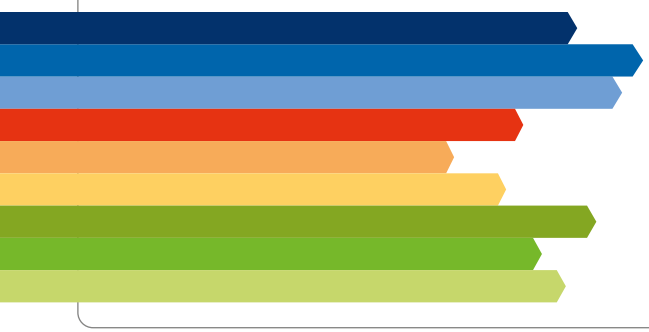


BUT

BEARINGS UNIVERSAL TECH

Deep Knowledge of All Major Industries

After a century of transformation, BUT bearings have provided high-quality roller bearings for various industrial customer groups. We continue to develop, design, and manufacture sturdy bearings that serve as the cornerstone of the British industrial economy. The UK has undergone significant changes in the past 100 years, and BUT bearings have proven to be able to adapt to these changes. As steel has been one of our main customers since 1911, the industry has transformed into thin plate continuous casting machines and faster rolling mills, and BUT bearings use more precise bearings to cope with more precise steel products and longer service life. As mining became more open-pit, BUT bearings introduced a new generation of bearings that could provide longer lifespan equipment, and bearing replacement was a very complex process. BUT bearings have made significant contributions to the development of heavy industry and are committed to continuing. This century long tradition of excellence will become the direction of future development. BUT Bearing Company promises to "do better every day", designing, developing, and manufacturing better bearings for the 21st century market.

% Turnover

5% Angular contact ball bearings

7% Deep groove ball bearings

13% Tapered roller bearings

14% TQO

35% Spherical roller bearings

16% Cylindrical roller bearings

10% Multiroll

16% Power transmission

10% Marine, shipyard and offshore

6% Electric motors, industrial fans and pumps

7% Pulp and paper, converting and printing

% Turnover

6% Renewable and traditional energy

4% Chemicals, plastics and rubber

17% Mines and minerals

29% Metals

5% Off-highway

SWISS PREMIUM CLASS

WORLD PRESENCE

INDUSTRIAL EXPERIENCE

A Unique Source for Industrial Bearings

BUT always specialized in designing and manufacturing all types of rolling bearings:

- Deep groove (**DGBBs**) and angular contact ball bearings (**ACBBs**)
- Spherical roller bearings (**SRBs**), which are the largest share of the current production
- Cylindrical roller bearings (**CRBs**), particularly multiroll assemblies
- Tapered roller bearings (**TRBs**), especially multi row arrangements

The challenge of BUT is to offer, as a unique and **reliable source**, a **complete portfolio** of innovative high quality rolling bearings, ranging from miniature to extra-large sizes. BUT rolling bearings are manufactured in **conformity with ISO, ANSI/ABMA or GOST** standards or according to customer's special requirements. Naturally, customers are supported by BUT's Technical Department in the selection process of the most adequate bearing for their specific applications.

PRODUCTION

A Full Range of Bearings With a Focus on Large Sizes

BUT presently engineers and produces over **8.000 different part numbers**. They are commonly divided into four segments, according to bearing type and manufacturing site.

T1

Miniature and small size ball bearings manufactured in BUT MS Plant (**8.000 sqm**)

Size range: **1-35 mm** bore diameter
Precision class: up to **P4-ABEC 7**

T2

Standard rolling bearings manufactured in BUT T3 Plant (**56.000 sqm**)

Size range: **40-1925 mm** outer diameter
Precision class: up to **P0/P6-CL4**

T3

Technological and customized rolling bearings manufactured in BUT T3 Plant (**56.000 sqm**)

Size range: **80-1500 mm** outer diameter
Precision class: up to **P6/P5-CL2/CL3-HP**

T4

Rolling bearings manufactured in large and repeated batches in BUT T4 Plant (**40.000 sqm**)

Size range: **300-600 mm** outer diameter
Precision class: up to **P6/P5-CL2/CL3-HP**

A MATTER OF STEEL

MANUFACTURING TECHNOLOGY

QUALITY PROGRAM

Only Premium Quality Steels

High-quality bearings require **high-quality raw materials**. Steel cleanliness is the key element in choosing materials that can remarkably improve bearing fatigue performance and load carrying capacity. Based on a long collaboration with the most **renowned steelmakers worldwide**, BUT can currently rely on different types of steel (**5 through-hardening** and **2 case-hardening**), which are purposely selected according to bearing characteristics and application requirements.

6%

44%

42%

8%

% Volume

Leading-Edge Heat Treatments

BUT is at the forefront of heat treating processes. Its **specialists** can rely on automatic heat treatment lines, with multiple salt bath tanks and controlled atmosphere conditions for **bainite hardening treatment (HB)**, furnaces for dimensional stabilization and technology to reduce retained austenite and ensure smooth operation at below zero temperatures. All protocols are expressly studied to give the best hardenability or the most **uniform case layer depth (CHD)**.

