

2 thyssenkrupp Forged Technologies





thyssenkrupp Forged Technologies is a diversified supplier of components and system solutions for a wide range of different industries and markets. The Group produces Berco undercarriage components and systems as well as crankshafts, connecting rods and front axles for the automotive industry.

For our customers, we provide state-of-the-art mechanical solutions for a wide range of customer applications in the resource, construction and mobility sectors, thanks to our material, engineering and manufacturing competence. As a global player with a wide-ranging production network with 14 production facilities in all major regions of the world, we fulfill individual customer requirements in all markets.

"We fully commit ourselves to the core values of our Berco brand – quality, innovation and customer orientation. Together with our customers we see ample opportunities for growth in the Construction and Mining market."

Patrick Buchmann, Chief Executive Officer

Berco History: 100 years of experience



Berco history: Over 100 years of experience.

Undercarriages literally "move" equipment. And Berco has been the world's leading OEM manufacturer of undercarriage systems and components for the biggest names in the heavy equipment industry for over 100 years. So, chances are, a Berco undercarriage is already moving your machine. In fact Berco started as a little repair shop in 1918. Capitalizing on his extraordinary vision and mechanical abilities, Vezio Bertoni transformed the shop into a workshop and then

The company continued to develop further, extending its range to different kinds of machine tools (especially grinders), and continued to expand over the following years. It was only during the 1930s that the Ferrara-based company entered the undercarriage market, soon becoming one of the most important players in the world. During the late 1970s, the Bertoni family started the process that would transfer ownership to the Hoesch Group, then to Krupp and finally, at the end of the 1990s, to thyssenkrupp.



1910s

a factory.

In 1918 Vezio Bertoni opened a bicycle repair shop, continuing his father's work. Soon after he also began repairing agricultural machinery and vehicles abandoned by the US Army in the countryside of Ferrara. Vezio Bertoni relied on his own competence along with the help of his fellow citizens, and shortly, after the small shop turned into a workshop of 30 employees producing machine tools and spare parts for tractors as well.



1930s

The company was by far the largest and most important company in the region (5000 square meters of covered area) with over 100 employees. At that time Berco products also started to be exported to other European countries.



1950s

In 1957 his business partner Cotti resigned and was replaced by Vezio's son, Gianni Bertoni. During that time the company doubled in size, got renovated and modernized



1920s

When the entrepreneur Roberto Cotti ioined Vezio Bertoni, the company was named "Bertoni & Cotti". The production was extended to different machine tools: grinding machines, boring machines, presses, lathes, sanding machines and equipment for workshops.



1940s

With 824 employees the company was getting bigger and bigger, but the outbreak of the World War II compromised its growth. After 2 years of almost total inactivity, Berco got back on its feet in 1946 and renewed itself, by produc components for tracked machines, overhaul equipment for earthmoving machines and presses to assembly chains.



1960s

Berco was one of the most important companies in its sector not only in Italy. but also in foreign markets all over the world: 60% of the undercarriages produced were exported to the North American Market and Berco had roughly 120 authorized dealers globally. The first hot-forging workshop in the region was built on an area of 3000 square meters and with 27 of the most powerful and modern machines on the market



Berco covered 35% of the entire national undercarriage production and 6 out of 10 spare parts exported overseas were produced by Berco. As 50% of the products were exported to the US. Berco was heavily hit by the market crisis in North America at that time. In order to save the company, Bertoni was forced to sell the remaining shares to Hoesch. Under the 100% Hoesch ownership, Giovanni Bertoni, Gianni's son became CEO and he lead the entry into the OEM market, restructuring plans new investments and also technological



2000s

The share of exported products reached 90% and Berco reached the goal of 230,000 tons of finished products in one fiscal year. Berco continued to grow, with now over 3000 employees and three foreign branches: Berco of America in Waukesha, (WI), Berco South America in Campo Limpo (SP) and Berco Bulgaria in Apriltsi.



2020s

In October 2022 Berco announced the launch of 'Berco Aftermarket S.r.l.' The new company will be dedicated exclusively to serving the Aftermarket and is 100 percent owned by Berco S.p.A As a spin-off of the existing business, Berco Aftermarket S.r.l. will focus on providing a high-quality and ultra-efficient replacement parts service. Berco UC solutions are based on the markets, customers and technical data, and now the company is able to provide engineering capabilities and technical support anywhere in the world.



