

# Power and Performance

## For the Mining Industry



## Providing Innovative Solutions for the Global Mining Community

# Innovation in Motion

At Tsubaki, we know customers want the best. Indeed, we take pride in our ability to deliver an extensive product line up that satisfies these high expectations. We are also aware that each and every one of our customers has unique requirements. Therefore, we believe that in coming years there will be an increase in demand for products that can be readily applied to customers' global operational strategies. In other words, we foresee a rise in the need for highly customized products.

Our focus is on providing our customers around the world with concrete solutions by developing products to suit different countries, regions, and business environments.

Innovation in Motion. With an eye on future trends and lifestyles, we are committed to taking on the challenge of technical innovation. Based on our brand message, which incorporates that commitment and is shared by all Group members around the world, the Tsubaki Group provides solid support for the global business activities of its customers. You can count on Tsubakimoto Chain Co.

### Global Network

The Tsubaki Group includes 28 production locations and 35 group companies worldwide. Our production and sales networks are more fully developed than ever.

### Global Alliances

We continue to aggressively pursue operational alliances, mergers, and technical alliances with companies in Japan and throughout the world.

## Tsubaki Global Business

### Best Source/ Best Supply

Through global development of our network, we constantly seek the best combination of regions based on product distribution and market feedback.

### Global Marketing

With a keen grasp of the needs of customers, we use the Group's comprehensive strengths to commercialize products rapidly.

# Tsubaki Technology



# Tsubaki Environmental Action Plan

Helping to create an environment in harmony with people and our planet. With its focus on manufacturing, Tsubaki takes a unique approach to the challenges of environmental conservation.

## Principle

The Tsubaki Group believes that environmental conservation is a critical challenge facing humanity. We will remain mindful of the environment in all our operations and contribute to the world through our workmanship.

## Environmental Policy

- We will acknowledge the environmental impact of our operations, products, and services.
- In the interests of environmental conservation, we will use our creativity to exhibit industry leadership in reducing our environmental load.
- We will create a management system for environmental conservation and will promote pollution control and continual improvement.
- We will strictly comply with environmental laws, rules, and regulations, and will seek to develop good relationships with our stakeholders.
- Through environmental training and in-house public relations, we will work to enhance awareness of environmental conservation among all Tsubaki Group employees.

## Accredited with ISO 14001 Certification for Our Environmental Management System

- All Tsubaki Group workplaces in Japan are ISO 14001 certified; a growing number of Tsubaki Group workplaces outside Japan are doing so as well.

## Ongoing Efforts to Reduce Our Environmental Impact

- We are reducing CO<sub>2</sub> emissions resulting from our energy consumption.
- We are implementing recycling and waste-reduction initiatives.

## Ensuring Strict Compliance with Environmental Laws and Regulations

- We are instituting management systems at all our workplaces to ensure full compliance with local laws and regulations.



Reducing CO<sub>2</sub> emissions with a highly efficient cogeneration system.



This heat exchange system cools our injection molding equipment with heat from an electrical generator.

## Products for the Environmental Market



### Water Treatment Facilities and Equipment

Our sewage treatment facilities and equipment help maintain the water quality in water treatment facilities throughout Japan.



### Conveyors for the Environmental Market

Our conveyance devices for environmental facilities are used in applications such as waste incineration and processing of industrial waste, household refuse, and sludge. And with equipment provided by Tsubakimoto Bulk Systems Corporation and Tsubakimoto Mayfran Inc., we provide metal conveyance and coolant processing equipment for metal machining and processing applications. Clearly, our conveyor products are meeting the needs of the environmental market.



NEP Chain

# Tsubaki Solution

## Power and Performance

For the Mining Industry

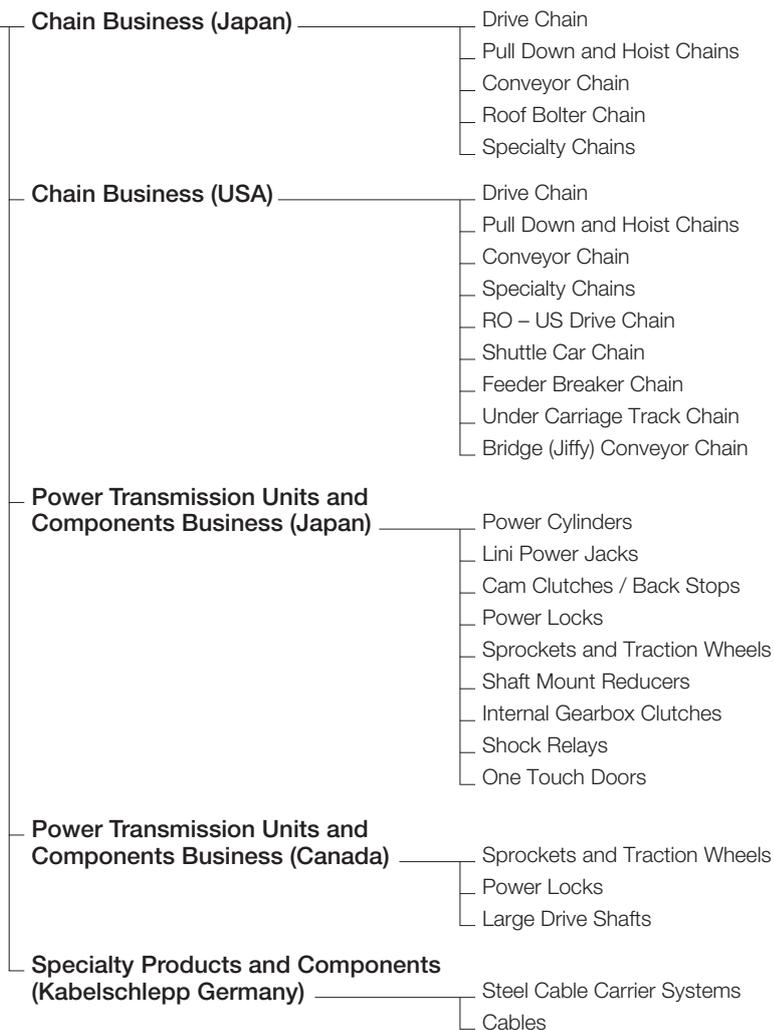
All of the products in the power transmission and materials handling fields were originally conceived as solutions for our customers.

If you have concerns about improving productivity or developing competitive products, come and talk it over with us.

We have developed the systems and components below by listening to our customers and customizing our technologies.

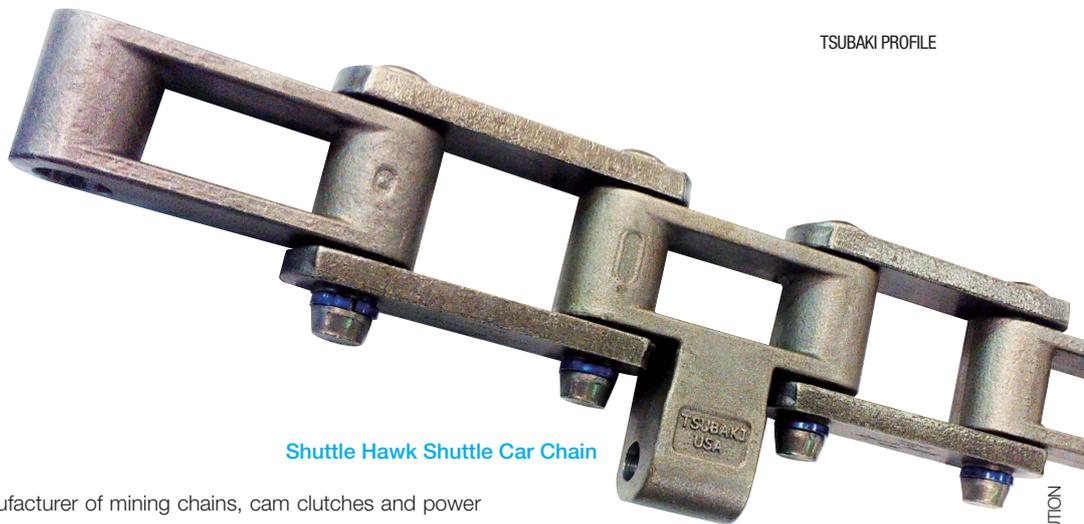
In response to increasingly pressing environmental preservation issues and the need for further IT integration, speed, and cost reduction, we will apply our advanced mechatronics technology and systems development capability to provide your company with the best solution. Let's work together on solving your next problem.

### Tsubakimoto Chain





Segmental Rim Sprocket



Shuttle Hawk Shuttle Car Chain

## Mining with Tsubaki

The Tsubaki Group is the leading manufacturer of mining chains, cam clutches and power cylinders used in underground mines, above ground mines, preparation plants, power stations and port facility applications.

We currently manufacture many different sizes of mining chains for several major OEMs. This relationship enables us to design upgrades for the chain in mining equipment to meet the ever-changing needs of the industry.

We use alloy-grade steels, heat-treated to precise specifications and assembled with the heavy press-fits required to withstand the punishment of today's more powerful, high production mining equipment.

Our complete line of mining chains includes Shuttle Car Chain, Feeder Breaker Chain, as well as various chains widely used in drill rigs, rotary breakers, reclaimers, face/roof drilling, continuous miners, prep plants, roof support machines, and continuous haulage systems.

To better service your industry, nearly all of our mining related chains are in-stock and ready for immediate shipment.

The Tsubaki Group is also proud to provide a wide variety of in-house designed sprockets, which are required in all chain applications, as well as other related products such as our highly reliable and strictly tested cam clutches and power cylinders, Power Locks, and One-Touch Inspection Doors®, etc.

Furthermore, as the Tsubaki Group prides itself on its ability to answer customers' demanding needs through innovative customization of its products, we are able to manufacture made-to-order chains and attachment configurations, sprockets, etc., for your individual requirements. Please contact your local Tsubaki representative for further details.



Feeder Breaker Chain



Feeder Breaker Chain



BS Series



Lambda® Chain

# Tsubaki Global Network



U.S.Tsubaki, Inc. (UST)

Wherever you are in the world, our production and sales network is able to provide your business with the immediate support it needs.

A manufacturing infrastructure that lets you forget international borders – the large scale on which Tsubaki’s services operate makes sure your global business ventures are successful.

Through 28 production centers and 35 Group companies worldwide, we will deliver full back-up and rapid response to your local needs anywhere on the globe.



\* Please contact your local Tsubaki representative for details on a distributor near you.



UST Portland Plant



UST Holyoke Plant



UST Sandusky Plant



UST Chicopee Plant



Tsubaki of Canada Limited

Tsubakimoto Europe B.V.

Korea Conveyor Ind. Co., Ltd.

Tsubakimoto Automotive (Shanghai) Co., Ltd.



Tsubakimoto Singapore Pte. Ltd.

Tsubakimoto Automotive (Thailand) Co., Ltd.

Taiwan Tsubakimoto Co.

Tsubaki Australia Pty. Limited



# Surface Mining



To access profitable material deposits located near the surface, heavy machinery and blasting techniques are used to remove overburden soil and rock which would normally impede extraction of materials. Depending on the material extracted, the ore or raw mineral is conveyed to a processing plant where it is either washed, beneficiated, concentrated or refined to achieve the saleable product.

As the extraction and processing of the raw material is done in the most demanding of environments, components on the machinery used need to excel in these conditions. For these applications Tsubaki offers a wide variety of tried and tested heavy duty roller chains, conveyor chains, reclaimer chains, engineering class sprockets, back stops, electric actuators and protection devices for use on equipment or in plants such as :

- Drill Rigs
- Feeder Breakers
- Rotary Breakers
- Shovels
- Diverter Chutes
- Coal Port Loading Facilities
- Bucket Wheel Reclaimers
- Drag Lines
- Rail Loading Stations
- Wash Plants
- Refineries
- Smelters
- Conveyors
- "A" Portal Reclaimers



**DRILL RIGS** (Pg.13) / **ROTARY BREAKERS** (Pg.17)  
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**10 HOPPER BIN**

Power Cylinder (Pg.51)

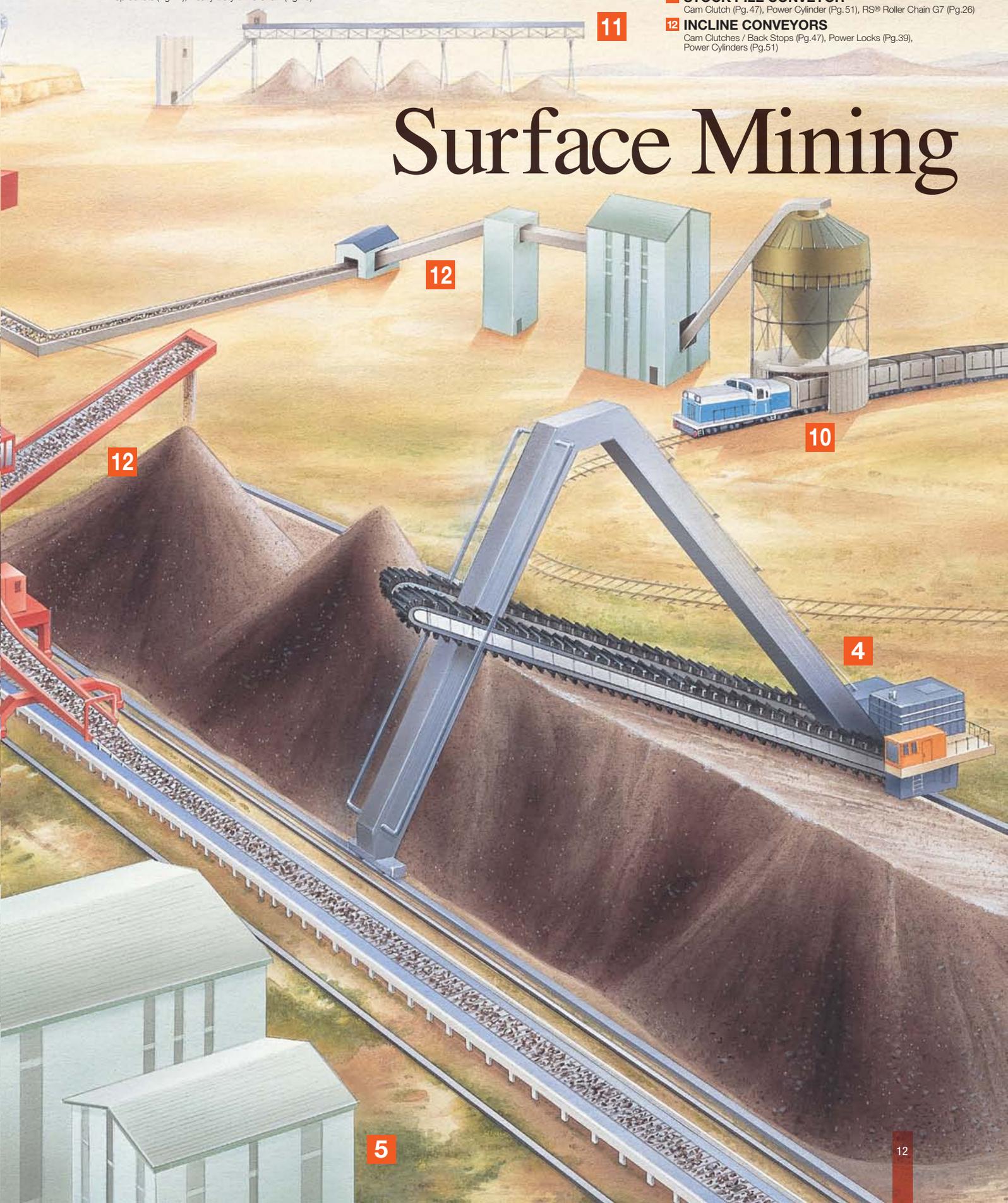
**11 STOCK PILE CONVEYOR**

Cam Clutch (Pg.47), Power Cylinder (Pg.51), RS® Roller Chain G7 (Pg.26)

**12 INCLINE CONVEYORS**

Cam Clutches / Back Stops (Pg.47), Power Locks (Pg.39), Power Cylinders (Pg.51)

# Surface Mining



# Drill Rigs

Drill rigs create deep surface holes which are then filled with explosives and blasted to allow for the removal of the overburden. Other applications include extracting core samples for exploration purposes. To overcome the heavy shock loads associated with this type of drilling, Tsubaki offers the Super Chain Series: HT Series, Super Series, Super-H Series, Ultra Super Series. To protect against pitting corrosion, Tsubaki offers APP surface treatment, which is highly effective in outdoor environments. To help create a safer work environment, Tsubaki provides Super Long Length Formation for Large Size Roller Chain, allowing for a continuous length chain void of any connecting links in the entire length of the chain.



# Super Chain Series

ANSI standard roller chains are widely used in various industries. To meet growing industry demands for cost efficiency, stronger and higher performing chains which can replace the corresponding ANSI standard chains are necessary. Tsubaki offers a line of Heavy Duty Super and Ultra Super Chains to solve your specific problems associated with heavy shock loads and other operating issues.

## HT Series

HT Series chains have a greater ultimate tensile strength (+15~30%) over ANSI standard roller chains by using through hardened pins and link plates of the next larger chain size. These chains also provide greater shock load resistance. The dimensions of the chains are identical to ANSI Heavy Series standard roller chains.

## Super Series

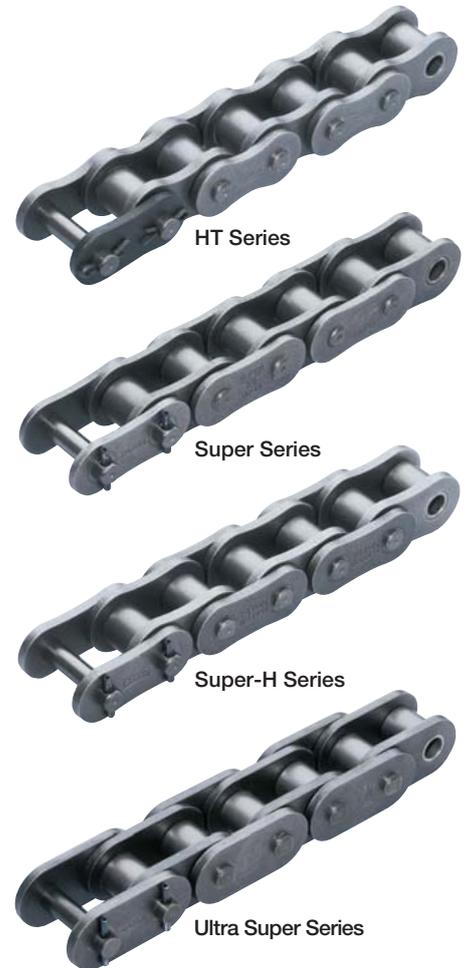
The dimensions of this series are identical to those of ANSI standard roller chains. Link plates of the Super Series have a special design and the pitch holes are critically formed to improve their allowable load by 25-30%. The pins are through hardened for greater shock load resistance.

