

RKB TAPER ROLLER BEARINGS ASSY

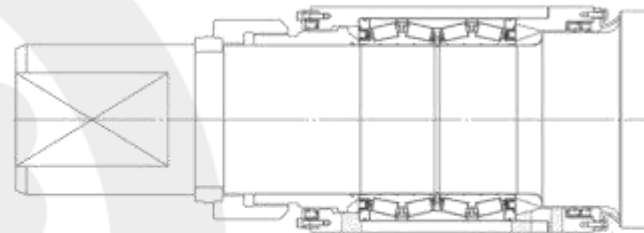
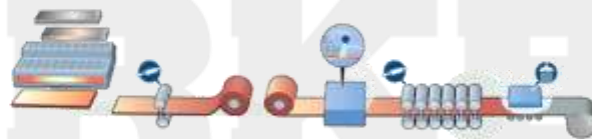
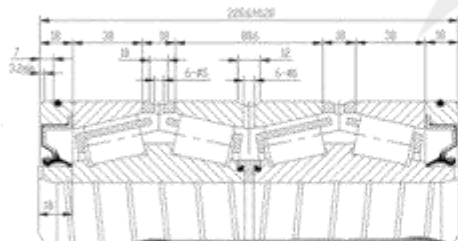


RKB EXECUTIVE HEADQUARTERS AND
TECHNOLOGICAL CENTER - BALERNA (SWITZERLAND)

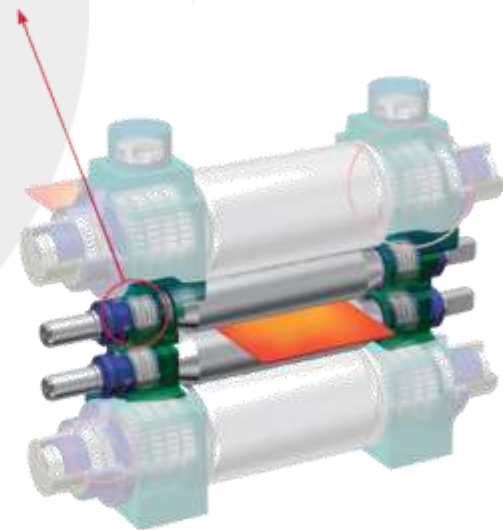
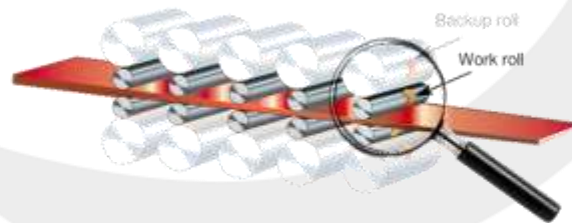


Engineered in Switzerland
Technological Bearings

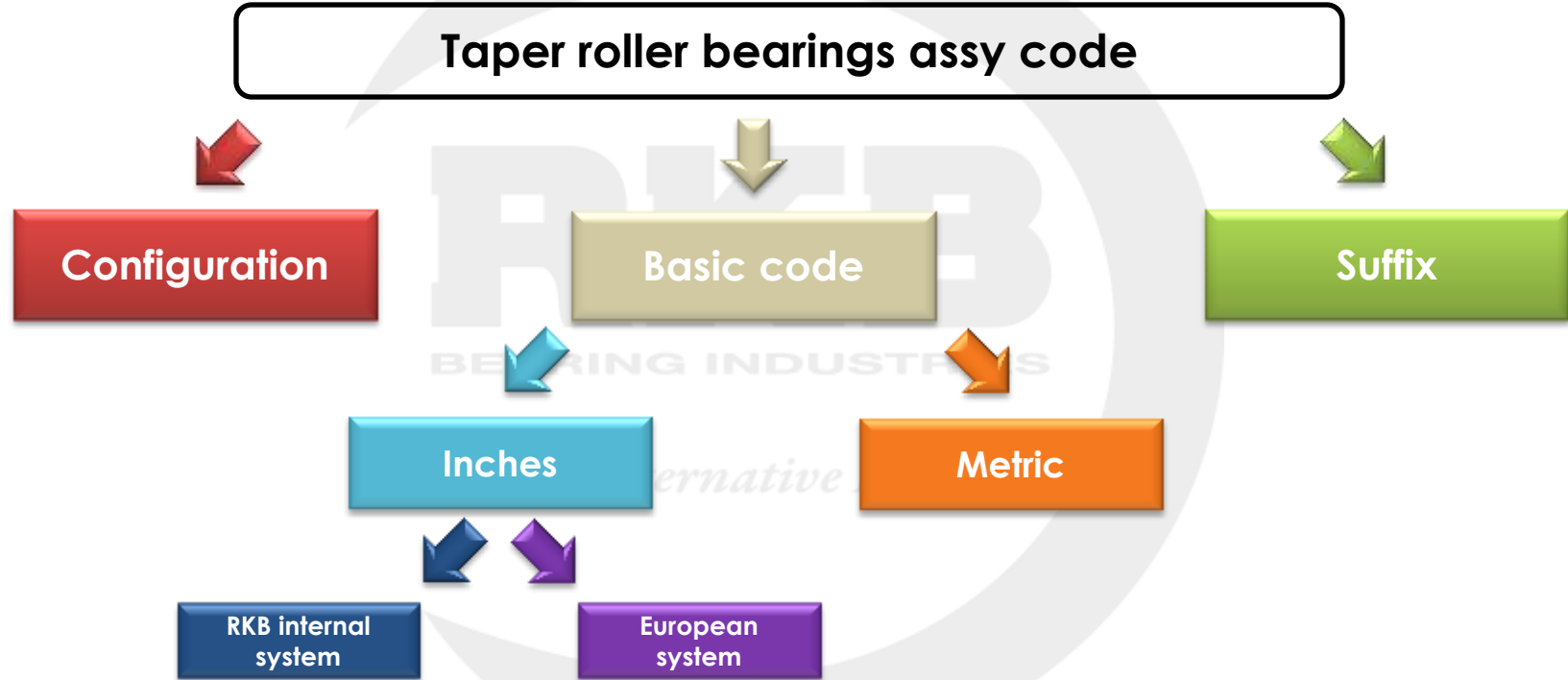
RKB taper roller bearings assy



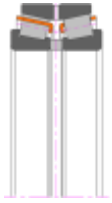
The Alternative Power



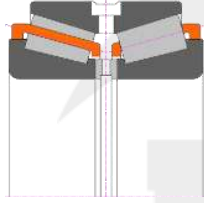
RKB taper roller bearings assy: designation system



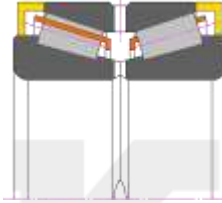
Example: **TDO** 081406/508750 **AAHA1ZBBT2B** K1453015



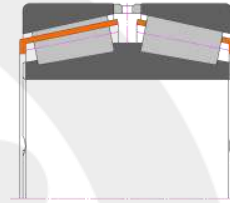
TDO



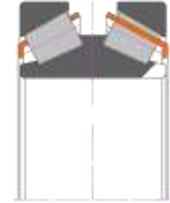
TDOM



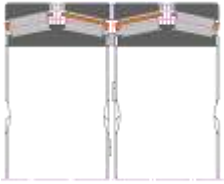
TDONAZ



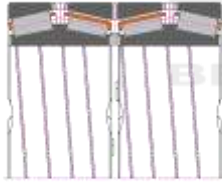
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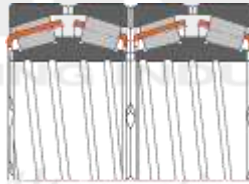
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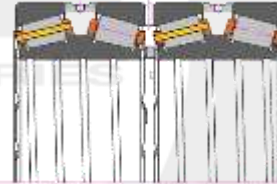
TQO



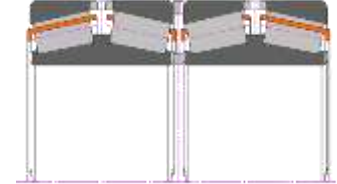
TQO/G



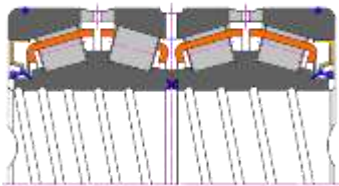
TQO/EG



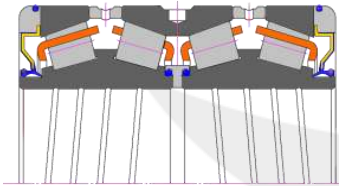
TQO pierced rollers



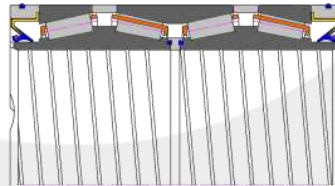
SET/TDI



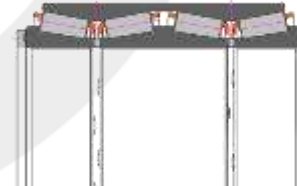
TQOS/AVS1



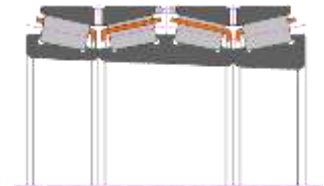
TQOS/AVS2



TQOS/AVS2/1



TQI



TQIT

RKB taper roller bearings assy: inches basic code internal system

Inches basic code: **XX YY ZZ / AA BB CC** ... **Suffix** ... **KDDD EE FF**

$d = \text{XX,CC}$ inch

$D = \text{YY,AA}$ inch

$T = \text{ZZ,BB}$ inch

K factor = **D,DD**

$r_{1,2} = \text{E,E}$ mm

$r_{3,4} = \text{F,F}$ mm

Example:

TDI **081407/127562** A1AZBBT2BK**1761564**

$d = 8,62$ inch = 218,95 mm

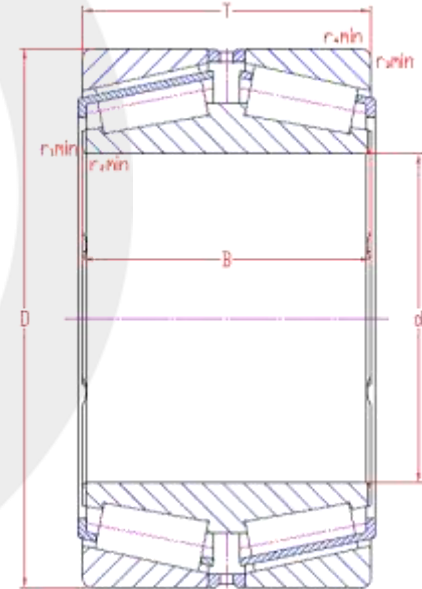
$D = 14,12$ inch = 358,65 mm

$T = 7,75$ inch = 196,85 mm

K factor = 1,76

$r_{1,2} = 1,5$ mm

$r_{3,4} = 6,4$ mm



TDI main dimensions

RKB taper roller bearings assy: suffix system

The RKB suffix system for multi-row taper roller bearings is composed of two different parts:

- **Bearing version** (corresponding to different executions)
- **Bearing features**

Version

Features

AA AA1

HA1÷4 = case-hardened steel

AB AA2

HB1÷3 = bainite treatment

AC AA3

PT1÷4 = phosphate treatment

... ..