Gianni Bertoni officially became CEO of the company, further driving globalization with over 2500 employees. He also managed to increase the turnover to 60 billion italian liras, coming from only about 4 billion the previous decade. In 1976 he sold 50% of the Berco's shares to the German steel multinational Hoesch



1990s

Berco boasted very important OE customers and representatives on the Middle Eastern market such as United Motors and Middle East. In 1992 the German multinational Krupp acquired the Hoesch group, giving life to the Krupp AG company Hoesch-Krupp, In 1998. Krupp AG merged with Thyssen AG, giving birth to ThyssenKrupp.



2010s

Berco automated many of its production lines and the OE business continued to be its most important segment. In October 2017 two Business Units of the thyssenkrupp AG, Undercarriages and Forging and Machining, were merged to the new BU Forged Technologies.





















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Our entire undercarriage product range covers Mining, Construction and Utility sectors.





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thyssenkrupp **Industrial Components world**

thyssenkrupp Industrial Components world

8 Introduction of Berco Mining Products



Berco Mining Products:

Efficient and reliable solutions

for mining operations

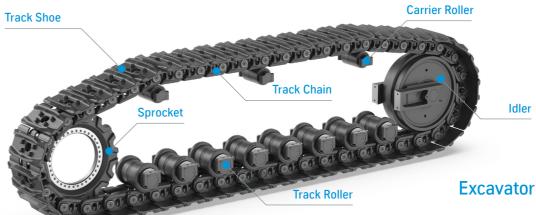
Berco Mining Products offer an efficient, reliable and economical range of solutions for mining operations, catering to the undercarriage needs of open pit mining, quarrying or earthmoving on large scale land reclamation ranging from 50 to 400 ton tracked machines with 240-395 mm chain pitch. Superior engineering and technology, comprehensive know-how and state-of-the-art manufacturing ensure the best quality of the products and services offered.

Our team of engineers supports our customers in the selection or design of the most effective and efficient solution in line with the specific needs of the customer.

- Dry, greased, sealed & lubricated chain versions
- Forged shoes for heavy duty applications
- Track chains with "BPR2™"
 (Berco Pin Retention 2), which improve the working life time of the components
- Available track chains for special application



Mining Excavator



Excavators are popular earthmoving vehicles that feature a bucket, arm, rotating cab, and movable tracks. These components provide superior digging power and mobility, allowing this heavy equipment to perform a variety of functions, from digging trenches and breaking holes to lifting away waste and excavating mines.

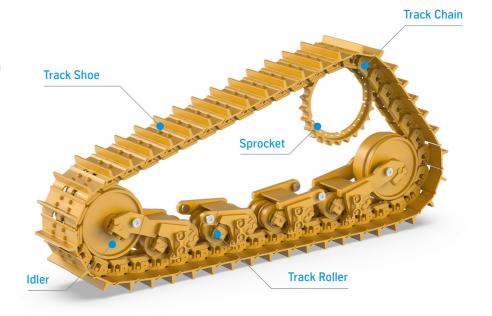
Mining Dozer

Dozer

Dozers mainly assist with pushing, digging and leveling materials like soil and debris at a work site.

They come with large, heavy blades in the front that push materials.

Some come with other modifications like rippers in the rear to help break down tough ground.





Mining Excavator



Track Group Assembly

Chain Features

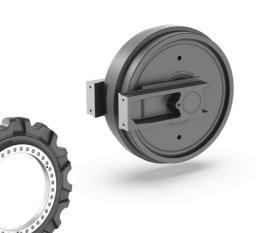
- Chain pitch ranging from 318-350-395 mm
- · Conventional chain design with forged track link and forged shoe plate
- · Each component is designed with optimized steel grade and heat treatment to accomplish the "mission"

Track Roller and Carrier Roller

- Rollers are designed for the high demanding duty cycle of a mining excavator
- Rollers are sealed for life using the most advanced sealing system solutions
- The usage of Boron steel grade and dedicated heat treatment devices provide a superior mechanical resistance and excellent impact resistance







Idler

- Fabricated and sturdy idler design
- · Unbeateable wear resistance
- Unique idler and track adjuster solution to ensure the right pretension of the chain