## Super-H Series

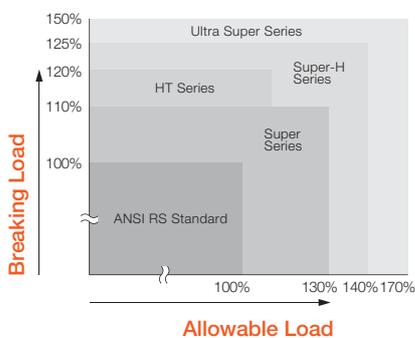
The thickness of the link plates of Super-H Series is the same as that of the next larger size of Super Series chains and the pins are through hardened. As a result, the chains have a greater ultimate tensile strength and allowable load than Super Series Chains.

## Ultra Super Series

Field test results show that Tsubaki Ultra Super Series has greater ultimate tensile strength and allowable load than any other roller chain manufactured. As the allowable load is 170% of that of ANSI RS Roller Chain, using Ultra Super Series allows selection of chain up to two sizes smaller than the suitable standard chain. Excellent for applications where heavy shock loads or space limitations pose problems.

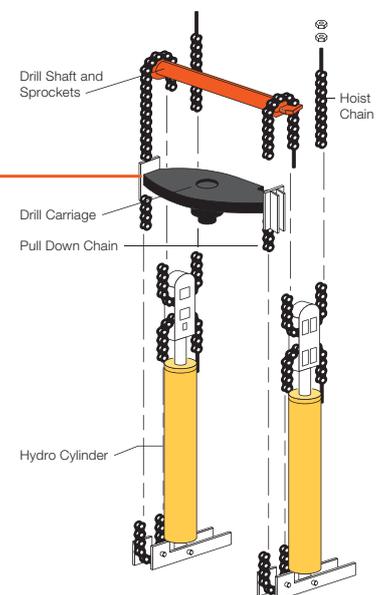


## Tsubaki Super Chain Features



If you've had problems such as fatigue breakage of link plates, or generally poor performance, we recommend that you try the Tsubaki HT Series, Super Series, Super-H series or the Ultra Super Series, where you can dramatically increase the strength of your chain without having to make major modifications to your existing equipment.

## Drilling Machine



# Drill Rigs

## Corrosion Resistant and Surface-Treated Drive Chains APP Series

### Outstanding performance in atmospheres conducive to pitting corrosion.

Pins are treated with a special surface treatment to protect against pitting corrosion that leads to fatigue breaks, thus preventing strength loss. This treatment is highly effective in environments that readily promote corrosion, such as outdoor or coastal applications.

Note: Pitting is a type of localized corrosion affecting metal surfaces. Pits form toward the interior, and if pitting occurs on pin surfaces, that pin can quickly lead to fatigue breakage and chain failure.



### Features

#### No strength loss!

Same as standard steel chain.

#### Eco-friendly chrome-free!

Special surface treatment does not use hazardous hexavalent chromium.

### Example Applications

APP Chains are ideal for atmospheres that readily promote corrosion.

- Outdoor uses
- Coastal or riverside uses
- When regular lubrication is difficult



Because equipment is used outdoors, rain can infiltrate equipment, creating conditions that promote pitting corrosion. Also, pitting readily occurs in equipment exposed to salty air or saltwater spray.

### Example of fatigue breaks caused by pitting corrosion

Chain: BS160HHHT-2

Equipment: Drill Rig

Pitting corrosion of the pin due to insufficient lubrication and corrosive atmosphere = Fatigue breakage



### Applicable Models

Single/Double Strand  
RS Roller Chain

Except for the surface-treated pins, dimensions and other specifications are the same as other roller chains.

Single Strand  
Heavy Duty Roller Chain

(For other models, contact Tsubaki.)

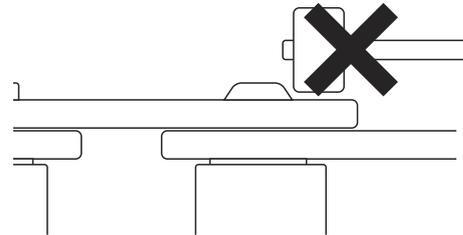
## Super Long Length Formation for Large Size Roller Chain

**Removes the hassle of connecting chain from the user and contributes to a safe work environment.**

As chain size increases, so does the burden of connecting it for the user. By connecting and delivering chain of the desired longer length, we can increase our users' work productivity and help maintain a safe working environment.

### Safer

The entire chain is connected, meaning no connection work for the user and more stable product quality.



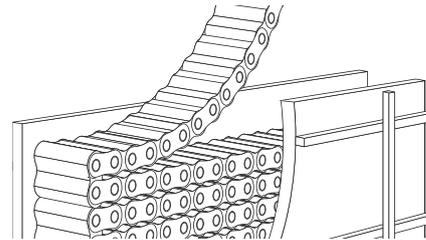
### Simpler

The chain is delivered folded over itself in a special made wooden box for easy removal.

\* Tsubaki can supply wooden boxes using heat treated materials for exports. (Complies with ISPM Guidelines.)

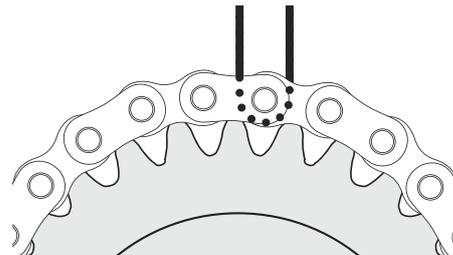
\* Case mark for export can also be affixed to the box.

\* Box is delivered horizontally. Box must stand upright to lift out chain.



### More Reliable

Reliable installation - No more worries about on-site connection or twisting.



**Super long length formation makes installation safer, simpler, and more reliable.**



1 Chain is packaged in a special wooden box and delivered horizontally.



2 Stand wooden box upright when removing chain. (Be careful when standing wooden box.)



3 Chain is packaged folded on top of itself. Attach one end to a crane and lift out for easy removal.



4 Safer, simpler, and more reliable installation on equipment!

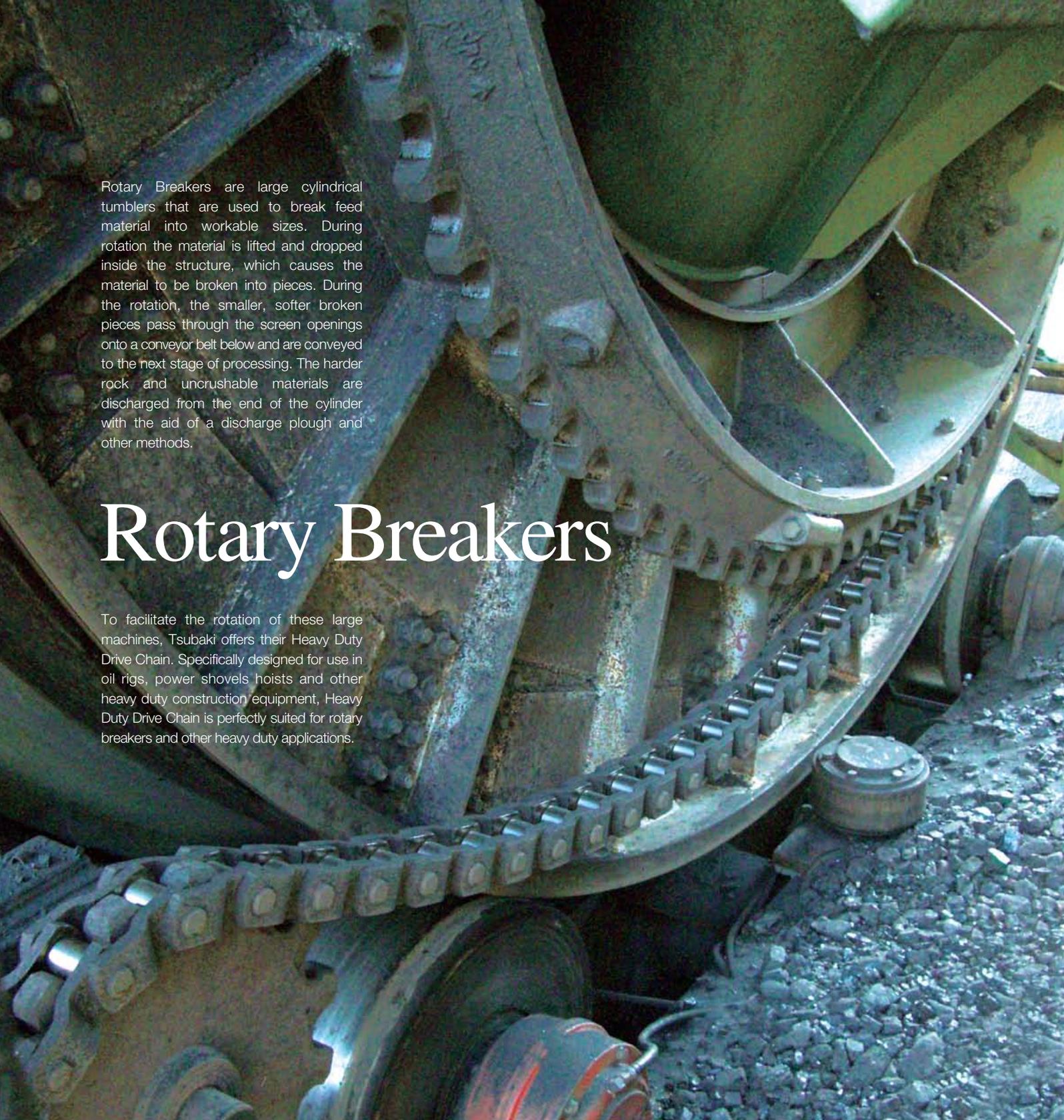
User Connects

User Connects

Before...

**BUT NOW!** Chain over 10m long can be delivered already connected!

DRILL RIGS



Rotary Breakers are large cylindrical tumblers that are used to break feed material into workable sizes. During rotation the material is lifted and dropped inside the structure, which causes the material to be broken into pieces. During the rotation, the smaller, softer broken pieces pass through the screen openings onto a conveyor belt below and are conveyed to the next stage of processing. The harder rock and uncrushable materials are discharged from the end of the cylinder with the aid of a discharge plough and other methods.

# Rotary Breakers

To facilitate the rotation of these large machines, Tsubaki offers their Heavy Duty Drive Chain. Specifically designed for use in oil rigs, power shovels hoists and other heavy duty construction equipment, Heavy Duty Drive Chain is perfectly suited for rotary breakers and other heavy duty applications.



## Tsubaki Heavy Duty Drive Chain

### Keep Your Operation Moving with Tsubaki Heavy Duty Drive Chain

Tsubaki Heavy Duty Drive Chain is designed to exceed the listed ultimate strength ratings. These ratings are very significant. Chains with greater ultimate strength have higher actual yield and greater fatigue strength. With Tsubaki Heavy Duty Drive Chain, you get extra reserve strength to withstand high shock loads.

### Precision Manufacturing Means Greater Fatigue Strength

Tsubaki Heavy Duty Drive Chain is built to withstand the most rugged conditions. We use the latest manufacturing and heat-treatment techniques to manufacture every component. Each component is carefully machined to close tolerances to ensure precise pitch control for smooth sprocket/chain interaction. That means longer service life for chain and sprockets.

### Add the Power of Alloy

When parts require extra hardness, we use alloy steel to make the components. This provides more uniform core strength, which is particularly important for heavy duty applications. Every Tsubaki Heavy Duty Drive Chain with an ultimate strength rating higher than 50802.35kg (112,000 pounds) is made entirely of alloy steel. All Tsubaki Heavy Duty Drive Chains are furnished with alloy steel pins.

### Reduced Maintenance Costs and Downtime

Tsubaki Heavy Duty Drive Chain stands up to the toughest environments for hour after hour of uninterrupted service.

- Optimum strength
- Fatigue resistant
- Pre-tested
- Alloy steel parts
- Press fit construction
- Accurate pitch control

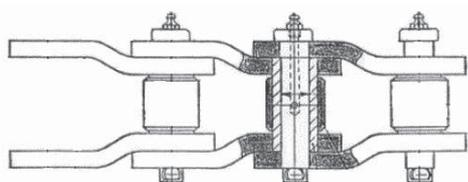
Heavy Duty Drive Chain Produced by U.S. Tsubaki

#### Sprockets and Thrust Rollers

Rotary breaker sprockets and thrust rollers are subjected to the highest load demands. The operating parameters for these components demand the most stringent level of engineering and machining know-how.

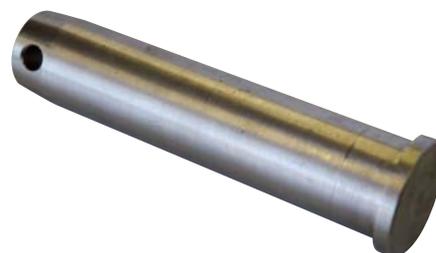
Tsubaki sprocket and thrust roller components are designed to exacting standards and the highest safety factor ratings to ensure optimal operating performance.

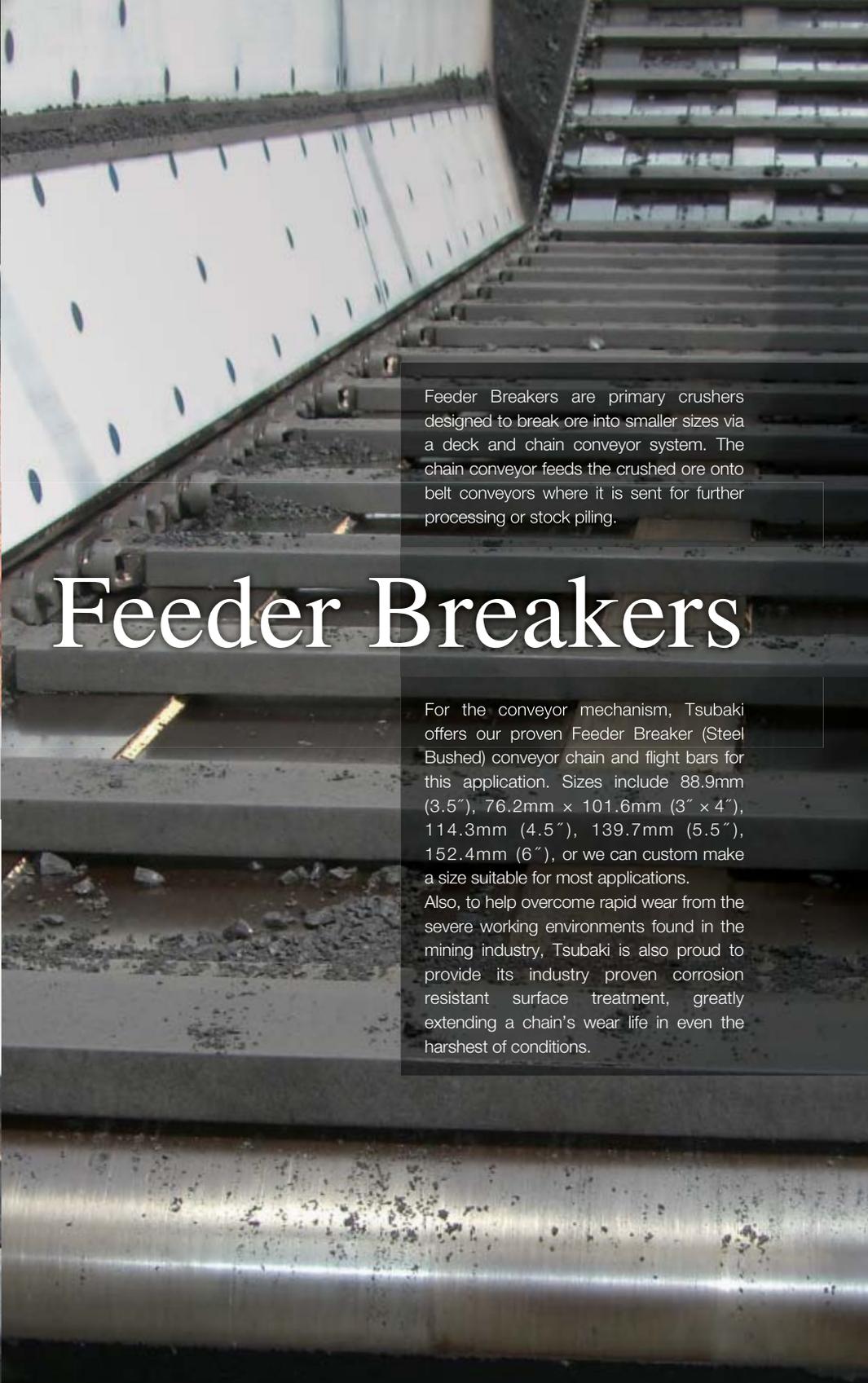
### Your equipment is on the line. Count on Tsubaki Heavy Duty Drive Chain.



#### Special Features

- Grease nipple pins
- Special pin coatings
- Stainless steel pins





Feeder Breakers are primary crushers designed to break ore into smaller sizes via a deck and chain conveyor system. The chain conveyor feeds the crushed ore onto belt conveyors where it is sent for further processing or stock piling.

# Feeder Breakers

For the conveyor mechanism, Tsubaki offers our proven Feeder Breaker (Steel Bushed) conveyor chain and flight bars for this application. Sizes include 88.9mm (3.5"), 76.2mm x 101.6mm (3" x 4"), 114.3mm (4.5"), 139.7mm (5.5"), 152.4mm (6"), or we can custom make a size suitable for most applications.

Also, to help overcome rapid wear from the severe working environments found in the mining industry, Tsubaki is also proud to provide its industry proven corrosion resistant surface treatment, greatly extending a chain's wear life in even the harshest of conditions.



## Feeder Breaker Chain (Steel Bushed Chains)

Tsubaki Feeder Breaker Chains (also known as Steel Bushed Chains) are especially designed and manufactured to provide excellent service in severe working conditions. Our chains are manufactured to close tolerances with the most modern equipment in the industry. Each component is made from high-quality alloy steels (pins are made of select alloy steel or high-quality carbon steel) and then specially heat-treated to provide maximum performance and long wear life. Joint parts are hardened to provide greater strength and wear resistance. Link plates are hardened to achieve ultra-high strength throughout.

Available Sizes	
88.9mm (3.5")	139.7mm (5.5")
76.2mm x 101.6mm (3" x 4")	152.4mm (6")
114.3mm (4.5")	Custom sizes also available

### Feeder Breaker Chain Components & Features

#### Strong, Tough Pins

Pins are hardened to achieve superior strength and extend wear life. This creates the ideal combination of surface hardness for wear resistance and core toughness to resist impact.

#### Long-Lasting Bushes

Bushes are manufactured to rigid specifications for optimum wear resistance and strength. Select steels are precision machined to maintain consistently high link plate interference. This results in positive link plate hold and favorable residual stress to resist fatigue. Bushes are case-hardened and heat-treated to extend wear life.

#### Fatigue-Resistant Link Plates

Link plates are through hardened to achieve ultra-high strength. This keeps the chain hanging failure-free, ensuring consistent service life. Tsubaki has developed superior techniques to ensure hole quality and pitch control. The result is fatigue resistance and premium performance.

#### Sealed Joint Chains

Tsubaki has developed a special triple sealing arrangement for the bearing areas of the chain. The incorporation of pin and bush greasing and precision chain assembly all play a part in the increased life this chain can offer in moist or heavy dust environments.

Feeder Breaker Chain is produced by U.S. Tsubaki.

