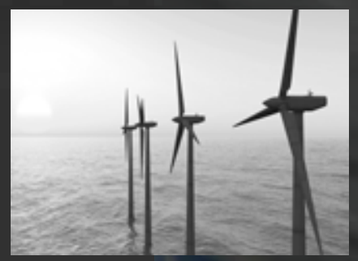
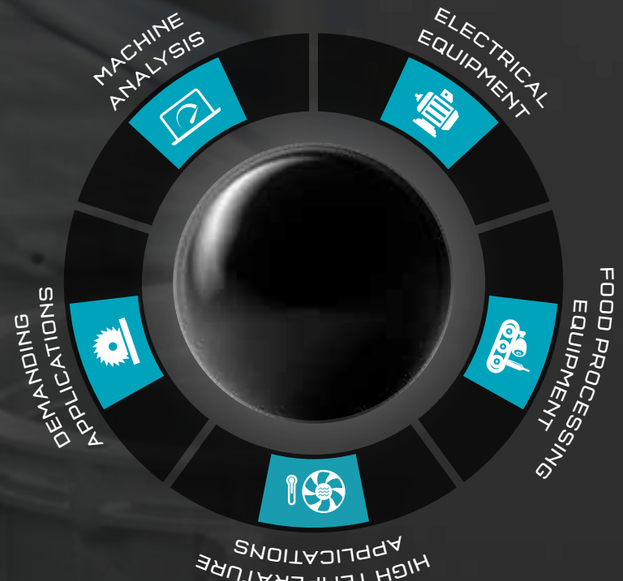
Saving operating costs by optimising with bearings

ceramicspeed

Bearings that last!



CeramicSpeed manufactures and markets a complete range of ball bearings and roller bearings, which feature a higher performance than traditional steel bearings. These bearing solutions assist the industry with optimisations, to achieve new competitive advantages.



Product selection

- Know-how and experience
- Product overview
- Customer case studies

CeramicSpeed manufactures and markets a complete range of ball bearings and roller bearings, which feature a higher performance than traditional steel bearings. These bearing solutions assist the industry with optimisations, to achieve new competitive advantages.

Know-how and experience are essential
For the components used in industrial applications, the requirements are continuously growing. Traditional materials such as steel are pushed to the limit of their application. With the help of new material technology, that make use of ceramics and coatings, the opportunities for continuous optimisation are highly extended. At CeramicSpeed, we have more than 15 years of know-how specialising in the field of bearings.

Hundreds of companies from several industrial branches have achieved major business operation savings, simply by optimising their equipment with CeramicSpeed Bearings. The companies have moved away from the idea of continuous bearing replacement and instead, they switched over to employing "bearings that last". At CeramicSpeed, we believe it is our task to spread the knowledge and accessibility of the best bearing solutions.

Product selection

Ceramic bearings
- Deep grove ball bearings
- Y/UC ball bearings
- Thin section ball bearings
- Angular contact ball bearings
- High-speed precision ball bearings
- Self-aligning ball bearings
- Thrust ball bearings
- Double row ball bearings
- Four point contact ball bearings

Roller Bearings
- Cylindrical roller bearings
- Tapered roller bearings
- Spherical roller bearings
- Thrust roller bearings

Linear motion
- Ball rail systems
- Ball screw systems
- Linear bushing system

Silicon Nitride balls
- Ceramic balls

Coated parts
- LongLife HardCoat
- LongLife WearCoat
- LongLife CorroCoat

Optimisation & Monitoring
- Predictive monitoring
- OptimiZe
- Balancing

Maintenance
- Mounting and dismounting tools
- Induction heater

4-8 times longer service life
- 99.4 % of CeramicSpeeds Bearings last at least 4 times longer
- 50 % of the bearings last 8-20 times longer

70 % less energy consumption
- 14-47 °C lower operating temperature than standard steel bearings
- Improves the effiency of electric motors by up to 1 %

Increased competitive performance
- Simplify maintenance planning
- Service costs will be reduced
- Increased productivity

LongLife Series

LongLife Insulate
CeramicSpeed Hybrid Bearings for electric motors and other environments where it is necessary to prevent bearing currents from passing through the bearing. The CeramicSpeed Balls are nonconductive and we provide a guarantee against bearing current. Additionally, LongLife Insulate Bearings reduce energy loss in the bearing by 70 %.

