RKB multi-level quality control system for rolling bearings

It is a widely shared statement that, regarding manufacturing, effective execution of all production stages is compulsory for actually achieving high-quality, competitive products. RKB fully complies and supports this integrated production framework, in which each stage preserves its distinctive status and contribution in the production chain. This presentation focuses on the RKB multi-level quality control system for rolling bearings.

A reliable, exigent, comprehensive, and well-organized quality control system is a must for producing high-performance rolling bearings. The RKB quality control program is rooted and sustained by our entire team's focus on quality, encompassing controls performed on multiple levels, from raw material procurement to pre-process and in-process operations and ending with post-process check activities.

As a part of the RKB Technical Division, the Quality Control Bureau is the main operational structure dedicated to creating quality procedures and performing tests and measurements to issue the quality certificates throughout the manufacturing process.

Quality Control Bureau first comes into play during the choice of all RKB suppliers. In this sense, the raw material selection process is one of the most critical topics. It is of paramount importance to provide customers with products of the highest possible reliability, and this implies, among other prerequisites, the use of only high-class raw materials. Besides the certificates provided by RKB suppliers, before allowing the clearance to its perimeter, the Quality Control Bureau arranges for its specific tests inside HQ's laboratories and facilities. The raw material quality control performed by RKB applies to both through-hardened and case-hardened steel, being based on multi-test inspections, according to our Material Guidelines and Protocols. Our advanced equipment and experienced personnel make possible the achievement of one of the most important tasks: the correct evaluation of steel cleanliness level. It is a crucial task in tribology, letting the real bearing life meet the minimum life estimation, theoretically calculated according to the fatigue theory.

Following confirmed positive results of quality controls on raw materials, the pre-process control level is performed. This procedure mainly involves the use of masterpieces for rings and rollers manufacturing. The masterpieces are extremely accurate bearing component prototypes. They have high-quality machined surfaces and very tight ranges of dimensional and geometrical tolerances and are used to calibrate the measuring instruments involved in the production process. The decision to use masterpieces for all product lines rises from the need for more precise and, therefore, reliable products. We produce the masterpieces with ultra-high precision machine tools endowed with the latest technologies. Using them reduce manufacturing time and errors, ensuring long-term consistent top quality. The final approval implies accurate measurements of the dimensions, geometrical and surface quality parameters, using precise measuring instruments, in a strictly controlled environment, according to main International Standards and internal protocols.

The in-process quality operations refer to the controls performed throughout the strictly speaking "bearing manufacturing process". They ensure consistency in product quality during all stages of bearing production by adopting the most modern and advanced quality control techniques in forging, heat treatment, machining and assembly.

More in-depth, after the raw material approval, the forging process begins, encompassing steel bar or ingot cutting, heating, upset forging, or upset pressing and rolling. Every steel bar or ingot lot enters the forging area accompanied by the related Quality Control Data Sheet that specifies, besides other data, type and quality grades of steel, dimensions and weight of the material. This way, according to the Forging Operational Plan, the technicians can easily set the correct heating temperature ranges and forging ratios, which are crucial parameters for this process. After forging, the components are dimensionally examined, and the relevant data is recorded.

All our bearing steels are heat-treated in-house to get optimum mechanical properties and the complete traceability of the process. After the heat treatment, we check a series of parameters concerning form, hardness, and microstructure. If the test results are below the specifications set by the afferent applicable International Standards and RKB internal protocols, the cause of the error is determined, and all suspected components are isolated and carefully reinspected after the corrective actions are applied. Whenever they are recoverable, they can be properly retreated once again. To get complete traceability, RKB records all the parameters specific to every lot in a special database.

The quality controls connected to the machining process start with the set-up of every machine tool according to the RKB production method. RKB specialists and operators verify these settings at regular intervals during production through inline quality control and at the end of each single manufacturing phase, according to RKB Quality Control Plan.

At the end of every turning and grinding operation of rings and rollers, a check for compliance with the tight tolerances of masterpieces is then performed. An integral calibrated system that ensures all measures are within the allowable tolerances and under RKB internal manufacturing drawings control a series of dimensions and geometrical and surface quality parameters.

Specific non-destructive controls like the Magnetic Particle Inspection for detecting superficial micro-cracks and the Ultrasonic Micro-Crack Detection for under-surface micro-cracks location are regularly performed on rings and rollers during the production process.Moreover, a visual check of the parts ready for assembly is always carried out to avoid any noticeable anomaly.

Selections and sorting of rolling elements and rings in groups of defined grades for correct matching are made to get the radial internal clearance specified by the pertinent bearing technical drawing.

As yet another confirmation of our support for the clients' specific needs, RKB releases, on request, additional quality certifications.

To produce state-of-the-art bearings of Swiss origin, RKB Group has been unceasingly implementing a serious investment plan that involves R&D, design and engineering, quality assurance, machining and logistic activities.

More information about RKB can be found at www.rkbbearings.com.