### Corrosion Resistant Chain Pin Technology Stainless Steel, Nickel-Plated, Zinc-Plated, UWP, NEP, Chrome Coating, and Triple Plated Chrome Coating

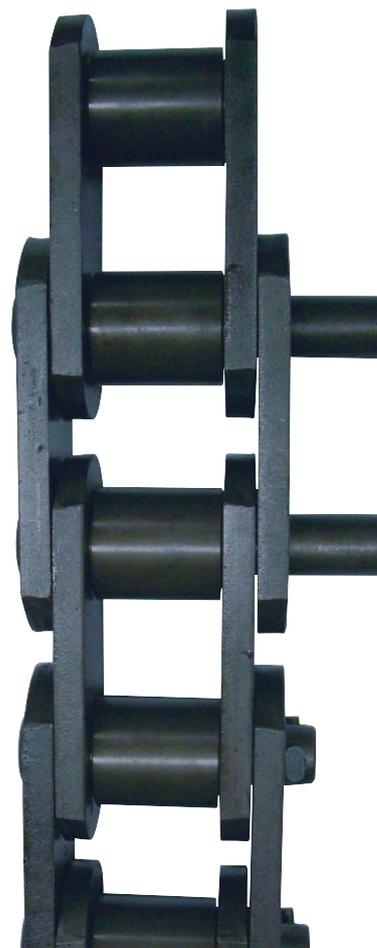
Combining the proven strength of alloy steel with superior corrosion resistance, these special corrosive resistant surface treatments deliver significantly extended service life for reduced total operating costs. Tsubaki offers a complete corrosion resistant package for roller chain, engineering chain, and sprockets.

If your drive or conveyor chains are exposed to intermittent water, occasional wash-downs, outdoor conditions, or even chemicals and salt water, your chains and sprockets need to be surface treated to keep your equipment moving.

The advanced performance of Tsubaki's corrosion resistant surface treatments is the result of a revolutionary mechanical plating system treatment that forms a lasting bond to the steel. It protects the chain and extends its service life by resisting corrosion longer than ever before.

Tsubaki's corrosion resistant surface treated chains stand up to water better than other types of plated chain.

Corrosion eats up more than chain — it eats up your profits! Choose strong, long-lasting corrosion resistant surface treatment and protect your bottom line. For more information, please contact your local Tsubaki representative.



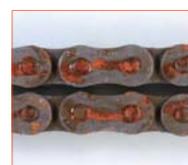
#### In-house Salt Spray Test Results



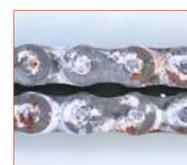
Tsubaki: 700H  
NO RUST



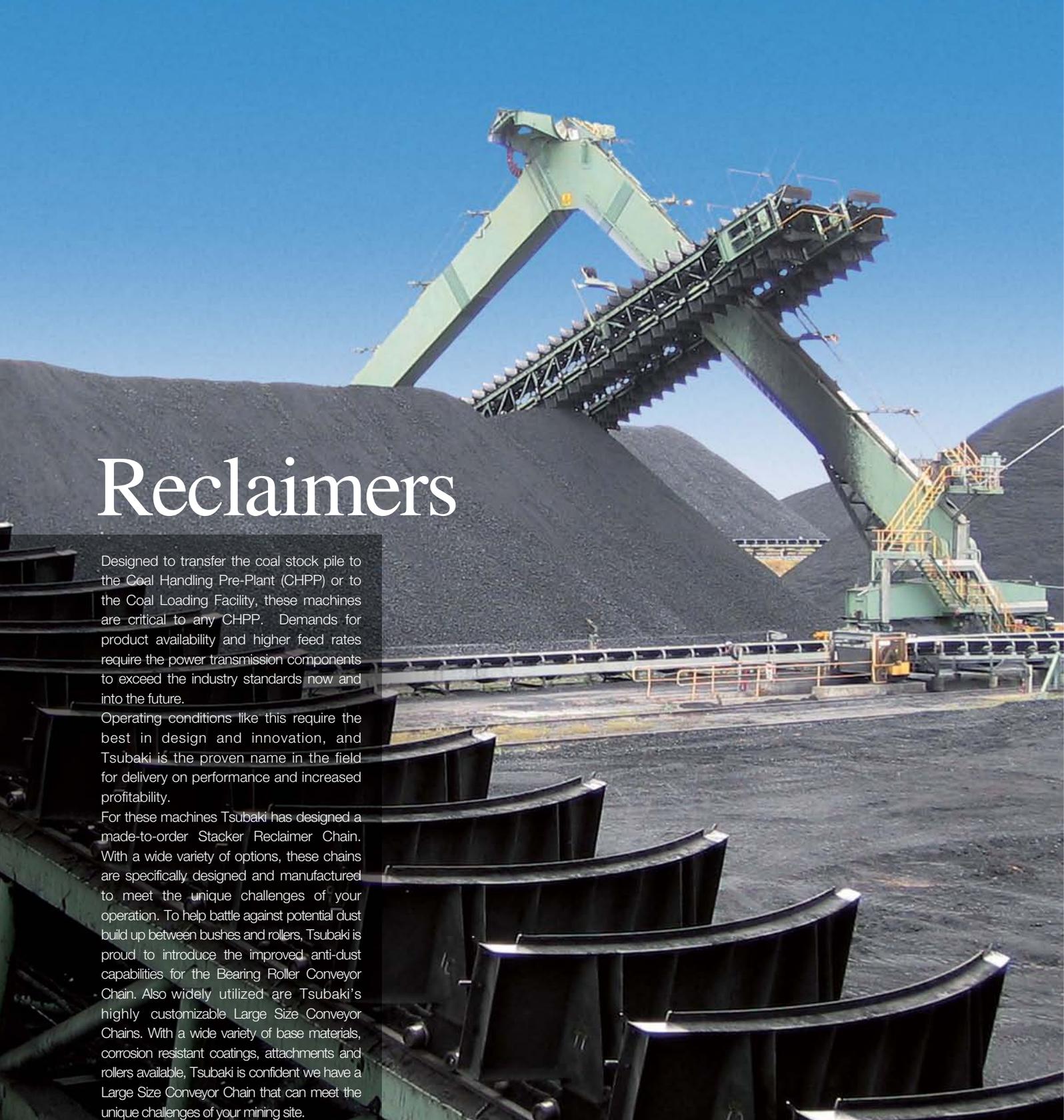
Company A: 100H



Company B: 300H



Company C: 400H



# Reclaimers

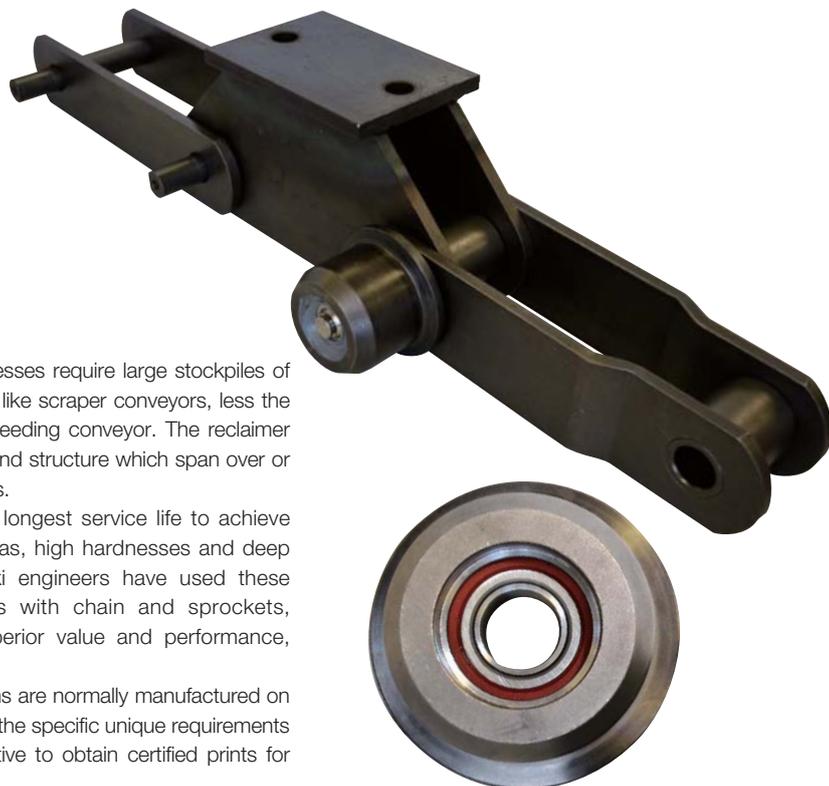
Designed to transfer the coal stock pile to the Coal Handling Pre-Plant (CHPP) or to the Coal Loading Facility, these machines are critical to any CHPP. Demands for product availability and higher feed rates require the power transmission components to exceed the industry standards now and into the future.

Operating conditions like this require the best in design and innovation, and Tsubaki is the proven name in the field for delivery on performance and increased profitability.

For these machines Tsubaki has designed a made-to-order Stacker Reclaimer Chain. With a wide variety of options, these chains are specifically designed and manufactured to meet the unique challenges of your operation. To help battle against potential dust build up between bushes and rollers, Tsubaki is proud to introduce the improved anti-dust capabilities for the Bearing Roller Conveyor Chain. Also widely utilized are Tsubaki's highly customizable Large Size Conveyor Chains. With a wide variety of base materials, corrosion resistant coatings, attachments and rollers available, Tsubaki is confident we have a Large Size Conveyor Chain that can meet the unique challenges of your mining site.



## Stacker Reclaimer Chains



Stacker Reclaimers are popular when heavy industrial processes require large stockpiles of raw material. Reclaimer chain and flight assemblies function like scraper conveyors, less the trough, with flight blades that push material toward a belt feeding conveyor. The reclaimer conveyor's chain with digging flights are supported by rails and structure which span over or across the pile being reclaimed for transfer to plant processes.

Chain for this demanding application should provide the longest service life to achieve the best overall value. Chain must have large bearing areas, high hardnesses and deep case depths to provide the best performance. Tsubaki engineers have used these principles while retrofitting many reclaiming conveyors with chain and sprockets, achieving longer service life than OEM chains. For superior value and performance, Tsubaki chain is your best choice.

Note that due to their complex requirements, reclaimer chains are normally manufactured on a made-to-order basis, designed and manufactured to meet the specific unique requirements of each site. Please contact your local Tsubaki representative to obtain certified prints for design and construction.

## Improved Anti-Dust Capabilities

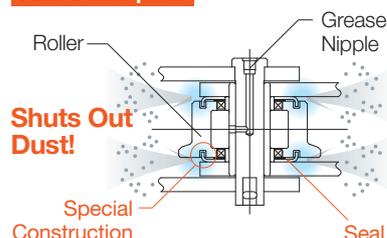
3x the wear life of Bearing Roller Conveyor Chain Standard Specs

Tsubaki's Bearing Roller Conveyor Chain Anti-Dust Specifications solve the problem of dust causing early wear between bushes and rollers that afflicts standard conveyor chains.

- Exhibits the same performance and efficiency of the Bearing Roller Conveyor Chain, even in dusty environments.
- Same dimensions as standard R or F rollers and RF Conveyor Chains

Please contact your local Tsubaki representative for further details.

### Anti-Dust Specs



## Large Size Conveyor Chains

Along with the above mentioned Stacker Reclaimer Chain, Tsubaki is proud to offer its large line up of highly customizable Large Size Conveyor Chains. As these conveyor chains are highly customizable, with a variety of materials and corrosion resistant coatings, attachments, and roller types available to match the unique conditions of your mining site, we at Tsubaki are confident that our Large Size Conveyor Chains can meet any challenges your site has to offer. Furthermore, because many of our innovative products are a direct result of answering specific challenges presented by our customers, please do not hesitate to contact your local Tsubaki representative if your mining site has unique challenges other chains just can't stand up to.

Please refer to the following pages for information regarding chain base material, corrosion resistant coatings, as well as types of attachments and rollers available.

### Features and Benefits

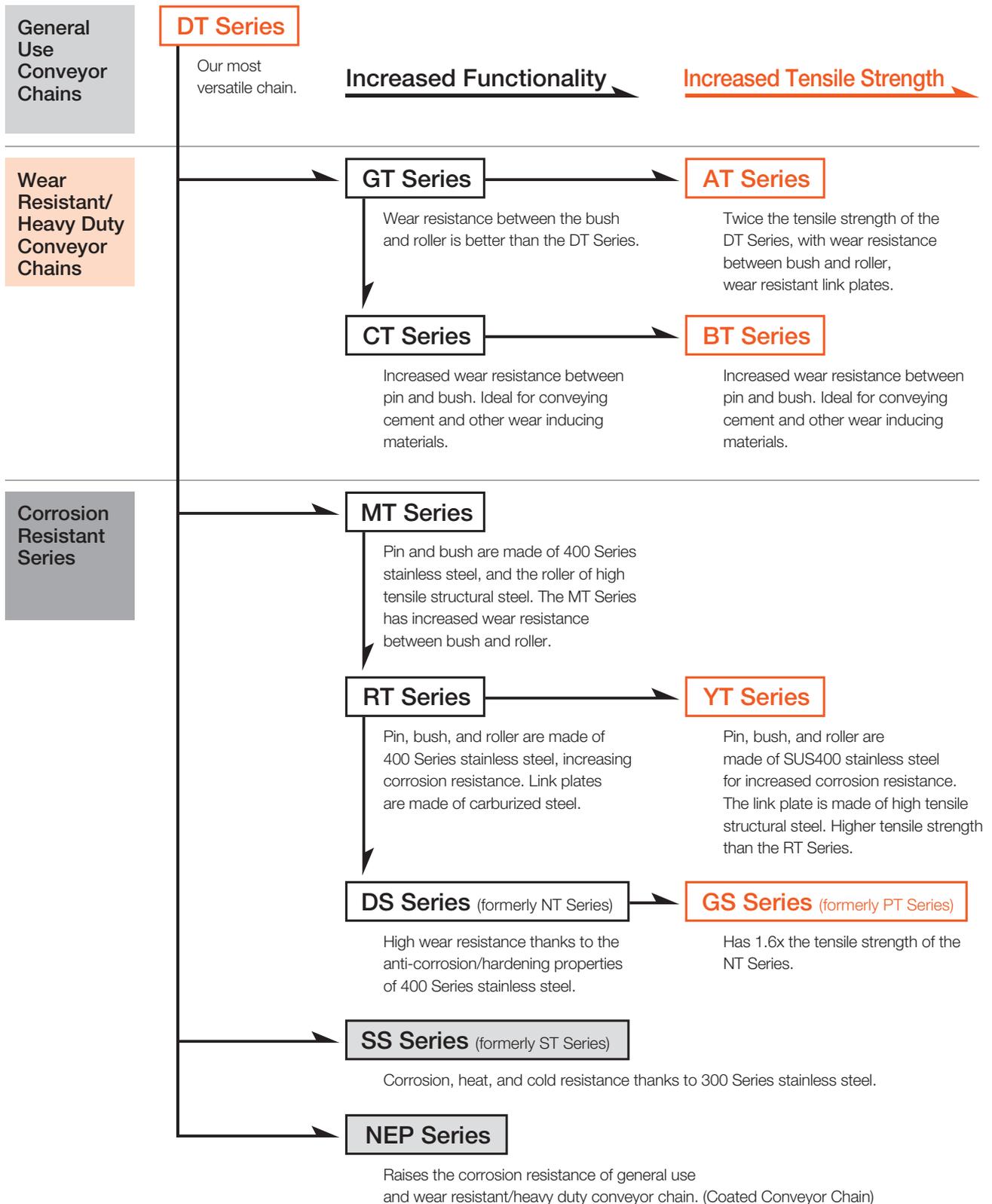
- Made to order custom chains to suit individual applications, and customized upgrades for problem applications.
- Specialized materials and heat treatment applications for every pitch size.
- Matched chain and sprocket assemblies for smooth chain operation.
- Specialized coatings for corrosion resistance, enhancing chain life and reducing maintenance costs.
- Special lube ports and greasing ports for easy maintenance and longer wear life.
- Outboard bearing rollers to reduce wear to the base chain roller.
- Special sealing arrangements for harsh environments to improve wear life.



# Reclaimers – Large Size Conveyor Chains

## Tsubaki's Wide Selection of Large Size Conveyor Chains

Tsubaki Conveyor Chain is made from carbon steel, high tensile structural steel, or stainless steel ( 300 / 400 Series ) parts to satisfy any application.





## Attachment Types

Attachments can be placed at any link spacing.

### Standard Attachments (A1, A2, K1, K2, GA2, GA4)

Standard attachments are both economical and versatile.

#### A Attachments

A attachments have a bent link plate on one side. They are referred to as A1, A2, or A3 attachments, depending on the number of bolt holes.

\*Tsubaki may send an A3 attachment for some A1 attachment orders. Contact a Tsubaki representative for more information.

#### K Attachments

K attachments have a bent link plate on both ends. They are referred to as K1 or K2 attachments, depending on the number of bolt holes.

\*Tsubaki may send a K3 attachment for some K1 attachment orders. Contact a Tsubaki representative for more information.

#### GA Attachments

GA attachments have holes in the link plate itself. They are referred to as GA2 or GA4 attachments, depending on the number of bolt holes.

Please note that other non-standard attachments and special "Outboard Roller" (OBR) bearings are available. Furthermore, special sealed, long life outboard rollers to suit highly contaminated areas are also available upon request. Please contact your local Tsubaki representative for more details.



A1 Attachment



K2 Attachment



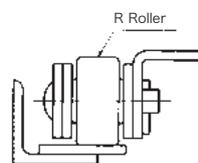
GA4 Attachment

## Roller Types

Tsubaki Conveyor Chains use three basic roller types.

### 1. R Rollers

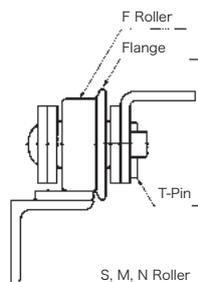
The outside diameter of the roller is larger than the height of the link plate. Tsubaki's most basic, versatile roller type. It has a large allowable load and low frictional resistance.



R Roller

### 2. F Rollers

There is a flange on the roller, attached on the T-pin side, that acts as a guide. Flange rollers are a simple way to prevent side oscillation. They are perfect for rough usage conditions and regular slat conveyance. Be careful when using K attachments, as the attachment area may contact the roller flange.

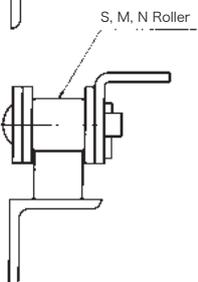


F Roller

### 3. S, M, and N Rollers

These rollers are effective in alleviating the shock and wear the chain would normally suffer during sprocket engagement.

S Rollers: The outside diameter of the roller is smaller than the height of the link plate.  
 M Rollers: The outer diameter of the M Roller is slightly larger than that of the S Roller.  
 N Rollers: The roller diameter of the M and N rollers are the same, but the pin diameter is larger, increasing its strength. (RF26200N and above)



S, M and N Rollers



# Coal Handling Preparation Plants (CHPP)

Coal Handling Preparation Plants (CHPP) are large facilities used to remove (wash) the grime and sediment (soil, rock, etc) from coal in order to prepare it to be transported to market. The cleaner the coal is able to become, the higher the market value will be, plus less waste material means less weight, resulting in lower overall transportation costs.