LongLife Xtreme
Bearings for contaminated environments, where particles can enter the bearing and affect its performance. The extreme hardness of the balls means that they simply crush any foreign particles which enter the bearing. Xtreme Bearings last at least 4-8 times longer than standard steel bearings.

LongLife HighTemp
Ceramic balls and hi-tech components are combined to create a unique HighTemp series, for use in operating environments of up to 260 °C and 350 °C. This is largely made possible by the ceramic balls, which expand 70 % less than steel balls.

LongLife Corrotec/ CorroCoat
Bearings which are specially developed for humid environments. Stainless steel races, ceramic balls, synthetic cages and the optimal lubricant combine to form bearings with unique properties in terms of resistance and service life. Food industry approved lubricant is used in LongLife Corrotec Bearings. The bearing is also available as a coated version, which delivers increased protection against corrosion and even lower friction.

LongLife HardCoat
A coating with extremely good friction and wear reducing properties. The greatest hardness and lowest friction are achieved by using LongLife HardCoat - a flexible coating, which follows the material and doesn't flake.

LongLife WearCoat
A coating which is extremely effective in reducing wear and friction. The coating also offers limited protection from rust.

LongLife Xtreme

Improved competitiveness by reduced bearing purchase

One of Denmark's largest sawmills started years back the optimisation of its production equipment with CeramicSpeed to improve its production uptime. Before the start of the optimisation program with CeramicSpeed, the company used to change its bearings every 6th month. To date, the CeramicSpeed Bearings have been running 8 times longer than the bearings used before.

The saws are delivered from the manufacturer with steel bearings that have a 3 months service life. The first step in the optimisation program was to replace these bearings with alternative bearings, which doubled the service life to 6 months. As this was yet not an optimal solution, the company engaged in the process of replacing the steel bearings with ceramic bearings.

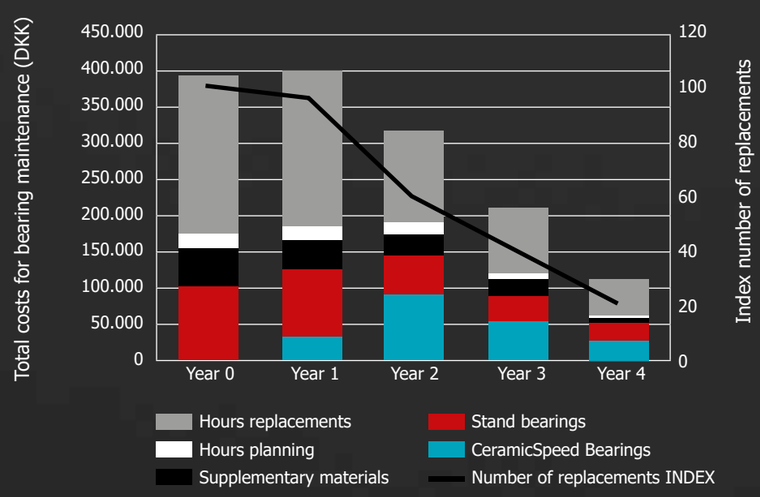
The team went over the production process, eliminating as many bearing replacements as possible, in order to determine which bearings were optimal to replace on the machines. Finally, the total project of optimisation consisted of CeramicSpeed Roller Bearings, Ball Bearings and Linear Guides.

In addition to considerably less bearing replacement, the company reduced the costs substantially, eliminating follow-up costs as well as maintenance hours. After 4 years from the start-up, the company has saved 290.000 DKK/year, and at the same time, the bearing replacement has been cut down by 80 %. The complete process of optimisation with CeramicSpeed Bearings throughout the production facility has contributed to an increased competitiveness of the company.

Application
- 8 saws
- Timber Conveyors
- Linear guides
- Carts in the pressure impregnating facility

Highlights
- Rotation speed: From oscillating operation to 1,500 RPM
- Bearing temperature: 40 ^{0}C – 80 ^{0}C
- Lubrication: NLGI-2 lubricant with EP additive
- Environment: Environment highly contaminated with wood shavings, and etc.

