

ADVANCED BEARING SOLUTIONS



Bearings

ITA

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Bearings



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ADVANCED **BEARING** SOLUTIONS



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ADVANCED **BEARING** SOLUTIONS



C.R. COMPANY

C.R. is an Italian company specialized in the project and manufacture of special bearings for different industrial applications and for the internal handling equipment. C.R. was born in 1984 by three founder-members and has always been committed to satisfy the requests of a constantly expanding worldwide market. At present, export covers more than 70% of C.R. production. C.R. manufactures special bearings according to the specific requests of the customers, with exclusive projects; furthermore, C.R. realizes perfectly interchangeable spare parts, following the customer drawings or samples.





Made in Italy



CODOGNO (LO)

50Km far from Milan

The structural dimension of the company (21.000 sq. m covered by a plant of 10.000 sq. m), the know-how due to more than 30 years of experience and the direct contact with customers also after-sale: all this allows C.R. bearings to be successfully used by main worldwide machine and plant manufacturers for the working of steel.

C.R. constantly invests in up-to-date and advanced technologies, and in the specialization of the human resources, considering that research and innovation in solutions are the main issues to focus on, in order to constantly maintain the high level of reliability and quality of the products.

FROM THE HEART OF ITALY, C.R. IS PRESENT WORLDWIDE

C.R. has a strategic geographic position. The company is located in the heart of Northern Italy, very close to the most important motorways and Lombardy airports. C.R. is an international leader in different types of bearings.

The strong specialization in the project and construction of special bearings is C.R. main skill; this allows to fulfill the requirements of plant manufacturers and sophisticated plant builders, with high standard of performance.



ADVANCED **BEARING** SOLUTIONS



C.R. IN THE WORLD

A NETWORK IN EXPANSION

C.R. works on Italian territory with a direct and global cover of the country. C.R. can rely on its own structures and branches in strategic European and Asian countries, being able to satisfy all the requests in the different application fields.

Worldwide, C.R. is present in more than 50 countries with a very extensive structure of agents and specialized distributors, with a network of pre- and post-sale assistance with high technological and quality profile.





CeMAT

C.R. has always been operating in a dynamic and propulsive way, by developing and increasing the presence of its brand in worldwide economic scenery, according to a unitary project finalized to continuous improvement, by taking part to main international trade shows.



AISTech

These events are very important in C.R. management of commercial network, as both C.R. products and C.R. people are directly involved at the same time. The participation to the trade shows is a glance at the future passing through present, among innovation, advanced technologies and sharing of successful experiences.



ADVANCED **BEARING** SOLUTIONS



C.R.: SMART INDUSTRY 4.0

AN ADVANCED MODEL OF PRODUCTION AND MANAGEMENT

C.R. constantly invests in its production capacity both regarding technological innovation and evolution of systems and procedures.

C.R. is ready for the future.

The newest devices recently installed provide the connection between the physical and digital systems, allowing complex analysis through big data, and the continuous control of production in real time, through the planning, monitoring and optimization of the procedures.



The new continuous washing device



The production procedure of C.R. bearings takes place in 9 fundamental steps:

- | | |
|---------------------------|-----------------|
| - Raw material | - Grinding |
| - Cutting of raw material | - Washing |
| - Half-worked material | - Assembling |
| - Turning | - Laser marking |
| - Heat treatment | - Final test |

Furthermore, C.R. pursues concrete aims of environment sustainability: the photovoltaic plant, installed in 2014, supplies more or less 70% of the energy used in the production cycle.

The manufacturing of every C.R. bearing always follows the same fundamental guidelines:

- Selection of highest quality raw material, both carbon steel for core hardening and for stainless steel 420B-420C-440B-440C
- Machining executed on state-of-the-art machines with real time continuous control.
- Advanced heat treatment
- Selective and strict quality tests, in order to guarantee that the products satisfy the highest standard.
- Smart logistic: tracking of the products and monitoring of the installations.



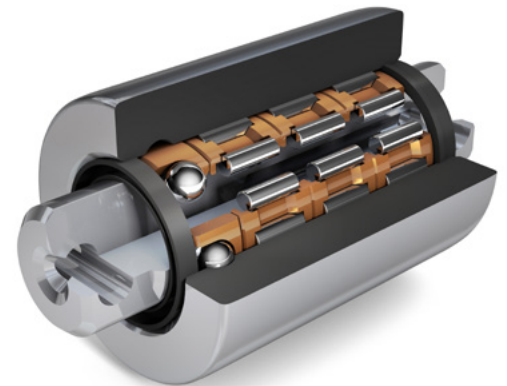
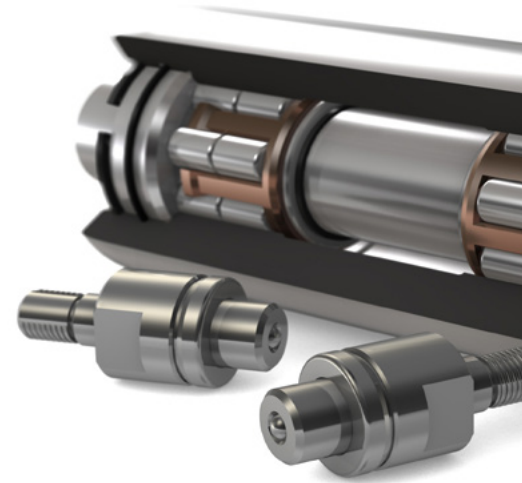
ADVANCED **BEARING** SOLUTIONS

C.R. PRODUCTS

A COMPLETE AND SPECIFIC RANGE
FOR EVERY APPLICATION

C.R. offers a complete range of roller bearings, both standard and custom-made, suitable to work in heavy duty condition, such as contaminated and subject to high vibrations environments.

C.R. is structured to obtain the maximum flexibility and the full possibility to customize the bearings, and guarantees not only the realization of the specific project, but the creation of advanced and performing solutions that can increase the productivity of the machines where they are fixed in.



Back-up bearing with shaft with ball groove



ADVANCED SOLUTIONS FOR STEEL FIELD

C.R. develops unique products and projects related to bearings used in the machining of steel.

Among these, **the back-up bearing with shaft with ball groove** (special project of C.R.) allows to bear axial thrust and at the same time to give more space to rolling elements (rollers or cylindrical roller cages), which allows to reach maximum bearing levels in relation to the radial loads.

The production range includes also:

- Back-up bearings for levelers and tension levelers
- Multiroll bearings for the shoulder of cold/hot steel mills
- Shoulder bearings for Sendzimir steel mills
- Bearing for sinter plants
- Back-up bearings for coil conveyor chains

BEARINGS AND RAILS FOR HANDLING FIELD

C.R. manufactures cylindrical or ball bearings, both according to designs and standard types, for the handling field (mainly for fork lift truck manufacturers), textile industry, robotics, and for automatic palletization.

- Combined bearings of different types
- Chain pulleys
- Ball bearings for fork lift masts
- NUTR, NUKR, NNTR and shoulder bearings
- Rail guides



ADVANCED BEARING SOLUTIONS

Certificato N°

Cliente: C. R. S.r.l.
D.B.T.: C. R. S.r.l.
Codice: 902-4534
Descrizione: PERNO
Lotto: 2011/01
Operatore:

del:
Q.tà: 01/03/2011
del:

Durezza Superficiale:
Durezza a Cuore:

Note: PROVA TAF PUNTA
PROFLO DI DUREZZA

Profondità (mm)

Profondità efficace: 5.10 mm

Ø	SP	ØMC	ØSM	ØV	ØFC
0.100	0.20	0.40	0.60	0.80	1.00
0.200	0.40	0.80	1.20	1.60	2.00
0.300	0.60	1.20	1.80	2.40	3.00
0.400	0.80	1.60	2.40	3.20	4.00
0.500	1.00	2.00	3.00	4.00	5.00
0.600	1.20	2.40	3.60	4.80	6.00
0.700	1.40	2.80	4.20	5.60	7.00
0.800	1.60	3.20	4.80	6.40	8.00
0.900	1.80	3.60	5.40	7.20	9.00
1.000	2.00	4.00	6.00	8.00	10.00
1.500	3.00	6.00	9.00	12.00	15.00
2.000	4.00	8.00	12.00	16.00	20.00

Testamento e Garanzia erogati in conformità alle normative DIN e ISO.