Widely utilized within CHPPs is Tsubaki's full lineup of RS® Roller Chain G7 and lube-free Lambda Chains. As conditions can make chain lubrication difficult, these chains allow for long wear life without addition lubrication, keeping your CHPP running longer, cleaner, and reduce the impact on the environment.

## RS® Roller Chain G7

### Pursuing the Ultimate in Quality...

Our 7th model upgrade, celebrating 90 years of quality. Pursuing the ultimate in quality, Tsubaki has created the world's highest standard of roller chain.



"TSUBAKI" and the "RS" brand are stamped together on the chain. (Applicable sizes: RS40 to RS240)

### Smaller Size and a Longer Wear Life

- Twice the life means a dramatic reduction in maintenance costs. (Applicable sizes: RS80 to RS140)
- kW ratings increased by 33%.

The world's top-class kW rating is achieved by increasing strength in the M-type connecting link through Ring Coin (RC) processing and improvement in the two-pitch offset link. This enables the reduction of chain and sprocket sizes (one size down), downsizing equipment. (Applicable sizes: RS80 to RS240)

#### LG Solid Bush Patented

Tsubaki proprietary LG (lube groove) technology has been applied to the inside surface of our cold-forged seamless bush. The combined effect of "seamless + LG" effectively doubles the wear life over previous bushes. (Applicable sizes: RS80 to RS140)

\*LG (lube groove) Technology (patented): Tsubaki proprietary technology that includes lubrication in the grooves on the inside surface of the bush to retain the beneficial effects of lubrication longer.

Note: The wear life and kW ratings of sizes RS60 and smaller have not changed.

## Tsubaki Lube Free Lambda Chains

Tsubaki's Lube Free Lambda® Chains were the first in the industry to use a special oil-impregnated bush. Since their launch in 1988, they have been adopted for diverse industries and applications, and their performance has been highly rated.

### Lube-free and Long-life

Longer lasting chains made possible by special oil-impregnated bushes.

### Compatibility

Compatible with RS Roller Chains.

### Operating Temperature

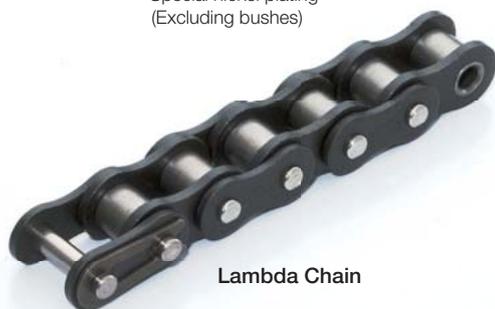
-10°C to 150°C / 14°F to 302°F

### Selection

Use the General Selection Method.

### Basic Construction

- Lambda Chain (Normal specification)  
Black inner and outer ring plates
- Lambda Chain (Nickel-plated specification)  
Special nickel plating (Excluding bushes)

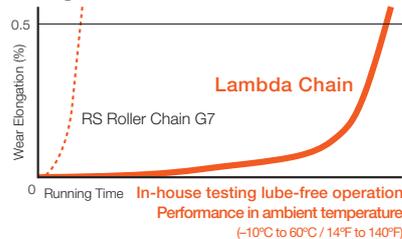


Lambda Chain

## Products

Tsubaki has a wide line-up of lube-free, long life products that help customers reduce costs, while also reducing their impact on the environment. These include Standard Lambda Chain, Surface Treated Lambda Chain (NP/NEP specification) Heavy Duty Lambda Chain, Curved Lambda Chain, BS Lambda Chain, etc. For conveyance needs a wide variety of specialized attachments are also available. Please contact your local Tsubaki representative for more details.

### More than 7 Times the Wear Elongation Life of RS Roller Chain



RS120-LMD-1 and RS140-LMD-1 wear elongation life are 2.5 times longer.

### Superior Performance through the Combination of Superior Parts

- Special Coated Pin**  
For smoother rotation
- High-Performance Sintered Bush**  
Impregnated with lubricant
- Ring-Coined Connecting Link (Patented)**  
A ring-shaped groove is provided around the connecting link plate hole. This creates positive residual stress that keeps the same strength as the base chain, even with slip fit between pins and holes.

# Tandem Drive Road Graders



# Mining Shovels (Excavators)



## Tandem Drive Road Graders



Spline Bore Drive Sprocket



Graders are used for leveling out roadways and keeping things running smoothly on the mine site. Their operation is vital to keeping the cost down on wheel loaded equipment such as dump trucks and wheel loaders. Tsubaki offers a complete range of Tandem drive chain replacement kits to suit nearly every make and model of grader on the market today, with specific design features to withstand the shock loads and drive forces these systems produce.

Our Super Series chain products will keep your equipment driving. See page 14 for details.



TANDEM DRIVE ROAD GRADERS / MINING SHOVELS (EXCAVATORS)

## Mining Shovels (Excavators)

Driven by high class Heavy Duty Drive Chain, mining shovels are used to move earth, load trucks and excavate relatively smaller areas (compared to bucket wheel reclaimers). These highly versatile machines are the modern day workhorses of almost any mining site the world over. Multi Strand Winch Drives of 6 to 8 strand sets are used to drive the cable winch drum, which raises and lowers the shovel head. Cables are connected to the large drum and driven by an electric motor. Our RS Roller Chain (Pg.26) and Tsubaki Heavy Duty Chain (Pg.18) are widely utilized and trusted in these core operations. Let Tsubaki keep your site running, even in the harshest of conditions.



Ideal for Track Drives



RS60-6 Chain

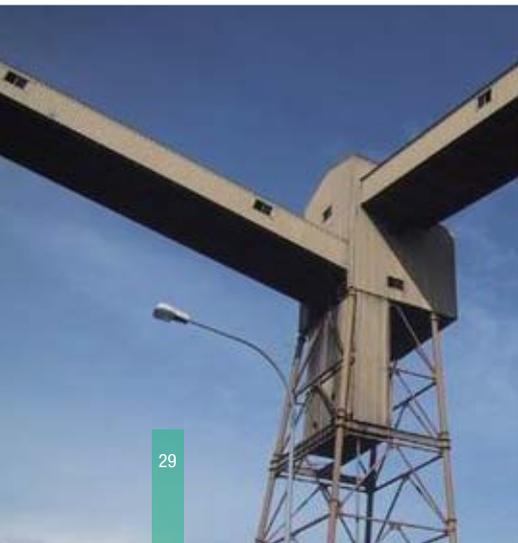
When desired material deposits are located at levels too deep or too expensive for surface mining techniques, the job must go underground. The desired material is extracted either via blasting or specially designed machines such as long wall miners and continuous miners. The material is then transported to the surface for further processing via various means including conveyors. Prior to being transported to the surface the material can be handled via shuttle cars and bridge conveyors, and sized via feeder breakers.

In this extreme environment shock loads are high and chain and/or sprocket failures can take hours to fix. Thus, efficient and reliable extraction can make the difference between profits and losses. You need to get in and out as quickly as possible, which means maximum performance from every piece of equipment on your site.

For these harsh applications Tsubaki offers their specially designed shuttle car chains, heavy duty chains, and chains for continuous miners.



# Underground Mining





**SHUTTLE CARS** (Pg.33) / **FACE & ROOF DRILLERS** (Pg.35)  
**CONTINUOUS MINERS,**  
**BRIDGE CONVEYORS (JIFFY CONVEYORS)** (Pg.35)  
**PUMPING STATIONS, DRIFT CONVEYORS** (Pg.51)



# Underground Mining

# Underground Mining

## 1 SHUTTLE CAR

Shuttle Car Chain (Pg.34), Sprockets (Pg.41)  
ANSI Drive Chain (Pg.20)

## 2 FACE/ROOF DRILLER

Heavy Duty Drive Chain (Pg.18),  
Sheaves, Kabelschlepp Products (Pg.61)

## 3 CONTINUOUS MINER

Continuous Miner Chain (Pg.36),  
Sprockets (Pg.41)

## 4 BRIDGE CONVEYOR

Bridge Conveyor Chain (Pg.36), Sprockets (Pg.41)

## 5 FEEDER BREAKER

Feeder Breaker Chain (Pg.20), Sprockets (Pg.41),  
Undercarriage Track Chain

## 6 MINE VENTILATION

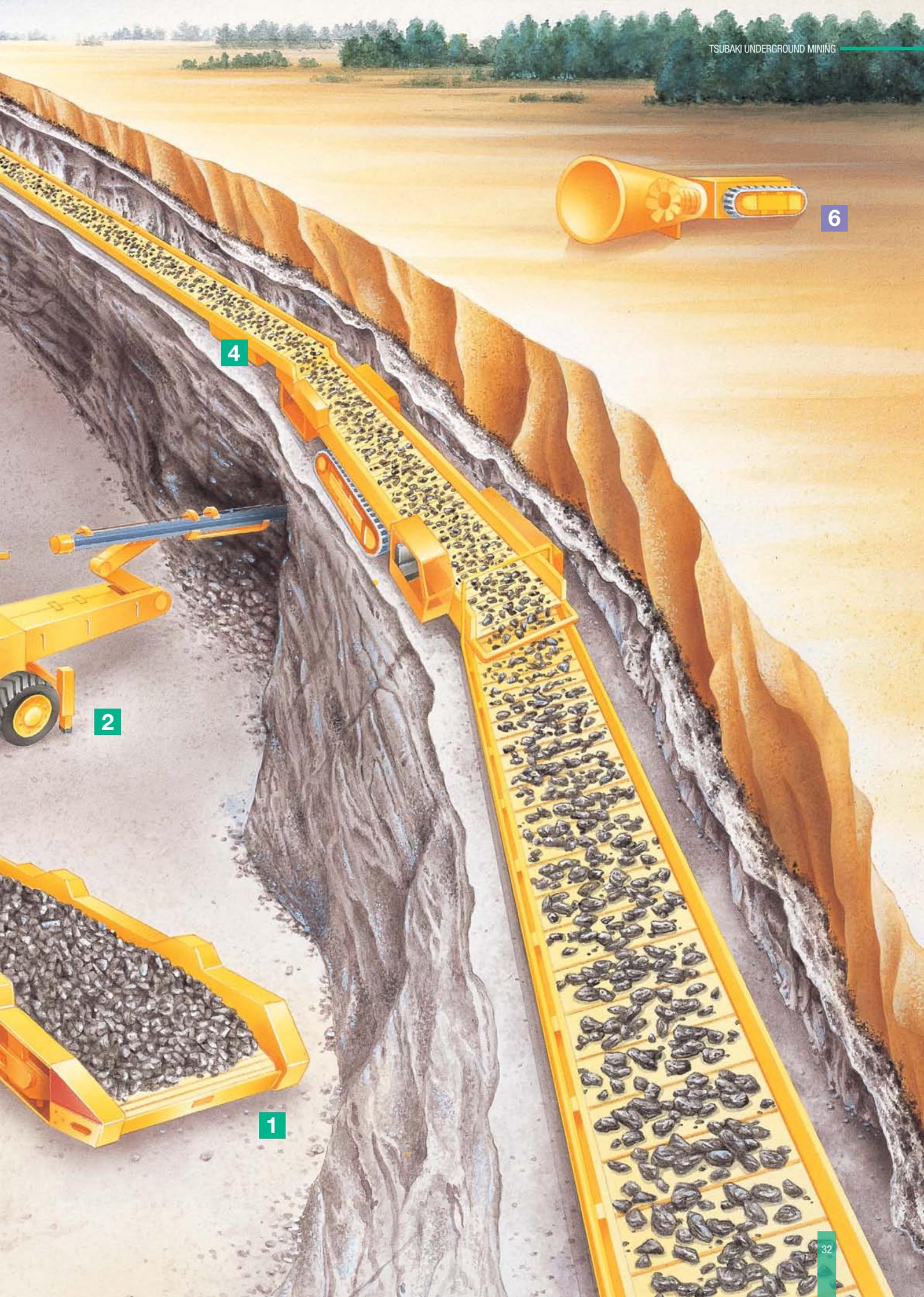
Cam Clutches (Pg.47)  
One-Touch Inspection Door (Pg.55)

## 7 DRIFT/INCLINE CONVEYORS

Back Stops (Pg.47), Power Locks (Pg.39), Power Cylinders (Pg.51)

## 8 DE-WATER AND SLURRY PUMPS

Back Stops (Pg.47), Power Locks (Pg.39)



4

2

1

6



Shuttle cars are the workhorses of the underground mining system, transferring coal from the development face to the transport conveyors.

# Shuttle Car



These machines load and unload hundreds of tons of coal per shift and operate around the clock in the harshest of environments. Critical to the output of the mining operations, operators demand the most of the equipment and components, and Tsubaki has been a proven partner for decades and continues to lead the way in product materials and service.

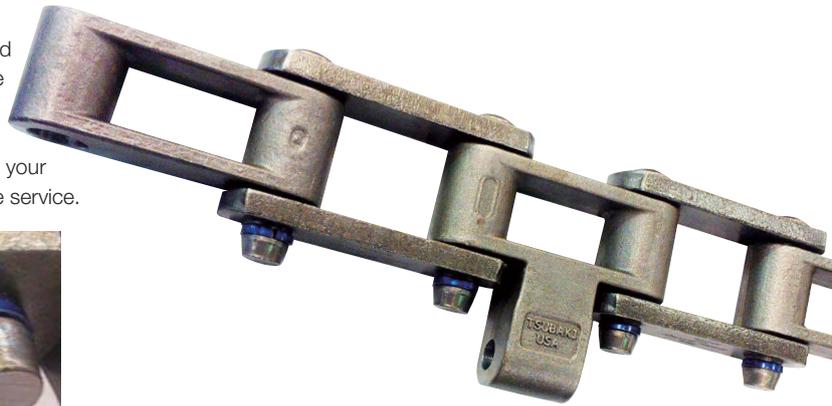
## Tsubaki Shuttle Car Chain

### Increase Your Shuttle Car's Dependability with Tsubaki's Rugged Shuttle Car Chain

As the world's leading manufacturer of rugged chains designed exclusively for the mining industry, Tsubaki manufactures the traditional 3.075" pitch and the latest and most common 4.100" pitch Shuttle Car Chain for use on new or existing shuttle cars. Tsubaki Shuttle Car Chain will provide two major benefits to your mining operations: Reduced maintenance costs and safer machine service.



Tsubaki Shuttle Hawk 4.100"

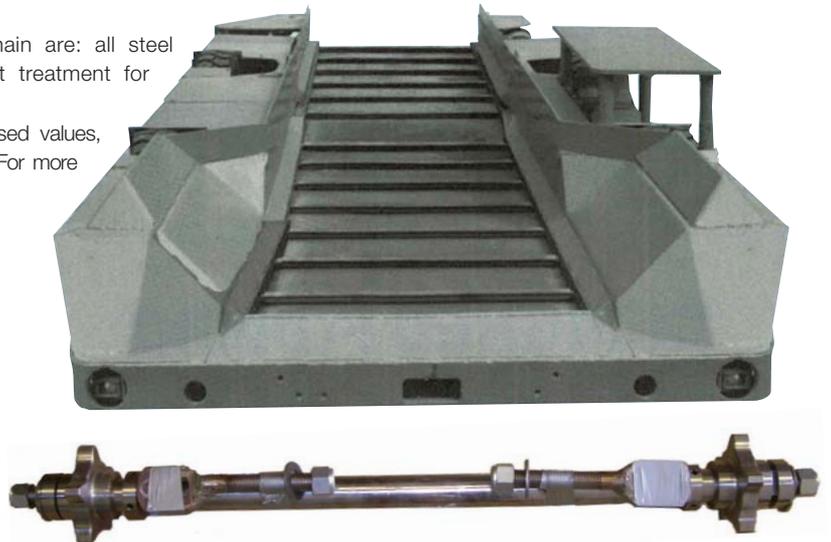
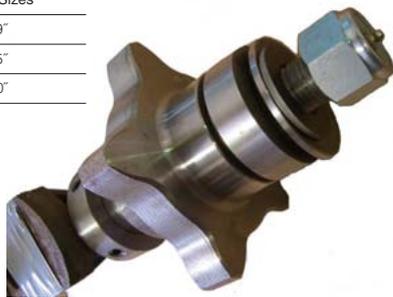


### Designed for Optimum Wear Life

The two key design features of the Shuttle Car Chain are: all steel construction of specially selected materials and heat treatment for optimum wear life.

This specially designed product provides you with increased values, savings, and performance for your Shuttle Car applications. For more details please contact your local Tsubaki representative.

Available Sizes
2.609"
3.075"
4.100"



SHUTTLE CAR

## Tsubaki of Canada

Tsubaki can supply complete shafts and sprocket take-up assemblies either in complete kits or component format.

We can reverse engineer all components and adopt in additional manufacturing upgrades to material properties and sprocket design features at our manufacturing plant in Canada.



# Face & Roof Drilling



# Continuous Miner Product Transfer Systems (Mobile Bridge Conveyor – Jiffy Conveyor)

## Face and Roof Drilling

Face and roof drillers are the first machines into newly opened areas to shore up the roof and walls and make it safe, and having Tsubaki as a partner to get this job done makes it all that much easier. Whether you are drilling for the next blast or setting in roof bolts, our products work underground with you.

For this application, Tsubaki chains are specified by major OEMs and replacement parts specialists for performance and reliability, which makes your choice even easier.

With special Heavy Duty Drive Chains (Pg. 18) and surface coating (Pgs. 15, 20) to prevent corrosion and failure, the Tsubaki chain line up is second to none.

These chains are available in cotter pin specification for easy breaking and assembly in underground operations.

With special Heavy Duty Drive Chains (pg. 18), Japanese-made Leaf Chain, and surface treatment combinations to prevent corrosion and failure, the Tsubaki chain line-up is second to none.

### Surface coating treatments for chain available upon request:

- Molybond™ coating
- NEP coating



FACE & ROOF DRILLING / CONTINUOUS MINER & BRIDGE CONVEYOR

## Continuous Miner

Continuous miners are large machines that work directly in the coal face, scraping material from the wall/ceiling with their giant teeth set on rotating steel drums. Being able to mine well over 30 tons of coal per minute, these machines are the heart of modern underground mining.

Tsubaki manufactures tried and tested products at our US facility based in Sandusky, Ohio. For decades, the market has relied on Tsubaki products – used by OEMs, asked for by customers, and demanded when reliability and reduced downtime are your objectives.

Track Pad Sizes: 11" }  
 15" } Chain Pitch Size: 4.760"



## Bridge Conveyor

These units are the transfer systems of the continuous miners and operate at high speeds and discharge rates, so the chains used on these machines must be equal to the operation's demands. That's why mine sites around the world specify Tsubaki as their partner, as our name is synonymous with performance under pressure.

Available types of Bridge Chain.

- Standard Bridge Chain
- Heavy Duty Bridge Chain
- Extended Pin Bridge Chain

Please contact your local Tsubaki representative for more details.



Although Tsubaki was born and built through innovations in chain technology and development almost 100 years ago, chain is definitely not our only world class product. To facilitate and support our many lines of high class and highly reliable chains, we at Tsubaki have gone the extra mile to independently design and manufacture our own line of top-grade carbon steel, alloy, and stainless steel sprockets for use with our chains in a wide variety of industries, including mining.