Products
- A varity af ceramic hybrid bearings and hybrid linear guides.



As the chart shows, the cost of the bearings alone is only a small part of the total costs of bearing maintenance. The much bigger part is represented by hours and additional materials.

LongLife Corrotec

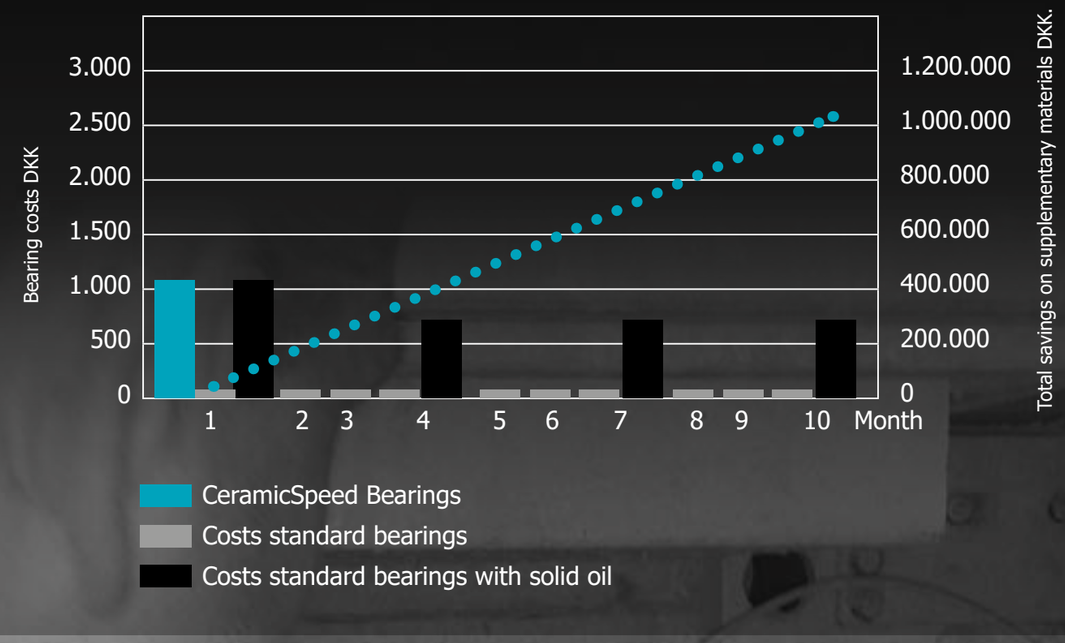
Less stop in production with CeramicSpeed Bearings

A global manufacturer of interior doors increases production efficiency with CeramicSpeed Bearings. In the company's painting facility the bearings are facing an extremely demanding environment, where they are exposed to paint thinner, paint, hardener and acid. As the entire production is automated, it means that a stop in the painting facility requires also a halt in the rest of the production. Due to this, the company has registered an annual loss of 1,25 million DKK.

In an attempt to solve these challenges, the company has tested several different high-quality steel bearings on the market, which have increased the service life to 3 months. The cleaning cart in the painting department was reviewed, and on critical positions CeramicSpeed Bearings were mounted, translated to an equivalent of 80 % of the bearings. Thanks to this replacement, the bearing service life has now reached 9 months and the bearings continue to run, without wear. The costs caused by unplanned downtime have been halfed, which has earned the company savings of 625,000 DKK.

The company's maintenance manager said: "Increased service life, great savings in the long term, less maintenance, optimised production, and last, but not least, more time left for preventive maintenance – in a nutshell these are the valuable advantages we have gained by switching to CeramicSpeed Bearings".

Costs and savings after replacement with CeramicSpeed Bearings



Application
- Barrels on cleaning carts in the painting facility

Highlights
- Rotation speed: 60 RPM
- Temperature: 30 ^{0}C
- Lubrication: NLGI-2 grease
- Environment: Contaminated by paint thinner, paint, hardener and acid.