HB
BAINITE HT

PROFILE

AVH
CAGE DESIGN

TOUGH ROLLER

OPTIMIZED

VICTORY LINE

Latest Technology for Medium and Large Size Bearings

BUT T3 Plant and T4 Plant, which together cover a total area of 96.000 sqm, are specifically dedicated to the production of **medium and large size bearings**, both standard and customized.

Among other things, they feature:

- over **260 machining centers**
- latest generation **multi-axis CNC lathes**
- latest generation **multi-axis CNC grinders**
- **high precision hard turning** machine tools to reach stricter bearing dimensional and geometrical parameters
- **high precision honing** machine tools to improve bearing form characteristics
- **special surface treatments** to extend bearing resistance to wear and corrosion (**AWT** and **PT**)
- **centralized digital traceability system** for collection of all manufacturing data.

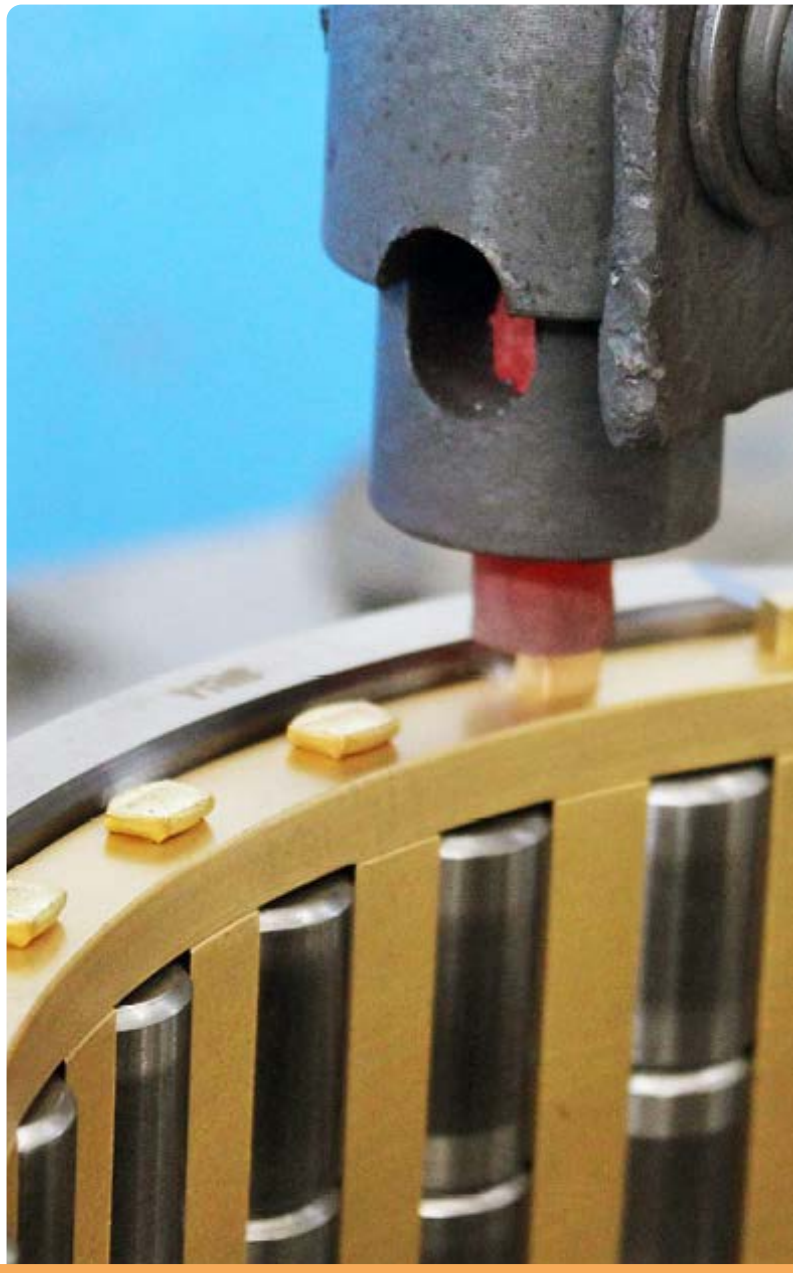
Advanced Technology with a Focus on Flexibility

BUT's business model is based on the concept of a **vertically integrated system**, according to which all main phases of the production chain are managed within company perimeter. Through the **effective control** of every manufacturing step, BUT ensures the quality of its products.

BUT is continuously updating its production processes to optimize investments in equipment and to exploit the latest technical and engineering developments. BUT's manufacturing strategy is supported by the R&D Department, which constantly develops **new technologies and techniques** to increase product reliability, production flexibility and environmental sustainability.

BUT's innovative business model can respond quickly to all supply requests, even in small or medium batches.

Finally, the wide use of smart in-line systems for **tighter control of manufacturing processes** efficiently reduces waste and production allowances and variations, resulting in enhanced overall quality and precision.



A MATTER OF STEEL

MANUFACTURING TECHNOLOGY

QUALITY PROGRAM

Automation for Small Sizes

BUT's new MS Plant encompasses over 8.000 sqm and is dedicated to manufacturing **miniature and small size ball bearings:**

- **36 fully automatic production lines**
- **strictly controlled environmental conditions** of all workshops
- **in-line Anderon meters** for control of 100% output
- **centralized digital traceability system** for collection of all manufacturing data.