ZB = ZB rollers profile

... ..

VL = Victory Line (RKB premium brand)

... ..

BT2B = double-row taper roller bearing

... ..

BT4B = four-row taper roller bearing

Example:

TDI 081407/127562 **A1A****ZB****BT2B** K1761564

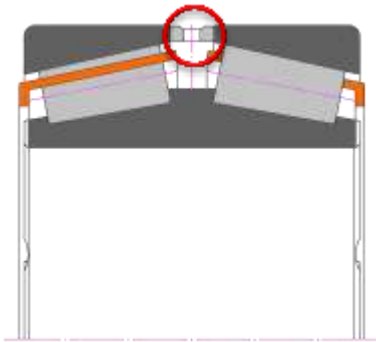


1. Inner and outer rings
2. Outer ring
3. Inner ring
4. Inner and outer rings and rolling elements

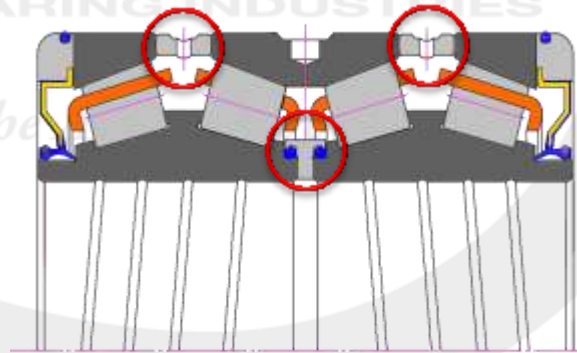
X

RKB taper roller bearings assy: B.E.P. and M.E.P. definitions

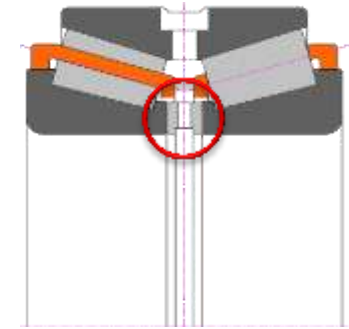
All of the multi-row taper roller bearings manufactured by RKB are supplied correctly assembled, with the axial internal clearance (B.E.P. - Bench End Play) required. Usually the correct B.E.P. range is obtained by RKB adjusting the width of the spacers between cones and cups, but in some designs, with no spacers between cones and cups, the B.E.P. is pre-adjusted by RKB. When the bearing is mounted on the shaft and in the housing with interference fit, the axial internal clearance is reduced. The remaining axial internal clearance after mounting is called M.E.P. (Mounted End Play).



TDI cup spacer



TQOS/AVS2 cone and cup spacers



TDOM cone spacer

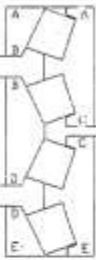
RKB supplies the B.E.P. value in its Technical Fiches and Q.C.C.D.S. (if available):

0000-0000-0000-0000

see the following: <http://www.fishbase.org>

RKB taper roller bearings assy: B.E.P. in Q.C.C.D.S.

QUALITY CERTIFICATE OF CONFORMITY DATA SHEET	
Bearing Specification: TQ03682AAHA1ZBBT4B	Serial No: F A
Unit: mm	



Bore Specification	
Min	Max
259.975	260.060
Bore Actual 259.980 - 259.990	

O.D. Specification	
Max	Min
440.900	439.967
O.D. Actual 439.970 - 439.980	

B Space	29.97
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D Space	29.70
---------	-------

C Space	19.44
---------	-------

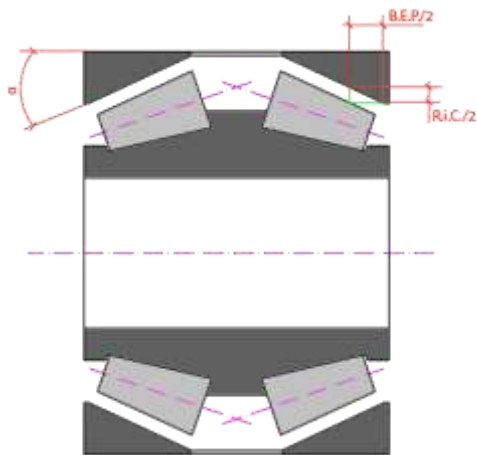
Axial Clearance	0.50
Width AC Cone	159.97
Width CC Cone Spacer	19.94
Width CE Cone	159.97
Width AB Cup	30.50
Width BB Cup Spacer	30.50
Width DD Cup	159.90
Width DD Cup Spacer	30.20
Width DE Cup	30.50
Height Over Cups	300.10
Height Over Cones	299.82

Inspector	RKH-01
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RKB	LN	PLANT
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RKB taper roller bearings assy: from B.E.P. to R.I.C.

The Technical Fiches provided by RKB supply all the information necessary to calculate the radial internal clearance (R.I.C.) of the bearing starting from the B.E.P. and the e values:



B.E.P. scheme of a TDI



$$R.I.C. = \frac{B.E.P. * e}{1,5}$$



$$B.E.P. = 0,350/0,400\text{mm}$$

$$e = 0,39$$

$$R.I.C._{\min} = 0,350 * \frac{0,39}{1,5} = 0,091\text{mm}$$

$$R.I.C._{\max} = 0,400 * \frac{0,39}{1,5} = 0,104\text{mm}$$

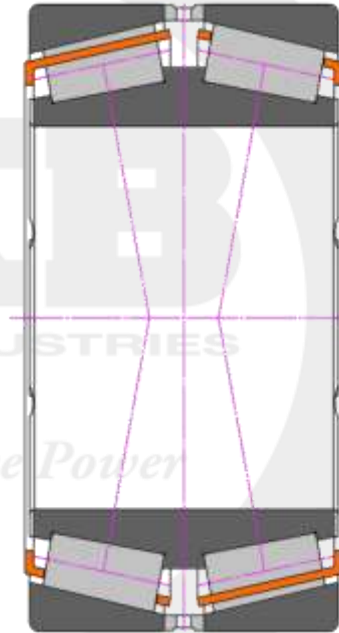
$$R.I.C. = 0,091/0,104\text{mm}$$

RKB double-row taper roller bearings: bearing selection

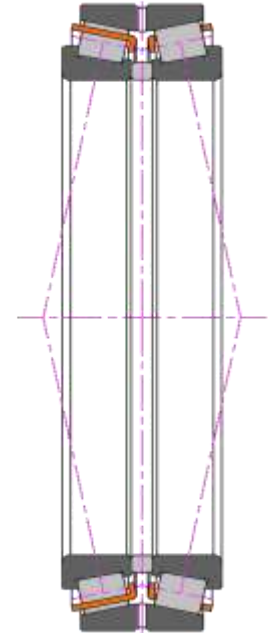
The RKB double-row taper roller bearings are available in two different arrangements:

- Face-to-face (TDI)
- Back-to-back (TDO)

In the TDI configuration the load lines are converging as the axis of rotation is approached. This arrangement doesn't increase the stiffness of the assembly and the bearing cannot support overturning moments. Reversely, in the TDO configuration, the contact angle is diverging as the axis of rotation is approached, increasing the stiffness of the assembly. This type of arrangement is suitable to resist overturning moments.