Products
- LongLife Corrotec 6205/2RS1.CSB

LongLife Insulate

Bearing temperature plays a critical role in the production efficiency

CeramicSpeed Bearings are mounted in an electric motor within one of Denmark's largest dairies. The dairy has production facilities in several countries and more than 19,000 employees around the world.

The dairy was experiencing big issues with the durability of the steel bearings that they were using. As the products manufactured by the dairy contain many small particles, which penetrate into the bearings, the bearing service life was significantly reduced.

To maintain an efficient production, it is crucial that the bearing temperature never exceeds 80 ^{0}C. In order to control the temperature, the dairy was thus forced to implement a permanent temperature control on the machines, which would automatically stop its function as soon as the temperature exceeded the 80 ^{0}C limit.

When using standard steel bearings, its default temperature was 60 ^{0}C, the expected bearing service life was 1,200 hours and the realised durability was of approx. 1,000 hours.

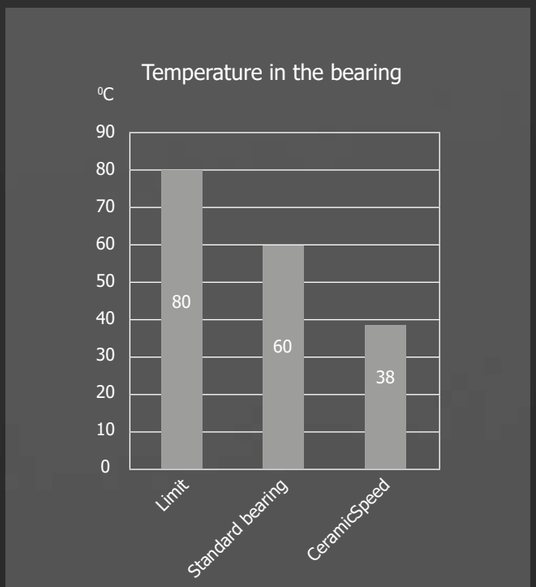
Facing these challenges, the dairy decided to optimise one of the machines in a project carried out in close cooperation with CeramicSpeed, aiming to reduce the risk of production shutdown. By using the CeramicSpeed Bearings, the default temperature was lowered to a level of just 38 ^{0}C, and at the same time, the dairy had the chance to use food-approved lubricant in the bearings.

As a result of the optimisation with the CeramicSpeed Bearings, the measurements after 1,000 hours of continuous production showed that the bearing temperature was stable at 38 ^{0}C showing no signs of wear. It is important to mention that the bearing lubrication plays a significant role as well. Reducing the bearing temperature by 15 ^{0}C, the lubricant's service life is doubled, and the bearing's service life is quadrupled.

Application
- Elektric motor

Highlights
- Rotational speed: 2800-3200 RPM
- Bearing temperature: 38 ^{0}C – 60 ^{0}C
- Lubrication: Food approved lubricant
- Environment: Environment contaminated with small particles of whey powder