Organizational Efficiency and Flawless Production

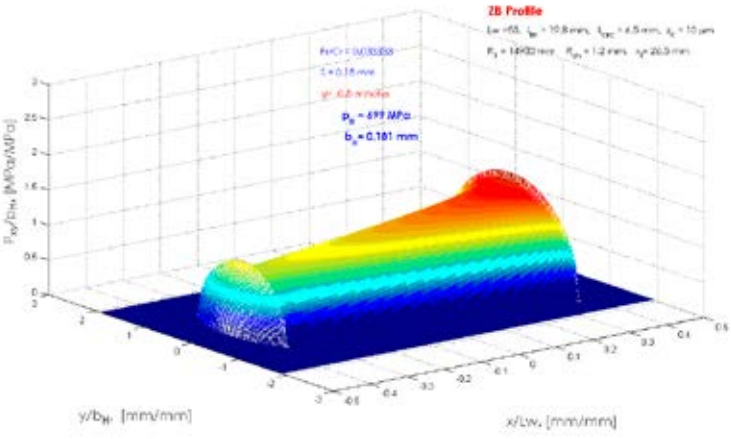
Since its foundation, the BUT Group has been following a **Total Quality Approach** devoted to increasing organization efficiency and safeguarding product quality. BUT Executive Headquarters and manufacturing facilities have **ISO certifications** in quality, environment, and occupational health and safety, which are a mark of distinction and well emphasize the commitment of the Group to sustaining rigorous standards of quality throughout the value chain.

As an additional proof of this, in 2012 BUT was awarded **top class rating by D&B**, the world's leading source of commercial information and insight on businesses. In terms of production, BUT has developed a **multilevel quality control system** to prevent flaws from spreading in the production chain: from steel bar acceptance to forging, from turning to heat treatments, from grinding to assembling.Naturally, together with the strict in-line controls directly carried out in BUT manufacturing facilities, further dimensional and destructive controls are methodically performed in the metallographic and metrological laboratories of the Group.

A MATTER OF STEEL

MANUFACTURING TECHNOLOGY

QUALITY PROGRAM



R&D Meets Production Needs

Every year the BUT Group invests more than **10% of total turnover for R&D**. The main target is to maximize product quality and performance, while reducing overall costs.
The main activities of R&D involve:

- **advanced calculation tools** to predict actual contact areas, load and pressure distributions, and von Mises stresses
- **new materials** for rings, rollers and cages in direct collaboration with renowned steelmakers worldwide.

Certified Metrology and Metallographic Laboratories

All metrological and metallographic laboratories in BUT facilities and Headquarters serve the **Quality Assurance** of the Group, guaranteeing the consistency of the goods that are finally supplied to customers.

The **metrological laboratories** are equipped with **latest generation devices** for the measurement of raceway and roller profile, roughness, waviness, roundness and all other geometrical and form parameters that may affect bearing quality and therefore performance.

The same applies to the **metallographic and metallurgical laboratories**, where highly skilled and trained engineers use leading-edge equipment to perform all kinds of analyses, including micro-hardness test, evaluation of steel non-metallic inclusions, segregation and porosity, blue fracture test and many other analyses.

- **heat treatments** to increase bearing fatigue life by reaching optimal material microstructure
- **surface coatings** to reduce friction coefficient and increase wear and corrosion resistance
- **endurance tests** performed on special test rigs according to sudden death method
- **technical seminars** to transfer latest findings to design department
- **collaboration with academic centers** on tribology and bearing design.

Complete Engineering Support

Bearing Design

In order to optimize bearing performance, BUT makes extensive use of proprietary and commercial software systems, which strictly comply with the relevant international standards. Along with classic **2D** drafting and **3D** modeling tools for mechanical engineering, BUT can also count on a set of specifically developed **evolutionary algorithms for mono- and multi-objective optimal design** of bearing macro-geometry in order to maximize bearing life. Finally, finite element (FEM) and semi-analytical (SAM) methods are selectively used to refine design solutions through advanced simulations.

Co-Engineering Activities

Whether it is a greenfield project or an existing application, BUT's Technical Department can be actively involved to co-engineer and co-design with the customer's technical office. **Joint activities** mainly base on the chance of creating synergies between different domains of knowledge and expertise. In case of new applications, BUT can offer technical advice regarding:

- **selection** of bearing type, size, arrangement, fit with conjugate parts, internal clearance or preload, seals, and lubricant
- **calculation** of actual bearing loads, residual internal clearance or preload after mounting and in operation, bearing starting and operating torque, operating temperature, etc.

For machinery already in operation, BUT can provide value-added recommendations for:

- **lubrication** system and lubricants, in order to favor elastohydrodynamic conditions and decrease overall operating temperature
- **regreasing intervals** and grease amount to be used
- **bearing handling and maintenance.**

Root Cause Failure Analysis

BUT can perform a full bearing root cause failure analysis (RCFA) by which it's possible to

- identify the **mechanisms** that caused the bearing to fail in a specific application
- assess bearing **steel cleanliness** for the eligibility process of steel suppliers
- analyze steel **microstructure and hardness** to validate heat treatment processes
- investigate **fracture nucleation and growth** using the latest optical microscopy techniques.