Sprocket

- Cast sprocket is designed with an even number of teeth in order to provide high resistance to vertical loads
- Special tooth profile offers anti mud packing features



Mining Dozer



Track Group Assembly

Chain Features

- Chain pitch ranging from 240-318 mm
- Newly developed sealing system and Berco positive pin retention (BPR2) provide maximized joint durabilty
- New design, extend chain life and allows to plan predictive maintenance with reusability of the inner components

Shoes Features

- Single grouser common for dozers
- High grip required to push dirt

Track Roller

- Rollers available as single and double flange options
- Rollers are designed with dual journal shaft to reduce internal heat generation
- Rollers Shells are through hardened to have wear resistance even in the most harsh terrain condition
- All rollers are available in the "all weather configuration" in order to provide best perfomances also in arctic climate

Cartridge Pin

- Newly developed Sealing System providing superior perfomance for low radial and axial clearance
- State of the art assembly process to ensure great operational results
- Cartridge pins outer diameter allow installation with specific pressfit





Idler

- Fabricated idlers with special rim profile to optimize the strength and durability of the product
- · Hot rolled rim with boron steel grade offer high compact material, zero material defect and final heat treatment provide high wear resistance

Sprocket

- Segment design for easier maintenance
- No need for track chain removal for replacement
- Forged part using Boron steel through hardening to maximize life



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Bogie Assembly

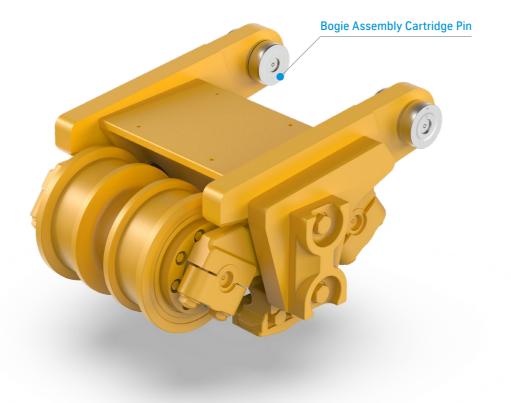
Bogie Assembly Cartridge Pins

Berco expands its offer adding Bogie Assembly Cartridge Pins to be applied on suspended undercarriage Dozer machines range from 40 to 100 ton.

Cartridge pins provide a pivot point that allows major and minor bogies of a suspended undercarriage to oscillate in order to maintain in uneven terrain conditions, major track on ground footprint for better dozing capability by distributing among the undercarriage components impact loads and shock loads.

Features

- Newly developed Sealing System providing superior perforance for low radial and axial clearance
- State of the art assembly process to ensure great operational results
- Cartridge pins outer diameter allow installation with specific pressfit



Platinum Line Features 13

Platinum Line Features

Engineered by Berco competence

When the job requires exceptional solutions, Berco is the perfect partner for your business. We develop tailored solutions to serve machines that have to work in unique conditions.

Our Platinum Line guarantees outstanding undercarriage lifetime allowing customers to reduce cost per hour of operation in mining, large-scale construction, oil & gas and all applications where reliability matters: Platinum Line is the most profitable investment for your machine.

Features

- Incresed sealability of the joint by "BPR2™"
- Optimized link shape permits the reduction of the stress level in the pin boss of the track link
- High impact steel material

Advantages

- Lowest total cost of ownership
- Longer joint life
- Maximum stiffness to the joint with a new pin retention system
- Longer resistance
- High structural durability of the chain

Working Lifetime of Components - Platinum Line



Projected values based on last measurement. Data as of October, 2022.