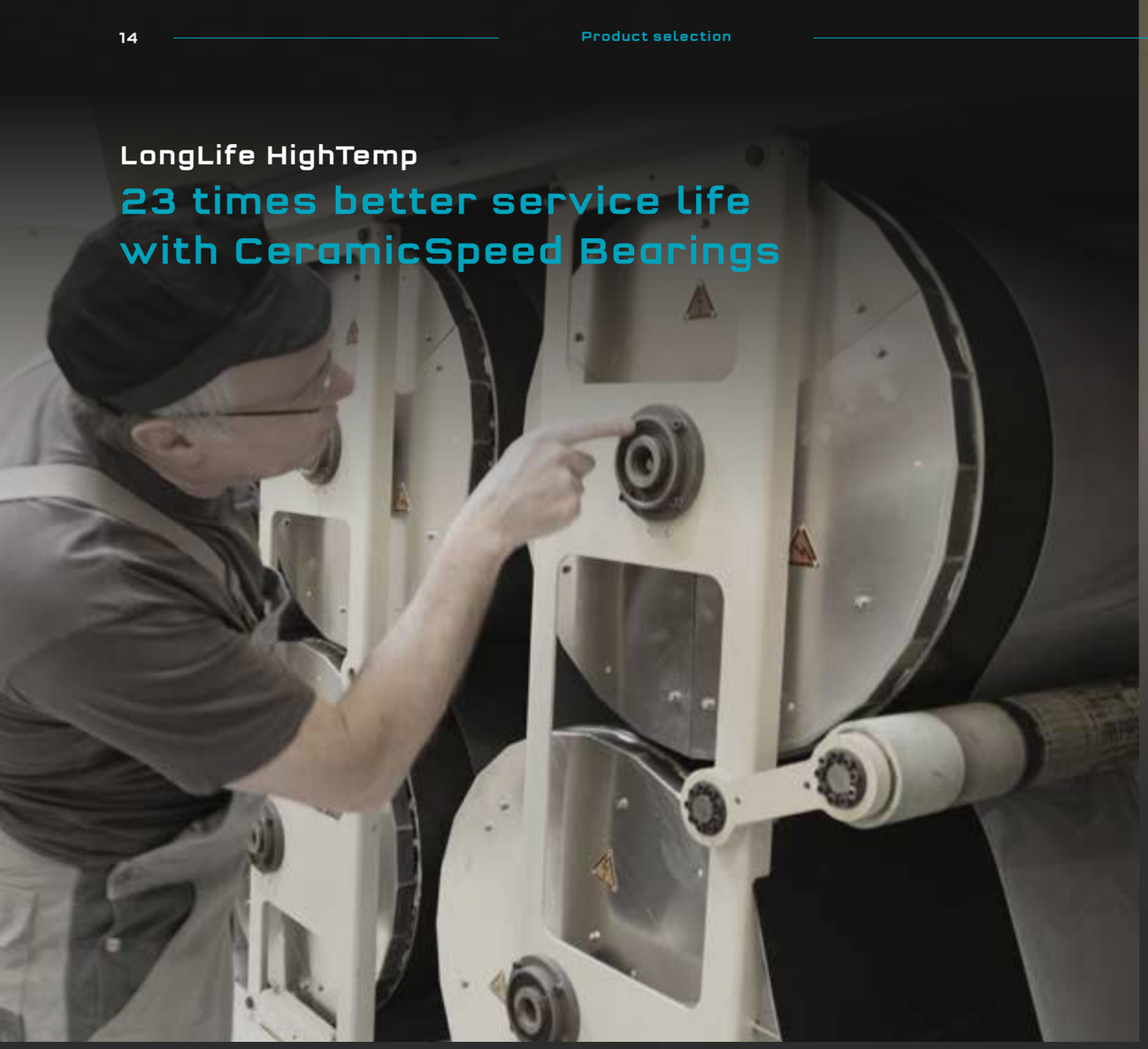
Product
- LongLife Insulate 6010/2RS.CS3



The bearing temperature plays a significant role in the achieved service life, and thus in avoiding unnecessary production halts.

LongLife HighTemp

23 times better service life with CeramicSpeed Bearings



Plastic dust is one of the challenges that threaten the bearings service life, an issue that one of Europe's leading plastics manufacturers has experienced. Mounted in ovens where the plastic film is extruded 24 hours a day, the bearings are facing a harsh environment, where the temperature varies between 150 ^{0}C – 170 ^{0}C. Running at an average of 12-15 start/stop per minute, followed by vibrations, no air circulation and plastic dust, the service life of a steel bearing is about 2 weeks. Machine crashes caused by bearing failures have huge economic implications, as the oven must be cooled before any bearing can be replaced. Each operation of this kind means a loss caused by a 6-7 hour downtime, every second week.

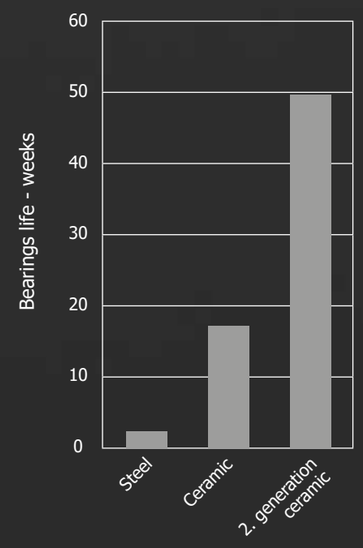
Back in 2004, the first CeramicSpeed Bearings were delivered to the company for a testing period of 14 weeks. After the 14 weeks, the bearings were checked, and no signs of wear were found. Thanks to the positive results, after the test period CeramicSpeed has further optimised the bearings with different cages and a new special lubricant. Today, the CeramicSpeed Bearings feature a service life of 55-75 weeks.

