

# Anti-Impact and Anti-Tear Series for Severe Operating Conditions

Impact and Tear Resistant conveyor belts provide reliable protection, extend service life, and reduce downtime risk in mineral crushing sections, high drop material transfer points, and other high-impact operating conditions. This series utilizes a specialized high impact and tear resistant compound in the cover rubber, effectively protecting the belt surface.

## Anti-Tear Capability Standard [HG/T3646]

HG/T3646-2014 Technical Specification for Anti-Tear Conveyor Belts systematically evaluates the conveyor belt's resistance to damage under complex working conditions from two dimensions: cut resistance and impact penetration strength.

- The cut resistance index is determined by a standard blade cutting test, simulating the material's ability to resist crack propagation when subjected to slitting or cutting by foreign objects.
- The impact penetration strength index is determined by a falling mass impact test, reflecting the material's ability to resist damage or penetration of the carcass caused by sudden external impact while the belt is under tension.

Both tests set detailed requirements for sample preparation, testing equipment, operating procedures, and data processing. For example, the specimen length must meet a 400 mm effective section, the cutting tool must match the belt carcass reinforcement material, the falling mass impact energy covers the 100 to 3000 N·m range to encompass common operating conditions, and a force-time curve must be recorded to assist in determining if internal damage has occurred.

By comparing the measurement results from these two dimensions, users can gain a more comprehensive understanding of the conveyor belt's safety performance and service life in high-impact and high-slitting-risk scenarios such as mines, ports, and bulk material transport, serving as an important basis for selection, acceptance, and quality control.



Item	HG/T3646 Standard	
	A	B
Cut Resistance/kN	≥3.0	≥10.0
Impact Penetration Strength/N·m	≥400.0	≥1000.0

### Diverse reinforcement solutions are offered for the carcass structure:

- High-Density Fabric Carcass** Transverse strength is enhanced through special weaves such as BTW, XP, and CFW, to better dissipate impact forces.
- Steel Cord Carcass** Adding a high-strength fabric anti-tear layer compensates for the weakness of easy penetration, absorbs impact, and prevents tear propagation.
- Integrated Steel Mesh Carcass** Using transverse steel cords further strengthens anti-penetration and anti-tear capabilities.

**The diversified combination of carcass and cover rubber allows the conveyor belt to achieve tougher and longer-lasting protection under various severe operating conditions.**

# BTW Impact Resistant Conveyor Belt

BTW Impact Resistance Excellent Elasticity

The BTW super heavy-duty carcass uses high-strength polyester and nylon as base materials, employing BOTON's independently developed BTW Triple Weave structure. It features both high elasticity and high strength, which significantly enhances the belt body's ability to absorb and disperse impact while improving transverse tear resistance. It is an anti-damage fabric carcass customized for high-impact conveying environments.



## Structure Type

### BTW

Unique Triple Weave structure utilizes high-strength polyester warp and nylon weft yarns. The upper and lower weft layers are woven into bundles with the main warp yarns, enhancing the carcass ply consistency and compressive elasticity. Characterized by high fabric density and strong adaptability, the conveyor belt consists of no more than 3 plies and is compatible with single or double-layer finger splicing as well as mechanical fasteners.

## Key Features

### Impact Resistance

The BTW fabric carcass has a tight structure and features a triple weft layer structure. It has excellent elasticity and high-efficiency impact absorption capability, significantly reducing damage such as carcass rupture or breakage caused by materials dropping onto pulleys during loading or reclaiming.

### Flexibility

Reduced number of plies avoids stress concentration issues during installation.

### Tear Resistance

The tightly woven structure strengthens transverse support, enhancing overall tear resistance and effectively suppressing structural damage caused by sharp material impact.

### Compatibility

The BTW fabric has a low modulus and good elasticity, allowing for smooth replacement of traditional multi-ply fabric conveyor belts. It supports quick mechanical splicing, with a splice strength retention rate of over 70%, facilitating on-site maintenance and system upgrades.