Brand	CAT	k					Kom	atsu				Lieb	herr					Hita	chi			
Model	336	375	385	390	6018 / RH90C	6020B	PC700	PC800	PC1250	PC1600 / PC1800	PC2000	R964	R974	R984/R9100/R9150	R9200	R9250	R994	ZX650	ZX690	ZX850 / ZX870	EX1200	FX1800 / FX1900
TRACK GROUF	ASSEM	BLY										<u> </u>						<u> </u>				
Track Group Assembly	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
ROLLER																						
Track Roller	•	•	•	•	_	•	•	•	•	•	•	•	•	•	0	•	•	•	•	•	•	-
Carrier Roller	•	•	•	•	_	•	•	•	•	_	•	_	_	•	•	•	_	•	•	_	•	_
IDLER AND SP	ROCKET																					
ldler	•	•	•	•	_	•	•	•	•	•	•	•	•	•	0	•	_	•	•	•	•	c
Sprocket	•																					

													As of October, 2022
Min	ing	Doz	er										Drilling Machine
CAT*				Koma	atsu			Liebl	nerr		Shan	ıtui	Epiroc
D8	D9	D10	D11	D155A	D275A	D375A	D475A	PR754	PR764	PR776	SD 32	SD 42	PV351 Pit Viper
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^{*}All products shown in this document originate from Berco exclusively. Any references to Caterpillar (the Caterpillar word signs) are mentioned to communicate that the aforementioned products are only suitable for Caterpillar machines with the corresponding model designation.

Introduction of Berco Construction Products



Berco Medium Range:

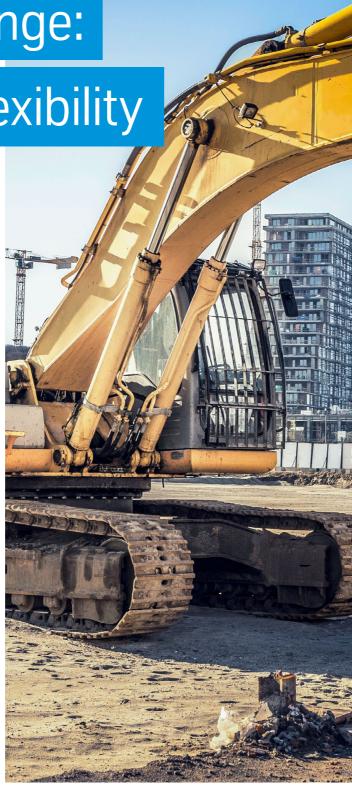
Adaptibility and flexibility

for every need.

Berco Medium Range offers an innovative, reliable and economical set of solutions to your undercarriage needs, for both, the Original Equipment Manufacturers (OEMs) and the Aftermarket customers.

The track-type machine classes range from 7 to 50 ton and 140-228.6 mm chain pitch also provides our cuostmers with the right solution to their specific requirements.

- Dry, greased, sealed or lubricated chain versions, heavy duty chains, more than 11,000 configurations
- Any configuration available with single, double, triple grousers
- Special shoes options available with bent ends and poly pad
- ⇒ Single flange, double flange or inner flange rollers, more than 1,500 configurations
- Multiple sprockets and segments product available for any type of final drive
- Low and high temperature versions for extreme applications
- Undercarriage for special applications: conveyor, pipeline handling, milling machines, forest machines, etc.



Construction Excavator



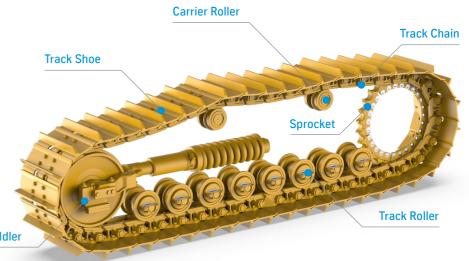
Excavators travel slowly and short distances; their undercarriage moves for 10-20 % of SMU hours*. Excavators have high machine weight and high impact to the undercarriage during normal working conditions.

Construction Dozer

Dozer

Dozers travel at high speeds (max speed approx. 10-12 km/h) and distances; hence UC requires larger volume of wearable material and deeper heat treatment.

Dozer undercarriages move for 80-90 % of SMU hours*, and require more undercarriage maintenance and service/ refurbishment on components.