Assistance at Customer's Site

Application Engineering

BUT's Technical Team Unit (TTU) is the division of the Technical Department that offers **technical assistance** directly at customer's site. The Unit is made up of skilled application engineers and experienced mechanic technicians, it is able to:

- **bearing mounting supervision**
- **condition monitoring** services, including visual, shock and vibration analysis
- **training** with maintenance and technical staff, focusing on lubrication and correct mounting and dismounting procedures.

Reverse Engineering

Through the process of reverse engineering, BUT's Technical Team Unit can **deduce decisions from end products** in applications which have incomplete or obsolete documentation. The experience of BUT TTU is instrumental in solving **machine and bearing design problems** starting from little or no knowledge about the original components installed in the application. The analysis of the current mechanical design and operating conditions can also led to recommended **structural improvements**, optimizing the overall performance.

Asset Lifecycle Solutions

In today's business scenario, the effective management of assets throughout their lifecycle is crucial to deliver **value-added solutions**, improve productivity and reduce total costs. **BSS** (**Bearing Service and Solutions**) feature:

the 360° proposal worked out by BUT to support customers over the entire lifecycle of the asset, from early consultancy services to after-sales maintenance.
BSS aims to maximize the mechanical performance of the customer's application, creating **synergies** between BUT and the customer's knowledge and experience.

ENGINEERING & ASSISTANCE

SPECIAL PROJECTS

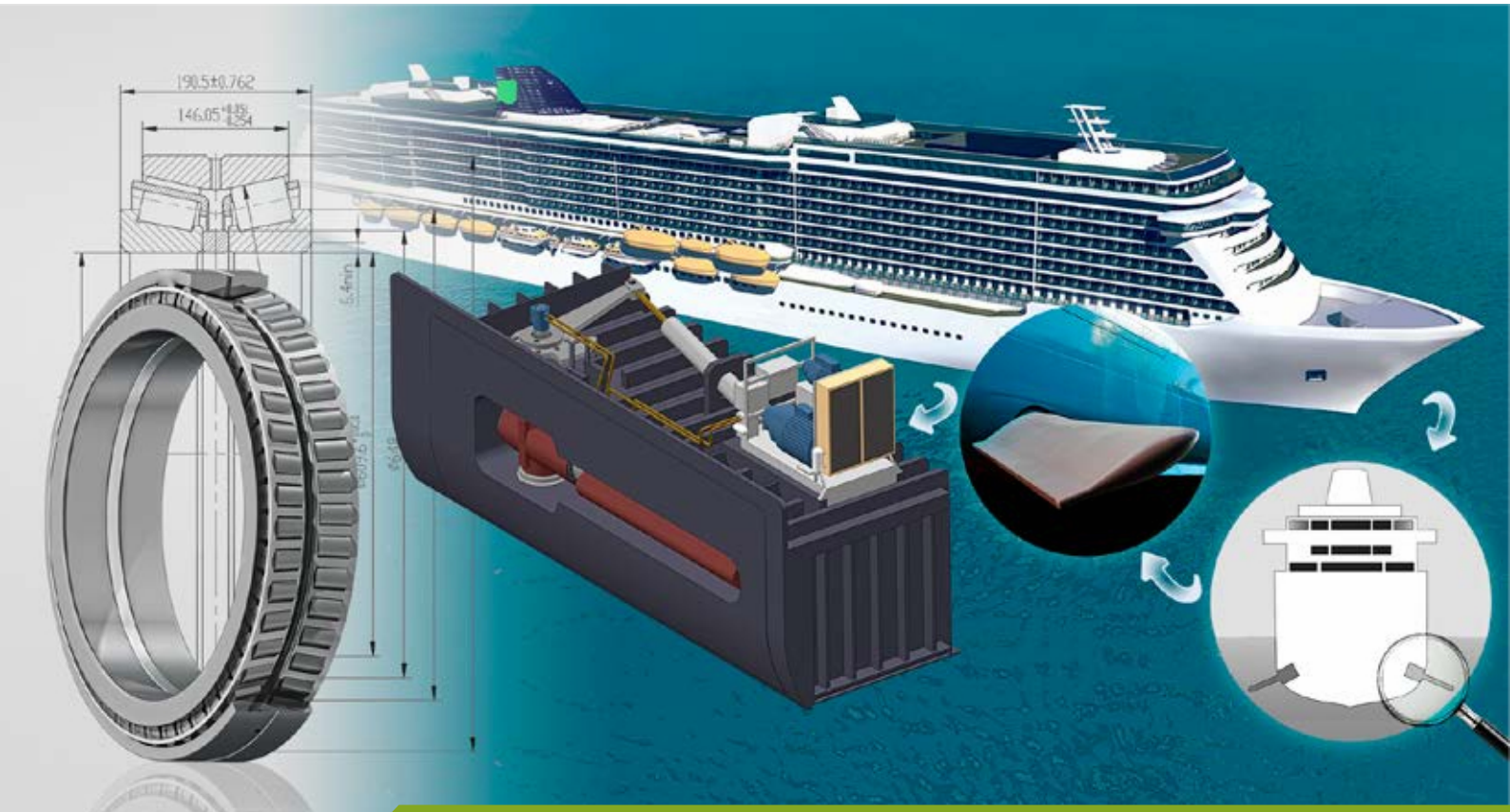
JUST IN TIME

Training and Seminars

Training is a cost-effective investment that yields **higher productivity and increased efficiency**. For this reason, BUT's Technical Department can offer a comprehensive and **customizable portfolio of seminars**, featuring highly skilled experts in the bearing industry.