QA/105 **Firma**

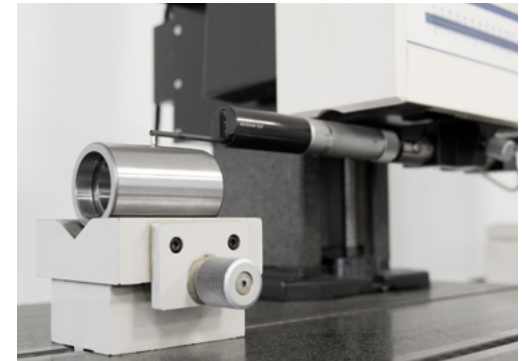


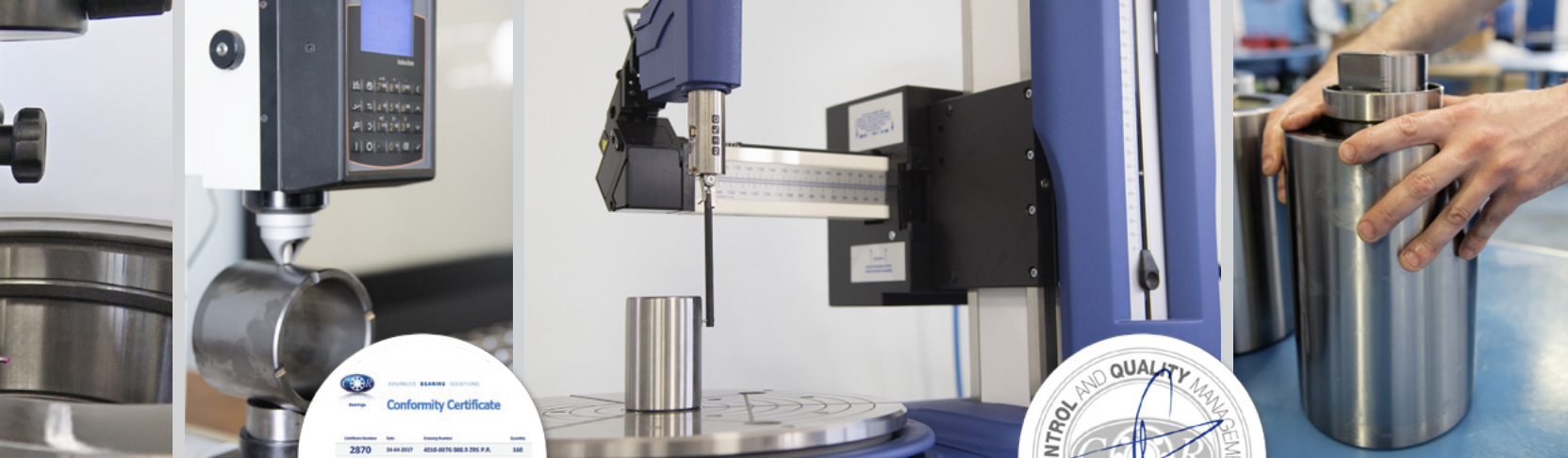
C.R. QUALITY

ITALIAN QUALITY
IN INTERNATIONAL EXPERIENCE

C.R. constantly invests in the improvement of total quality, by researching the most advanced solutions that can lead to real increase of the efficiency and reliability of the products.

The use and implementation of last generation equipment and machinery, along with new instruments and procedures for more specific and selective tests, represent the best and most effective guarantee on the quality of C.R. products.





CONTROL OF RAW MATERIAL – the types of steel used for C.R. bearings are supplied by selected suppliers. The laboratory executes an additional sample test in order to confirm the chemical structure of the steel, and verifies the basic characteristics and the absence of defects.

CONTROL OF TURNED PARTS – once the turning phase is finished, all the parts are checked in quality department to test the conformity to the treatment. The main dimensions are measured with regularly calibrated instruments and then recorded for next machining.

CONTROL OF HEAT TREATMENT – once the pieces are heat treated, they are checked again to verify the conformity and precision, and the uniformity of the hardness obtained by the treatment. The basic measurements are made by using Rockwell method. The pieces can be tested by Vickers method as well.

CONTROL OF GRINDING OUTPUT – any single grinded part undergoes an additional control both during and after rectification process. The dimensions, surface finish and shape defects are checked with high precision up-to-date instruments. Dye-penetrants test is effected in order to detect any crack in the material.

TRACKING OF THE PRODUCTS – a laser marking allows to track all the products, which are identified by their own reference number and the information regarding production lot.

ASSEMBLING AND FINAL TEST – once the products are assembled, they undergo a final test that checks the total conformity. Apart from dimensional control, all the necessary verifications to guarantee the correct performance of the product according to the specific requirements are executed.



ADVANCED **BEARING** SOLUTIONS



C.R. CUSTOMER

THE BEST SOLUTIONS ARISE FROM REAL NEEDS

C.R., on the basis of its experience in the field of cylindrical roller bearings, supports the customers with advanced projects, advanced technologies, strategic support services and also on-site assistance.

C.R. operates with a dynamic and proactive global vision, supporting the customers during the engineering of the bearings, aiming at optimizing the performances for the whole lifetime of the product.





THE INNOVATION PROCESS ARISES
FROM THE CONTINUOUS AND CONSTANT SHARE
OF SKILLS AND EXPERIENCES

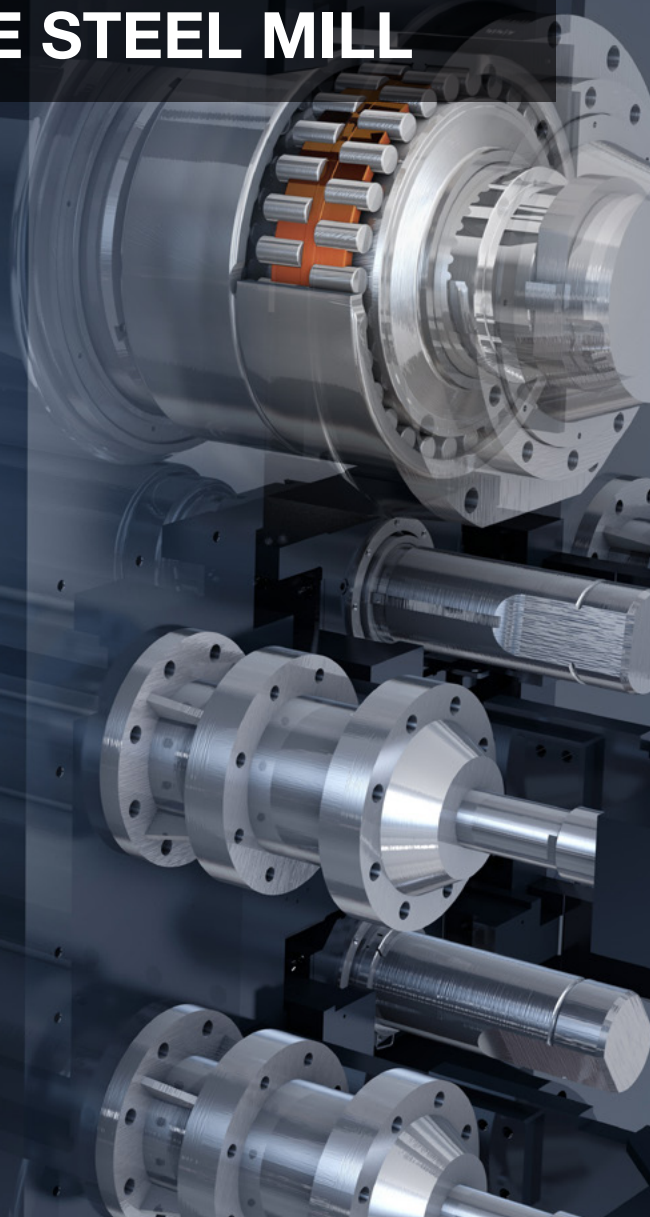
C.R. has always been particularly committed in having a direct contact with the customer, in order to create and consolidate advanced partnership that aim to mutual competitive and durable advantages. C.R. availability to this remains unchanged: either the meeting takes place in its production plant, where the customers can get to know both C.R. staff and technological procedures, or directly in the customers' seats, where any particular requirement or critical issue can be analyzed.