^{* &}quot;SMU hours" are the Engine Hours based on the Service Meter Unit (SMU)

Construction Excavator / Construction Dozer Products



Construction Excavator



Track Group Assembly

Chain Features

- Track link with optimized design in the main structural sections
- Pin and bushing with selected material and heat treatment for high load and high impact resisatnce
- Press-fit type master pin:

used in more severe application, it requires a field press for the assembling procedure

• T-type master pin:

low severity application and service, which doesn't require a field press for the assembling procedure

Track Roller and Carrier Roller

- Rollers are sealed for life using the most advanced sealing system solutions
- The usage of Boron steel grade and dedicated heat treatment devices provide a superior mechanical resistance and superlative impact resistance







Idler

 Idler and track adjusters are designed to absorb any kind of external loads generated during the working conditions of the excavator



- Cast sprocket for standard duty application
- Forged sprocket for HD and forestry application
- Multiple drilling pattern to fit different final drive flanges





Track Group Assembly

Chain Features

- Stepped bushing available on selected machine models
- Less friction between components and reduced fuel consumption

Link Features

- Taller track link profile for more wear material
- Deeper heat treatment case depth

Shoes Features

- High grip required to push dirt
- Clipped corner and mud hole as options

Track Roller and Carrier Roller

- Rollers are sealed for life using the most advanced sealing system solutions
- Roller shells are differential quenched to provide high wear resistance at the rail diameter and high mechanical strength at the inner diameter to avoid any kind of deformation under load







Idler

- Idlers with brackets have an adjustable shimming system to reduce idler to frame clearance
- Rubber spring are also availabe for a better vehicle NVH



Sprocket

- Segment design for easier maintenance
- No need for track chain removal for replacement
- Forged part using Boron steel through hardening to maximize life



20 Service Line Features / Berco Green 21



Service Line Features

Engineered by Berco competence

Berco has revolutionized the chains for 17-25 & 30-35 ton excavators with 190 mm and 216 mm pitch. A new patented design maximizes performance while minimizing cost. Sealed and greased chains are developed for machines of many brands such as Komatsu, John Deere, Hitachi and Caterpillar*.

Both chains are fully interchangeable with the OE products as well as with previous Berco chains. The completely redesigned link makes the new chains the first choice for all tracked excavators on the market. The chains in the Service Line range have an exclusive, patent link profile design with a weight reduction of 8% approximately, without compromising their wear resistance or structural strength.

Berco Service Line also includes dozers for 100 kW and 170 kW applications, rollers and lubricated chains designed to cope with intensive use.

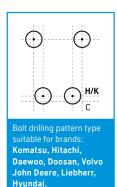
Production of Service Line range reflects the high standards of quality in every product from Berco, adding a value: low TCO. Every products in Service Line range provides a lengthy warranty period (up to 2500 hours under normal operating conditions, in certain geographical regions such as Europe and the Americas), and is highly resistant to abrasion, impact and humidity.

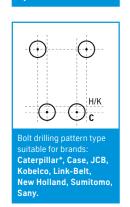
Features

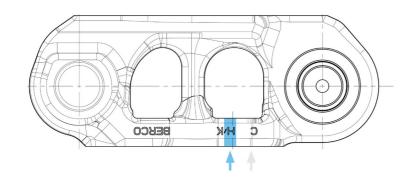
- Completely redesigned link
- New system of identification

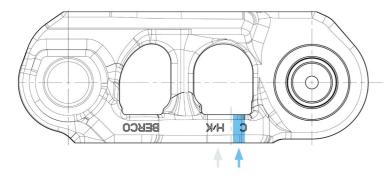
Advantages

- Maximum reliability in the 17-25 & 30-35 ton excavator range
- Perfect interchangeability with OE chains and current Berco chains
- Reduced complexity and stock levels due to only 2 part numbers to cover 17-25 & 30-35 ton excavators









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Berco Green

Highest quality, designed in Italy

The Aftermarket line for Agricultural machinery: High level for more competitiveness in sugar cane harvester.

Agricultural applications are known as one of the toughest environments for machine operations.

Sugar cane harvesting operations in particular do not allow any compromises. For this reason, Berco has now developed a product line especially for agriculture and the first products launched are made for harvesting machines - Berco Green. Italian engineering, first-class Italian design with a more competitive price characterize the Berco Green Line for the agricultural market.