TDI configuration
(face-to-face)



TDO configuration
(back-to-back)

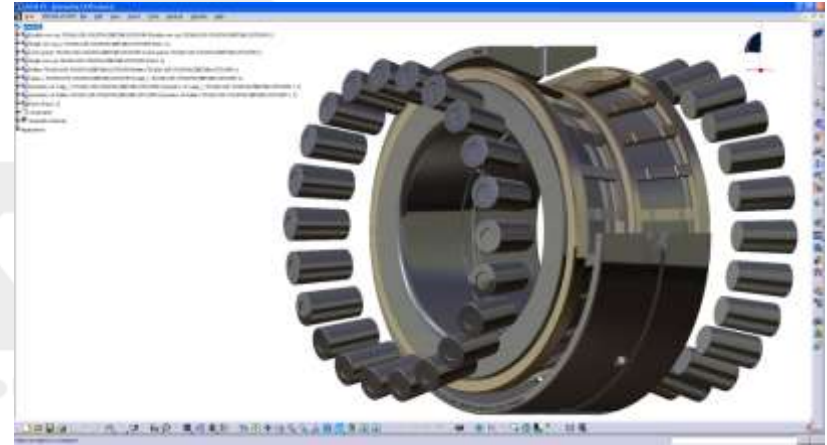
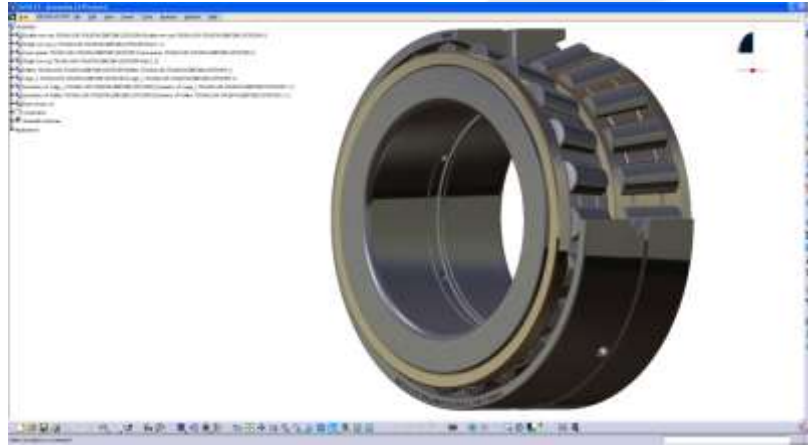
TDO design



The Alternative Power

The RKB TDO configuration consists of a double-row taper roller bearing composed of two single cones, one double cup, two pressed steel cages, two rows of back-to-back rollers and one cone spacer (plain or with annular groove and lubrication holes). The width of the cone spacer permits to obtain the correct B.E.P. The TDO bearings with a blind hole in the double cup are particularly suitable to be mounted with a loose fit in the housing, due to the hole counter bored that allows the insertion of a pin to avoid sliding between the double cup and the housing.

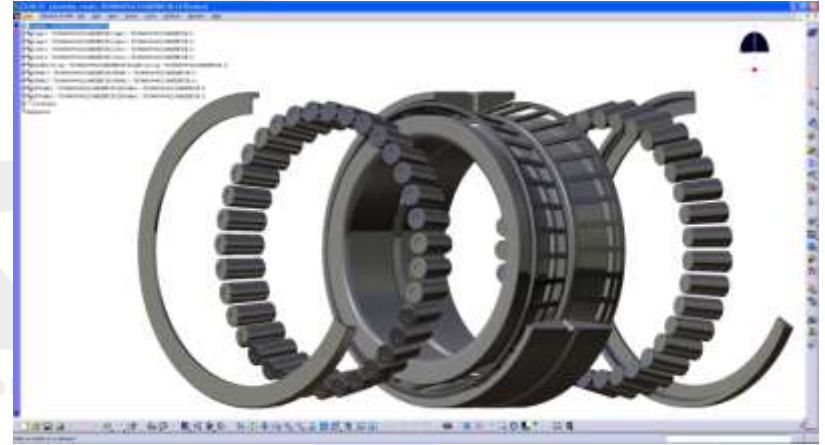
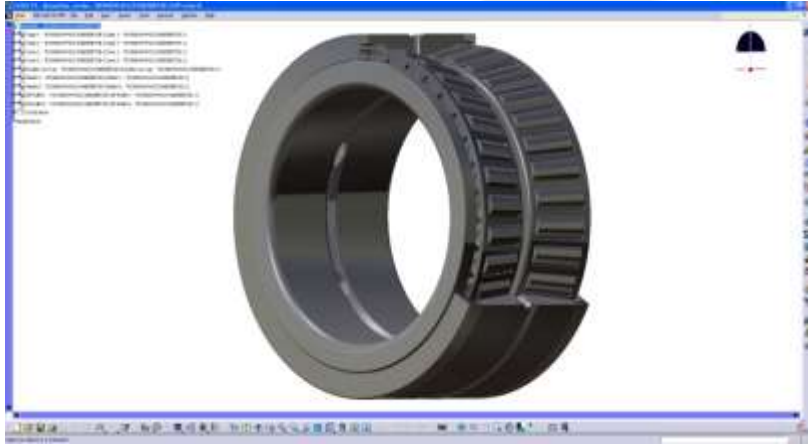
TDOM design



The Alternative Power

The RKB TDOM configuration consists of a double-row taper roller bearing composed of two single cones, one double cup, two machined brass cages, two rows of back-to-back rollers and one cone spacer (with annular groove and lubrication holes). The width of the cone spacer permits to obtain the correct B.E.P. The TDOM bearings with a blind hole in the double cup are designed to be mounted with a loose fit in the housing due to the hole counter bored that allows the insertion of a pin to avoid sliding between the double cup and the housing.

TDONAZ design



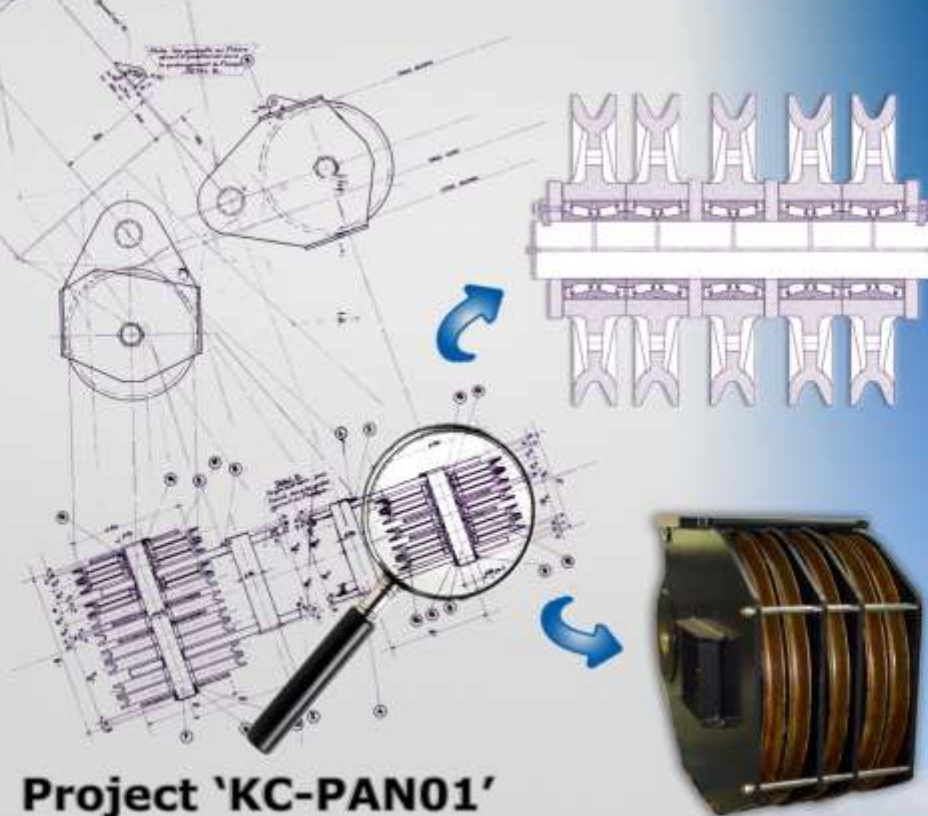
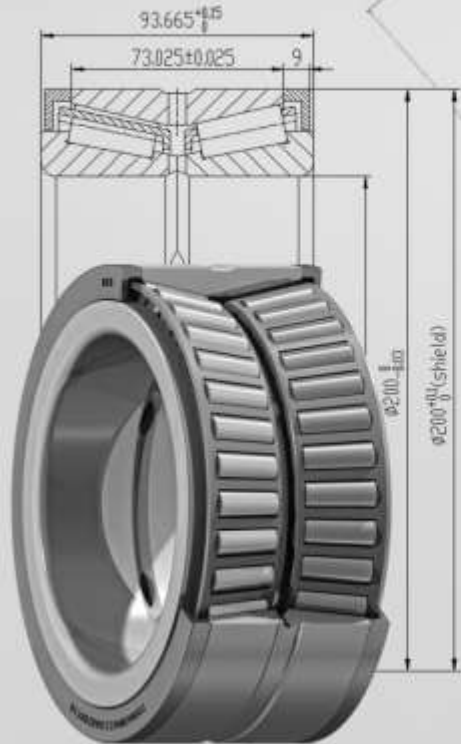
The Alternative Power

The RKB TDONAZ configuration consists of a double-row taper roller bearing composed of two single cones, one double cup, two pressed steel cages, two rows of back-to-back rollers and two pressed steel shields. There are no spacers and the bearing is supplied with the correct B.E.P.

RKB special project



Main bearings: T3 Segment -
Double row taper roller bearings with shields



Project 'KC-PAN01'

TDONASW series special execution for crane winches



RKB double-row taper roller bearings: example of Technical Fiche

RKB Bearings Technical Fiche

Double row taper roller bearings

00C198411

TDO 040704/501825 A1ZBBT2BK1403515

Main boundary dimensions (mm)

d	107,950
D	190,500
T	106,362
C	80,962

Technical data

Basic load ratings (kN)	i	C_0	525
	d	C_{90}	950
Mass (kg)			12,0
Cage material			Pressed steel
Radius min (mm)	r_1	3,5	
	r_2	3,5	
	r_3	1,5	
	r_4	1,5	
Precision class			CL2
α			0,42/R factor 1,40
R.S.P. (mm)			0,100/0,150
Configuration/Design			Inch TDO IA1/T

The image is a technical cross-section drawing of a double-row taper roller bearing. It shows two rows of rollers within a cage, mounted on an inner ring and an outer ring. Key dimensions are labeled: 'd' for the inner diameter, 'D' for the outer diameter, 'T' for the total width, and 'C' for the distance between the two rows of rollers. Individual roller dimensions are labeled as 'r1', 'r2', 'r3', and 'r4'. The angle of the roller cone is labeled as 'alpha'.