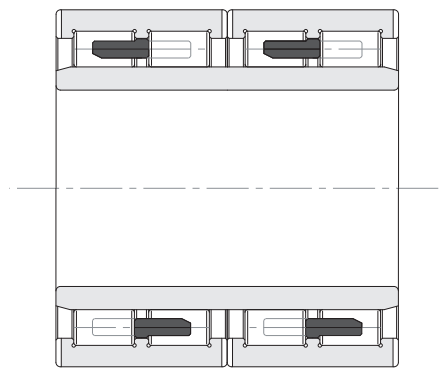
TRACKING
OF THE PRODUCTS

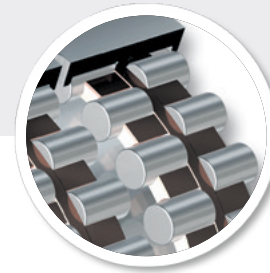
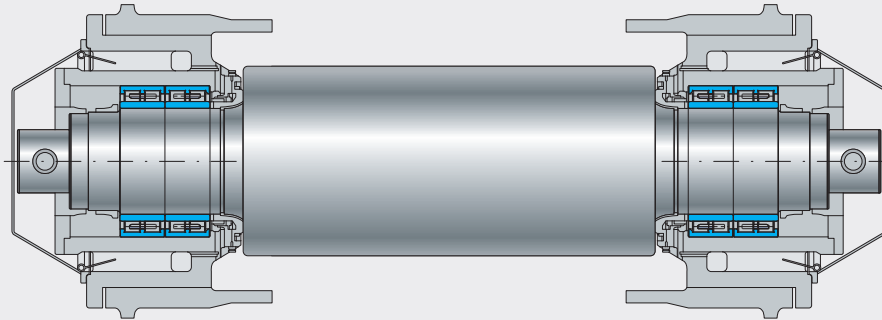
C.R. guarantees the complete tracking of its products, thanks to a new system of laser marking. The information related to manufacturer, item code and production lot, along with the specific documentations in C.R. records guarantee at any time the analysis and detailed control of the material and the production procedures related to the specific product.

THE STEEL MILL



MULTIROLL
FOUR-ROW ROLLER BEARING



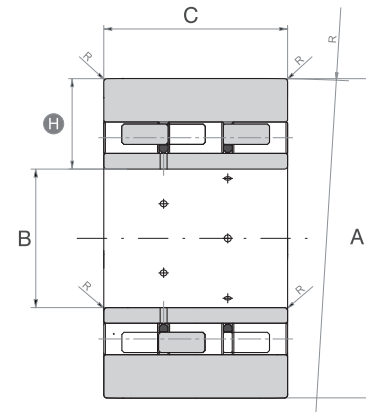
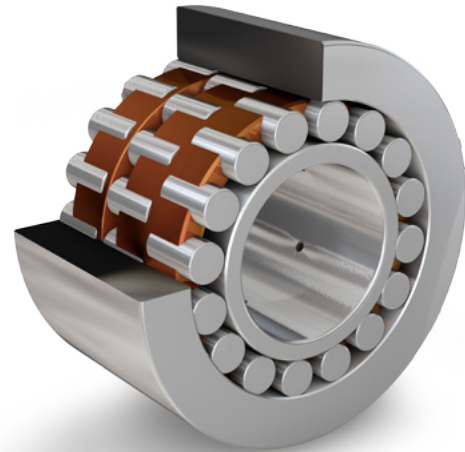


Four-row cylindrical roller bearings are generally used on the neck of milling cylinders, of calenders and rolling presses. They are particularly suitable on high speed steel mills. Thanks to the high quality of rolling raceways, the radial load capacity is extremely high. Four- row cylindrical roller bearings are demountable, that is to say, the outer ring and the cages form a unique body named "R" and can be fixed independently from the inner ring, named "L".

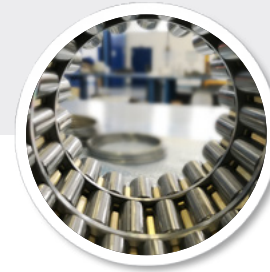
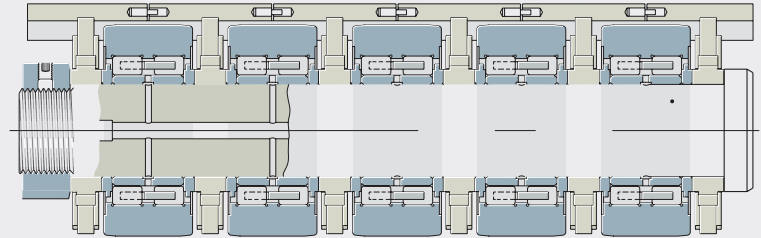
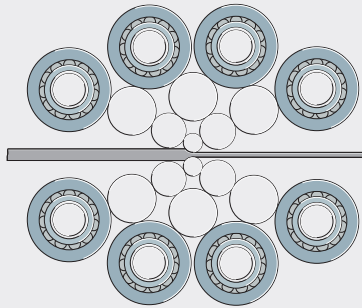
This makes the assembling and the maintenance of milling plant easier. This series of bearings is available with different executions, according to specifications, application and maintenance. They differ from each other in the shape and in the number of parts that build the whole.

SENDZIMIR STEEL MILL

SENDZIMIR BACK-UP ROLLER WITH TWO/THREE/FOUR ROWS OF ROLLERS



H HEIGHT SECTION "H" IN MEASURING POSITION



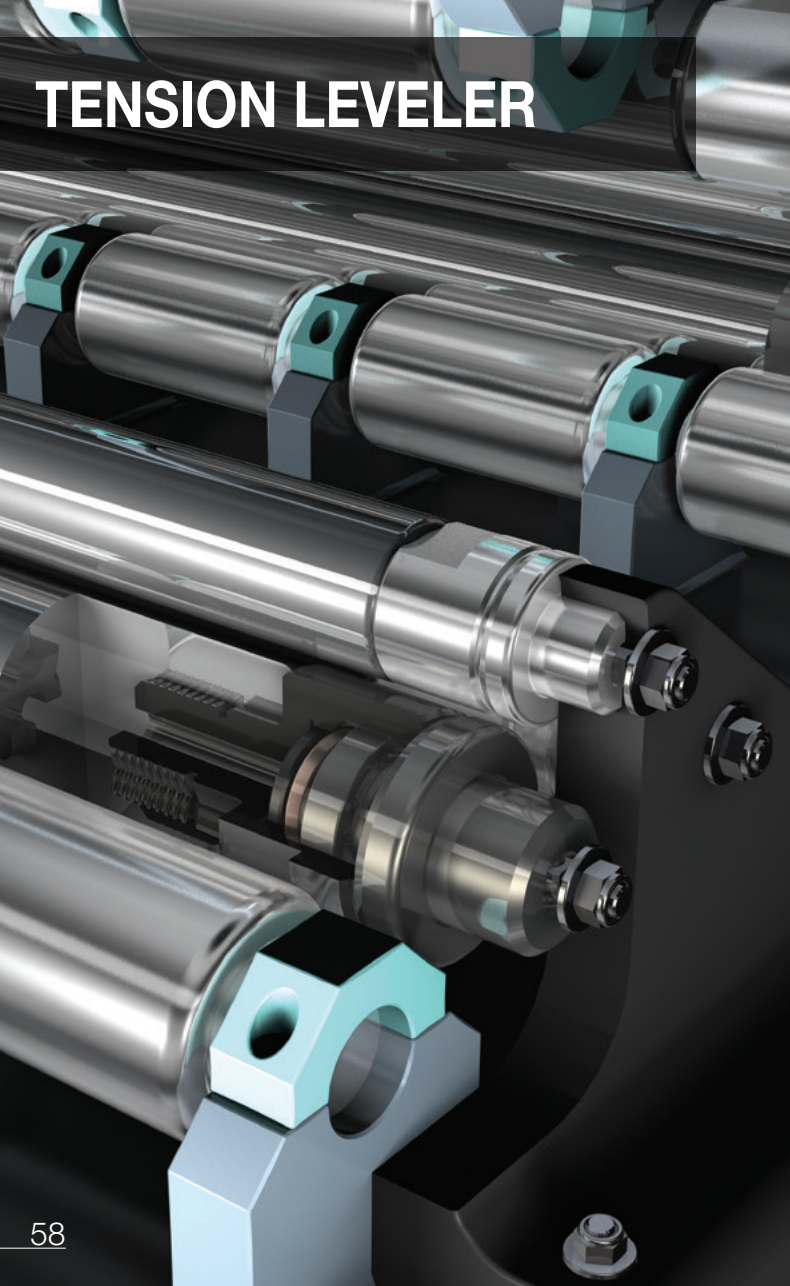
Shoulder bearings have been projected on purpose for Sendzimir cold steel mills: they can be used also in straightening or flattening machines. Shoulder bearings show different shapes in construction, in order to fulfill several application requirements. Cylindrical roller shoulder bearings can have up to 4 rows of rollers, with cages or without cages. They have the advantage of having a simple shape and a high radial load capacity. Some series are manufactured with entire edges obtained on the outer ring, other series

are without entire parts, with distance rings and lateral thrust rings. The material used for the production of the outer ring can be of two types, according to the requests of the customer