In spite of the higher purchase price of ceramic bearings, the investment is recovered already after the bearing service life has been extended by 2 to 3 times. Thanks to the replacement with CeramicSpeed Bearings, which are specially developed with a focus on the specific application, the service life is 23 times higher.

Application
- Transmission in the ovens

Highlights
- Rotation speed: 0-150 RPM
- Temperature: 170 ^{0}C – 190 ^{0}C
- Lubrication: Special grease customized for the application
- Environment: Heat, vibrations and contamination with plastic dust

Products:
- LongLife HighTemp 6004.CSB



23 times better bearing service life means increased efficiency and reduced maintenance costs.

Product advantages

- Energy-efficient
- Durable
- Reliable

Robust bearings with long service life provide better production efficiency

The bearings often figure only a small percentage of the total costs. Contrariwise, the costs for the servicing of bearings are many times higher than the bearing cost. Therefore, there is a big savings potential when choosing bearings that provide a longer service life.

A research based on the analysis of 1,000 bearings shows that 99.6 % of CeramicSpeed Bearings last a minimum of 4 times longer than the standard bearings they replace. In 50 % of the cases, they last even up to 8-20 times longer. This is why the price premium for the CeramicSpeed Bearing solutions are earned back on average by the 1st or 2nd service life of a traditional bearing. For bearings that last under 1 or 2 years, this means significant production efficiency benefits. In addition to longer service life, the CeramicSpeed Bearings provide a wider range of additional benefits, which contribute to a better production efficiency.

Bearing service life calculator

Medium to hard operation (load, lubrication, contamination, temperature)

Standard steel balls and steel roller bearings

CeramicSpeed Roller Bearings – ceramic coated rollers

CeramicSpeed Ball Bearings – ceramic balls

The bearings were tested under identical conditions. In comparison with standard steel bearings, the two types of CeramicSpeed bearings have a service life which is 4-20 times longer.

Simplified maintenance and improved competitiveness

4 times longer service life

Stable during the entire operating period

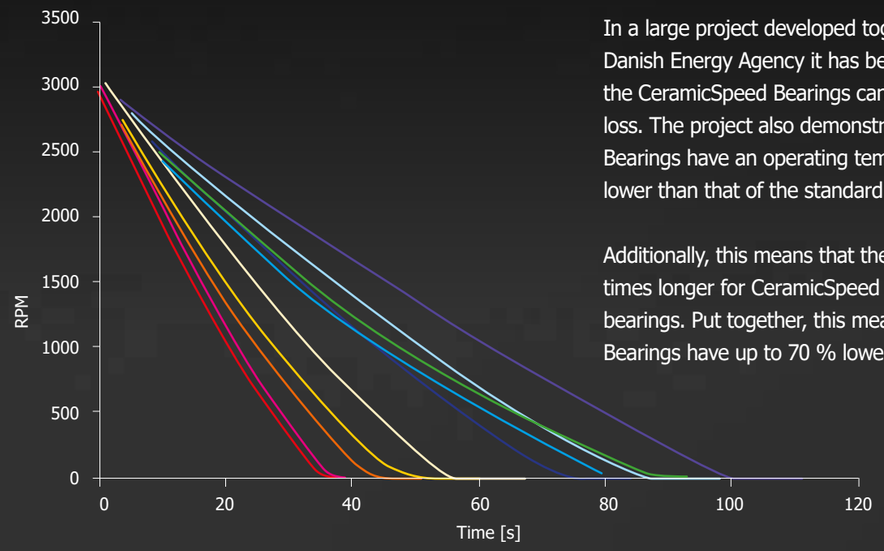
Bearings with long service life provide the opportunity to systematically remove the bearings, which disrupt production and constrain the production capacity. Instead of regular bearing replacement, the CeramicSpeed Bearings allow you to carefully plan for few larger maintenance programmes. By using CeramicSpeed OptimiZe, a solution that monitors the machinery, it is possible to act in before the damage occurs. Hence, maintenance can be planned when it least interferes with the production, avoiding additional costs.