Features

- Onger wear life due to a thicker link
- Extended chain durability from a completely new designed track link
- Stronger bushing strap for improved pulling force resistance
- Reinforced structure for twisting load resistance
- Increase of working clearence for longer link wear life
- Stepped bushing: 60 mm diameter



Construction Exc	avat	or																				
Brand		CAT	*							Kom	atsu						Hita	chi				
Model TRACK GROUP ASSEM	RIV	215	235	312	320	325	330	345	350	PC130	PC200	PC300	PC360	PC400	PC450	PC600	ZX130	ZX200	ZX280	ZX330	ZX450	ZX600
Track Group	во	•	•	•	•	•	_	•	•	-	-	_	_	•	•	•	•	-	-	-	•	•
Assembly	SL	•		•	•	_	•	_	_	•	•	•	•	_	_	_	•	•	•	•	_	_

ROLLER																						
Track Roller	во	•	•	_	•	•	•	•	•	_	-	•	•	•	•	•	•	•	•	•	•	•
Hack Rollel	SL	•	_	•	•	•	•	_	_	•	•	•	•	•	•	_	•	•	•	•	•	_
Carrier Roller	ВО	•	•	-	•	•	•	•	-	_	•	•	-	•	•	-	_	•	•	•	•	-
Carrier Note:	SL	_	•	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_

IDLER AND SPROCKET																						
ldler	во	_	•	_	•	•	•	•	_	_	•	•	•	•	•	_	•	_	•	•	•	_
luler	SL	-	_	_	0	_	_	0		_	_	_	_	_	_	_	0		_	_	_	_
Canadiat	ВО	_	•	•	•	_	_	•	•	_	_	_	_	•	•	_	_	_	•	•	•	_
Sprocket	SL	_	_	•	•	•	•	_	_	•	•	•	0	_	_	_	•	•	•	•	_	_

As of October, 2022

Lieb	herr					Doo	san				Volv	0			Kob	elco				JD						Sany
R906	R916	R926	R934	R954	R956	DX140	DX255	DX300	DX350	DX420	EC140	EC210	EC360	EC480	SK135	SK210	SK330	SK450	SK480	135	180	210	270	350	450	SY240 / SY265
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As of October, 2022

Construction Doz	er																				
Brand		CAT ³	k					Kom	atsu		Lieb	herr				Shar	ntui		JD		
Model		D3	D4	D5H	D6M/N	D7E	D7R	D61	D65	D85	PR712	PR721	PR726	PR734	PR746	SD16	SD22	SD23	650	750	850
TRACK GROUP ASSEM	BLY																				
Track Group	ВО	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Assembly	SL	-	•	0	0	_	_	_	•	-	•	•	_	•	_	_	_	_	_	_	•

ROLLER																					
Track Roller	во	•	•	•	•	•	•	_	•	•	•	•	•	•	_	•	•	•	_	•	•
Hack Notice	SL	•	•	•	•	•	_	_	•	_	•	•	_	•	_	•	_	_	•	•	_
Carrier Roller	ВО	•	•	•	•	•	•	_	•	•	•	•	•	•	•	•	•	•	•	•	•
Carrier Notice	SL	_	_	_	_	_	_	_		_	_	_	_	_	_	_	_	_	_	_	_

IDLER AND SPROCKE	Т																				
Miles	ВО	•	•	•	•	•	•	_	•	_	_	_	-	•	•	_	-	-	_	-	•
Idler	SL	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
	ВО	-	-	_	-	-	•	•	•	•	-	•	-	•	•	•	•	•	-	•	•
Sprocket	SL	_	_	0	0	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_







 $\label{lem:construction} \textbf{Construction dozers in action within different working environments.}$

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26 Introduction of Berco Utility Products 27



Berco Mini Undercarriage:

Innovation for small machines

with huge duties.

Berco Mini Undercarriage segment offers an innovative, reliable and economical set of mini undercarriage solutions for machine classes from 1.5 to 6 ton, Compact Track Loader (CTL), for mini excavators, horizontal drilling machines, small dozers or paving machines. Berco can supply a complete range of interchangeable components for rubber track belts or traditional steel track chains, guaranteeing the best possible value for the users activity.

- Track chains with 90-135 mm pitch
- Traditional steel chains with welded or bolt-on shoes
- (a) Interchangeability from steel to rubber and vice versa
- Clamp-on rubber pads or rubberized shoes available



Quadtrack



Quadtrack

A big change is in progress: conventional wheeled vehicle as back hoe loader has the twin version with a tracked undercarriage. CTL and Agricultural tractors are also expanding the market offer into innovative version adopting a Quadtrack configuration.

