Type with Ribbed Top Cover**	**Elastic Type with Mini-RT Top Cover**	**Fabric Type**	**Flat Belt**	**V-Guide Belt**	**NBR Covers**
Input stage											
Telescopic loader	●	●		●							
Picking section	●			●							
Merging, gapping											
Merge system		●			●	●	●				
Accumulation				●							
Gapping, acceleration		●			●	●	●				
Identification											
Check weigher, scale	●				●						
Scanner, labeling	●	●			●		●				
Induction to sorter											
Metering	●	●			●	●	●				
Induction unit		●			●	●					
Sorter											
Cross belt sorter		●			●	●	●				
Belt diverter	●	●	●	●							
Right angle transfer		●				●		●			
Pusher sorter				●							
Outfeed, final stage											
Deceleration	●	●	●			●					
Outfeed system	●										
Conveyor sub-systems, modules											
General service	●	●		●							
Belt on roller / MDR					●	●	●				
Incline / decline	●	●	●			●					
Narrow belt sorter									●	●	
Live roller conveyor / heavy duty									●	●	
Live roller conveyor / light weight								●			
Palletizer / automated shrink wrap											●

NIBA The Belting Association®

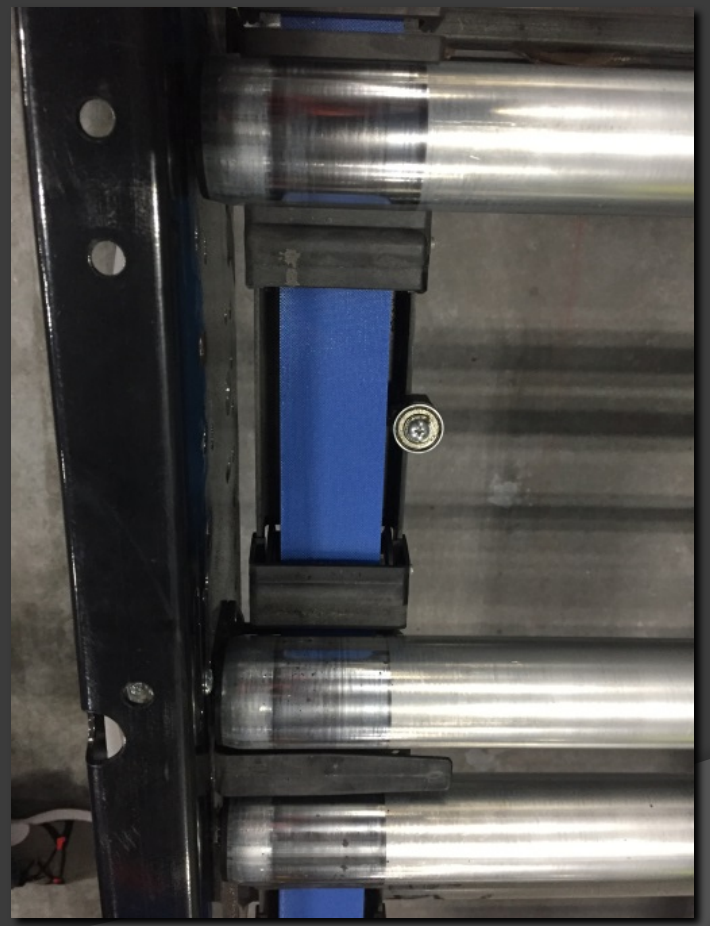
Practical Examples of Belting Solutions for the Logistics Industry

Success Stories

Rubber by Urethane Aramid Cord Flat Belt on Live Roller

During a conversation at a global logistics conference, the VP Operations of a well-known retail chain expressed interest in allowing a comparative performance test of a Live Roller belt to that of the OEM belt specified on systems manufactured by a well-known manufacturer of conveying systems.

The belt to be tested was a rubber by polyurethane flat belt with urethane-encapsulated aramid cord tension members, vulcanized endless via finger-splice.



NIBA
The Belting Association®

Rubber by Urethane Aramid Cord Flat Belt on Live Roller

The original equipment mechanically fastened belts were lasting four to five weeks before having to be re-laced due to stretch; in addition, the facility's maintenance staff spent hours each week addressing belt tracking concerns which led to belts coming out of the track and getting damaged, which led to more down time for replacement.

Two years after the initial replacement installation took place, the rubber by urethane aramid cord flat belts that were installed were still running, the original vulcanized splices intact.

Over two years' service life vs. the five weeks realized with the OEM belts. After the retail giant reported the improved performance of the replacement belts, the equipment manufacturer within seven months named a new default source for their live roller belts based on this information.