Technical notes

- Through-hardened steel for rings and rollers
- Double cup with annular groove and 8 lubrication holes dia 10,0. One hole counter bored for locking pin (Ka 17,3,Kb 5,3)
- Cone spacer 7,638 width
- 2023 rollers
- Cage max protrusion 6,0
- For general industry purpose

Sketch notes to Note

Load ratings are principally based on ISO 281 and ISO 76, but not calculated according to the exact bearing design and execution. For further background look for related calculations.

Unapproved engineering factors, formulas and tolerances are not taken into consideration.

And refer to RKB Product of Compliance (LISA) for related compliance to international standards.

Every care has been taken to ensure the accuracy of the information in the present drawing, but no liability can be accepted for any errors or omissions contained herein, or for wear, failure and/or damages (direct, indirect, consequential) should occur.

RKB Bearings Industries reserves the right of any intellectual effort notice.

RKB double-row taper roller bearings: product samples

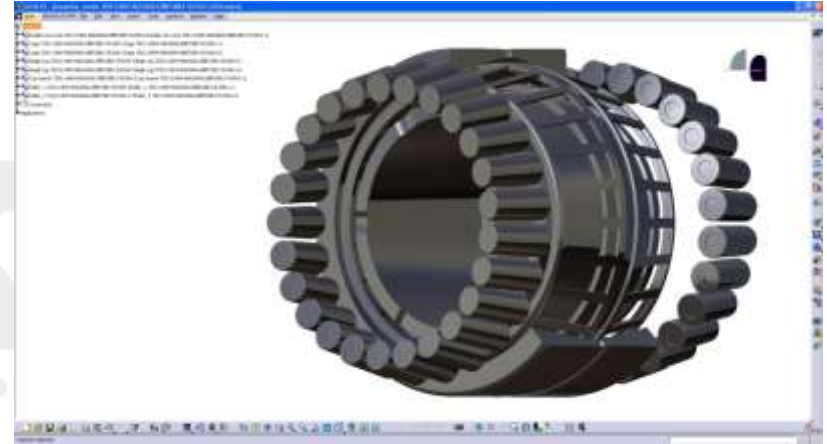
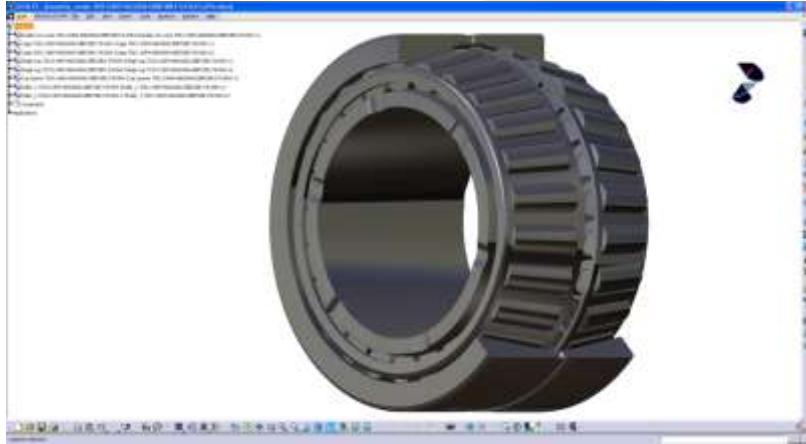


RKB TDO bearing



RKB TDO bearing

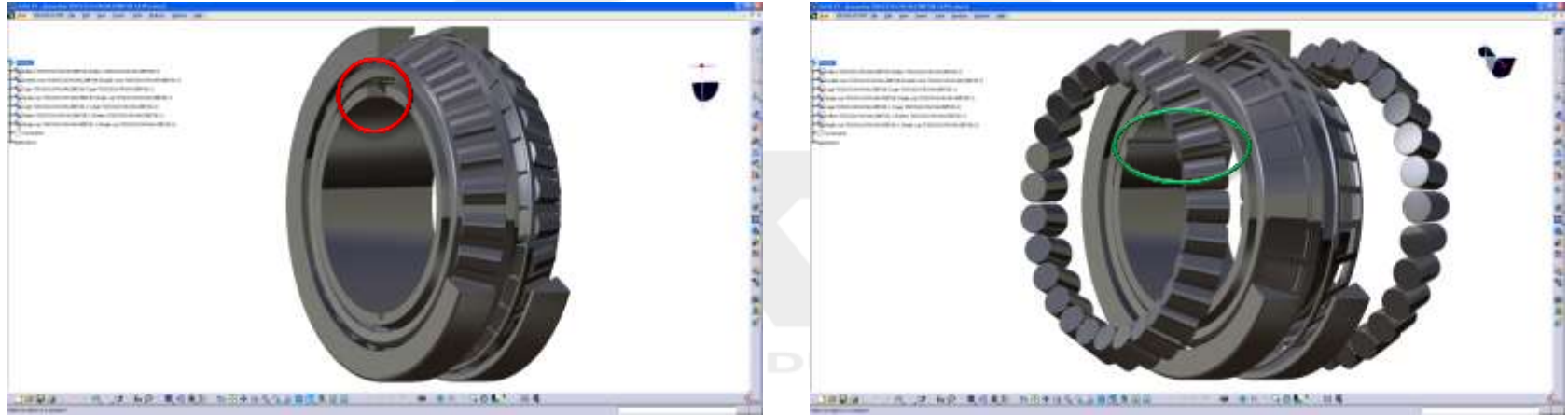
TDI design



The Alternative Power

The RKB TDI configuration consists of a double-row taper roller bearing composed of two single cups, one double cone, two pressed steel cages, two rows of face-to-face rollers and one cup spacer. The width of the cup spacer permits to obtain the correct B.E.P.

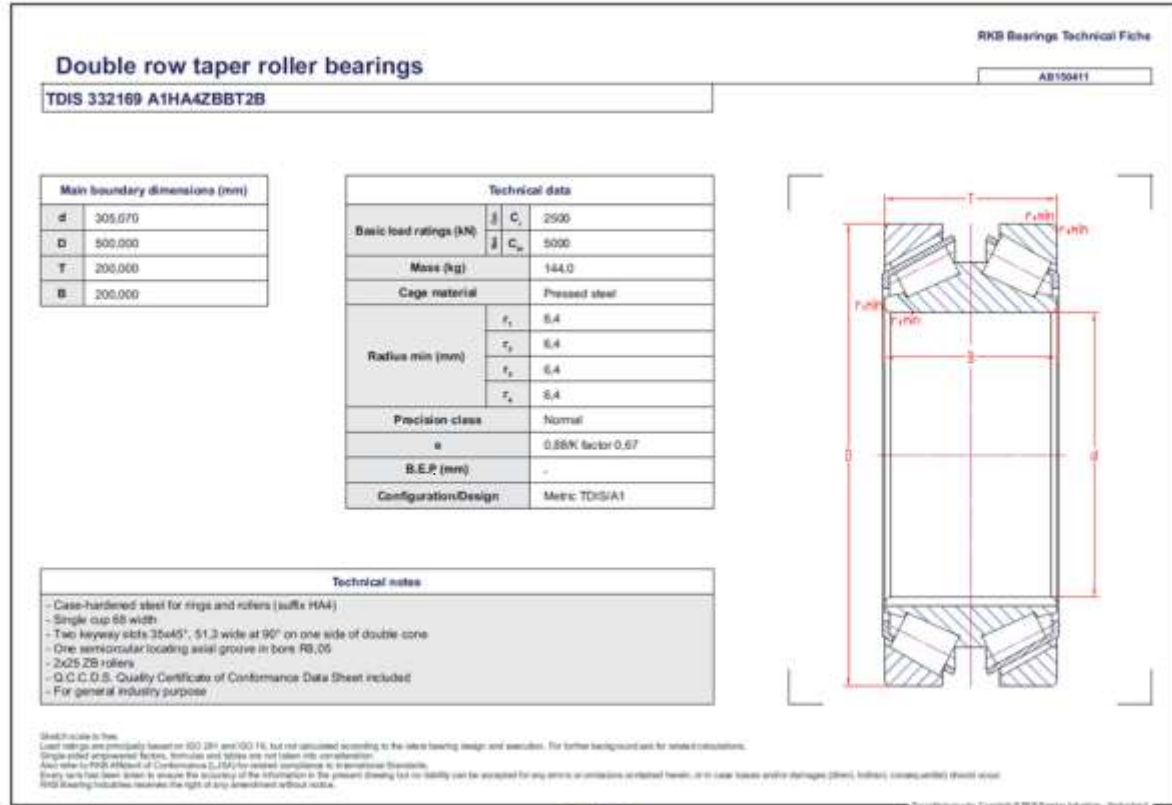
TDIS design



The Alternative Power

The RKB TDIS configuration is a double-row taper roller bearing composed of two single cups, one double cone, two pressed steel cages and two rows of face-to-face rollers. Compared to TDI, TDIS configuration has a B.E.P. equal to zero due to the lacking of a spacer between the two cups and a higher contact angle to increase the axial load capability of the bearing. This type of bearing is usually mounted with a loose fit on the shaft. For this reason, RKB produces this type of bearing with one or two keyway slots (red circle) in the bore or with one semicircular locating axial groove (green ellipse) to locate circumferentially the bearing.

RKB double-row taper roller bearings: example of Technical Fiche



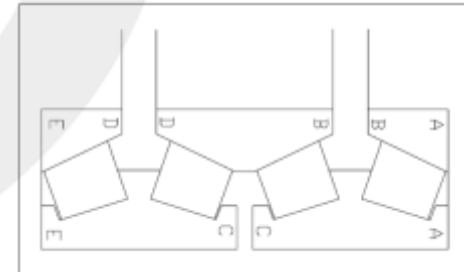
RKB taper roller bearings assy: serial number, mounting sequence and marked zones

The serial number (red circle) indicates a single part in a production lot. RKB applies the serial number only to some types of bearings, especially those made up of several different parts (e.g. four-row taper roller bearings).