The attendees of the training courses, which may take place both in BUT Headquarters and at the customer's plant, will increase their **knowledge** on the most significant bearing-related topics, thus improving their working efficacy.

Bearings for Gyrofin Stabilizer Systems



ENGINEERING & ASSISTANCE

SPECIAL PROJECTS

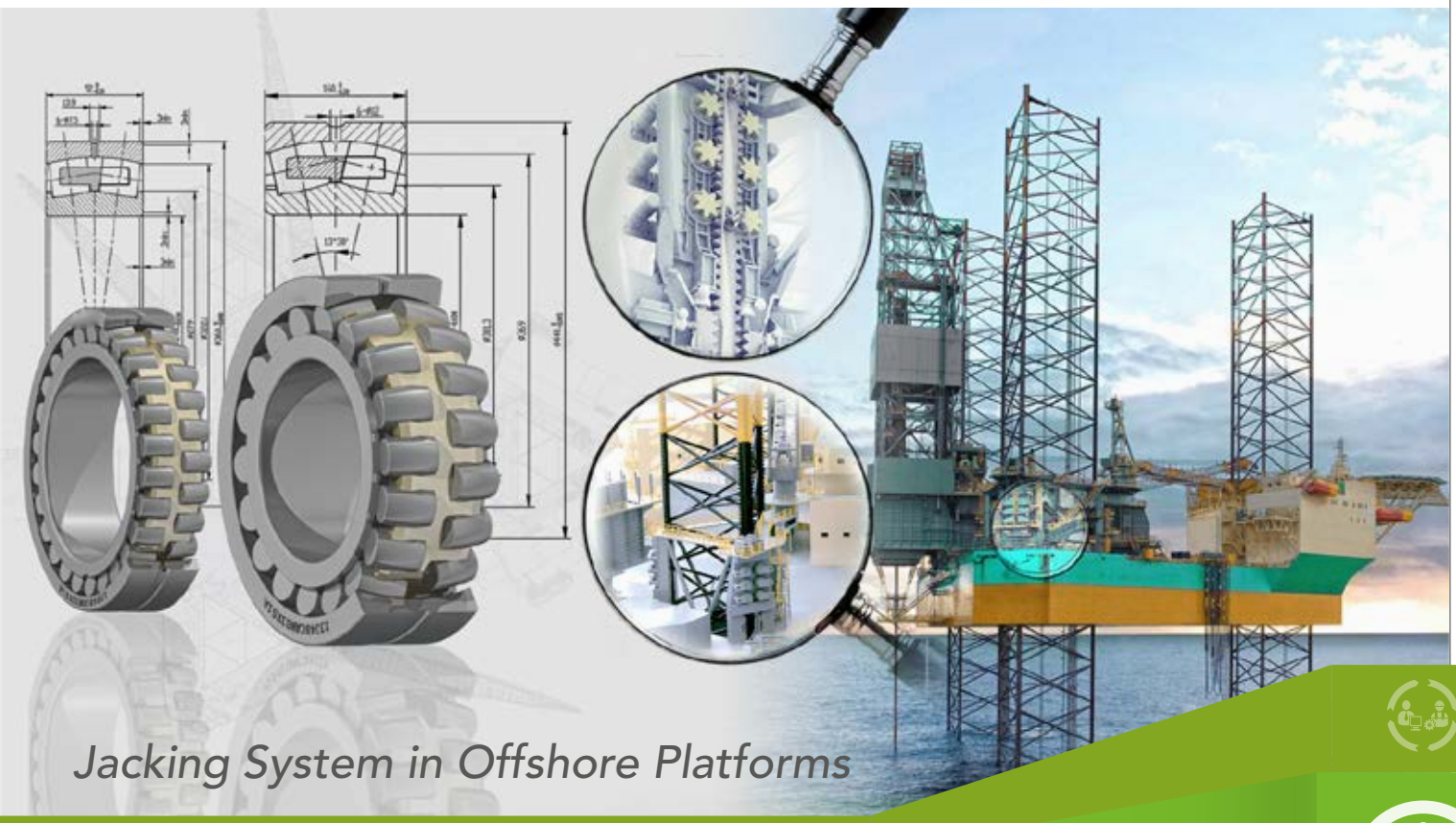
JUST IN TIME

Long Product Rolling Mill Stands

Special Solutions for Special Applications

BUT is actively engaged in the development, management and oversight of hundreds of special projects worldwide to support clients in the implementation of **original and customized bearing solutions** for their applications.