Also, as safety on the work site is of the highest priority to Tsubaki, we have developed our revolutionary series of Cam Clutches, Back Stops, and Power Lock devices. Utilized in various applications and industries, the highly refined construction of these unassuming devices provides safety on the job site. Cam Clutches and Back Stops allow freewheeling or overrunning in one direction, and driving or backstopping in the other, protecting both your equipment and employees, while Power Locks eliminate backlash damage to keyways from heavy loads.

Guide It



Lock It



Drive It

# Specialty Mining Products



Furthermore, for applications where linear motion is required, such as flop gates, opening and closing of roofs and doors, etc., Tsubaki is proud to provide their full line-up of compact and self-contained power cylinders. Utilized in industries such as mining, power stations, ports, and so on, these extremely sturdy units may even be operated from remote locations, further increasing the safety and efficiency of your site. Lastly, for quick inspection of your lines, Tsubaki offers the easily installed One-Touch Inspection Door. With one simple touch you can quickly inspect your lines and then get on with the rest of your operation.

## Inspect It



## Hold It



## Lift It

- POWER LOCKS** (Pg.39), **SPROCKETS** (Pg.41)
- CAM CLUTCHES / BACK STOPS** (Pg.47)
- POWER CYLINDERS** (Pg.51)
- ONE TOUCH INSPECTION DOOR** (Pg.55)
- KABELSCHLEPP PRODUCTS** (Pg.61)



Specialty Mining Products



Our Power-Lock solves your problems. Eliminate backlash damage to keyways from heavy loads: the Tsubaki Power-Lock fits tightly without backlash around the shaft/hub and is not affected by load reversals. End your high machining expenses for long shaft keyways, splined shafts, threads, grooves and steps. The Tsubaki Power-Lock offers exacting, slip free location. Erase the headaches of shrink and press fits. The Tsubaki Power-Lock simplifies installation and removal.

# Power-Lock<sup>®</sup>

## AS-Series & AD-Series

This easy-to-install unit slides into position and offers a keyless, shaft-hub lock that will simultaneously handle both high torque and thrust while increasing your shaft strength. The Power-Lock is easy to assemble, with only one tool needed. It is ideal for locking in large or small sprockets, conveyor pulleys, gears and rollers.

# Tsubaki Power-Lock®

## Features & Applications

### High Durability Against Reversing or Impacting Loads

The Power-Lock connection is not affected by torsional load reversal or impact which damages the key and keyway connection. Tsubaki's Power-Lock fits tightly around the shaft/hub and is free of backlash.

### Easy and Precise Positioning

The Power-Lock offers 360 degree angular adjustment and is excellent for Indexing Tables, Cam Mechanisms, Gear Drives and Double Strand Conveyor Sprockets, Head Shaft Pulleys, Torque arm levers for power cylinders, large drive sprockets and gearing.

### Thrust Capability

The Tsubaki Power-Lock can hold axial forces too. Typical applications with these forces include indexing tables, bevel gears, conveyor pulley drums, reclaimer drive sprockets, feeder breaker drive shafts and drive gearing.

### Easy Assembly and Disassembly

The Power-Lock can be assembled and disassembled frequently, so maintenance or replacement of worn parts is simple and easy as compared to other methods (key and keyway, spline, shrink or press fits, and welding).

### Increased Shaft Strength

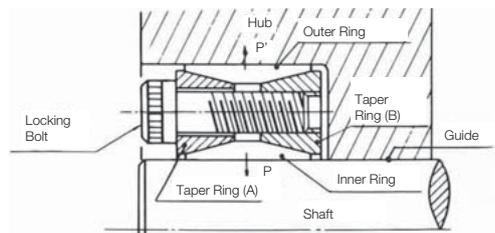
By using the Power-Lock, no metal needs to be removed from the shaft (such as the cutting of a keyway). The strength of the shaft can be kept at its original diameter. The effects are especially seen on hollowshaft applications.

### Eliminates Costly Machining

There is no need for time-consuming machining of keyways. The Power-Lock offers substantial savings on long, heavy shafts.



## Construction



Taper rings (A) and (B) fit perfectly with the tapered inner and outer rings. By tightening the locking bolts, taper rings (A) and (B) generate clamping pressures ( $P'$  and  $P$ ) against the outer and inner rings to produce the frictional force to join the shaft and hub. A slit is provided on the circumference of the outer and inner rings to prevent reduction of the clamping force.

### AS Series (Available in metric and inch sizes)



1. Can be assembled and disassembled any number of times.  
There is no relative movement, and therefore no points where wear will occur, making maintenance simple.
2. Available in metric and inch sizes.
3. Available in stainless steel type.
4. Available in zinc plated bolt type.

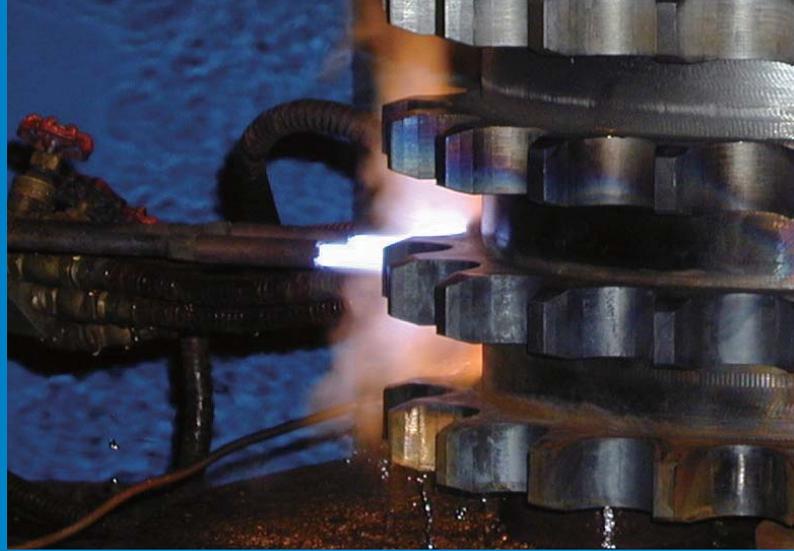
Applicable Shaft Size: 19 to 500mm

### AD Series



1. Same inner and outer diameters as the AS Series.
2. Large capacity locking device that has approximately twice the locking power of the AS-Series.
3. Centering Function  
The AD-Series has excellent coaxiality with the boss during installation.

Applicable Shaft Size: 45 to 300mm

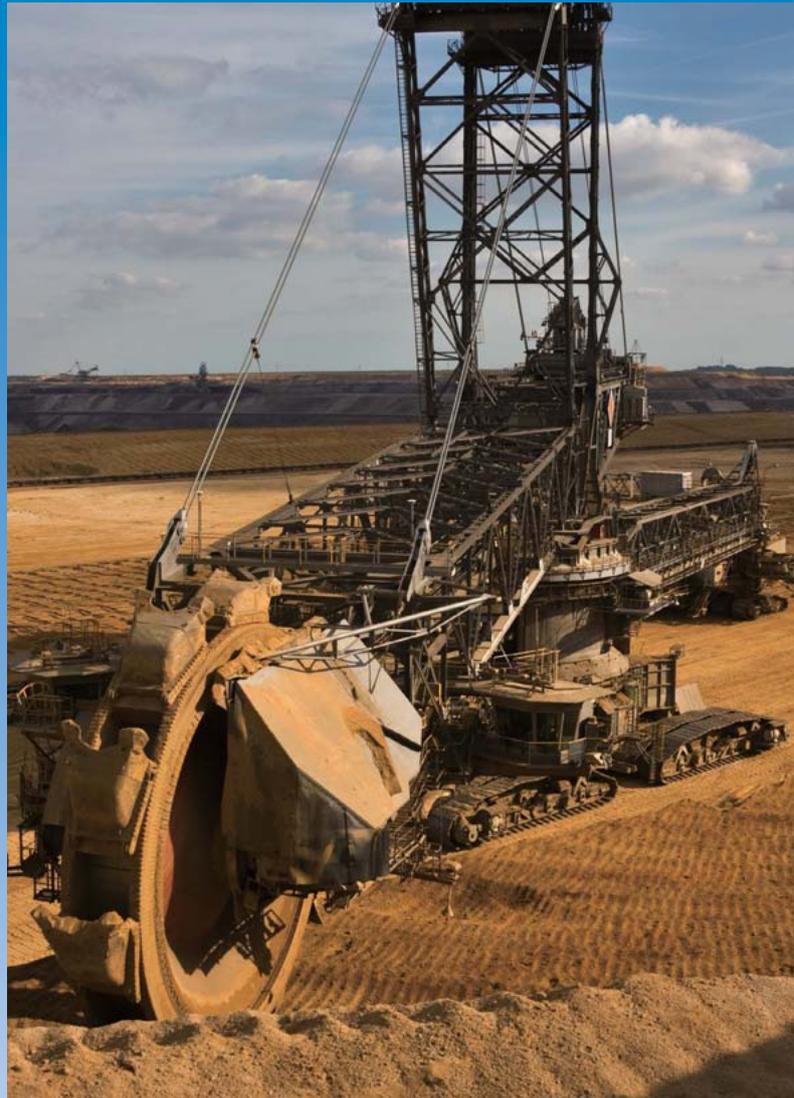


To allow for reliability in the harsh environments of the mining industry, chains and sprockets must consistently work together smoothly, so buying them from the same source makes sense.

Our sprockets are built from top-grade carbon steel to offer long wear life, resist abrasion, and withstand heavy shock loads. Alloy and stainless steel sprockets are also available for extra corrosion resistance and food-grade applications.

# Sprockets

You get long service life and reliable performance, turn after turn, time after time, even in the harshest of environments. And it's all part of the Tsubaki Advantage: reliable premium products that don't just perform, they outperform the competition. All the while saving you money.



## Sprocket Options

Tsubaki can manufacture sprockets to meet your specific needs. The results are sprockets designed to maximize the life of your chain. Chains and sprockets must work together, so buying them from the same source makes sense. When chains and sprockets articulate correctly, the life of the chain is extended. That means long term savings and real value for your application. Tsubaki sprockets can be made in a variety of grades of carbon, stainless, and alloy steels, as well as other metals. Since chain loadings are distributed over all engaged sprocket teeth, tooth breakage or distortion is not normally a problem. It is seldom necessary to use special high strength material. Diameter, pitch, and the number of strands of the sprocket determine the specific grade of carbon steel used. Many of our wide range of carbon steel sprockets are heat treated as a standard. For other sprockets, heat-treating can be specified as an option. Heat-treated carbon steel provides long wear life and resists abrasion.

The hardening process of small diameter, small pitch sprockets is usually a one step procedure using electrical induction heat-treating. Large diameter, large pitch sprockets are usually heat treated using direct flame hardening. These methods are used to provide high hardness at the wear areas of each tooth and maintain a ductile tooth core that is tough and resilient. The hubs and bore remain soft to permit reworking.

### Split Construction

Split sprockets allow for easy maintenance of sprockets and machinery because the sprocket can be removed from the shaft without having to disassemble everything around the sprocket. Most Tsubaki sprockets can be supplied as A, B or C Style (hub combinations) split sprockets. Split A Style sprockets (without hubs) can be supplied with bolt holes or mounting brackets to attach to shafts or drums. B and C Styles (with one or two hubs) are supplied with Tsubaki's standard Type I or Type II split hubs, or custom made-to-order hubs. Split sprockets that cannot be welded are made with oversized hubs to allow for the bolts that hold the sprocket together. Welded split sprockets are manufactured with Tsubaki's standard or custom split hubs.

### Segmental Rim

Segmental rim sprockets and traction wheels are split rings (two or more pieces) that generally fasten by bolting to a standard hub body. Segmental rims are usually applied when ease of replacement is desired because the chain, shaft, and bearings do not have to be disturbed during sprocket replacement. When downtime is critical in an operation, consider segmental rim sprockets and traction wheels. Adjustable rim sprockets are also available from Tsubaki. The adjustability of these sprockets allows for precise alignment of multiple sprockets along a shaft. Segmental rims are made of special steel plate material and may be heat treated (optional) to high hardness levels to achieve long service life. Hardened teeth resist abrasive wear common in operation. Consult Tsubaki Technical Support when material being conveyed is cement, ash, or other high hardness material. Special sprocket tooth hardness is necessary to resist wear from abrasive material.

### Lightening Holes

Available on request for a wide variety of sprockets. Please contact your local Tsubaki representative for more details.

### Mud Relief

In applications where material build up may be a problem, the bottom of the tooth pocket can be beveled on the side to allow the material to "squeeze" out. This reduction of contact area is not critical because the pressure on the bottom of the pocket is very light in horizontal conveyors. Other relief styles may be necessary for vertical conveyors.



Tsubaki's Custom Bore Sprocket



Slots for Adjustment Bolts



Segmental Rim Sprocket

Adjustable Segmental Rim Sprockets



Quad Sprocket with Lightening Holes

# Sprockets

## Our Capabilities

- Made-to-order capabilities:
  - Specializing in high quality Roller Chain and Engineering Class sprockets.
- Short lead times.
- Over 30 years of manufacturing experience.
- ISO 9001:2008 registered.
- Heat treating: Induction, flame, carburizing/case hardening, etc.
  - \*Effective hardness depth maintained in sprockets
- CNC machining for special machined tooth profiles.
- Robotic and submerged arc welding.
- Flame and laser cutting.
- Finishes include paint, powder coat, and black oxide.
  - Stress relieving sprockets
  - Balancing sprockets
  - Certificates (material/welding) available upon request
- Max Dia. Size: Solid = 2286mm (90")
  - Segments = 3200mm (126")

## Engineering Options

- Split Sprockets
- Segmental Hub & Rims
- Lightening Holes
- Mud Relief
- Installation & operation manuals available.
- Reverse engineering and improvements

## Custom Products

- Solid, welded, and custom machined sprockets.
- Mounting, lightening, adjustment, and safety lockout holes.
- Split and Segmental Rim Sprockets
- Mounting methods including straight bores, taper bush styles, drum mountings, splines, Power-Locks and other keyless devices, and much more.

## Materials and Coatings

- On request, we can manufacture any sprocket from alloy steel (4140, QT-400) materials.
- Coatings for anti-corrosion and anti-wear are available, including nickel, zinc, chrome, and others.

## Popular Products

- Coal Reclaimer Sprockets
- Drilling Sprockets
- Shuttle Car Sprockets
- Feeder Breaker Sprockets
- Oil Field Multi-Strand Sprockets



Engineering Class Sprockets



Feeder Sprocket Bore Key



Engineering Class Sprocket with Flat Sided Teeth



Made-to-Order Split Sprocket

## Engineering Class Sprocket Teeth Options

- All Engineering Class sprockets can be provided with “gap tooth” profiles in order to accommodate chain attachments.
- Tsubaki’s standard Engineering Class non-drive style sprockets are manufactured with “Low Profile” teeth. The teeth are not higher than the chain sidebar height to allow for chain attachments. Special flat profile teeth can be designed to clear attachments on long pitch sprockets.
- “High Profile”, or “Long Tooth” sprockets are available on request. The sprocket teeth project out through the top of the chain.



## Shipping Methods

- Special shipping methods available, such as custom crates and kits.



- Sprockets are produced by Tsubaki of Canada

# STOP THE GUESSWORK

When it really matters, trust Tsubaki

Sprocket wear is one of the leading causes of premature chain failure.

When you can't waste valuable machine time inspecting sprockets, trust Tsubaki wear indicators to remove the guesswork.



## Products to Increase Productivity

### Sprocket Wear Indicators

Drive system inspection and maintenance add cost to any production facility. That's why Tsubaki has created an innovative wear indicator to allow a quick and easy replacement decision to be made.

Too often drive components are replaced at the wrong time: Too early (due to historical practices), costing money and increases downtime, or too late, creating forced shutdowns to replace failed drive systems.

With Tsubaki's integrated wear marks incorporated into the sprocket, the task just got a whole lot easier. So much so that just one glance and you'll know. So Tsubaki has "Stopped the Guesswork," allowing you to save time and money to increase your bottom line and eliminate forced shutdowns from drive sprocket failures.



### Sprocket Wear Gauges – Large shaft and multi-tooth segment sprockets

With sprockets used in heavy industries having diameters in excess of three meters and section segment tooth assemblies, they require a tooth gauge that allows several areas to be inspected.

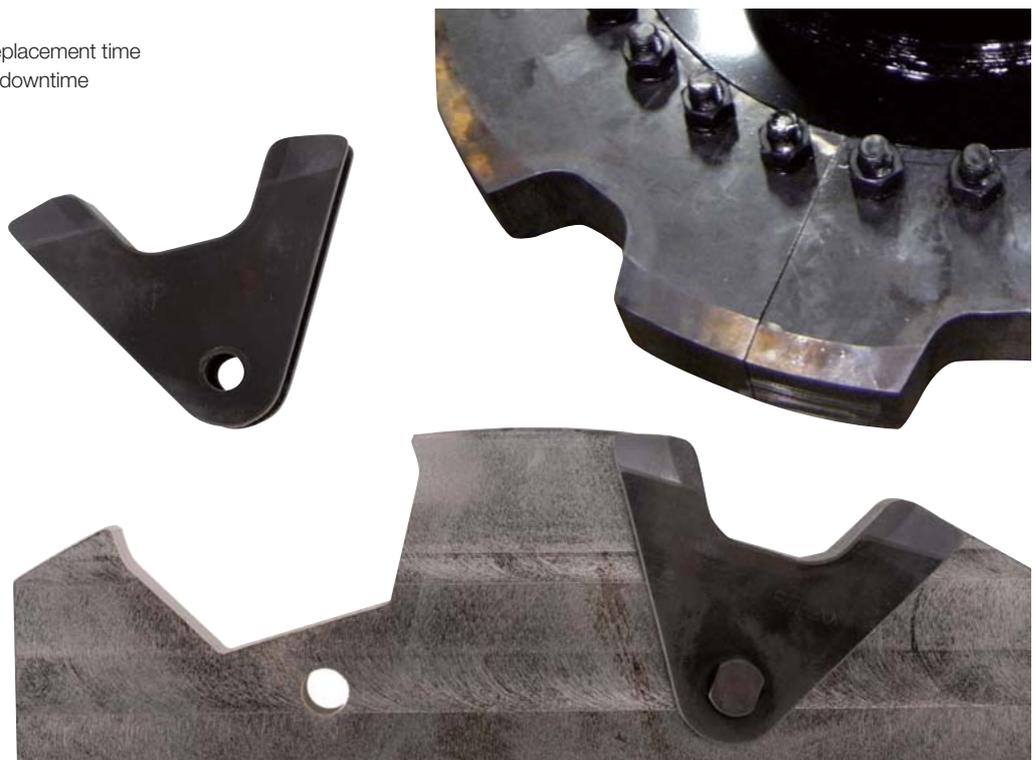
Tsubaki again has the solution with a reverse tooth profile available at the time of order. Tsubaki provides a specialized gauge to "Stop the Guesswork" and allow cost savings and planned maintenance to be scheduled in a timely and organized manner.