Serial number

RKB produces various types of bearings composed of several parts assembled together in a well-defined sequence that ensures the correct functioning of the bearing. The mounting sequence is necessary especially for TQO and TQOS bearings where the B.E.P. is adjusted by the spacers width.

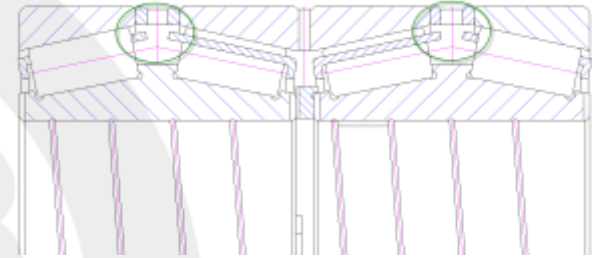


Mounting sequence

RKB taper roller bearings assy: serial number, mounting sequence and marked zones

In addition, the correct assembly of the bearing components permits to obtain the correct B.E.P. and have the axis of the lubrication holes of cup spacers equally spaced between the single cup and the double cup.

The marked zones are four special references made on the side surface of the bearing outer ring at intervals of 90° . In most applications, the radial load on the outer ring acts always along the same direction; therefore, only a small portion of the ring itself is under load. This way, the bearing may face early failure. To avoid this issue, fully exploit bearing potential and extend its life, according to the scheduled maintenance program, it is necessary to rotate the bearing outer ring of a notch (90°) so that the working area of the outer ring regularly changes. Of course the same concept does not apply to the inner ring, since it rotates with the shaft and therefore the load acts always on a different portion of material.

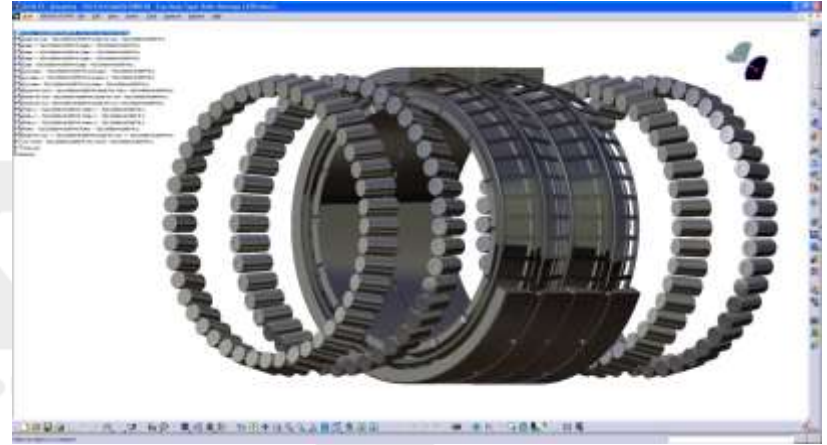
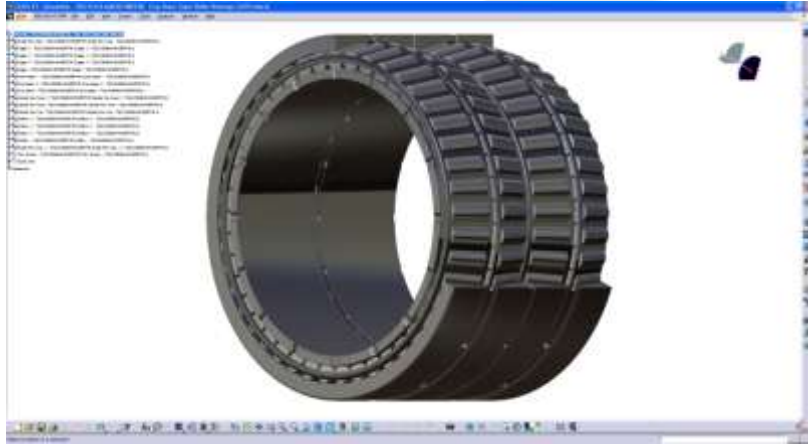


Position of cup spacers



Marked zones on a TQOS

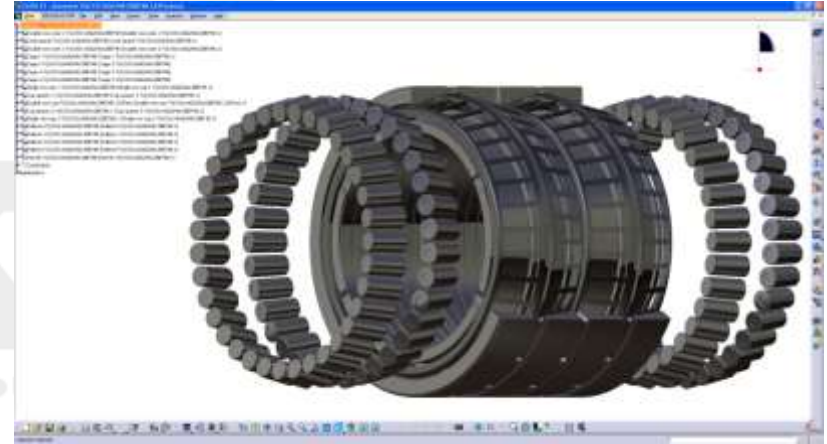
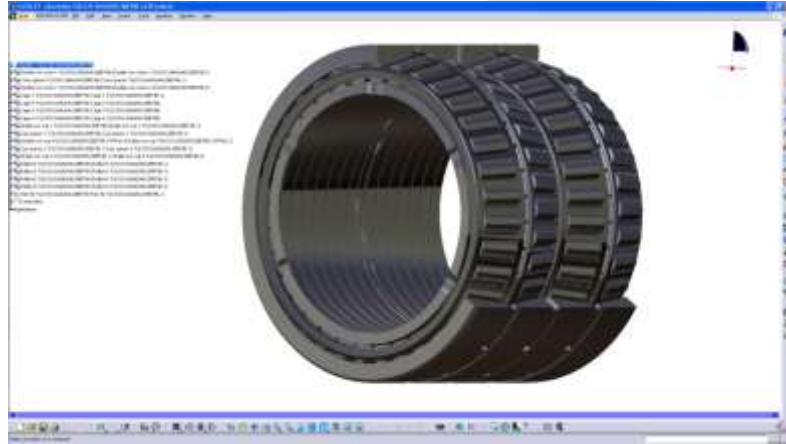
TQO design



The Alternative Power

The RKB TQO configuration is a four-row taper roller bearing composed of two double cones, one double cup, two single cups, four pressed steel cages, four rows of rollers, one cone spacer (also available with lubrication grooves) and two cup spacers (with annular groove and lubrication holes). The paired rollers are in face-to-face configuration.

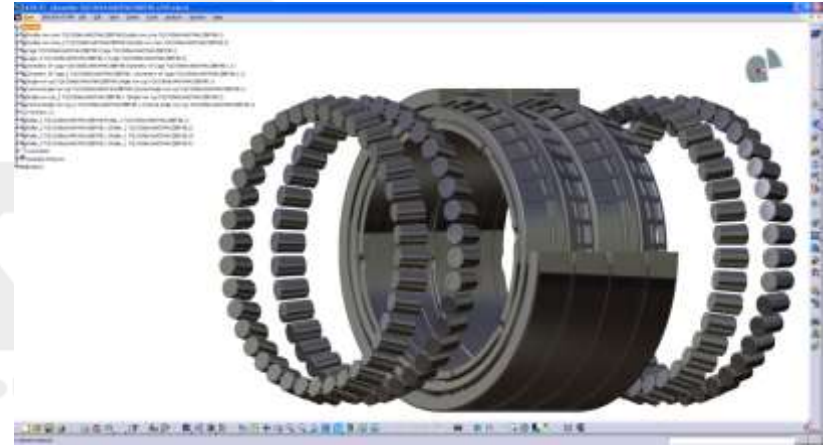
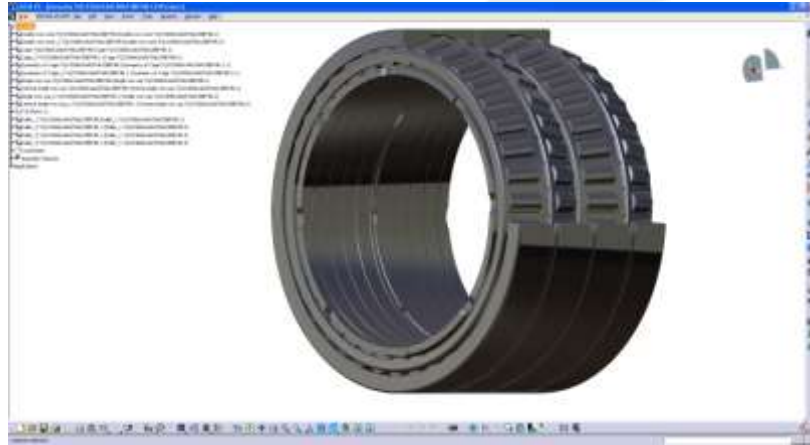
TQO/G design



The Alternative Power

The RKB TQO/G configuration is a four-row taper roller bearing composed of two double cones with helical groove in bore, one double cup, two single cups, four pressed steel cages, four rows of rollers, one cone spacer (also available with lubrication grooves) and two cup spacers (with annular groove and lubrication holes). The paired rollers are in face-to-face configuration. When the bearing is mounted on the shaft with a loose fit, RKB performs the helical groove in bearing bore to reduce the wear between the two parts. The wear reduction is obtained by interposing oil in the contact zone between the shaft and the two double cones.

TQO/EG design



The Alternative Power

The RKB TQO/EG configuration is a four-row taper roller bearing composed of two double cones with helical groove in bore, two central single cups, two single cups, four pressed steel cages and four rows of rollers. This type of configuration differs from the other types of TQO by the absence of spacers. The B.E.P. is obtained adjusting the dimensions of the cones and the cups. The paired rollers are in face-to-face configuration.