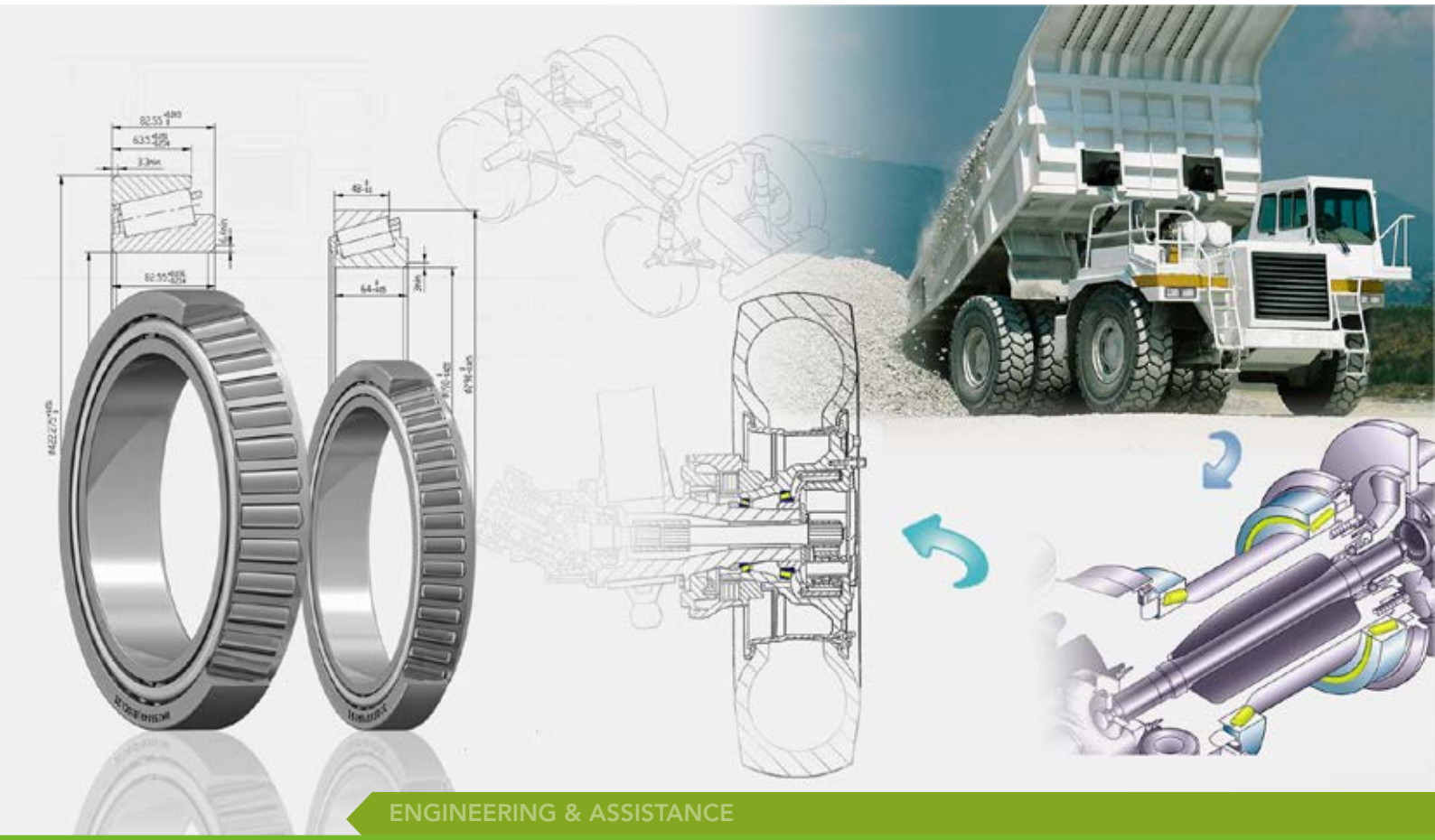
Collaborating with OEM and MRO companies, BUT can develop the best technical proposals in order to **meet customer requirements** in terms of specifications and rolling bearing performance.