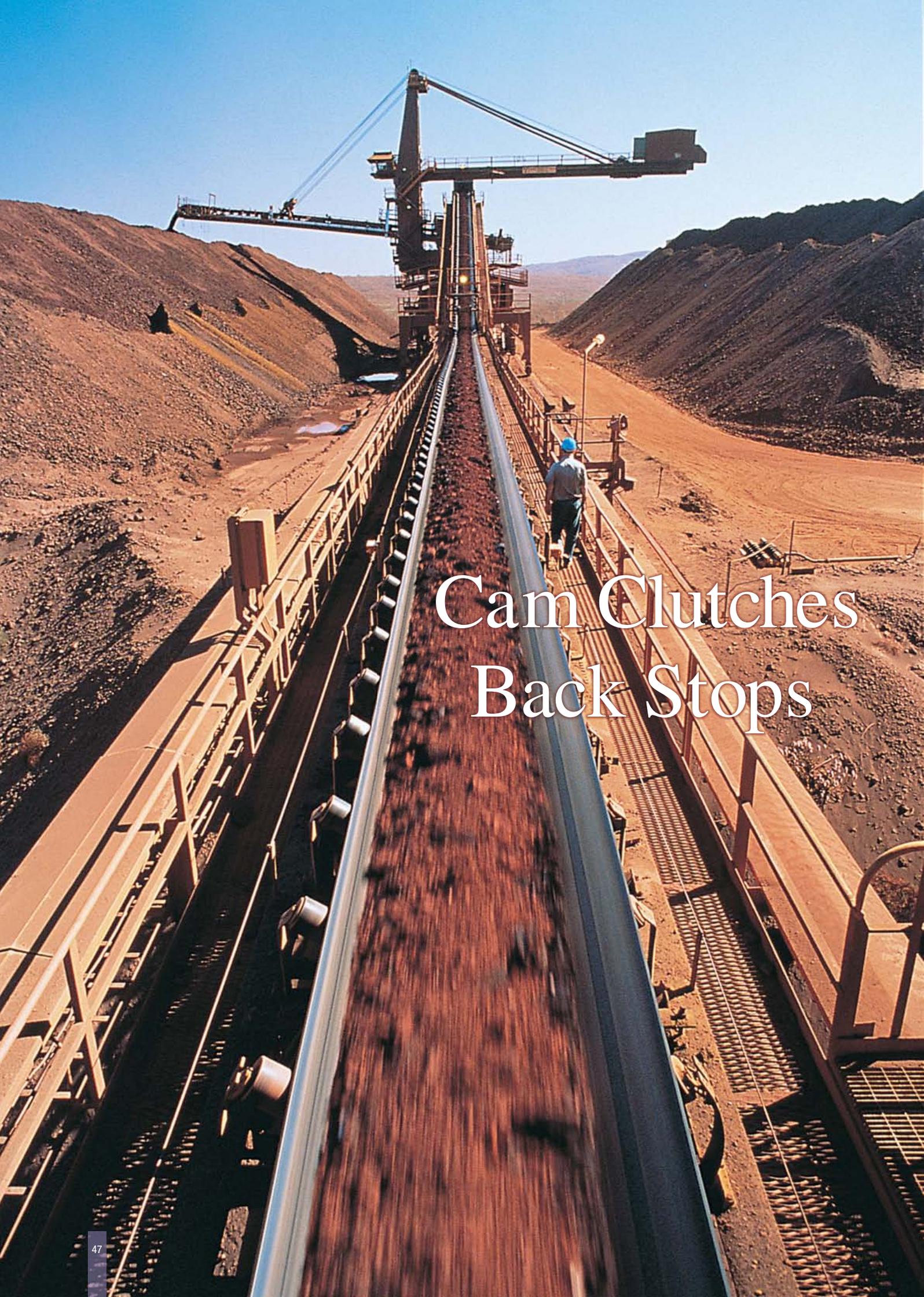


### Tsubaki Insert Tooth and Segment Tooth Assemblies

Cost savings are the key to better profitability, and innovative thinking is the way to ensure the very best for our customers. Tsubaki knows the pressures of competition and keeping production moving. Our innovative Insert Tooth Sprockets and Segmental Tooth Assemblies help keep you on track.

- Reduced costs
- Reduced maintenance & replacement time
- Increased production, less downtime
- Increased productivity





# Cam Clutches Back Stops

## Tsubaki Cam Clutches

Mining and conveying go hand in hand, and in a business where transferring product up into CHPP facilities and stock pile reclaim pads is vital, you want to know that you have the right equipment to hold the load to prevent the conveyor from running backwards.

Tsubaki brings to the market a mining series of Cam Clutches with a greater torque capacity size-for-size than other clutches, with a full complement of cams on our HS model to provide maximum load transmitting members per given diameter. Tsubaki has the most versatile and complete clutch selection there is.

Reliable, tough, field-proven. Tsubaki precision formed cams are “non roll-over-type” with superior durability against shock loads. With cams and races always in contact, you get instantaneous hold reverse without backlash.

Whether used on the head shaft pulley, on the geared motor intermediate shafts, or connected to the system via couplings, Tsubaki has the Cam Clutch to get the job done and handle the pressure of your mining site.



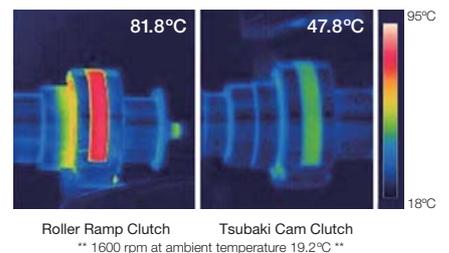
### Typical Applications

The BS series Cam Clutch was developed for inclined belt conveyors and bucket elevators used in mining and other industries. This specialized Cam Clutch for back stopping applications features superior load resistance and dust protection abilities. One such application in mining for the BR-P Series is on ventilation fans to prevent reverse fan flow when the units are turned off.



### Superior Cam Design

With the design of the Tsubaki clutch you will be running with less energy and heat due to the cam design reducing the effects of friction compared to the roller ramp design. The image on the right shows the roller ramp with a much higher running temperature from its design, which allows centrifugal forces on the rollers to increase the temperature of the clutch. This temperature increase causes premature failure of the oil seals and reduces wear life, which leads to clutch failure.



### Special Design Features

#### 1. Self Lubrication Function

When the inner race overruns, the rollers also rotate so the cam and roller cage orbit around the inner race outer circumference at a low speed. Grease in the cam and roller cage spreads completely throughout the insides of the Cam Clutch due to this orbital motion, thus maintaining good lubrication.

#### 2. Sliding Speed Diminishing Function

The actual sliding speed of the cams and the inner race is reduced due to the orbital motion of the cam and roller cage, so the wear on the cams is diminished, and a longer overrunning wear life is possible.



# Cam Clutches / Back Stops

## Tsubaki Cam Clutch - Mining Line Up

### MG Series

A proven field performer used on the intermediate shaft on small discharge conveyors and transfer conveyor chutes, as well as for backstopping on pumps.

This rugged model comes in either grease or oil filled configurations to suit your needs with a series of different seals and operating conditions.

Typical applications are small discharge conveyors and gearbox backstopping.



### BR-HT Series

This unique product incorporates very special cams to lift off and not contact with the inner and outer race when in overrunning operations. This is due to centrifugal force, and is the reason why this type of Cam Clutch is known as a *Lift Off* Type.

Suitable for overrunning high-speed inner race/low speed engaged outer race or Backstopping high speed inner race overrunning.

Applications include internal mounting in gearboxes for backstopping. Interchangeable with popular European brands.



### BR-P Series

Same as BR-HT Series but has a body that is wider than the standard BR-HT Series and two deep groove ball bearings to center the inner and outer races, which allow the clutch to be mounted externally on the gearbox intermediate shaft of the conveyor.

Other typical applications are backstopping for emergency pumps on process and inclined pumps.



### BS Series

A proven field performer for low speed high torque applications. Tsubaki has developed a Cam Clutch that has instantaneous hold back, low noise, easier maintenance, long life and compactness.

This product is ideally situated on the head shaft pulley to prevent any roll back of the conveyor if power failure or system failure occurs.

Typical applications are incline and decline conveyor assemblies.



### BS-HS Series

The next generation in Cam Clutch design that takes the best of all our designs for applications with higher speeds and greater load requirements than suited to our BS series. Our new design incorporates a Cam Cage with a full compliment of cams and bearing supported races to give optimum load capacities and running performance.

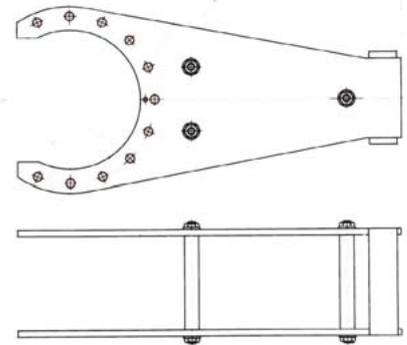
With a design that often allows for one size down selection compared to our BS series, this unit is a leading edge product.

Typical applications are the new super conveyor systems with large loads and high speeds.



## Torque Arms for Cam Clutches

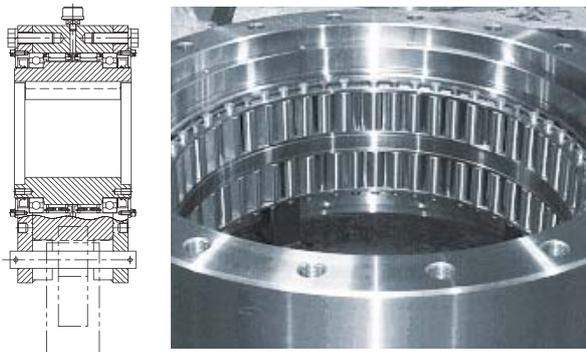
Torque arms stop the rotation of the outer race. A variety of torque arms are available for BS and other series of Cam Clutches. Please contact your local Tsubaki representative to find a torque arm appropriate for your application.



BS220TA - BS450TA

## Special Design Versions Available

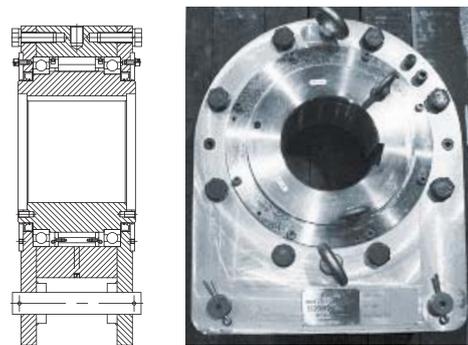
Double Cam Cage model  
(BS160WHS~BS350WHS)  
(BS160W~BS350W)



A double cam cage is a standard specification in BS425HS and BS450HS.

If the conveyor needs higher torque capacity in Cam Clutch sizes BS85 to BS350 and BS160HS to BS350HS, adding another cam cage to the design provides the required backstop holding capacity. Please contact your local Tsubaki representative for more details.

BS-HS series MA model



The special flanges mounted on both sides the MA type Cam Clutch allow for easy replacement of previous units. Also, to reduce costs, this Cam Clutch has been designed to be used with the previous torque arm as is.

## Safety Covers

Safety covers for Cam Clutches are available. These safety covers protect the unit while preventing hands, clothing, etc. from getting entangled in the rotating portion of the Cam Clutch. The safety cover shown here is for the BS Cam Clutch.



# Power Cylinders

Tsubaki Power Cylinders are a completely self-contained, motorized linear actuator unit available in a variety of types and speeds. Their compact size and ease of installation make them ideally suited to a variety of mining applications.

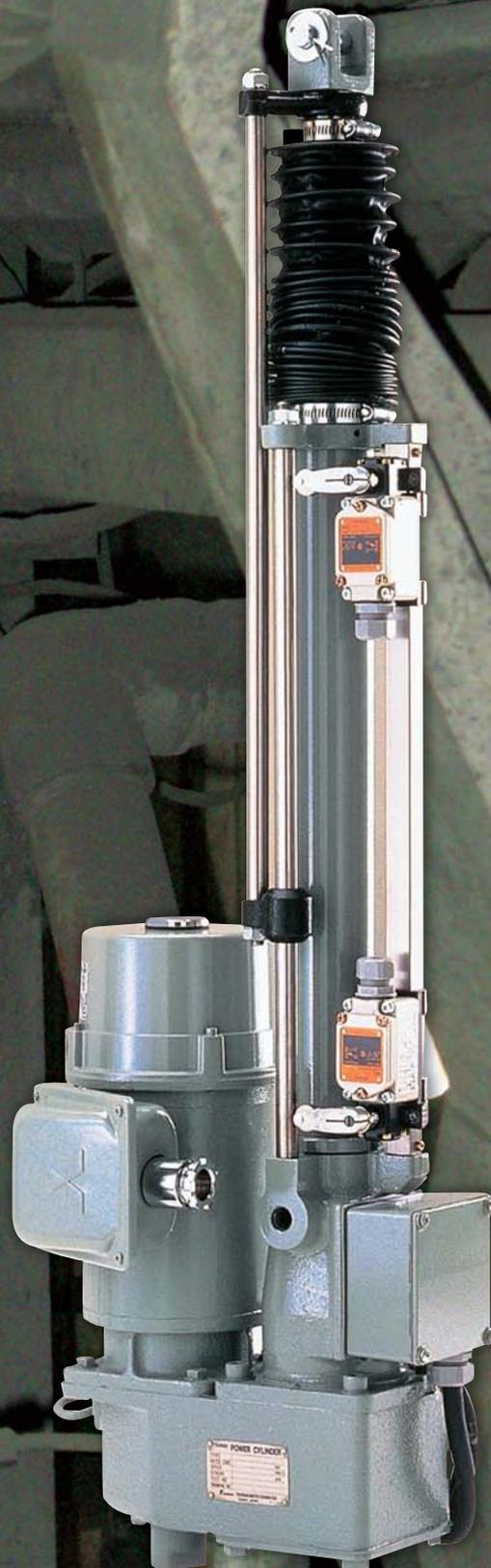
These units require little maintenance, and they are mainly used outdoors where there is a requirement for linear motion, such as flop gates, the opening and closing of rooves and doors, coal sampling units and trousers, leg chutes, and clam shells for Reclaimer Tunnels. Tsubaki Power Cylinders consist of an enclosed electric motor fitted with a DC brake rated 150% load capacity, over travel protection and load limiting friction discs. It uses a gear set, ball screw and nut to extend and retract the rod end.

As a standard for tropical applications we can have the unit painted with a rubberized paint and all non load bearings screws and fasteners supplied in stainless steel.

Applications for power cylinders are commonly found in mines, power stations, ports and any application where a self contained linear actuator with no leaky reservoir, hoses, tube fittings, etc. are needed to operate this unit.

As well as being extremely sturdy, the Power Cylinder has either Trunnion or Clevis mounting arrangements, and can be fitted with stroke limit switches, rotary encoders, potentiometers, bellows and other accessories. See pgs. 53-54 for more details.

Tsubaki Power Cylinders lend themselves to convenient operation from remote locations such as from other buildings.



# Tsubaki Power Cylinders

## What Are Power Cylinders?

There are three categories of linear actuators: the hydraulic cylinder, the pneumatic cylinder, and the electro mechanical cylinder which is a power cylinder.

The following is a specs and cost comparison table for these three cylinders.

\* One financial unit is equal to 1

	Tsubaki Power Cylinder	Pneumatic Cylinder	Hydraulic Cylinder
Type	LPTB1000HSL	Bore size 200mm	Bore size 50mm
Thrust load	1,000kg	1,000kg	1,000kg
Stroke	300mm	300mm	300mm
Speed	120mm/sec	120mm/sec	120mm/sec
Cylinder cost		0.4	0.1
System cost		2.5	1.5
Electricity expense	1*	18	6
CO2 emission		18	6

This is depending on the conditions of operation and the application.

### Applications:

- Clam Shell Valves and Knife Valves
- Flop Gates – Trouser Chutes
- Belt Cleaning Scrapers
- Conveyor Material Deflector
- Coal Sampling Units



## Power Cylinder T Series

Thrust force: 2.45kN { 250kgf } ~ 313kN { 32000kgf }

This is a large thrust type Power Cylinder which can be used with an AC power source. The Power Cylinder T series can be used across a wide range of applications such as mining, steel, cement, injection molding machines, liquid crystal and semiconductor devices. This Power Cylinder can be used outdoors. (IP55) (Higher ratings available upon request.)

### Two Easy-to Select Types

The T series has two different types of safety mechanisms. The TB type incorporates a slipping clutch and electric Shock Relay. The TC type is equipped with a thrust detection limit switch, for press stopping.

### Wide Variation

A wide range of standard models are available according to application, thrust and speed. Thrust force can be selected from a range of 2.45kN { 250kgf } to 313kN { 32000kgf } and speed can be selected in a range from 10mm/sec to 120mm/sec.

### Reliable Operation

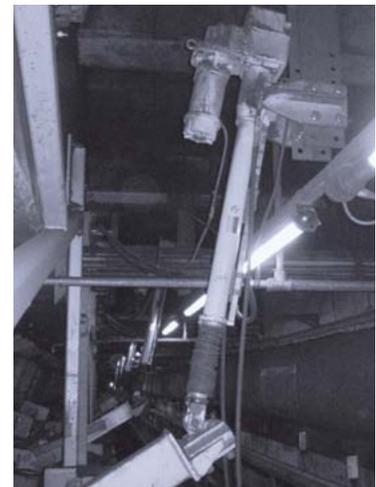
All models adopt a highly efficient ball screw, silent gear, and highly reliable brake motor. All series incorporate a highly reliable safety device which is effective against overload.

### Abundance of Options

The stroke adjusting limit switch includes an external and built-in type, and the stroke sensor includes a potentiometer, a rotary encoder, or both.

### Endrod Damper

This is an optional unit designed to take vibration away from cylinders.



# Power Cylinders

High Performance Linear Actuators  
Offering Efficient, Clean, Quiet Drive

## Easy and Economical to Combine with Your Equipment

The mechanical type motor driven actuator reduces the need for compressors, piping valves or hydraulic units, making the equipment simpler and more economical. The device can be treated as a motor and allows for simple remote control. Furthermore, the simple construction and long life grease provide for more economical maintenance.

## Ready for Outdoor Use (IP55, higher ratings available upon request)

**T series, G series, Ultra Heavy Duty series, F series, Battery series**

## With Electromagnetic Brake Motor

**T series, G series, Ultra Heavy Duty series**

## Battery Powered Actuator

DC motor type  
**Battery series, F series**



## Multi Type Actuator

Available for synchronized operation with one motor Multi series.



## Jack Type

(Ball screw or trapezoidal screw)  
Lini-power jack available in separate catalog  
1.96-980KN  
(0.2-100tf)



## Internal Position Sensor; Limit Switch Type

Optionally available for signaling the position of the stroke.  
**T series, G series, F series**



## Potentiometer (Analog) or Rotary (Digital) Encoder

Optionally available for remote control operation.  
**T series, G series, Ultra Heavy Duty series**

## Rear Mounting

**Trunnion Mount**  
**Clevis Mount**  
(not available with K2-K4-P-R)

## Rod Anti-Rotation Device

Available as made-to-order. If the actuator rod end is free or connected to wire rope, an anti-rotation device for the rod is needed.

**T series, G series, Ultra Heavy Duty series**

## Three Phase Motor with Brake

For precise positioning and rigid load holding.

**T series, G series, Ultra Heavy Duty series**

## IEC Motor Mounting

IEC flange adaptors available to suit servo motors and customer specific motor units.