RKB four-row taper roller bearings: example of Technical Fiche

RKB Bearings Technical Fiche

Four-row taper roller bearings

GOG121810

TQO 330662 AASTHA1ZBBT4B

Main boundary dimensions (mm)

d	355,600
D	482,600
T	269,875
B	265,113

Technical data

Basic load ratings (kN)	$\frac{C}{C_0}$	3000
	$\frac{C_0}{C_0}$	8000
Mass (kg)		140.0
Cage material		Pressed steel
Radius min (mm)	r_1	1.5
	r_2	1.5
	r_3	3.3
	r_4	3.3
Precision class		CL2
α		0.49/K factor 1.24
B.E.P. (mm)		0.4300.530
Configuration/Design		inch TQOIAA

Technical notes

- Case-hardened steel for rings (prefix HA7)
- New generation AA: reinforced execution without spacers
- Lubrication grooves in side faces of internal cups (B-RC0) and of double cones (B-RC30)
- External single cup 68,675 width; Internal single cup 68,263 width; Double cones 132,557 width
- Helical groove in bearing bore (pitch 35; deep 1.0; R2)
- Restricted width tolerances of T and B dimensions (prefix ST)
- Marked zones and Q-C.C.D.B.: Quality Certificate of Conformance Data Sheet included

Shrink-on is Yes.

Load ratings are principally based on ISO 261 and ISO 76, but not calculated according to the latest bearing design and execution. For further background see for related calculations.

Single-point engineered factors, prefixes and suffixes are not taken into consideration.

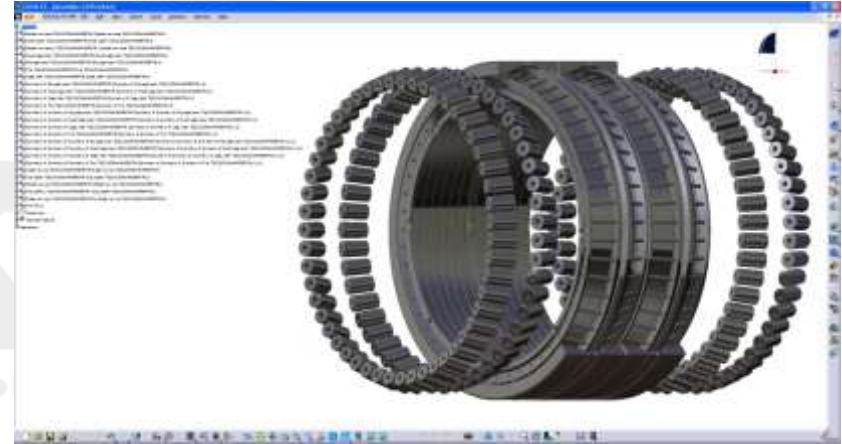
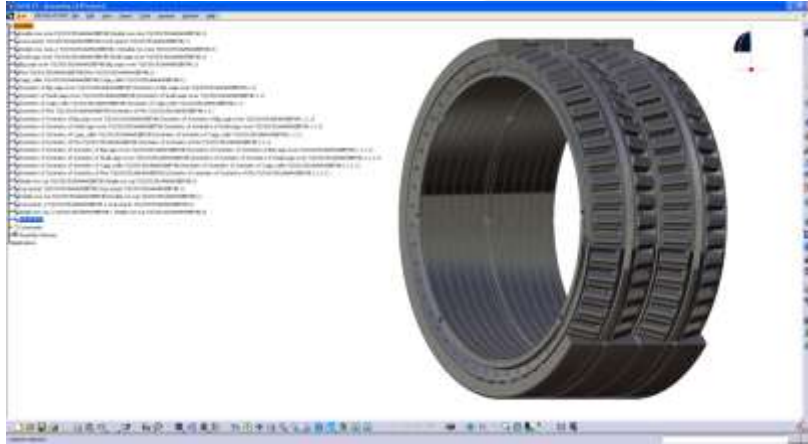
See also RKB Affidavit of Conformance 3_20A for details compliance to International Standards.

Every care has been taken to ensure the accuracy of the information in the present drawing but no liability can be accepted for any errors or omissions contained herein, or in data based on the drawings (first, revised, subsequently) should occur. RKB Bearing Industries reserves the right of any amendment without notice.

TQO pierced rollers design

T3

TECHNOLOGICAL



The Alternative Power

The RKB TQO pierced rollers configuration is a four-row taper roller bearing composed of two double cones with helical groove in bore, one double cup, two single cups, four rows of pierced rollers, one cone spacer and two cup spacers (with annular groove and lubrication holes). The rollers are enclosed between two rings of steel and guided with pins passing through the center of the roller. The pins are threaded in one side and welded in the other one to ensure maximum reliability. This configuration is particularly suitable for large size bearings and permits to increase the number of rollers compared to the configuration with pressed steel cages, improving C_r and C_{0r} values. The paired rollers are in face-to-face configuration.

RKB four-row taper roller bearings: example of Technical Fiche

Four-row taper roller bearings

TQO 332244 A2HA4ZBBT4B

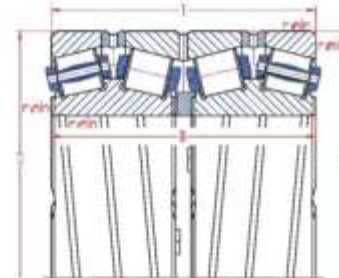
RKB Bearings Technical Fiche

ADVERTISING

Main boundary dimensions (mm)	
d	717.550
D	946.150
T	565.150
B	565.150

		Technical data	
Basic load ratings (kN)	C_r	13000	
	C_{10}	41000	
Mass (kg)		1091.0	
Cage material		steel (pin-type)	
Radius min (mm)	r_1	3.3	
	r_2	3.3	
	r_3	6.4	
	r_4	6.4	
Precision class		CL2	
α		0.33/K factor 1.76	
B.E.P. (mm)		0.200/0.360	
Configuration/Design		Inch TQO/A2	

Technical notes
<ul style="list-style-type: none"> - Case-hardened steel for rings and rollers (R05-SAE3135.RAV premium steel/tuffix HA4) - 3 lifting holes M14 on side faces of cage for eye bolts - Helical groove in bearing bore (pitch 25; deep: 1,0; radius 4,0). Lubrication grooves: 12-R05 on side faces of double cones - Double cup 250,632 width with annular groove and 16 lubrication holes dia 18 - Cup spacers 41,275 width with annular groove and 16 lubrication holes dia 18 - Single cup 115,868 width: Case spacer 19,050 width with lubrication grooves. Cage max protrusion 7,5 - Marked zones and Q.C.C.D.S. Quality Certificate of Conformance Data Sheet included



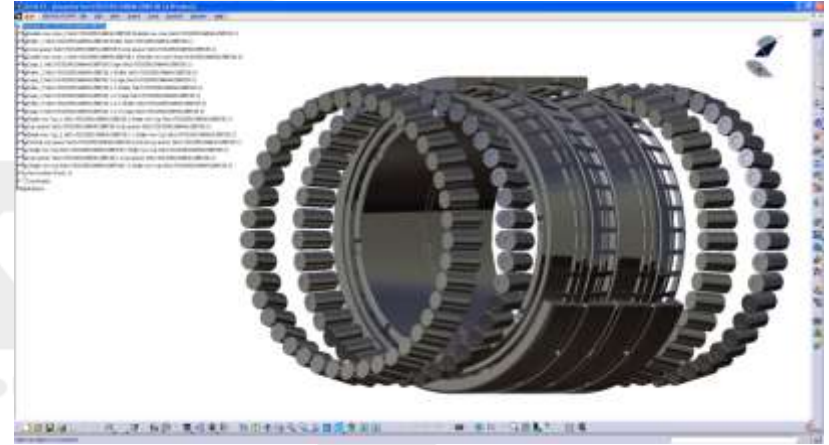
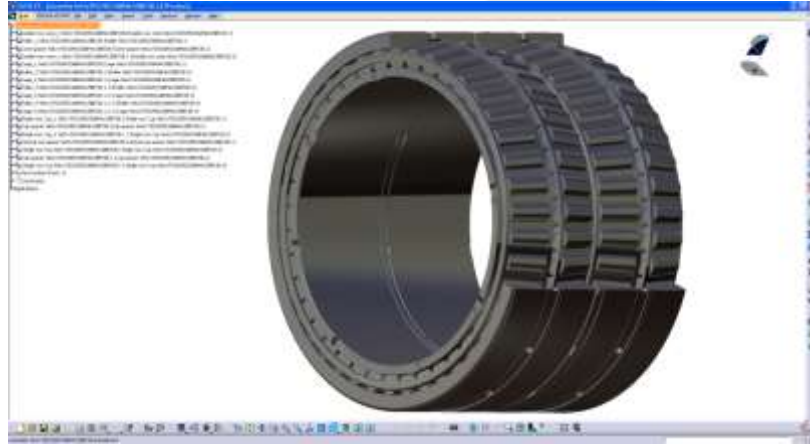
Small images are primarily based on ISO 2011 and ISO 15, but not necessarily according to the latest housing design and its evolution. For better background and its related submitters, design of the container, fixtures, panels and labels are not under this consideration.

Only data is ISO-Material of Composites (2.25A) for related compliance to international standards.

From any data have been taken to assess the accuracy of the information in the present housing, it is fully not be accepted for any service or additional standard, or to use for ISO-Material submitters under the ISO of any commercial effort and/or.

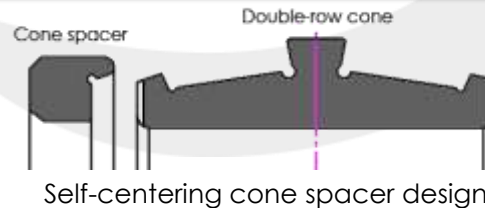
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Set 2xTDI design



The Alternative Power

The RKB Set 2xTDI configuration consists of two paired double-row taper roller bearings (TDI), separated by two different spacers, one between the two internal cups and one between the two cones. To easily mount the bearing on the shaft, RKB designs and produces the cone spacers with a conical profile which is self-centering on the cone shoulder.