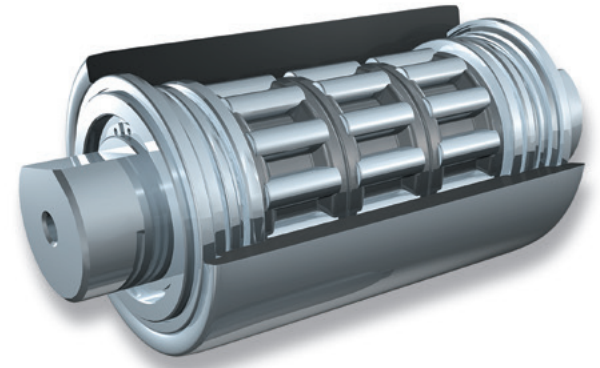
- 100CrMo7.3 with core hardening,
- 18NiCrMo5 with 3,5 mm cementation depth,

with extreme precision in the working tolerances, radial clearance, hardness and load capacity.

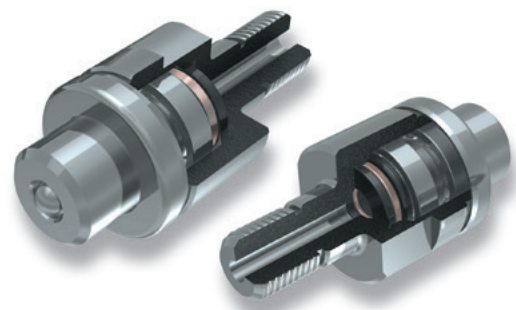
TENSION LEVELER

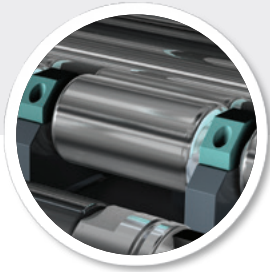
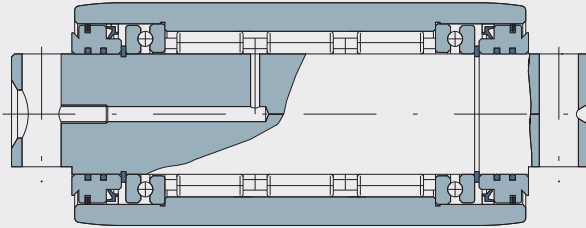


BACK-UP ROLLER WITH CYLINDRICAL ROLLER



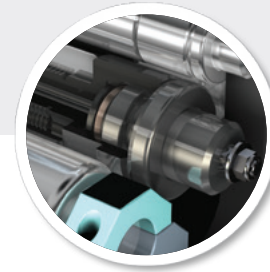
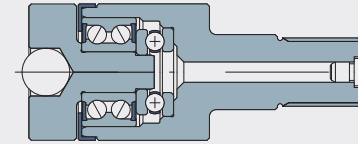
THRUST BEARING FOR WORK ROLL





TENSION LEVELER BACK-UP ROLL

The bearings for tension leveler machine are considered back-up bearings. If compared to the ones used in the flattening machines, these back-up bearings must bear very high speed. They are manufactured with radial and axial cages in a lot of typologies and executions. C.R. guarantees the perfect interchangeability with the original bearings, always searching to improve their design and consequently their performance.



THRUST BEARING FOR WORK ROLL

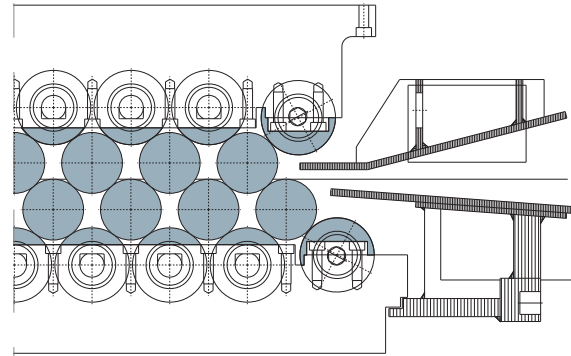
The axial thrust bearings used on the necks of the work rolls in tension levelers, are tightened on the sides in the threaded holes, which are located in their due seats.

These particular bearings bear both axial load during the working of the sheet, transmitted by leveling work rolls (thanks to an axial ball), and radial load generated by the yield of the sheet (thanks to roller/needle cages).

STRAIGHTENERS OR STEEL LEVELERS

IN THE HEART OF STEEL LEVELER

The heart of the leveler is represented by the structures, the bridge – and in the heart of the machine – **by the back-up rollers in the bank (cassette)**. A steel leveler that can process harder and more resistant materials is based on the leveling work rolls, which take advantage of the high and consistent support given by the back-up bearings. Old machinery used to adopt simple shells with internal oscillating bearings, which - in the long terms - “climbed” on the work rolls, and caused serious failures in the bank.



Suitable and reliable back-up rollers to rely on, allow to obtain at least 40% of optimized leveling.

In order to get more effect on the leveling, we should take into consideration:

- 1) alignment of the supporting structures for all back-up rollers;
- 2) calibration of back-up rollers for the correct support on the leveling work rolls;
- 3) correct calibration of the group of work rolls with all the supports;
- 4) reliability and efficiency and quality of the material of the components.

CASSETTE OF THE LEVELER

CONTRAST ROLL

1

2

3

4

5

BACK-UP ROLL WITH PIVOT



DOUBLE BACK-UP ROLL WITH PIVOT



SINGLE CYLINDRICAL ROLLER BACK-UP ROLL



SINGLE TAPERED ROLLER BACK-UP ROLL



SINGLE SPHERICAL ROLLER BACK-UP ROLL



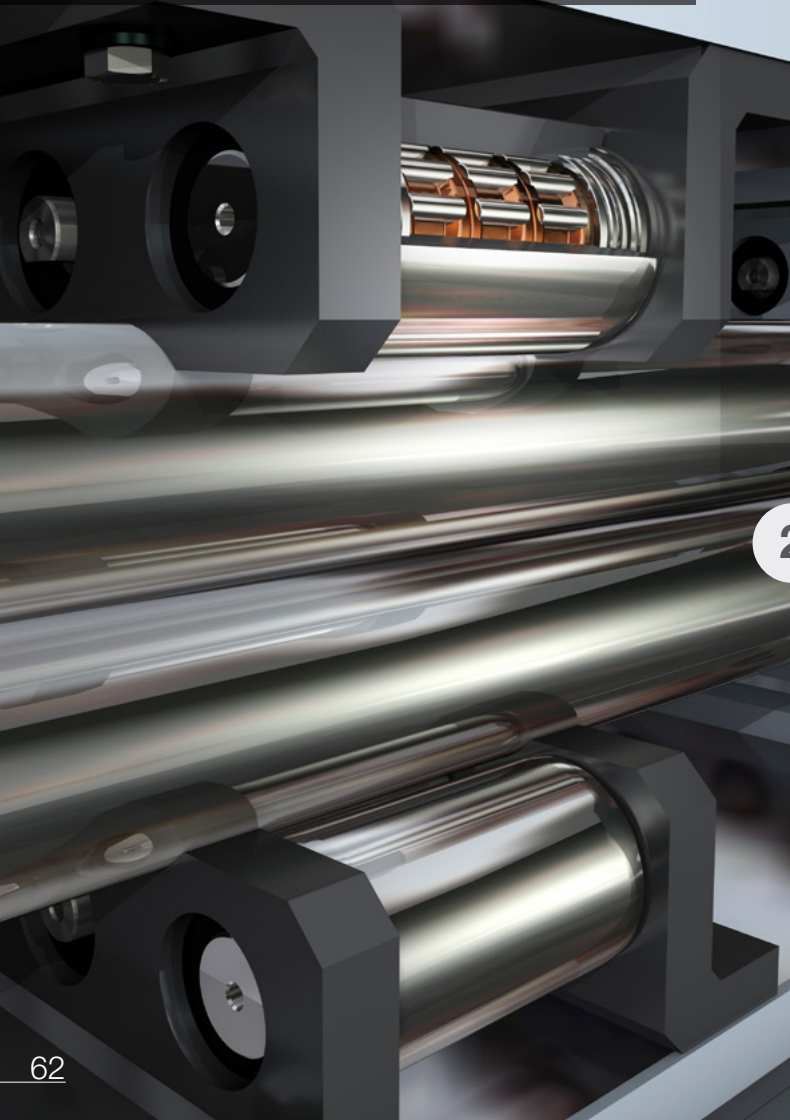
Leveler and straightener machines can be provided with five typologies of back-up rolls. C.R. manufactures all these typologies with the required technical features.