## Mounting Type and End Fitting

Clevis or trunnion mount and I type end fitting are available for T series, G series, and Ultra Heavy Duty series. F series: Clevis mount only.

## Bellows

To be used in dusty areas when needed.

**T series, G series, Ultra Heavy Duty series, F series**

## External Limit Switches

Optionally available for adjusting the stroke of the actuator.

**T series, G series, Ultra Heavy Duty series, F series**

## Press Loaded Stopping Device

For safety and thrust sensing.

A combination of disk springs and limit switches is used to provide thrust sensing and press loaded stopping.

**T series LPTC type, G series LPGC type, Battery series**

# One-Touch Inspection Door®

Durable and trouble free

Dust and rain tight

Easy to open

Easy to install

Patented Design >>



One-Touch Inspection Door is a dust and rain tight inspection and service door for conveyors, as well as processing and handling equipment. These pre-fabricated units are ready to-go for ease of use on the jobsite. Once in place, One-Touch Inspection Door allows for quick and simple inspection without the need for special tools: just lift the lever! No bolts to loosen and no covers to misplace. One touch is all it takes...it's that simple.

You can't build better access to your equipment. In-house fabrications are an expensive and labor-intensive proposition. They are clumsy and hard to open. Bolts are difficult to loosen, and easy to lose. That costs time and money. In-house fabrications just can't stand up to the rigors of most in-plant operations.

One-Touch Inspection Door® is a registered trademark of Tsubaki Conveyor of America, Inc.

## Easy Access To Your Equipment

### Put One-Touch Inspection Door® to Work Today!

One-Touch Inspection Door was specifically designed to last, indoors and out. In fact, it has a three part, **patented design**.

1. The framework is made of high quality mild steel or stainless steel to ensure durability and long service life.
2. The strong, long lasting hinges and self locking handles open and close easily.
3. The specially designed gaskets withstand temperatures of  $-70^{\circ}\text{C}$  to  $287^{\circ}\text{C}$  ( $-95^{\circ}\text{F}$  to  $550^{\circ}\text{F}$ ) and ensure a tight fit against water and dust.

Best of all, One-Touch Inspection Door installs quickly to existing equipment, with out detailed dimensioning or costly structural changes.

Select the door that is right for your operation. We offer Standard One-Touch Inspection Doors in regular and high-neck styles in a variety of sizes. Standard doors are available in mild steel for general applications or stainless steel for extra corrosion resistance. Polyethylene, epichlorhydrin, or silicon rubber gaskets seal tight in temperatures from  $-70^{\circ}\text{C}$  to  $204^{\circ}\text{C}$  ( $-95^{\circ}\text{F}$  to  $400^{\circ}\text{F}$ ). Large One-Touch Inspection Doors are available in mild steel for general applications or stainless steel for high corrosion resistance. Large doors come with neoprene rubber or silicon rubber strip gaskets to meet your operating temperatures from  $-62^{\circ}\text{C}$  to  $287^{\circ}\text{C}$  ( $-80^{\circ}\text{F}$  to  $550^{\circ}\text{F}$ ).

We also offer other sizes and materials on a made-to-order basis. Do you need a different size or extra handles? We can work with you on special requirements, including types of materials for casings and levers, unique sizes, as well as placement of hinges.

One-Touch Inspection Doors® are produced by U.S. Tsubaki.



### Safety Features

#### Lockout

A simple padlock can be used on any One-Touch Inspection Door to prevent entry to equipment.



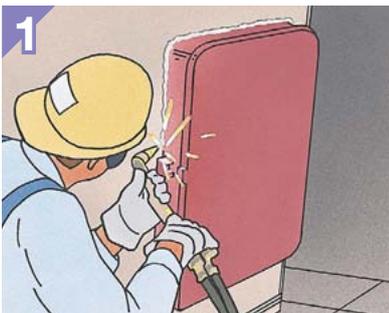
#### Protective Screen

A protective screen for visual inspection is available for immediate shipment for some styles (special order for other styles). Meets OSHA standards.



### It's As Easy As 1 - 2 - 3!

Easy access is at your fingertips.



#### 1. Position the door.

Place the door frame at the appropriate site and tack weld it into position. Then solidly weld the frame to the surface.



#### 2. Cut the inside hole.

Open the door and carefully torch burn the center to create the access area.



#### 3. Complete installation.

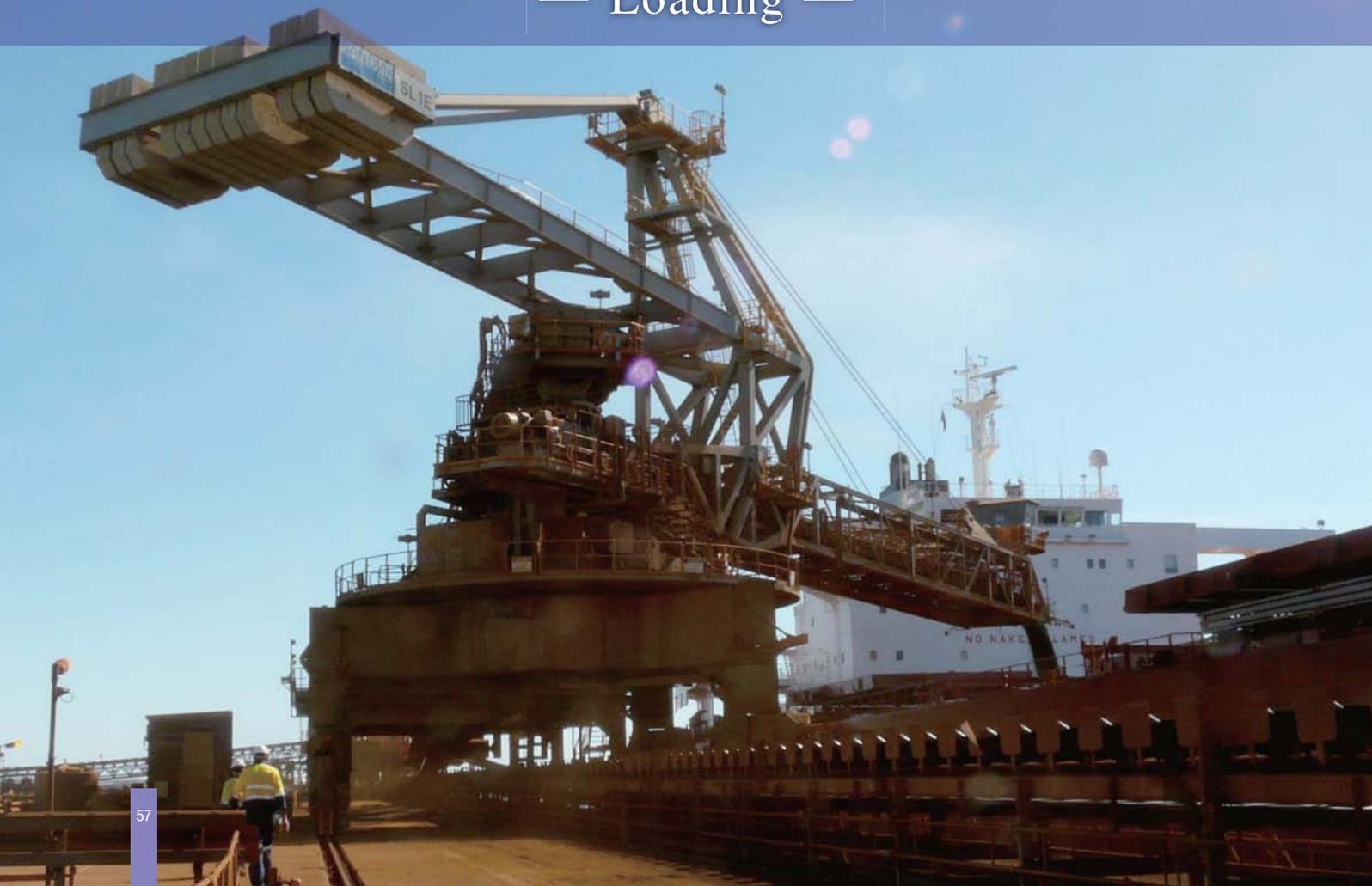
After the area has cooled, attach the lever, apply the gasket, and place the safety warning label in a prominent position.



— Power Generation —

# Power Stations & Port Terminals

— Loading —



# Power Stations and Port Terminals

– the two industries share a common use of several pieces of equipment:

- Train unloaders
- Stock pile overhead conveyors
- Coal silos, clam shells, and flop gate valves
- Conveyors and transfer towers
- Coal reclaimer chains – Scraper blades and bucket wheels

In addition to these applications, Tsubaki offers products to suit boiler feeder chains and sprockets, Fly Ash Chains, Water Screen Chains for both rotary and traveling screen systems, and Boiler Pumps and FD Fans with our clutch box range.



Port Terminals are the dispatch centers for raw minerals to market. These operations demand high performance products to ensure every ship is loaded on time, every time. Tsubaki products have a proven track record in this application, operating in many ports world-wide maintenance free for 20 to 25 years, guaranteeing on-time export departures.

Tsubaki Power Cylinders, Cam Clutches, and Chain are the hidden components critical to system operations.

## Applications:

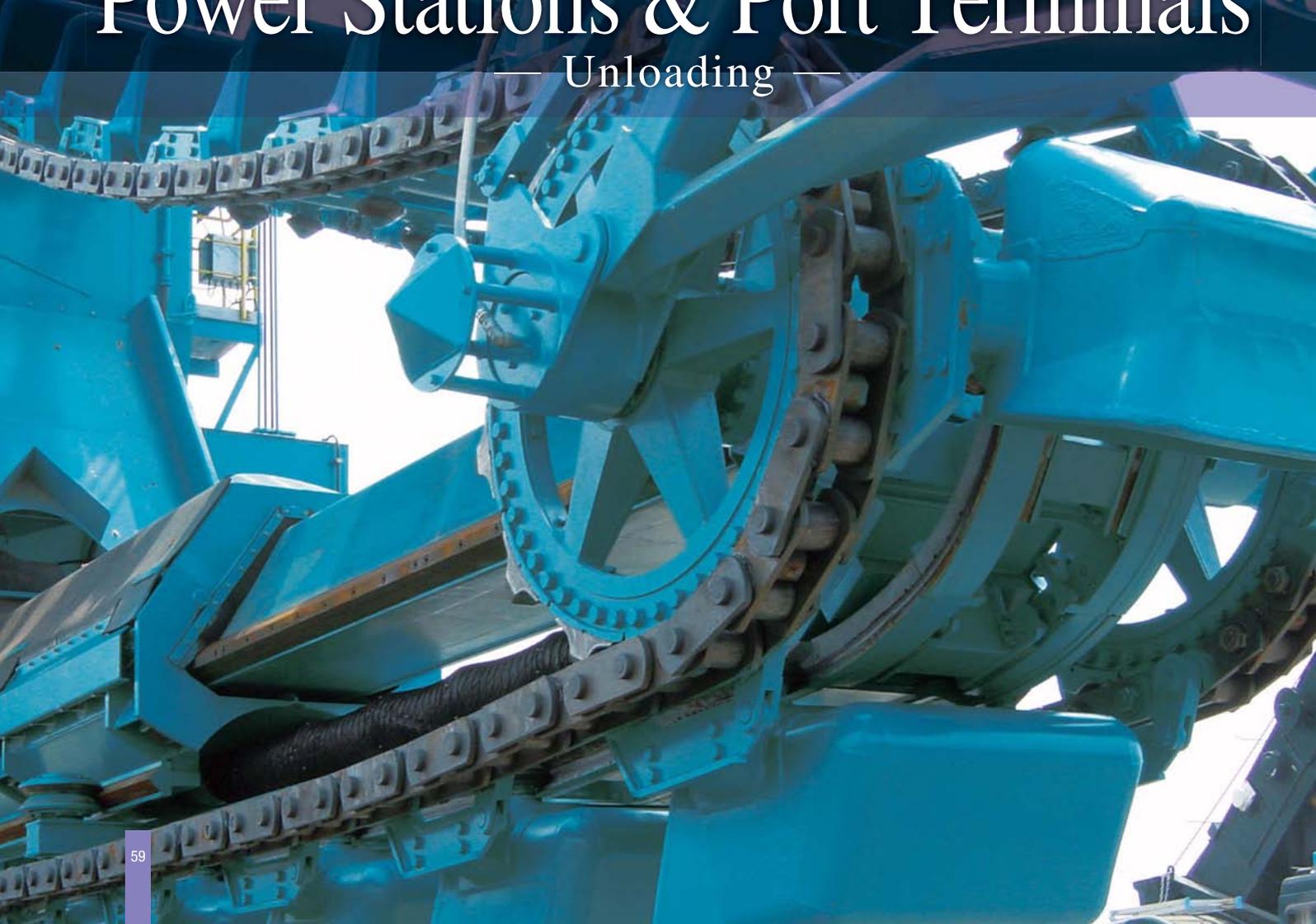
- Conveyor gearbox internal holdbacks (BR-HT Series)
- Flop gates, clam shell valves, loading spoon feeders (Power Cylinders)
- Head drums (Power Lock locking elements)
- Tripper car travel chains (Roller Chain)
- Port loading radial boom electrical cable control (Kabelschlepp products)





# Power Stations & Port Terminals

— Unloading —



# Power Stations and Port Terminals

## - Unloading

### Unloader Chain

Unique technology gives Tsubaki Unloader Chain its superb endurance and proven track record. We also offer various specifications and series to match the needs of the conveyed items.



### Unloader Sprockets

Unloader sprockets are optimized for use with unloader chains. We specially harden them for extremely effective wear resistance.



### Steel Cable Carriers

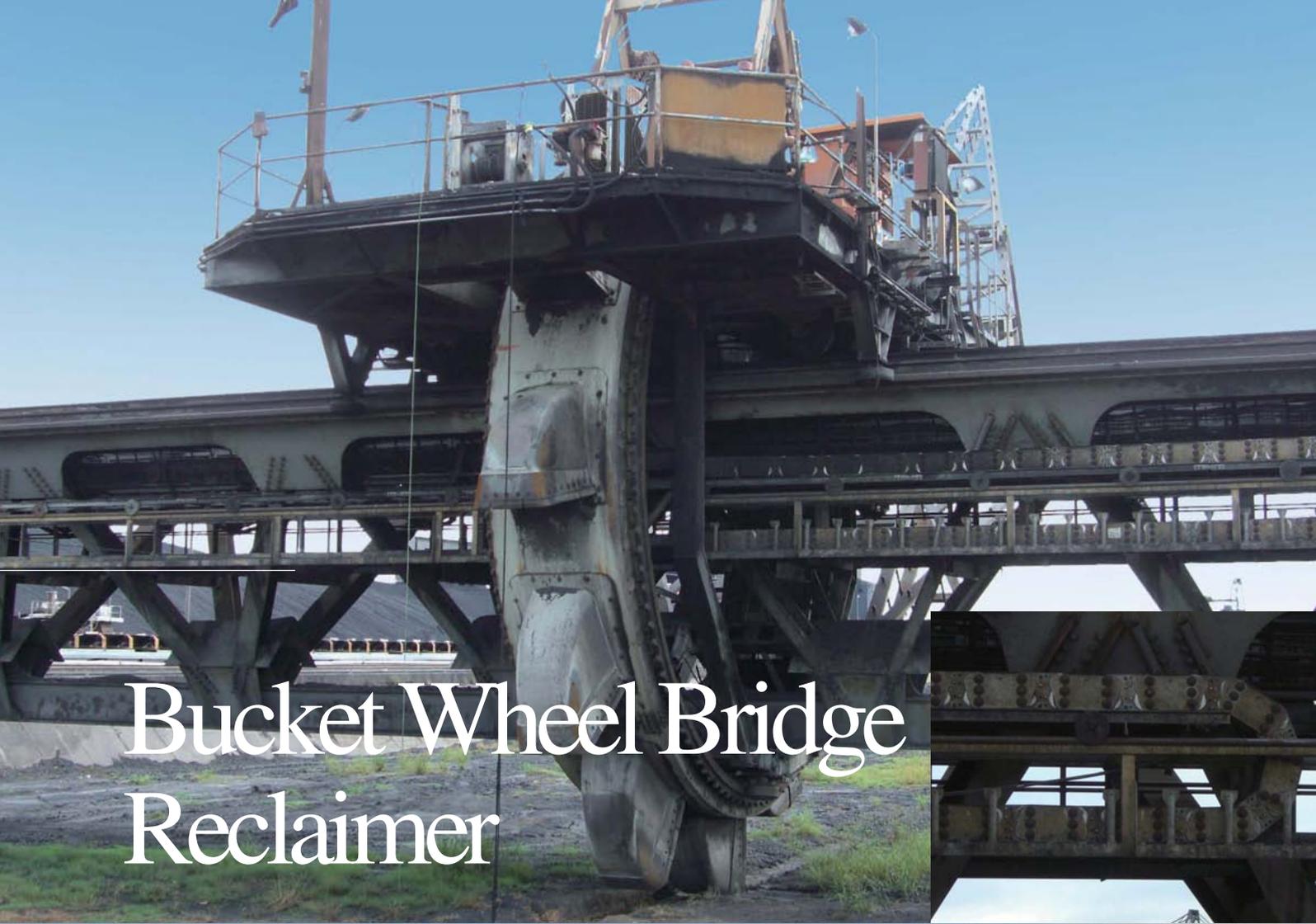
Steel Cable Carriers have excellent strength and heat resistance. Stainless steel and side mount specifications are also available. We also offer an extensive line-up of covered cable carriers for added cable/hose protection.