Jacking System in Offshore Platforms

Vertical Lifting Systems for Bridge

Front and Rear Axles of Dump Trucks



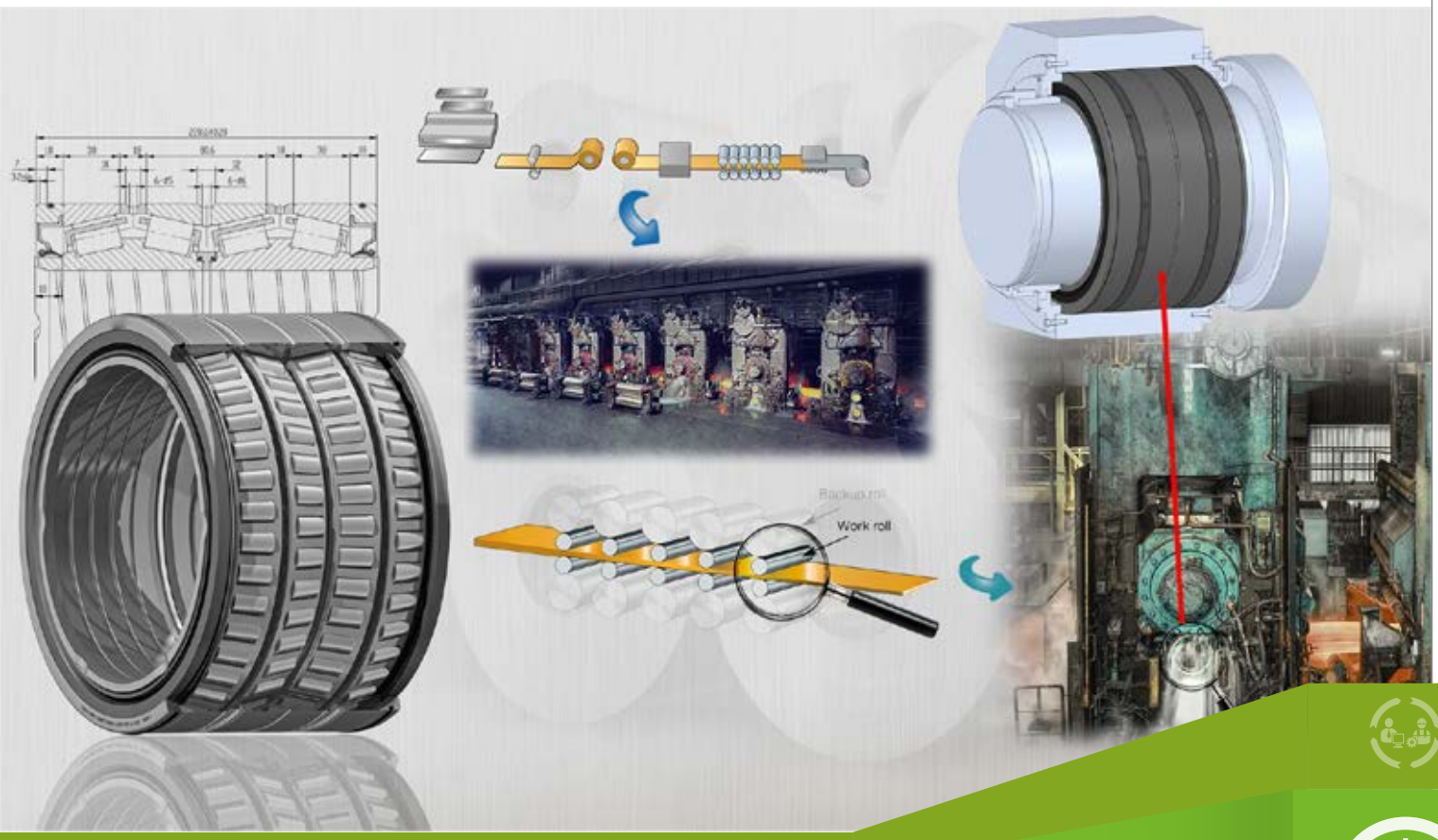
ENGINEERING & ASSISTANCE

SPECIAL PROJECTS

JUST IN TIME

Gearbox for the City Bus on Tyres

Work Rolls of Hot Rolling Mill Stands



Heavy Lift Dockside Crane Winches

PRODUCT TABLE

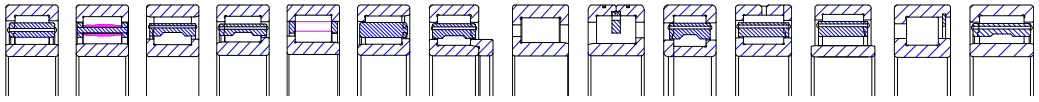
Cylindrical Roller Bearings

CYLINDRICAL ROLLERS

RADIAL

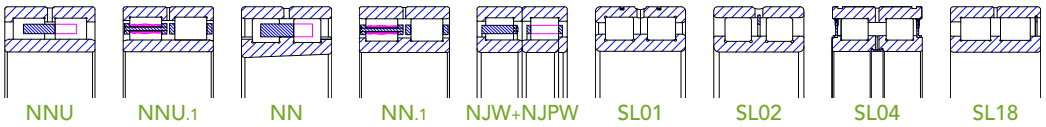
O.D. up to 1800 mm

Single Row Cylindrical Roller Bearings



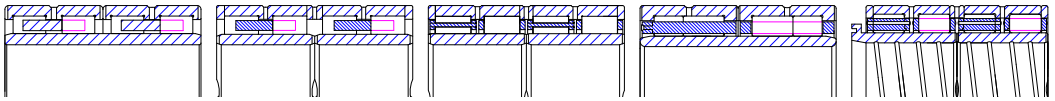
O.D. up to 1800 mm

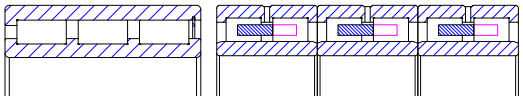
Double Row Cylindrical Roller Bearings



O.D. up to 1400 mm

Multi Row Cylindrical Roller Bearings





AXIAL

O.D. up to 1600 mm

Single Direction Cylindrical Roller Thrust Bearings

Double Direction Cylindrical Roller Thrust Bearings

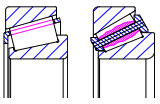
Tapered Roller Bearings

TAPERED ROLLERS

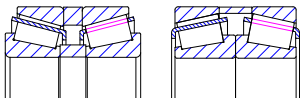
RADIAL

O.D. up to 1800 mm

Single Row Tapered Roller Bearings

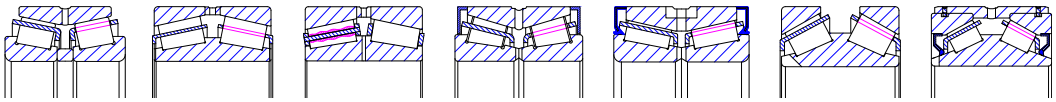


Single Row Paired Tapered Roller Bearings



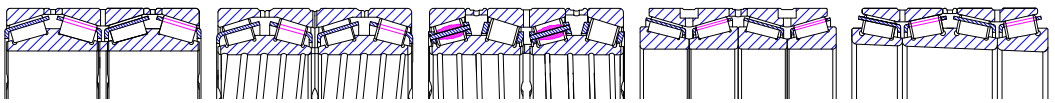
O.D. up to 1925 mm

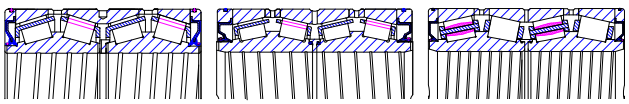
Double Row Tapered Roller Bearings



O.D. up to 1925 mm

Multi Row Tapered Roller Bearings

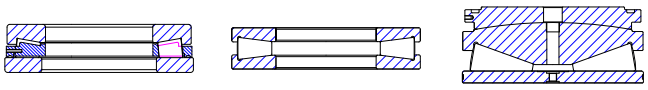




AXIAL

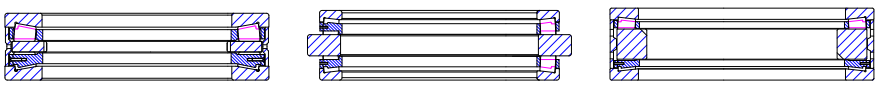
O.D. up to 1600 mm

Single Direction Tapered Roller Thrust Bearings



O.D. up to 1600 mm