The back-up rolls for leveler and straighteners machines are very resistant to the applied loads and have a perfect combination between the tangent force and the grease tightness.

The metal flattening machines are manufactured with the possibility to quickly remove the cassette (work rolls and back-up rollers).

During maintenance phase, it is possible to insert the spare cassette so that the cost of the stop of the machine is dramatically reduced. C.R. in accordance with service centers, can foresee the complete or partial revision of the back-up rollers, once verified the condition of them.

STRAIGHTENERS OR STEEL LEVELERS



1

BACK-UP ROLL WITH PIVOT



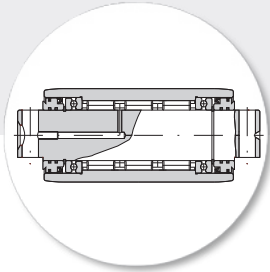
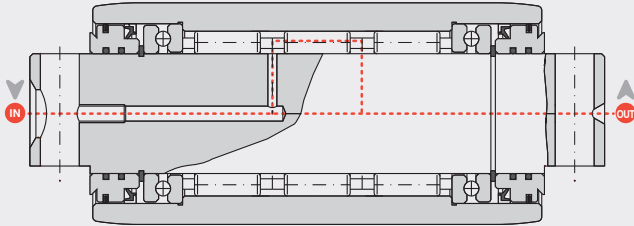
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DOUBLE BACK-UP ROLL WITH PIVOT





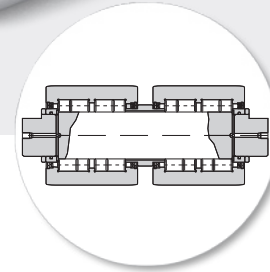
LUBRICATION SYSTEM



Back-up rollers for metal flattening machines are made in two different executions:

- full complement of cylindrical rollers
- with roller cages in molded steel or bronze.

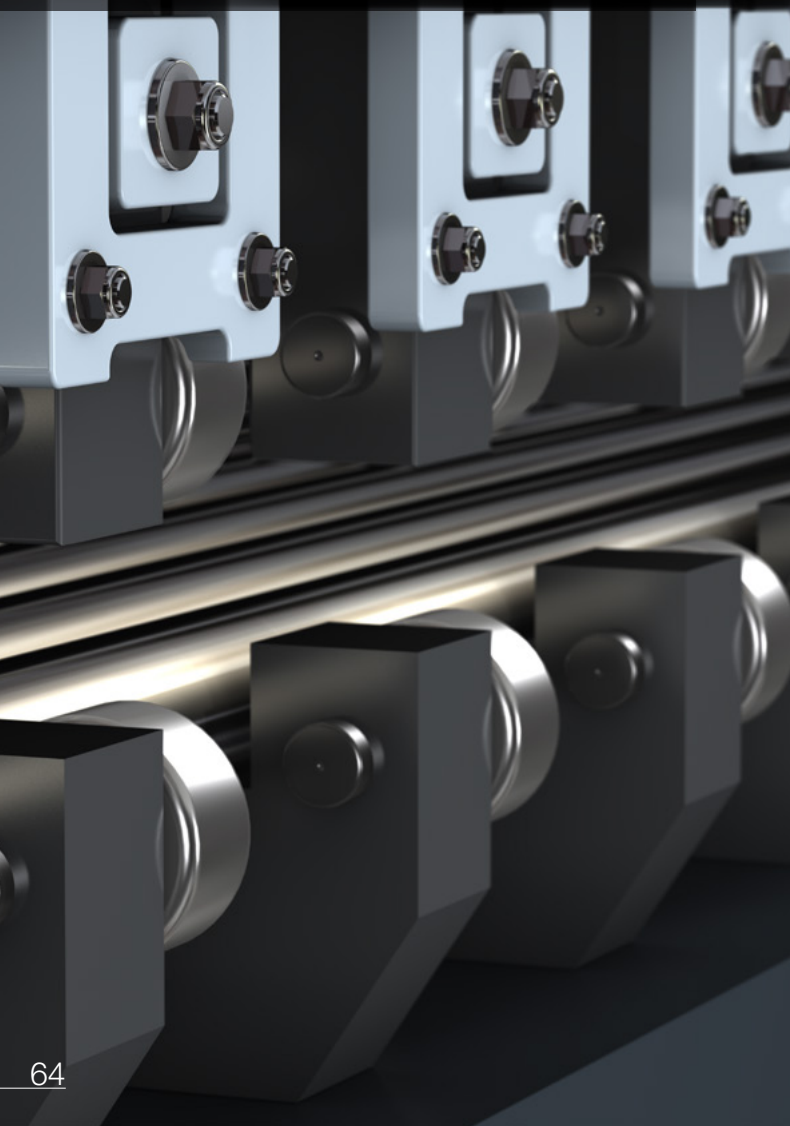
The full complement execution allows the bearing to reach a high load capacity both dynamic and static. The wide working surface, along with the rolling system, made of two or more cages, allow the machine to reach very high leveling performance and high speed.



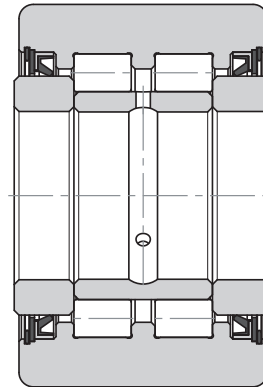
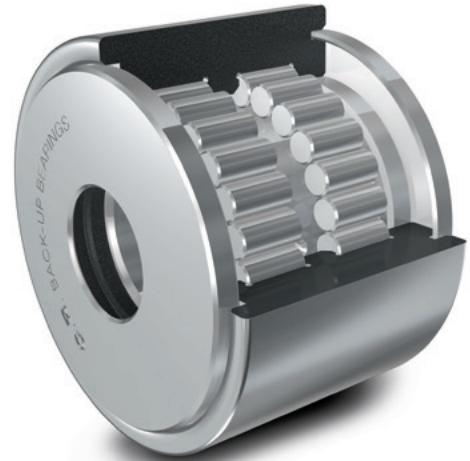
The distance rings, which are entirely obtained on the outer ring and shaft, and the radial clearance calculated at the minimum, allow a good support of the axial load. The execution with roller cages represents the best project in the series of back-up rollers, usually manufactured with two lateral thrust bearings in the inner body, either with balls or rollers, which guarantee a very strong support of axial loads.

STRAIGHTENERS OR STEEL LEVELERS

3

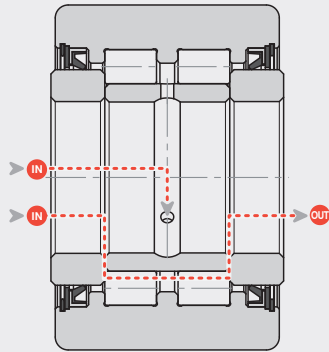


SINGLE CYLINDRICAL ROLLER BACK-UP ROLL



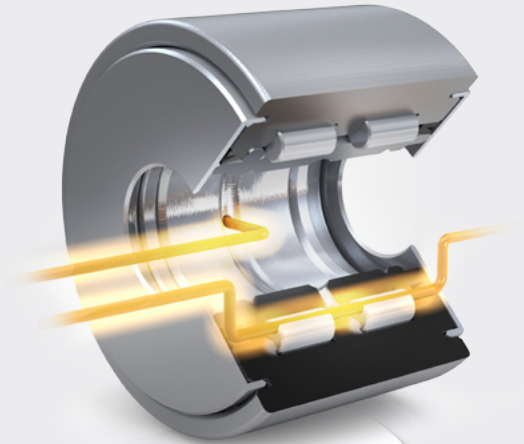


LUBRICATION SYSTEM



WITH STEEL SHEET
OR RUBBER SEAL

The series of back-up rollers without pivot is manufactured with two or more full-complement-cylindrical-roller rows: they are separated by spacers obtained entirely on the outer ring.