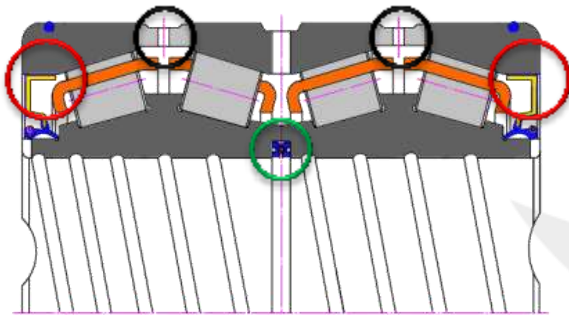
TQOS designs



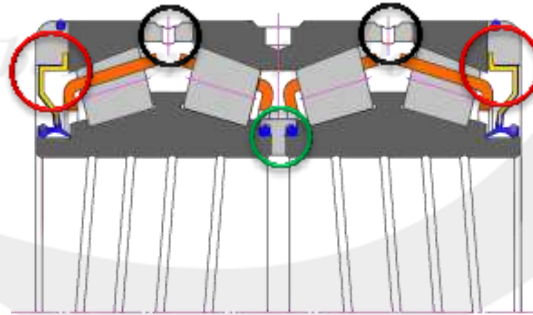
RKB produces 3 different types of TQOS designs:

- TQOS/AVS1
- TQOS/AVS2
- TQOS/AVS2/1

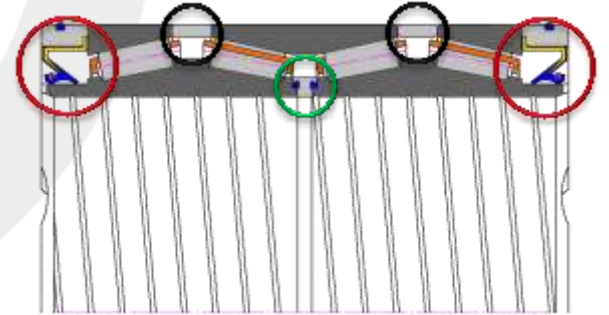
The main differences between the AVS1 and the AVS2 designs lie in the different method used to block the lateral seals (red circles) and to separate (and seal) the cones (green circles). Moreover, the AVS2 design provides a better sealing efficiency due to the latest findings of our R&D. The RKB AVS2 design is available in two variants, one with annular grooves and lubrications holes in cup spacers (AVS2), and one without annular grooves and lubrication holes (AVS2/1; black circles).



TQOS/AVS1 design

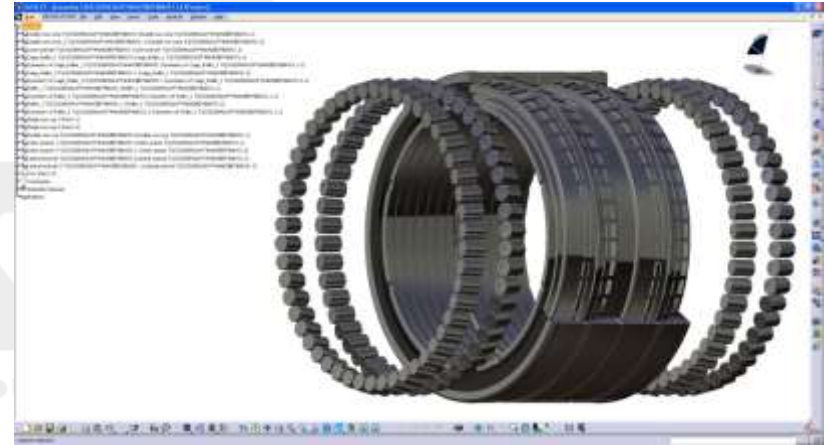
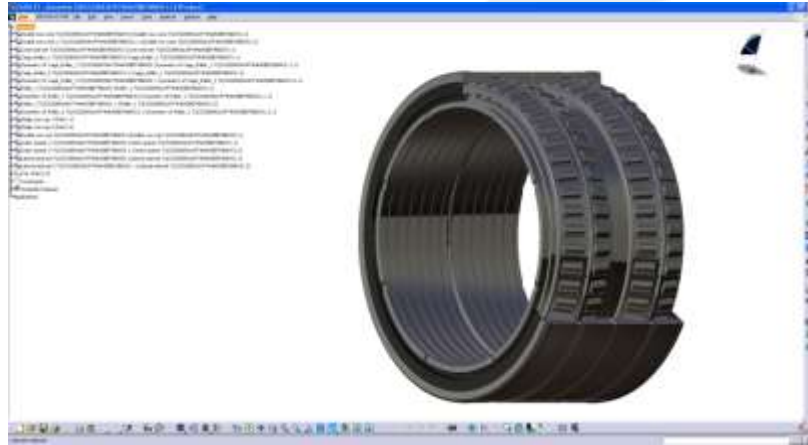


TQOS/AVS2 design



TQOS/AVS2/1 design

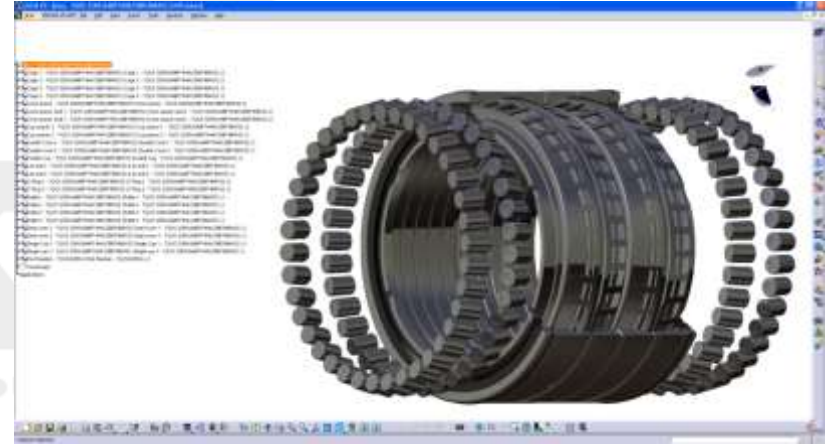
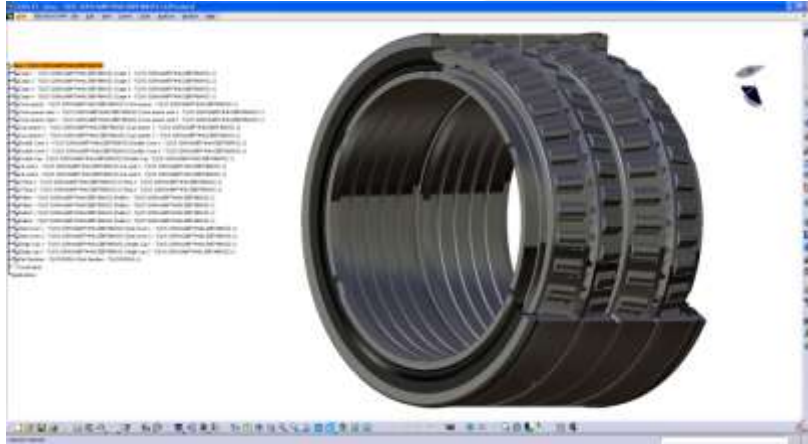
TQOS/AVS1 design



The Alternative Power

The RKB TQOS AVS/1 configuration consists of a four-row taper roller bearing composed of two double cones with helical groove in bore (the inner part of the bearing is sealed with a cone seal set AVS – Anti-Vortex System), one double cup, two single cups, four pressed steel cages, four rows of rollers, two cup spacers (with annular groove and lubrication holes), two lateral seals, two separable flanges and two “O” type seal rings. The paired rollers are in face-to-face configuration.

TQOS/AVS2 and TQOS/AVS2/1 designs



The Alternative Power

The RKB TQOS/AVS2 and AVS2/1 configurations consist of a four-row taper roller bearing composed of two double cones with helical groove in bore, separated by a cone spacer seal set (AVS – Anti-Vortex System), one double cup, two single cups, four pressed steel cages, four rows of rollers, two cup spacers (with annular groove and lubrication holes available only in the TQOS/AVS2 design), two lateral seals, two separable flanges and two “O” type seal rings. The paired rollers are in face-to-face configuration.

RKB four-row taper roller bearings: example of Technical Fiche

RKB Bearings Technical Fiche

Four-row taper roller bearings

AR200211

TQOS 328853 AAPT1HA4ZBBT4BAVS2

Main boundary dimensions (mm)

d 220,000

D 290,000

T 315,000

B 315,000

Technical data

$\frac{B}{C_1}$ 1450 (ISO Calculated)

$\frac{B}{C_{90}}$ 4500 (ISO Calculated)

Mass (kg) 60,0

Cage material Pressed steel

Radius min (mm)

r_1

2,0

r_2

2,0

r_3

4,0

r_4

4,0

Precision class

Normal

α

0,40W factor 1,51

B.E.P (rpm)

8,4000/430

Configuration/Design

Metric TQOSIAA/AVS2

Technical notes

- Case-hardened steel for rings and rollers (RKB SAE 9315 RA/V/suffix HA4)
- Phosphate treatment for rings and spacers (suffix PT1). Bearings provided filled with EP grease
- Double cup 119 width with annular groove and 6 lubrication holes. Single cup 45 width
- Cup spacers 29 width with annular groove and 6 lubrication holes
- Lubrication grooves in side external faces of double cones (A-R30)
- Helical groove in bearing bore (pitch 20, deep 0,8)
- Marked zones and Q.C.C.D.S.: Quality Certificate of Conformance Data Sheet included

Sketches are free

Load ratings are primarily based on ISO 261 and ISO 76, but not calculated according to the latest bearing design and execution. For further background ask for related calculations.