✓ Fabric Strength Rating: **BTW400 - BTW1000**

Classification	Belt Breaking Strength (Warp/Longitudinal)	Adhesion Strength	Thickness
	N/mm	mm	mm
BTW400	/	12	2.2
BTW500	≥550	≥14	2.4
BTW630	≥700	≥14	2.95
BTW800	≥850	≥14	3.5
BTW1000	≥1050	≥14	4.5

## BTW Impact Resistant Conveyor Belt

# Case Study / Replacement of BTW Impact Resistant Conveyor Belt in Heavy-Duty Cantilever Conveying System

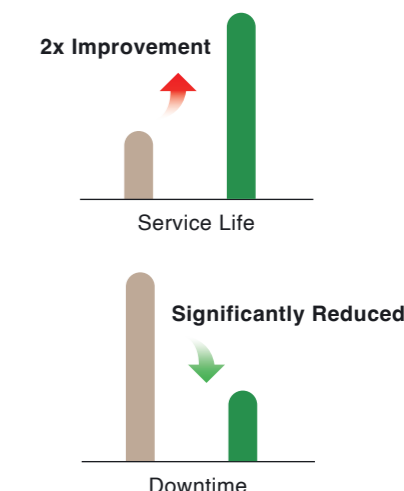
## Project Background

A cantilever belt conveyor at a certain stockyard had been using a standard EP fabric carcass conveyor belt for a long time. Due to complex operating conditions on-site, including wide belt width, large troughing angle, and frequent heavy material impact, the conveyor belt frequently experienced issues such as inter-ply delamination, premature fatigue cracking, and troughing deformation. The actual service life was less than half of the design expectation, resulting in high belt replacement frequency, significantly increased maintenance costs, and multiple unplanned downtimes severely affecting system continuity and production efficiency. The customer urgently required a customized solution specifically designed for cantilever systems, featuring high impact resistance and stable troughing capability.



## Operating Results

Dimension	Standard Conveyor Belt	BTW Conveyor Belt
Downtime Frequency	Frequent downtime, frequent maintenance	Unscheduled downtime significantly reduced
Adaptability	Vulnerable to bending, limited curvature	Good small curvature adaptation, no large bending fatigue
Impact Resistance	High-speed material drop easily damages carcass	Good impact absorption, more durable structure
Troughing and Tracking	Prone to tracking deviation, poor stability	Excellent troughing capability, smoother conveying
Annual Operation and Maintenance Cost	High O&M costs, large downtime losses	O&M costs significantly reduced, system operates continuously



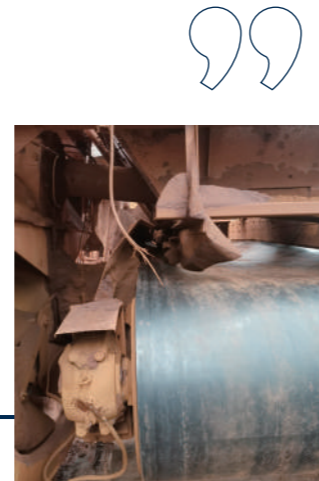
BTW Impact Resistant Conveyor Belt

## Case Study / Replacement of BTW Impact and Tear Resistant Conveyor Belt in Mine Crushing Section

### Project Background

A mine project belonging to a leading SOE group in China's steel and metallurgy industry requires that, after mining, large blocks of ore undergo a crushing process. These ore pieces, which are often >300mm, typically drop onto the conveyor belt from a height of 4-6 meters, generating enormous instantaneous impact force that can easily puncture or tear the conveyor belt.

To address the characteristics of high-impact materials at the site, BOTON provided the BTW Impact Resistant Conveyor Belt, which features excellent cushioning performance and superior impact resistance, effectively extending the service life in this critical process. In this project, the customer's original 8-ply NN300 conveyor belt was typically punctured by the high-velocity impacting ore within 5-7 months. After switching to BOTON's 2-ply BTW Impact Resistant Fabric, the conveyor belt's service life was extended to more than 18 months, achieving significant results and substantially reducing maintenance costs.



### Operating Results

Application Scenario	Original Solution (NN300 8-ply)	Improved Solution (BTW Impact Resistant Fabric)
Large Particle Size Ore Conveying 4-6 meter Drop Height	Service Life: 5-7 months Prone to Puncture	Service Life: Over 18 months Significantly Impact Resistant, Anti-Puncture

**3X the service life**

was successfully achieved by the BTW Conveyor Belt over the original solution.