Double Direction Tapered Roller Thrust Bearings



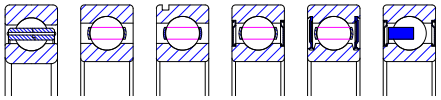
Ball Bearings

BALLS

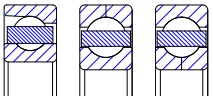
RADIAL

O.D. up to 1900 mm

Single Row Deep Groove Ball Bearings

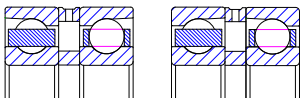


Single Row Angular Contact Ball Bearings

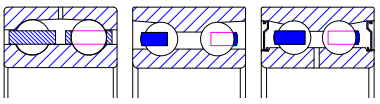


O.D. up to 1925 mm

Single Row Paired Angular Contact Ball Bearings



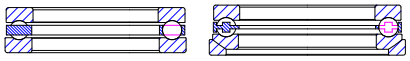
Double Row Angular Contact Ball Bearings



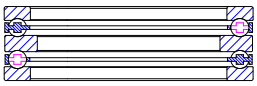
AXIAL

O.D. up to 1600 mm

Single Direction Thrust Ball Bearings



Double Direction Thrust Ball Bearings



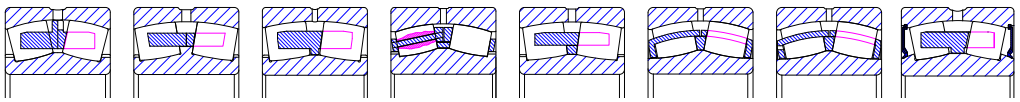
Spherical Roller Bearings

SPHERICAL ROLLERS

RADIAL

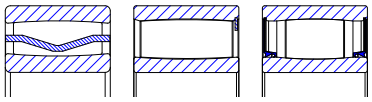
O.D. up to 1580 mm

Spherical Roller Bearings



O.D. up to 1400 mm

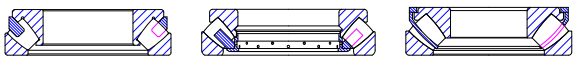
Toroidal Roller Bearings



AXIAL

O.D. up to 1400 mm

Spherical Roller Thrust Bearings

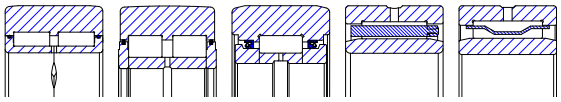


Other Products

RADIAL

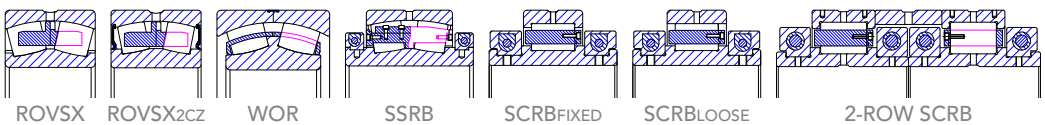
O.D. up to 400 mm

Track and Needle Roller Bearings



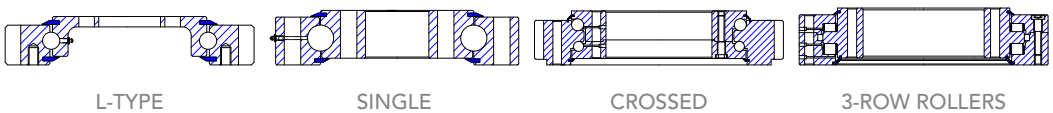
O.D. up to 1800 mm

Special and Split Roller Bearings



AXIAL

Slewing Bearings



Notes

1. Bearing dimensional and running accuracy according to ISO/AFBMA/GOST standards
2. All bearings available in metric and inch sizes, with cylindrical or tapered bore
3. Special features available on request

BUT

BEARINGS UNIVERSAL TECH