Single-sided engineering drawings, technical specifications are not taken into consideration.

Drawings by RKB Affiliates of Conformance S.A.S. for related compliance to inspection of standards.

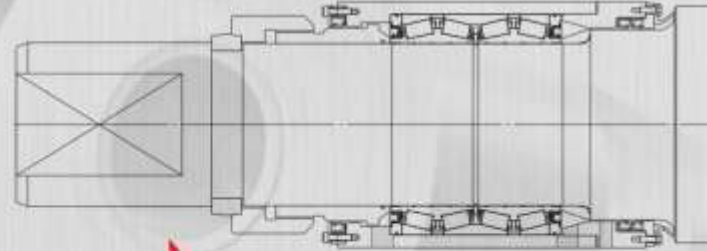
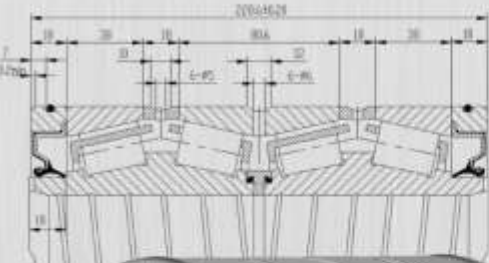
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RKB special project

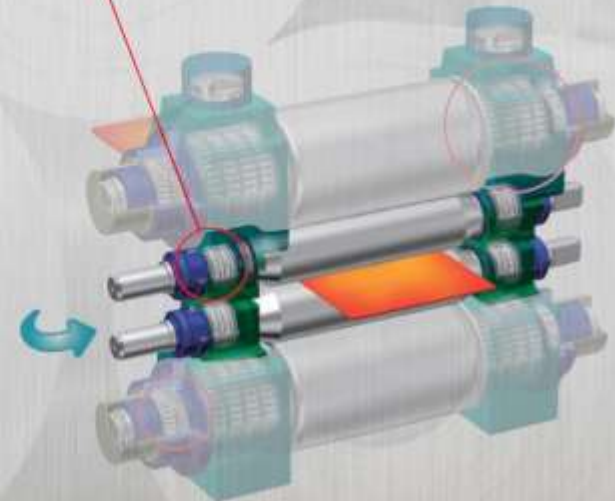
RKB



Main bearings:
T3 Segment - Sealed four-row taper roller bearings



Project 'TQOS/AVS2
New generation sealed four-row
taper roller bearings



RKB four-row taper roller bearings: product samples

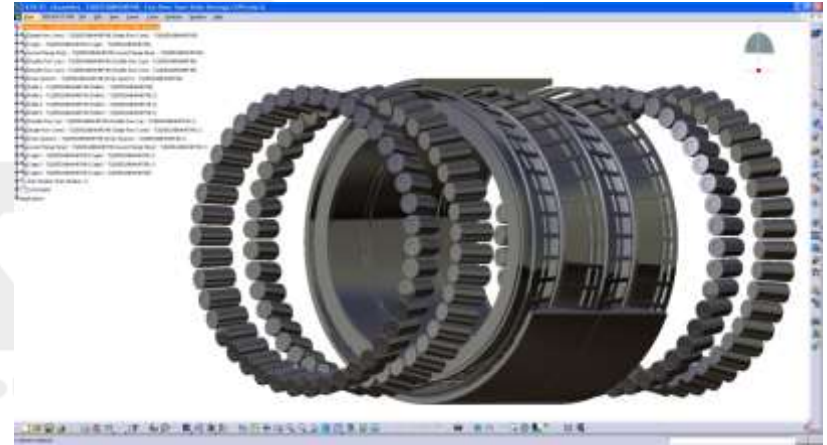
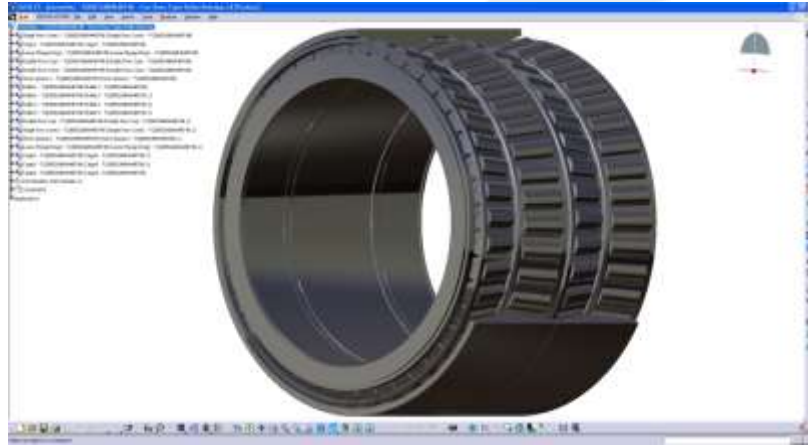


RKB TQO bearing



RKB TQO bearing

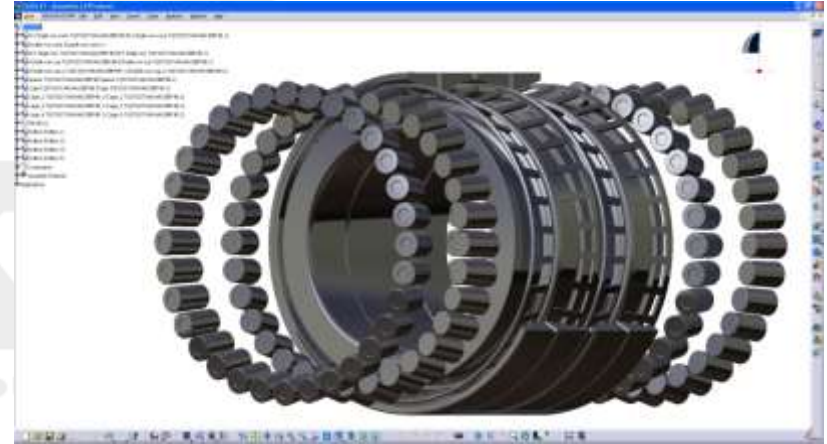
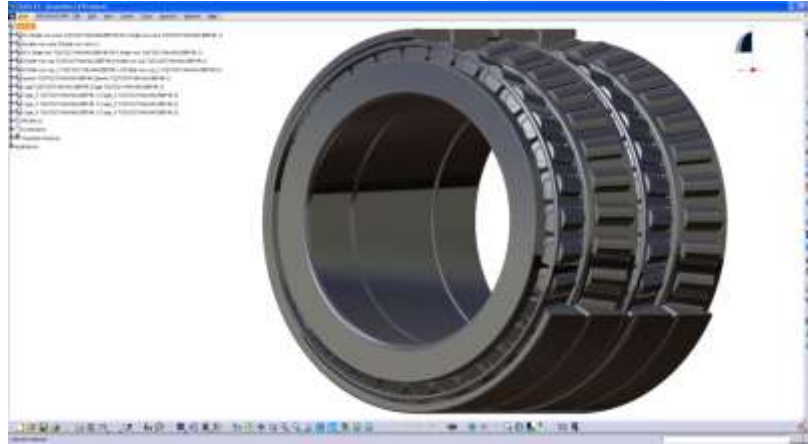
TQI design



The Alternative Power

The RKB TQI configuration consists of a four-row taper roller bearing composed of one double cone, two single cones, two cone spacers, four pressed steel cages, four rows of rollers, two double cups and two loose flange rings. The paired rollers are in back-to-back configuration. This arrangement is recommended for all those applications where high rigidity and resistance to overturning moments are required.

TQIT design



The Alternative Power

The RKB TQIT configuration consists of a tapered bore four-row taper roller bearing composed of one double cone, two single cones, four pressed steel cages, four rows of rollers, two double cups (available with annular groove and lubrication holes) and one cup spacer (available with annular groove and lubrication holes). The paired rollers are in back-to-back configuration. The main difference between TQIT and TQI lies in the bore, which is tapered in TQIT and cylindrical in TQI.

RKB taper roller bearings assy: improved bearing steels

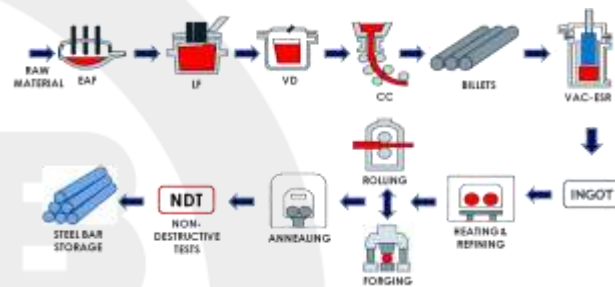


RKB can produce its multi-row taper roller bearings using two different types of steel:

- SAE 52100 (through-hardened steel)
- SAE 9315 (case-hardened steel)

The SAE 52100 is a through-hardened steel commonly used to manufacture rolling bearings for standard applications. In case of bearings subjected to heavy loads, shocks or vibrations (e.g. rolling mill stands), RKB recommends case-hardened steel (SAE 9315). In addition, the use of the Vacuum Degassing Electroslag Remelting process (VAC-ESR) through our RAV protocol has made possible to obtain two new types of steel gifted with better levels of cleanliness and non-metallic inclusions:

- RKB Type.RAV or ISO 100CrMo7 (through-hardened steel)
- RKB SAE 9315.RAV (case-hardened steel)



RAV steel manufacturing process



RKB special project in the steel industry

The Alternative Power

RKB
BEARING INDUSTRIES

FOR FURTHER DETAILS
DO NOT HESITATE TO CONTACT
RKB TECHNICAL DEPARTMENT



Engineered in Switzerland
Technological Bearings