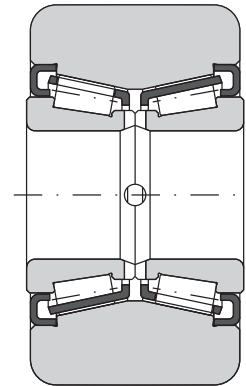
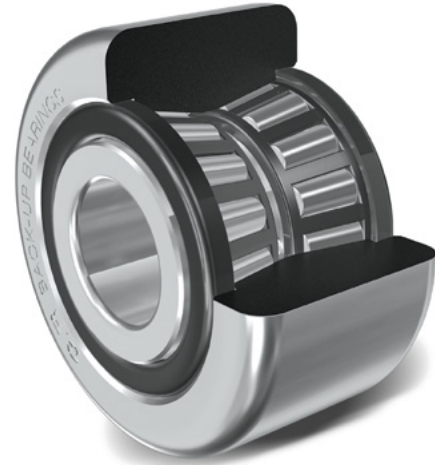
WITH LUBRICATION
HOLE OR LIFETIME
LUBRICATED

These bearings are particularly used on machines that work continuously and in extremely tough conditions, because of their high dynamic and static load capacity. The spacers between the rolling raceways guarantee the bearing of axial thrust.

STRAIGHTENERS OR STEEL LEVELERS

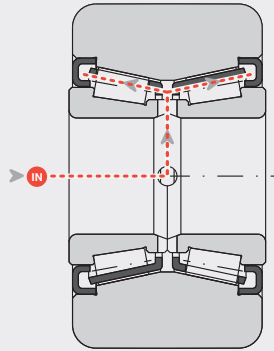
4

SINGLE TAPERED ROLLER BACK-UP ROLL





LUBRICATION SYSTEM

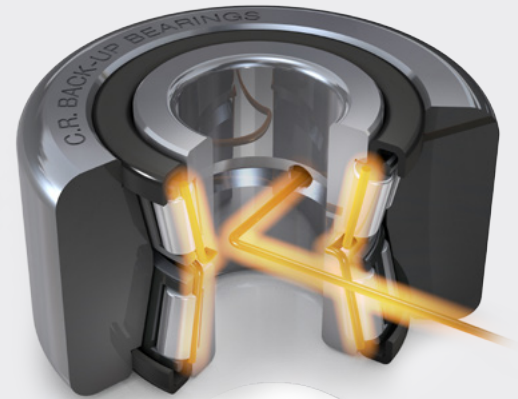


WITH STEEL SHEET
OR RUBBER SEAL

Tapered roller back-up bearings in inch dimensions are mounted on sheet metal leveling machines operating under very heavy working conditions.

Their design is suitable to bear big axial loads together with big radial loads.

They are supplied for complete units ready for the assembling and produced in normal precision class.



WITH
LUBRICATION HOLE

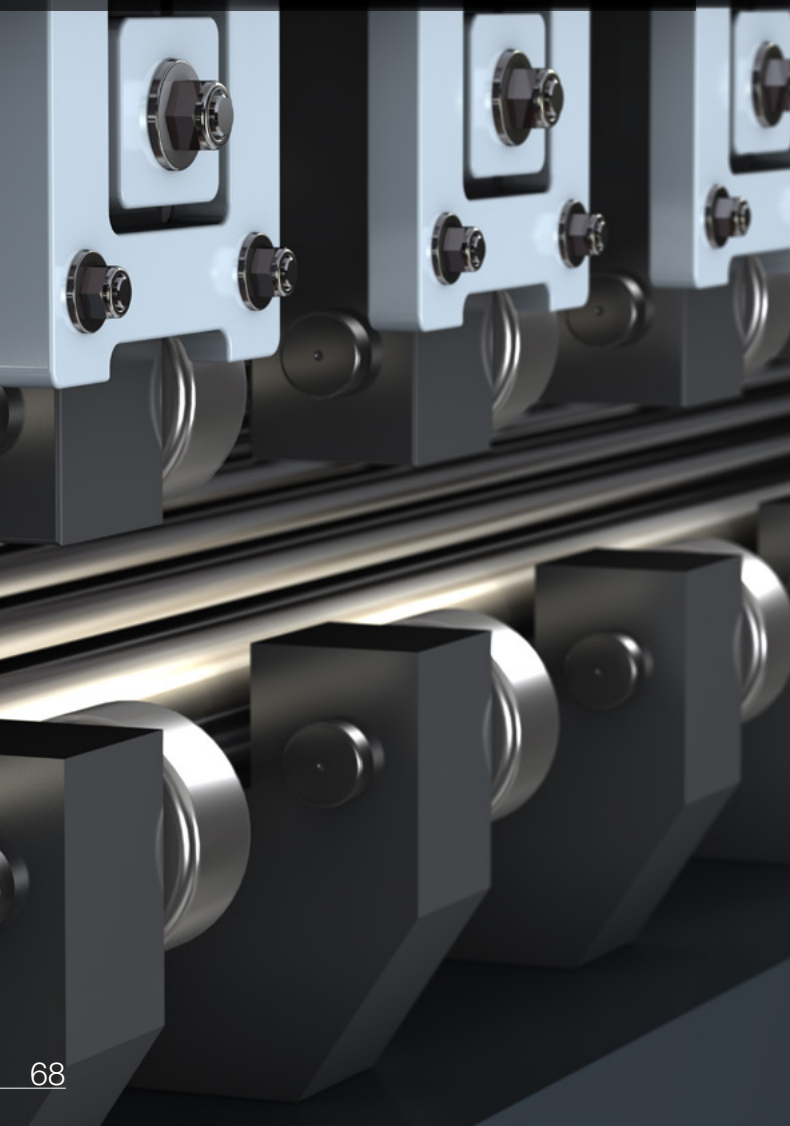
On request, the outer diameter can be manufactured with cambered or cylindrical shape.

Considering the working conditions, the sealing system is designed with rubber seals or with steel rings.

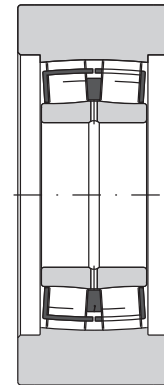
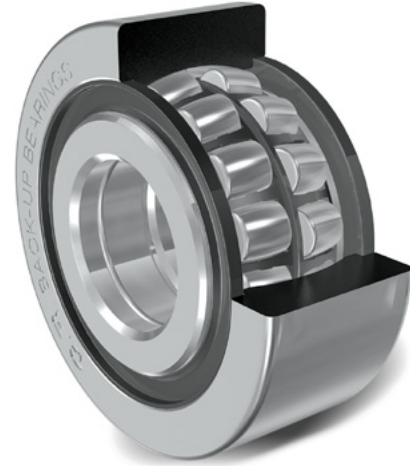
C.R. tapered roller back-up bearings are designed to allow a fast maintenance procedure both of the back-up and the whole cassette.

STRAIGHTENERS OR STEEL LEVELERS

5

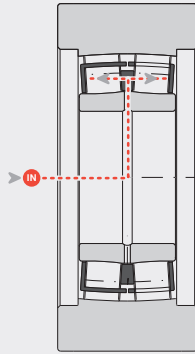


SINGLE SPHERICAL ROLLER BACK-UP ROLL





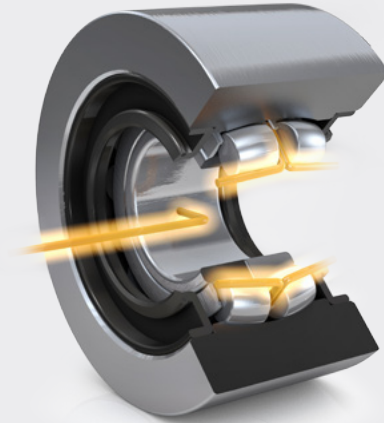
LUBRICATION SYSTEM



WITH STEEL SHEET
OR RUBBER SEAL

The spherical roller bearings (execution in mm or inches) are used on metal flattening machines in rare cases.