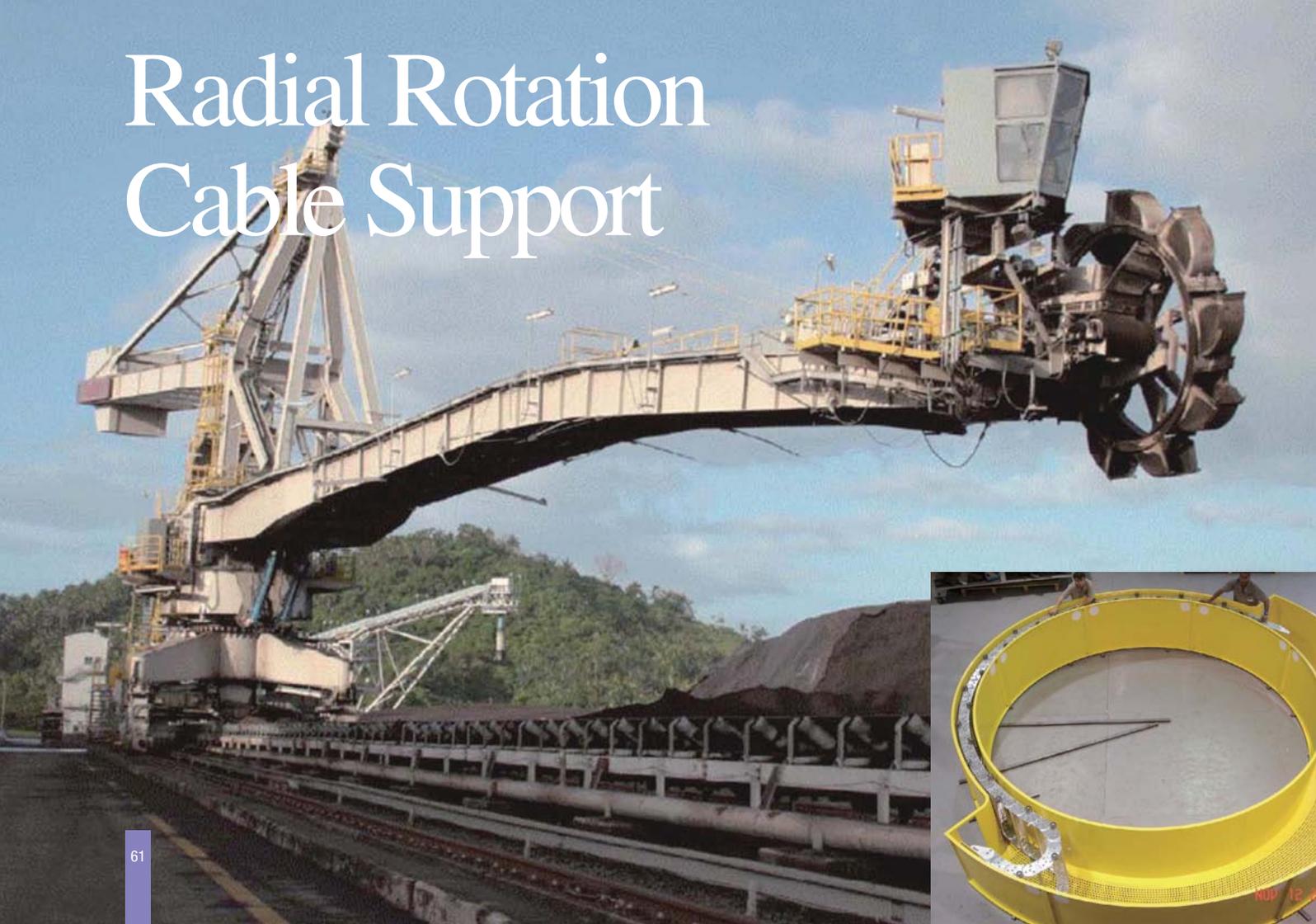
Side Mount Specifications



TK Series



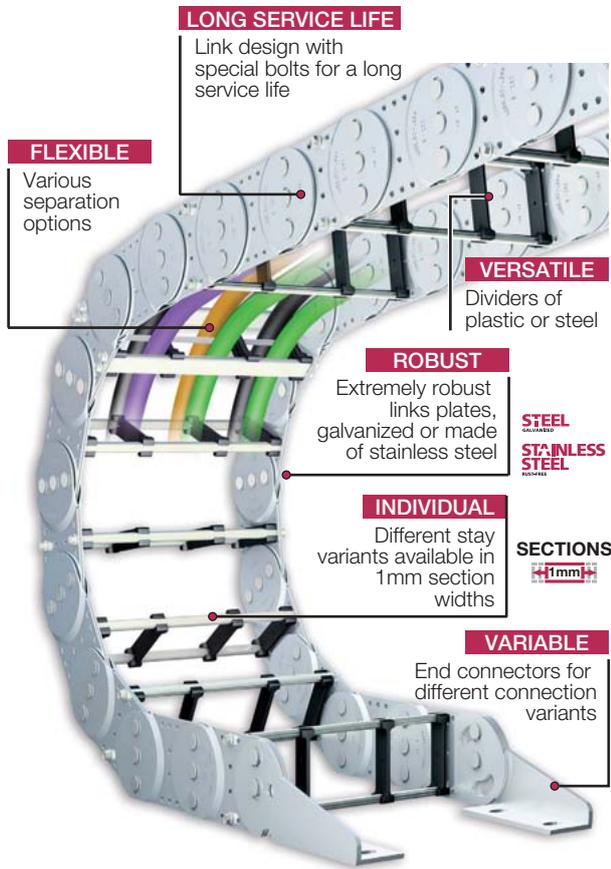
# Bucket Wheel Bridge Reclaimer



# Radial Rotation Cable Support



**S & SX Series :**  
Extremely robust and stable steel cable carriers



**Example of cross section**

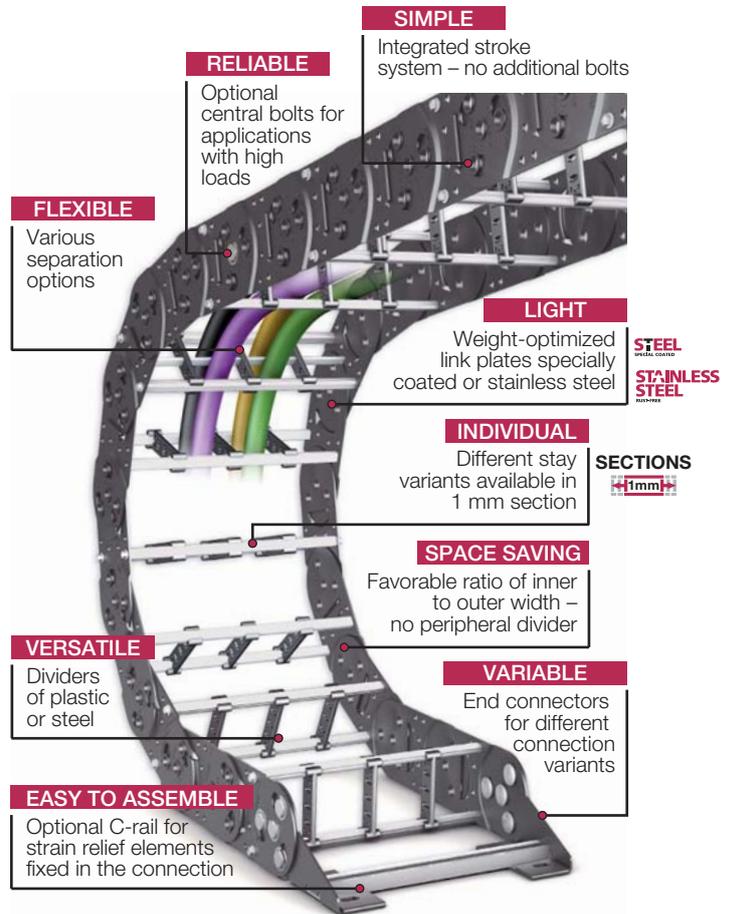
Cables are neatly positioned, applying less stress and pressure to the external cable insulation and internal cable construction.



**Convered versions**

Aluminum cover systems ensure extreme cable protection for a long service life even under extreme and harsh environmental conditions.

**LS & LSX Series :**  
Light, cost-effective steel cable carriers



**Built for harsh environments**

Kabelschlepp steel cable carrier on a bucket wheel reclaimer.



**Everything from a single source**

Ready-to-ship complete system with carrier, cables and plugs.

Bucket Wheel Stackers/Reclaimers and Bridge Type Bucket Wheel Reclaimers are the machines that feed the mining system. Whether delivering product to the processing plant or transferring product to the rail or seaport for transportation, these machines are the workhorses of the mine site. They operate under the harshest of conditions under the highest of loads, and the individual parts that make up the machine have the highest demands placed on them.

It's here that Tsubaki Kabelschlepp cable carrier systems thrive. Our cable carrier systems are built with the highest degree of engineering and technical know-how in our German manufacturing plant. For stackers and reclaimers worldwide, the product of

choice is the Kabelschlepp Steel Cable Carrier.

The various power and fluid cables used in these machines provide the lifeblood to operate them. If they fail, you're on downtime while your maintenance and production costs start climbing. The Kabelschlepp product is a proven performer with multiple features designed to operate in this environment and protect your cables, such as special protective coatings, versatile dividers, long life bolts, and variable heights and widths to suit a range of applications.

Don't let size worry you; our products range from a single power cable up to units the size of a dump truck.

## For Safe Use



### WARNING

Obey the following points in order to prevent hazardous situations.

- Do not use chains and accessories (accessories and parts) for anything other than their original purpose.
- Never perform additional processing on the chain.
  - Do not anneal the various parts of the chain.
  - Do not clean the chain with either acid or alkali, as they may cause cracking.
  - Do not electroplate the chain or its parts, as they may cause cracking due to hydrogen embrittlement.
  - Do not weld the chain, as the heat may cause cracking or a reduction in strength.
  - When heating or cutting the chain with a torch, remove the links immediately adjacent and do not use them again.
- When there is need to replace a lost or damaged portion of a chain, always replace the whole chain with a new product rather than replacing only the lost or damaged portion.
- When using a chain on suspension equipment, establish a safety manual, etc., and strictly prevent entry to the area directly below the suspended object.
- Always employ hazard protection devices for the chain and sprocket (safety cover, etc.).
- If a substance that can cause embrittlement cracking (acid, strong alkali, battery fluid, etc.) adheres to the chain, stop using the chain immediately and replace it with a new one.
- During installation, removal, maintenance inspection and lubrication of the chain:
  - Perform the operation according to the instruction manual or this catalog.
  - Always turn off the power switch to the device and make sure that it cannot be turned on accidentally.
  - Anchor the chain and parts so that they cannot move freely.
  - Perform cutting and connecting procedures properly using a press or other special tool.
  - Wear clothing and employ protective devices that are appropriate to the job (safety glasses, gloves, safety shoes, etc.).
  - Only allow experienced personnel to perform chain replacement procedures.
- In order to prevent hazards, damage, or injury when cutting a Leaf Chain, always install hazard protection devices (safety device, etc.) on the suspension equipment employing the Leaf Chain.



### CAUTION

Obey the following points in order to prevent accidents.

- Only handle the chain after thoroughly understanding its structure and specifications.
- When installing a chain, inspect it in advance to confirm that it has not been damaged in transport.
- Be sure to perform regular maintenance inspections on the chain and sprocket.
- Chain strength varies according to manufacturer. When selecting a chain based on a Tsubaki catalog, always use the corresponding Tsubaki product.
- Minimum tensile strength refers to the failure point when the corresponding load is applied to the chain once and does not refer to the allowable operational load.

## Warranty

### 1. LIMITED WARRANTY

Products manufactured by Seller: (a) conform to the design and specifications, if any, expressly agreed to in writing by Seller; and (b) are free of defects in workmanship and materials at the time of shipment. The warranties set forth in the preceding sentence are exclusive of all other warranties, express or implied, and extend only to Buyer and to no other person. ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED.

### 2. NON-RELIANCE

Buyer is not relying upon any advice, representations or warranties (except the warranties expressly set forth above) of Seller, or upon Seller's skill or judgment regarding the Seller's products.

Buyer is solely responsible for the design and specifications of the products, including without limitation, the determination of suitability for Buyer's application of the products.

### 3. CLAIMS

- (a) Any claim relating to quantity or type shall be made to Seller in writing within 7 days after receipt of the products; any such claim made thereafter shall be barred.
- (b) Any claim under the above-stated Limited Warranty shall be made to Seller in writing within three (3) months after receipt of the products; any such claim made thereafter shall be barred.
- (c) Seller's liability for breach of warranty or otherwise is limited to repair or replacement, at Seller's option, of non-conforming or defective products. Buyer waives all other remedies, including, but not limited to, all rights to consequential, special or

incidental damages, including, but not limited to, damages resulting from personal injury, death or damage to or loss of use of property.

- (d) Repair, alteration, neglect or misuse of the products shall void all applicable warranties.

### 4. INDEMNIFICATION

Buyer will indemnify, defend and hold Seller harmless from all loss, liability, damage and expense, including attorneys' fees, arising out of any claim (a) for infringement of any patent, trademark, copyright, misappropriation of trade secrets, unfair competition or similar charge by any products supplied by Seller in accordance with the design or specifications furnished by Buyer, or (b) arising out of or connected with the products or any items into which the products are incorporated, including, but not limited to, any claim for product liability (whether or not based on negligence or strict liability of Seller), breach of warranty, breach of contract or otherwise.

### 5. ENTIRE AGREEMENT

These terms and conditions constitute the entire agreement between Buyer and Seller and supersede any inconsistent terms and conditions, whether contained in Buyer's purchase order or otherwise, and whether made heretofore or hereafter.

No statement or writing subsequent to the date hereof which purports to modify or add to the terms and conditions hereof shall be binding unless consented to in writing, which makes specific reference hereto, and which has been signed by the party against which enforcement thereof is sought. Seller reserves the right to change these terms and conditions without prior notice.

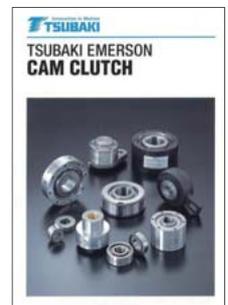
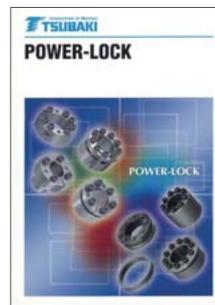
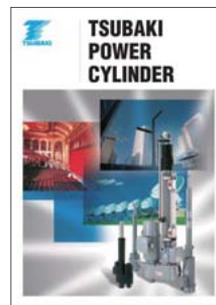
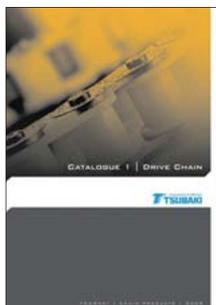
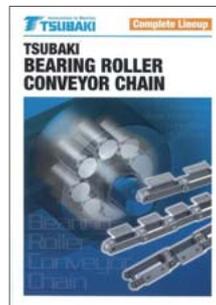
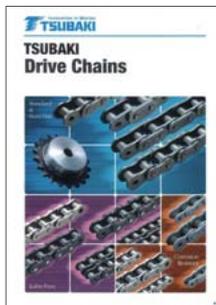
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## Additional Publications from Tsubakimoto Chain Co.

The following Tsubakimoto Chain Co. product catalogs are also available with measurements and other detailed information for the chains, sprockets, back stops and power cylinders listed in this

brochure. Note that not all available publications are listed below, and that not all publications will be available in all regions. Please contact your local Tsubaki representative for more details.



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### ONTRAK Engineering

493 Boundary Rd, Maraylya, NSW, 2765  
Australia  
www.ontrakengineering.com

### Sandvik Mining

Alachua Facility - Florida  
USA  
www.sandvik.com

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## TSUBAKIMOTO CHAIN CO.

### Headquarters

Nakanoshima Mitsui Building  
3-3-3 Nakanoshima, Kita-ku  
Osaka 530-0005, Japan  
Phone : +81-6-6441-0011  
Facsimile : +81-6-6441-0489  
Internet:  
<http://tsubakimoto.com/>

### Chain Division

**Chain Sales Department**  
1-3 Kannabidai 1-chome  
Kyotanabe, Kyoto 610-0380, Japan  
Phone : +81-774-64-5023/4  
Facsimile : +81-774-64-5212

For further information please  
contact the Chain Division.

### Global Associated Partners:

#### NORTH and SOUTH AMERICA

##### U.S. TSUBAKI, INC.

301 E. Marquardt Drive  
Wheeling, IL 60090-6497  
U.S.A.  
Phone : +1-847-459-9500  
Facsimile : +1-847-459-9515

##### TSUBAKI BRASIL

**REPRESENTAÇÃO COMERCIAL LTDA.**  
R. Pamplona, 1018 - C.J. 73/74  
Jd. Paulista - 01405-001  
São Paulo - S.P. Brazil  
Phone : +55-11-3253-5656  
Facsimile : +55-11-3253-3384

##### TSUBAKI of CANADA LIMITED

1630 Drew Road  
Mississauga, Ontario, L5S 1J6  
Canada  
Phone : +1-905-676-0400  
Facsimile : +1-905-676-0904

#### EUROPE

##### TSUBAKIMOTO EUROPE B.V.

Aventurijn 1200, 3316 LB Dordrecht  
The Netherlands  
Phone : +31-78-6204000  
Facsimile : +31-78-6204001

##### TSUBAKIMOTO U.K. LTD.

Osier Drive, Sherwood Park  
Annesley, Nottingham  
NG15 0DX U.K.  
Phone : +44-1623-688-700  
Facsimile : +44-1623-688-789

##### TSUBAKI DEUTSCHLAND GMBH

ASTO Park Oberpfaffenhofen,  
Friedrichshafener Straße 1, D-82205,  
Gilching, Germany  
Phone : +49-8105-7307-100  
Facsimile : +49-8105-7307-101

##### Tsubaki Kabelschlepp GmbH

Daimlerstraße 2, D-57482  
Wenden-Gerlingen Germany  
Phone : +49-2762-4003-0  
Facsimile : +49-2762-4003-220

#### ASIA and OCEANIA

##### TAIWAN TSUBAKIMOTO CO.

No. 33, Lane 17, Zhiciang North Road  
Gueishan Township, Taoyuan County  
Taiwan  
Phone : +886-33-293827/8/9  
Facsimile : +886-33-293065

##### TSUBAKIMOTO SINGAPORE PTE. LTD.

25 Gul Lane  
Jurong  
Singapore 629419  
Phone : +65-6861-0422/3/4  
Facsimile : +65-6861-7035

##### TSUBAKIMOTO (THAILAND) CO., LTD.

999/9 The Offices at Centralworld  
10th Floor, No. 1001, Rama 1 Road  
Pathumwan, Bangkok 10330 Thailand  
Phone : +66-2-264-5354/5/6  
Facsimile : +66-2-251-3912

##### TSUBAKI INDIA

**POWER TRANSMISSION PVT. LTD.**  
Chandrika Chambers No.4, 3rd Floor,  
Anthony Street, Royapettah, Chennai,  
Tamil Nadu 600014 India  
Phone : +91-44-4231-5251  
Facsimile : +91-44-4231-5253

##### PT. TSUBAKI INDONESIA TRADING

Wisma 46 - Kota BNI, 24th Floor,  
Suite 24.15, Jl. Jend. Sudirman, Kav. 1,  
Jakarta 10220 Indonesia  
Phone : +62-21-571-4230/31  
Facsimile : +62-21-571-4232

##### TSUBAKI AUSTRALIA PTY. LIMITED

Unit E, 95-101 Silverwater Road  
Silverwater, N.S.W. 2128  
Australia  
Phone : +61-2-9704-2500  
Facsimile : +61-2-9704-2550

##### TSUBAKIMOTO CHAIN TRADING (SHANGHAI) CO., LTD.

Room 1712, Lippo Plaza  
No. 222 Huai Hai Zhong Road  
Shanghai 200021, China  
Phone : +86-21-5396-6651/2  
Facsimile : +86-21-5396-6628

##### Tsubakimoto Chain Co., Korea Office

#1401, West Wing, Hanshin Intervalley 24,  
707-34, Yeoksam 2(i)-dong,  
Gangnam-gu, Seoul  
Republic of Korea  
Phone: +82-2-2183-0311  
Facsimile: +82-2-2183-0314

##### TSUBAKI AUSTRALIA PTY LIMITED - NEW ZEALAND BRANCH

2 Kalmia Street,  
Ellerslie, Auckland 1051  
New Zealand  
Phone : +64-9-914-1841  
Facsimile :

##### TSUBAKIMOTO SINGAPORE PTE. LTD. VIETNAM REPRESENTATIVE OFFICE

H&H Building 8F, 209 Hoàng Văn Thụ,  
Phú Nhuận District,  
Hố Chí Minh City, Vietnam  
Phone : +84-8-3999-0131/2  
Facsimile : +84-8-3999-0130