CTL

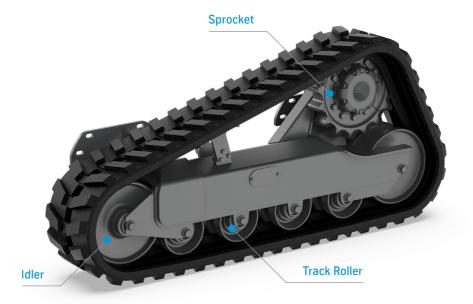
Compact Track Loader

The CTL market is still in its growing phase and the machine versatility makes CTL a very flexible unit for any construction activity and even more now that CTLs are gaining market shares in Ag application as well.

All rollers and idlers are designed and bench tested during the development phase to fit the mission of each single application with extraordinary consistent quality.

Forged parts using Boron steel grade to minimize wear rate and increasing Product durability.

Berco could offer mono-dual-triple flange idler design in order to satisfy operator comfort and reduce detracking effect.



Berco Utility Products 29



Quadtrack

A market transformation, a new technology trend, expanding and tailoring vehicle features for end users needs: this is Quadtrack.

Larger footprint of the UC, compared to standard vehicle configuration, offers unique performance such as better traction and reduced track on ground pressure. Berco decided to play an important role as a key partner for the main OEM players and launched a new dedicated product Line for Quadtrack vehicles.

All rollers and idlers are designed and bench tested during the development phase to fit the mission of this specific application with an extraordinary consistent quality. Rollers and idlers feature extremely high load capacity and are sealed for life, adopting Berco consistent quality metal face seals. Rollers have been developed for vehicles running at 15-20 km/h.



CTL

Berco the reliable partner for CTL solution.

After 20 years since the introduction of the CTL market Berco is still developing complete UC solutions for this high demanding dynamic vehicle.

Berco claims the patent ownership of the "sliding frame", a particular system which allows it to locate the first roller close to the idler thus allowing it to reach higher vehicle stability and higher tipping load.

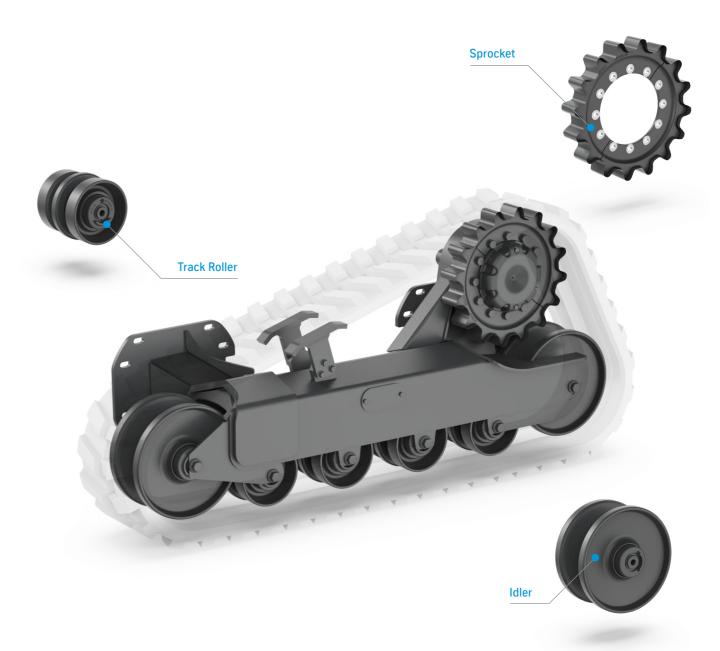
Berco produces more than 3000 CTL rollers per day: roller Reliability&Performance are key factors to prevent premature wear, high temperatures, noise and vibrations.

Berco Smart Bolt displays the temperature of the roller instantaneously with a plug&play system that does not require any particular skills to be mounted.