## Anti-Impact Ply / Anti-Tear Breaker

### Anti-Impact Ply

Characteristics	BS Steel Cord Anti-Impact Ply	HC Fabric Carcass Anti-Impact Ply
Scenarios	High abrasion and high impact resistance, suitable for severe operating conditions	Hard rock mining, port terminals, steel/metallurgy, cement, salt, power plants, etc.
Features	Moderate to heavy impact scenarios	Light impact scenarios
Core Features	Efficiently disperses peak impact energy, high longitudinal and transverse strength, exceptionally tight structure	Enhanced impact resistance of cover rubber, ensuring fabric is not exposed
Composition	Nylon Dipped Fabric (Twill Weave)	Nylon/Polyester Dipped Fabric
Strength Rating	BS400 - BS630	BP100-BP600

### Anti-Tear Breaker

Characteristics	IW Impact Resistant Heat Resistant Steel Mesh	BF Steel Cord Anti-Tear Breaker	BP Nylon Anti-Tear Fabric	BD Aramid Anti-Tear Fabric
Scenarios	IW: Both impact and heat resistant, ideal for localized high-temperature use	General purpose, light anti-tear requirement		
Features	High elongation, low modulus, low creep special steel wire mesh	Balanced impact/tear resistance	Light anti-tear requirement	Used for applications like steel cord conveyor belts requiring transverse reinforcement to prevent longitudinal tearing
Core Features	Excellent impact resistance, also possesses good heat resistance	High transverse strength, effectively prevents longitudinal tearing, not easily severed/broken	Used for severe applications like steel cord conveyor belts requiring transverse reinforcement	Aramid anti-tear fabric has high strength, tear resistance, and no electromagnetic interference
Composition	Copper Plated Steel Mesh	High Elongation Steel Cord Anti-Tear Fabric (Transverse Steel Cord)	Nylon Fabric	Aramid Fabric
Fabric Strength Rating	IW500 - IW1250	BF200 - BF630	BP40 - BP300	BD200 - BD630

## Problems to be Solved in Severe High-Impact Operating Conditions

### 01 Avoid Damage to the Conveyor Belt Carcass Structure Caused by Large, Hard Materials

In industries such as mining, steel, and building materials, conveying systems frequently face repeated impact from large, heavy objects or sharp materials. If the carcass structure strength is insufficient, the following problems can easily occur:

- The surface rubber is punctured/broken through, directly exposing the carcass
- The weft yarns are torn by cutting forces, forming penetrating cracks
- Continuous impact leads to carcass fatigue rupture and a sharp reduction in service life

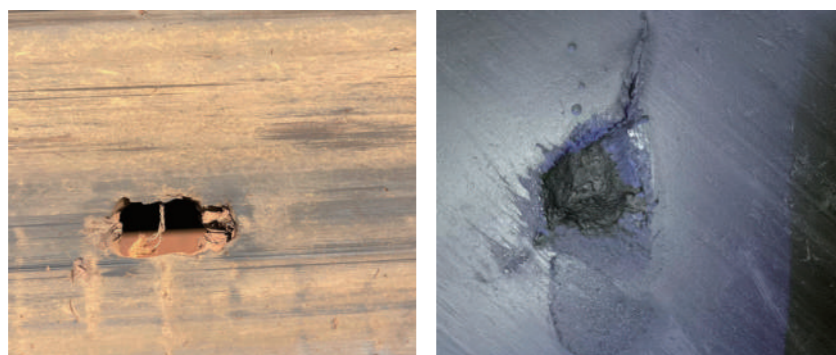
#### ✓ Solution Strategy and Selection Recommendation

Priority should be given to selecting a fabric carcass structure featuring enhanced design for transverse tear resistance and anti-puncture performance. Refer to the table for the impact resistant series fabric carcass weave structure for details.



### 02 Preventing Cover Rubber Stripping or Localized Punctures Caused by Impact

Under frequent impact or the action of sharp materials, the cover rubber layer can be broken through, leading to carcass exposure, rubber layer peeling (stripping), or even the formation of penetrating holes under heavy pressure.



#### ✓ Solution Strategy and Selection Recommendation

The selection of cover rubber specially designed for enhanced toughness can effectively improve the conveyor belt's resistance to cutting.

## How to Handle Severe Operating Conditions such as High Impact/Tearing?

### 01 Impact Resistant Series Fabric Carcass Weaves

To cope with this type of damage risk, BOTON has developed and designed two types of anti-impact/anti-tear plies, including the fabric anti-tear ply and the steel cord anti-tear ply.