This type of bearing can adapt, during the working phase, thanks to its oscillations, to the possible coupling irregularities between work roll and back-up bearing.



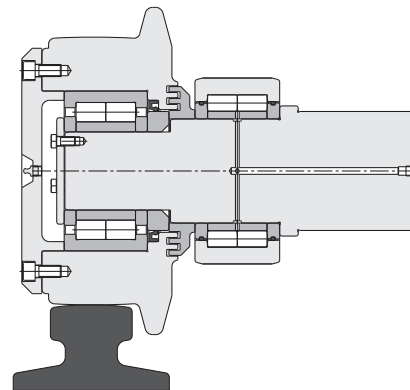
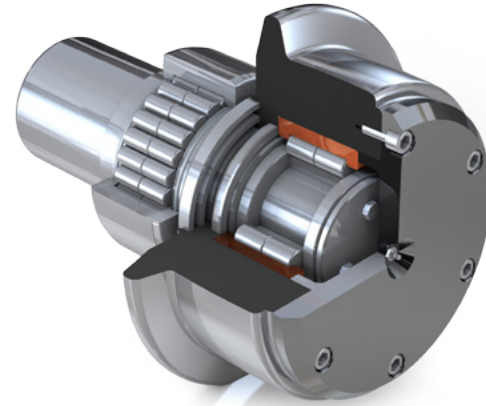
WITH LUBRICATION
HOLE OR LIFETIME
LUBRICATED

The characteristic of being orientable allows the bearings to bear high loads, both axial and radial. After the customer's request, C.R. evaluates the possibility of manufacturing the pieces, by considering the quantity and the dimensions.

SINTERING PLANTS



WHEELS AND PRESSURE ROLLS





C.R. has developed a series of bearings suitable to work under extremely heavy and difficult conditions. The sintering line is one of the main strategic issues in the steel plants, as the line that carries the ferrous material never stops.

The load applied is very high, dust and high temperature contribute to determine the worst possible working condition.

Both the outer ring and the inner ring of the bearings are made in 100CrMo7 core hardened steel. FKM

(Viton) seals are inserted in the sides, in order to prevent dust to enter the roller and this increases the lifetime of the bearings.

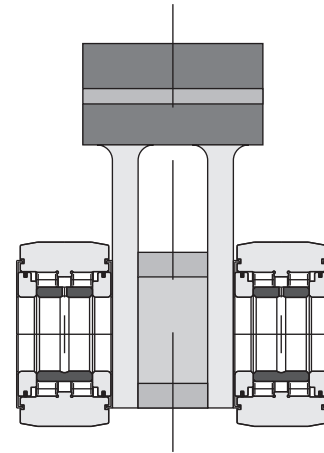
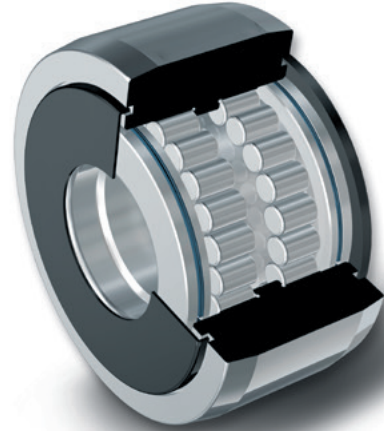
The rings undergo bainitic tempering treatment. The choice of the lubricant and its quantity are very important.

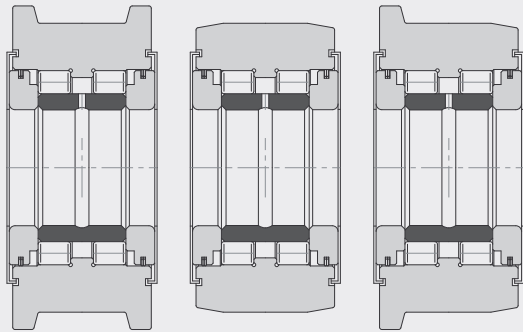
This is the reason why C.R. uses special lithium soap greases, specifically used in cases of very high pressure.

COIL CONVEYORS



COIL CONVEYOR WHEELS





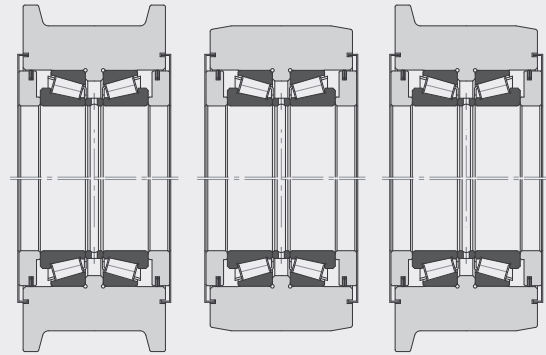
CYLINDRICAL ROLLER EXECUTION



Series of rollers with different profiles of the outer ring have been developed for various applications in the field of steel industry.

They are mainly used as support bearings in conveyor belts for coils.

The execution with tapered rollers is particularly suitable in case of high radial loads and strong axial



TAPERED ROLLER EXECUTION

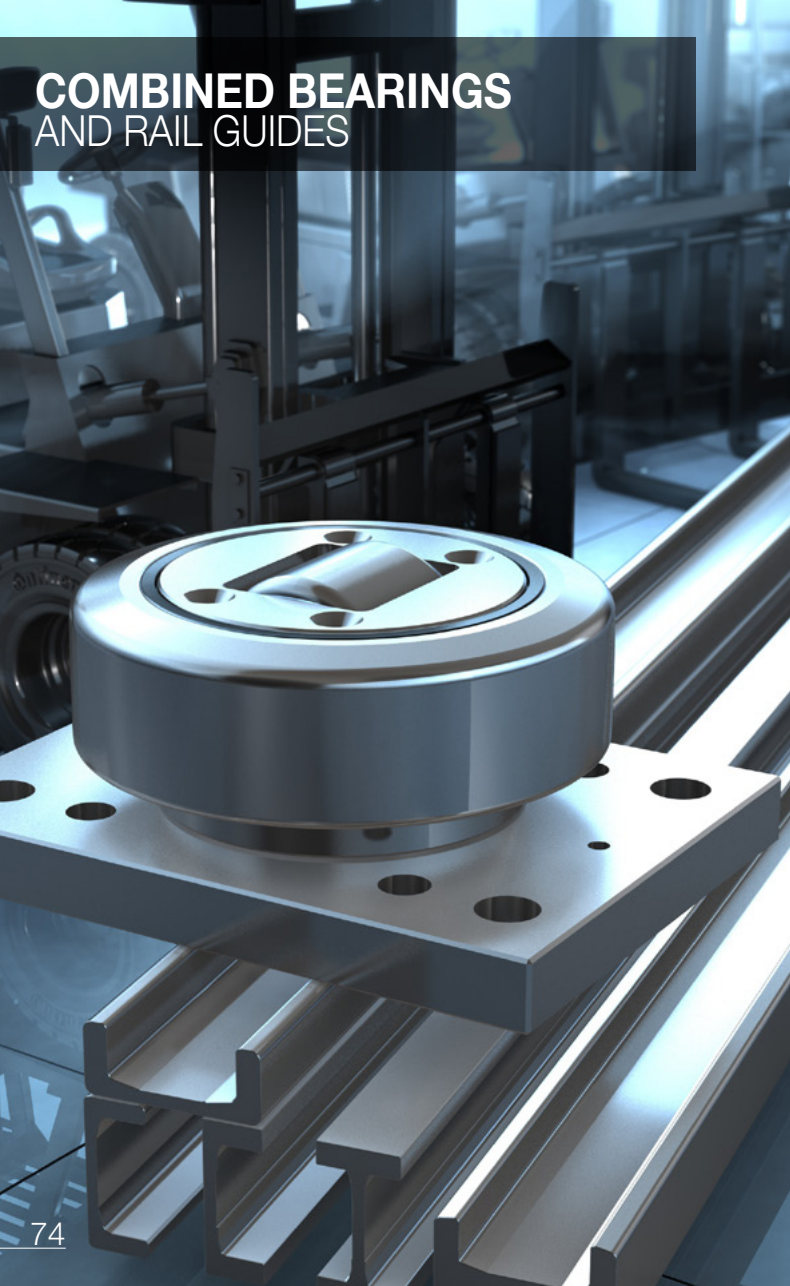


thrust, which are due to the shape and the length of the belt.