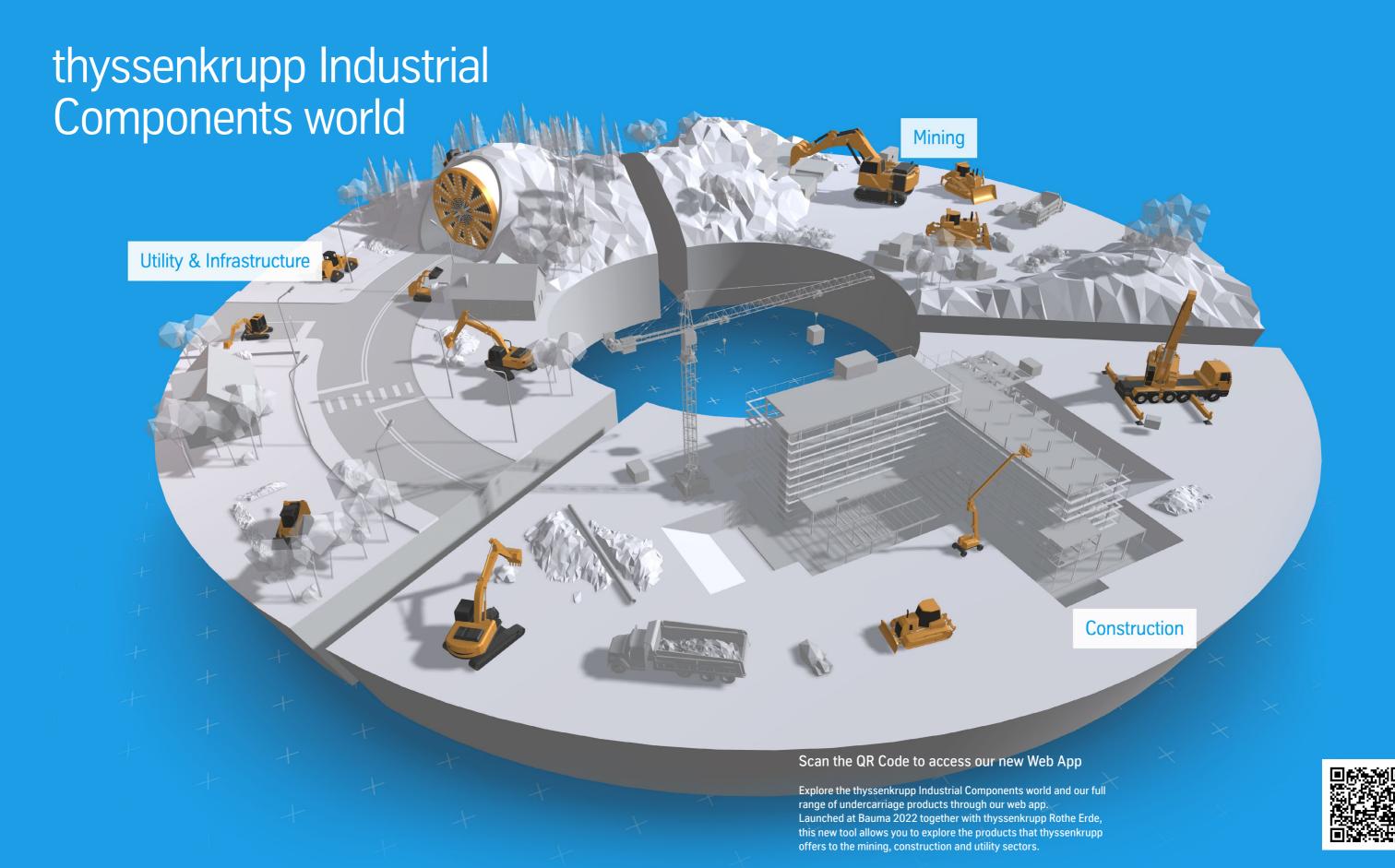
CTL are becoming faster and faster every year, lubricant condition of their rollers is crucial to the correct working state of your machine

Berco has found the key to keeping the lubricant condition monitored with a simple solution combined with the latest generation technology.

With the simple replacement of roller bolts and the installation of a small antenna, a warning signal is emitted if the rollers are about to fail due to the lack of lubricant.



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Forged Technologies

Headquarters thyssenkrupp Thyssenkrupp Allee 1 45143 Essen

Berco S.p.a. - Copparo (IT) Via 1º Maggio, 237 44034 Copparo (Ferrara) - Italy

Berco Aftermarket S.r.I. - Bologna (IT) Via Altabella, 17 40126 Bologna (Bologna) — Italy

info.berco@thyssenkrupp.com www.thyssenkrupp-berco.com