#### ▶ Fabric Anti-Tear Ply

The fabric anti-tear ply includes lightweight polyester/nylon structures for absorbing impact energy, and high-strength nylon structures for active tear prevention.

#### ▶ Steel Cord Anti-Tear Ply

The steel cord anti-tear ply is composed of transverse steel cords and longitudinal tie wires, with strength determined by the steel cord diameter and spacing. Although seemingly stronger, the steel cords are non-stretchable and cannot gather to form a thick barrier like the fabric structure, thus their actual tear resistance may not necessarily be superior to the nylon ply. The appropriate protection ply should be selected based on the specific site conditions during the design process.

[【See Impact Resistant Series Fabric Carcass Weave Structure Table P61 for details】](#)

### 02 Dual Defense

To further address severe operating conditions such as high impact and tearing, BOTON has also developed high-performance cover rubber compounds specifically designed for harsh impact environments. These compounds strengthen surface resistance to impact and cutting, forming a dual defense with the carcass structure.

#### ✓ RockArmour™ X Series

Features "Ultra-High Impact Resistance + Anti-Cutting" performance, suitable for extremely severe scenarios with high drop height, highly sharp materials, impact and cutting. Its high elongation at break and tear strength can significantly mitigate impact peaks and effectively prevent crack propagation.

#### ✓ RockArmour™ Plus Series

While maintaining extremely strong impact resistance, it enhances abrasion resistance. It is suitable for long-distance, heavy-duty conveying systems where impact damage is the primary mode of failure, and it is particularly adept at absorbing intermittent strong impacts, slowing down surface aging and peeling.

Both products maintain stable and strong performance across a temperature range of -40°C to 70°C through special rubber compounds and reinforcement systems. They feature extremely low abrasion loss rates and are widely used in high-intensity mining operations such as iron ore, copper ore, and quarries, providing customers with lower maintenance frequency and greater economic assurance.

### 03 Intelligent Conveying Products

BOTON has also developed and applied an embedded RFID chip + intelligent monitoring system within the belt carcass. This system, paired with a belt tear monitoring system, enables continuous, accurate, and automated management of the conveyor belt's tear status.

[【See Intelligent Conveying Products P81 for details】](#)

# Impact-Resistant Series Fabric Core Woven Structure

Characteristics	BTW	XP	DW	CFW	EPP
Main Applicable Scenarios/ Advantages	Stacker-reclaimers, main conveyor lines, crushers, etc., where high transverse tear resistance and high risk of material spillage are required.		Extra heavy-duty, high-impact applications, such as hard rock mining, port terminals, iron and steel metallurgy, cement, etc.; suitable for mechanical fastener splicing.	General impact resistance applications, such as hard rock mining, port terminals, iron and steel metallurgy, cement, etc.	Short-distance conveying applications
Structure	BTW	XP	DW	CFW	SW
Core Impact Resistance Features	Ultra-high strength, excellent transverse tear resistance, protection against material piercing damage	High strength, extremely tight fabric structure, can effectively resist the impact and cutting of sharp ores	Tight structure, not easily cut punctured, extremely high impact resistance	High weft strength, high longitudinal tear strength, good impact resistance performance	Compared with steel cord conveyor belts, EPP fabric conveyor belts have better impact resistance and tear resistance.
Warp Tear Strength (N/cm)	≥630~≥1000 (Single ply)	≥6000~≥11000	≥2800~≥6600	≥2400~≥6700	≥4200~≥16500 (Single ply) ≥4900~≥14800 (Double ply)
Weft Tear Strength (N/cm)	Extremely high transverse tear resistance performance	≥3500~≥6000	≥1400~≥3100	≥1200~≥1800	≥1200~≥2400 ≥1350~≥2200
Thickness Range (mm)	Recommended number of plies does not exceed 2, bottom cover thickness ≤ 3mm (if there is a risk of material spillage)	2.9~5.0	1.05~2.52	1.0~2.5	2.0~5.5 (Single ply) 2.20~4.70 (Double ply)
Applicable Temperature Range (°C)	Not explicitly stated, can be improved when combined with cover rubber	-60~60	-40~150	-60~60	-60~60
Fabric Strength	BTW400~ BTW1000	XP500~ XP1000	DW500~ DW1000	CFW500~ CFW1000	EPP400~ EPP1600