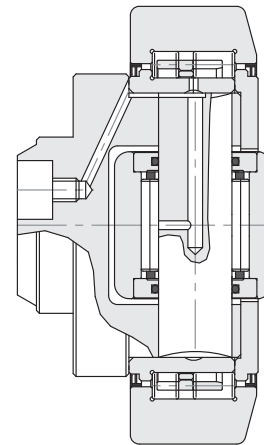
As the path of transportation is not linear, variations of directions of the applied load should be foreseen.

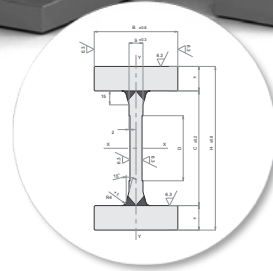
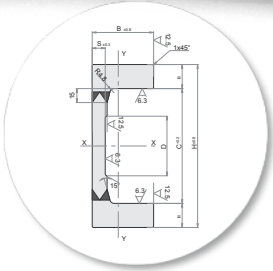
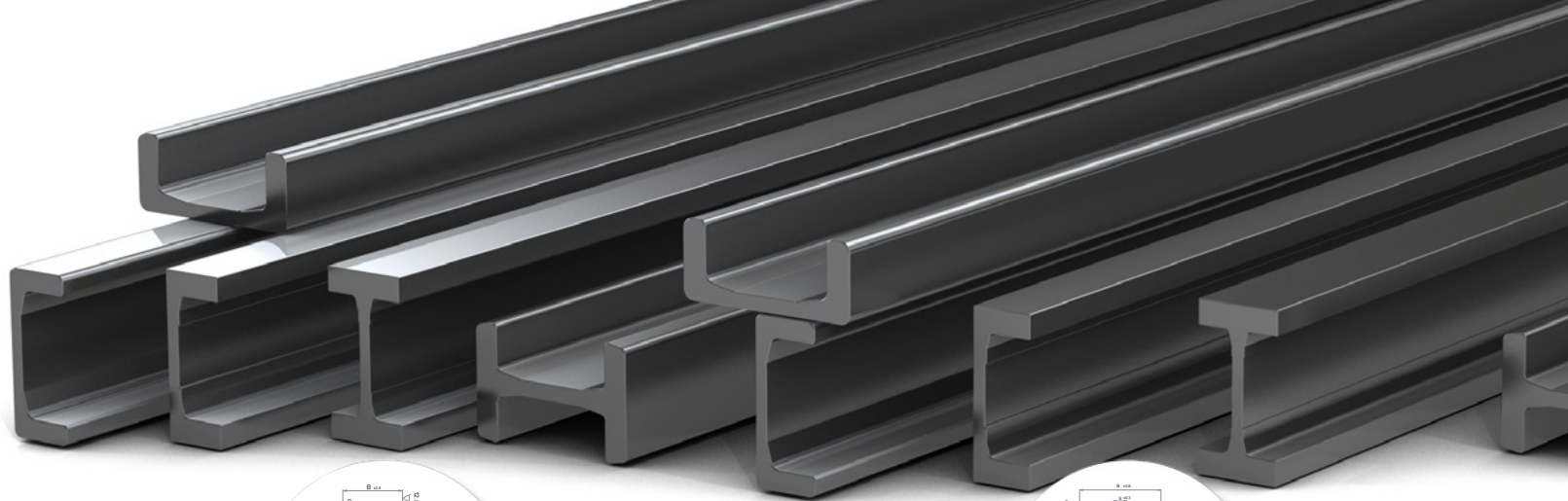
These tapered roller bearings are fixed in pre-loaded groups and adjusted through central distance ring.

COMBINED BEARINGS AND RAIL GUIDES



COMBINED BEARINGS





In 1984 C.R. production was basically addressed to manufacturers of fork lifts, transpallets and palletization equipment, with products that later would change the lateral rolling system.

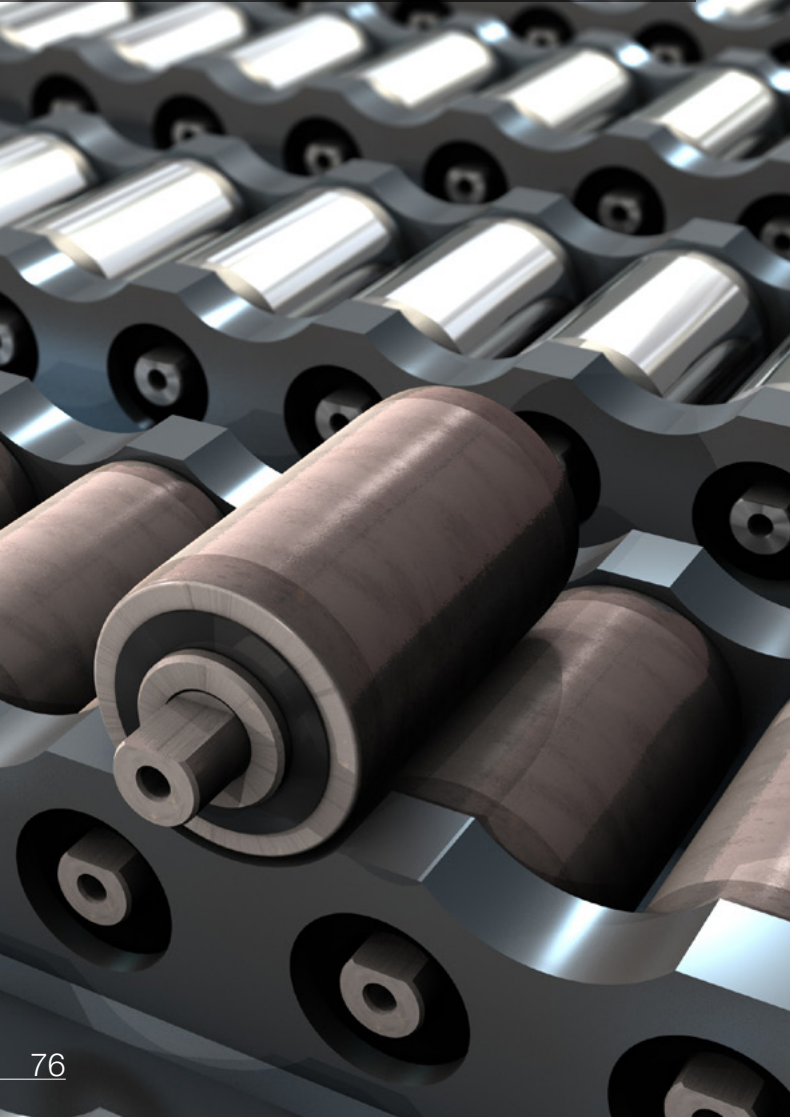
Combined bearings were the first type of bearings to be manufactured and put on the market.

Later, C.R. improved its production range by manufacturing chain pulleys.

At present C.R. provides full service, commercializing also medium and large size rail guides, both milled and extruded.

C.R. rail guides allow to satisfy most of the technical requirement for specific projects and the manufacturing of machines and equipment for the handling of commodities.

REVISION AND REVAMPING OF BACK-UP ROLLERS AND CASSETTES



BACK-UP ROLLERS



The correct maintenance of the bank in the leveler is vital for the lifetime of the parts and their wear, in addition to the quality of the material that is processed without fails. In the leveler, which is the heart of the cross-cutting lines, both leveling work rolls, and intermediate rolls and back-up bearings must fulfill the highest standard of reliability: the choice of poor and/or second best material will lead to achieve worse results than market expectations.

AFTER GRINDING

BEFORE GRINDING



Back-up rollers projected in accordance with best practice (type of material, hardness, failure and yield of material itself) lead to increase the lifetime of a leveler bank.

In order to obtain a perfectly precise surface and high precision, the banks should be checked, revamped or replaced every 6/7 months.

C.R. offers – in agreement with its customers – the possibility to re-use the back-up rollers that have already worked, by means of a procedure of revision

and revamping of the back-up rollers and the whole cassette. After a careful check of wear conditions, C.R. plans the operations for the revision of the back-up bearing, which is taken back to its normal working condition.

C.R. generally re-grinds the outer shell, and in specific cases, the roller and the side seals are replaced as well. The back-up bearings are then re-lubricated, assembled and tested.







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