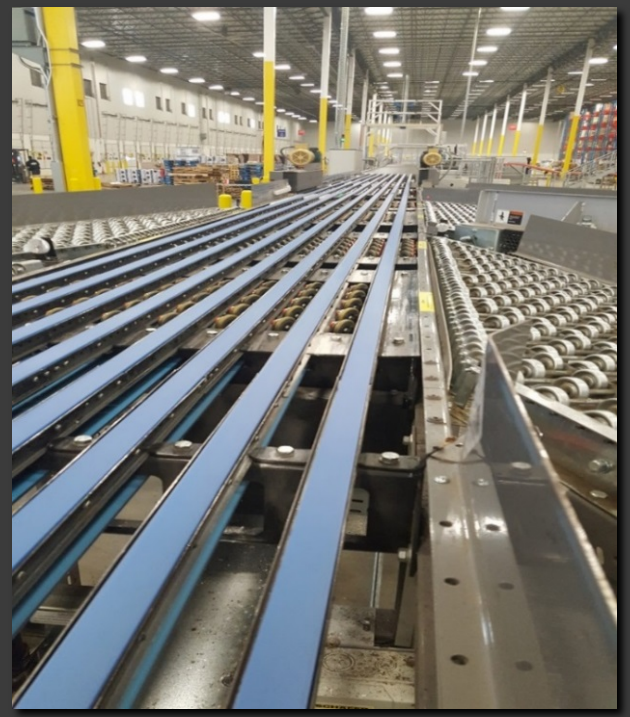
Rubber by Urethane Aramid Cord Flat Belt on Narrow Belt Sorter

A distributor client had a customer operating a several-million-square-foot DC who needed a more reliable belt for their Narrow Belt Sorter conveyors manufactured by a well known OEM.

The belt supplied by the OEM was a urethane material and was spliced with mechanical fasteners. Average service life was eight weeks with belt failures caused by tracking off (due to elongation) the guide channels leading to mechanical splice failures and ripped belts.

The replacement belt was a rubber by polyurethane flat belt with urethane-encapsulated aramid cord tension members, vulcanized endless via finger-splice.

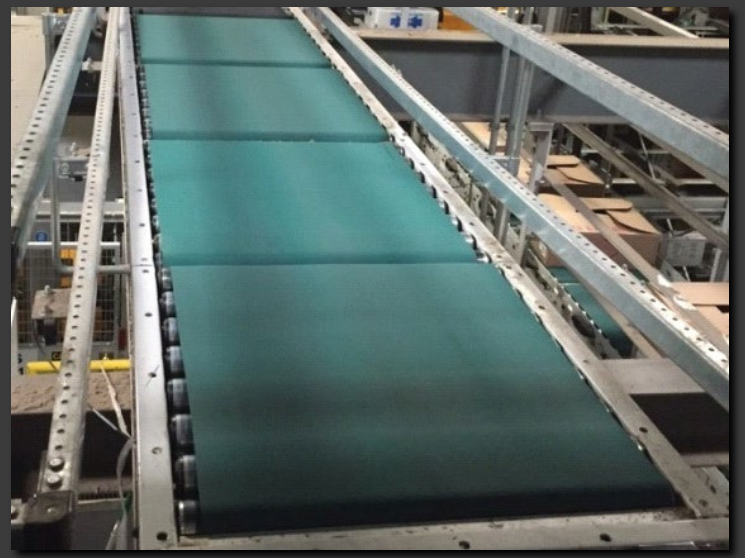
A team installed sixteen 300+ ft. long belts on two different sortation conveyors. One year later, all sixteen belts were still running, and the user began a wholesale conversion to the new belt.



NIBA
The Belting Association®

Elastic Type Belt on Gappers, BOR, SBOR

The regional distribution center for a large snack food manufacturer in the Midwest reached out when the belts supplied on their systems began to fail *en masse*.



Five elastic series conveyor belts were installed four years ago. Over the course of the following nine months, 3,000 belts – primarily Gappers, “Belt on Roller” (BOR) and Segmented Belt on Roller (SBOR) – were installed on the conveyors in this massive DC.

Four years later, the belts were still running and, as a result of their success, the other DCs of this company were expected to also convert.

Today, there are hundreds of thousands of BOR, SBOR and Gapper belts in use in distribution centers throughout North America. The staggering after-market sales opportunity for this segment of the logistics industry is very real. Success with Global OEMs has been a result of an extensive R&D commitment and outstanding engineering expertise in the manufacture and application of new leading-edge products.

NIBA
The Belting Association®

Thank you!

Questions?