The uptime is crucial for the production economy and thus competitiveness. Bearings manufactured with a focus on the function of the machine contribute to a better and more precise use of the production equipment. This provides a stable operation for the entire bearing service life, and leads to a reduced need for adjustments and corrections in pace with the natural wear of the equipment.

Try our web app to calculate the ROI using CeramicSpeed Bearings in your production environment.

Scan the QR code with your smart phone or go to roi.ceramicspeed.com to calculate your ROI in a few simple steps.

Reduced energy losses in the bearing by up to 70 %



In a large project developed together with the Danish Energy Agency it has been documented that the CeramicSpeed Bearings can reduce bearing energy loss. The project also demonstrated that CeramicSpeed Bearings have an operating temperature, which is 14-47 ^{0}C lower than that of the standard steel bearings.

Additionally, this means that the run-down time is 2-4 times longer for CeramicSpeed Bearings than it is for steel bearings. Put together, this means that the CeramicSpeed Bearings have up to 70 % lower energy consumption.

CeramicSpeed Bearings	Steel bearings
Motor 01	Motor 06
Motor 02	Motor 07
Motor 03	Motor 08
Motor 04	Motor 09
Motor 05	Motor 10

Source: Report on the use of energy-efficient bearing solutions in the industry. The Danish Technological Institute, September 2016.

Guarantee against bearing currents

Ceramic bearings are able to withstand voltages 80-800 times higher than the voltages, which steel bearing with insulation coated rings can withstand (up to 1-3kV). Thanks to the extremely high quality and the insulation properties of the CeramicSpeed Balls, we offer a guarantee against the passage of electrical current.

We ensure that your investment in CeramicSpeed Bearings is repaid in direct savings in maintenance costs (labour and materials). When steel bearings, that last for one year or less, are replaced with CeramicSpeed Bearings, we offer a NO RISK Guarantee.

NO RISK • GUARANTEE

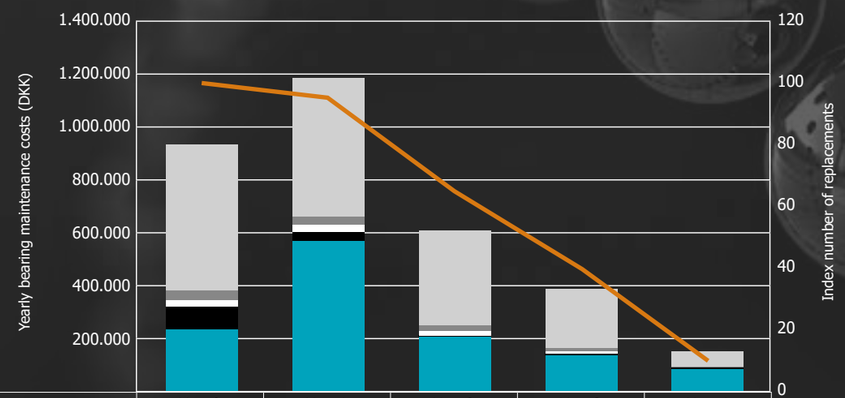
If the investment in CeramicSpeed Bearings is not in accordance with our ROI proposal, we provide you with new replacement bearings for the machine in question.

ALL-IN pays off...

Several large Danish companies have learned from the consequences of expensive, unplanned production halts, which cause huge costs. Companies are replacing all bearings with CeramicSpeed Bearings, combining this with the condition monitoring of critical machines. Companies are thus able to transform the unplanned halts to planned stops, at the same time stepping in before any expensive breakdown occurs. This means that companies have the chance to a better use of resources in the maintenance department, as well as reducing the maintenance costs in general.

”Over time, we expect far fewer breakdowns caused by standard bearings. This is without a doubt, thanks to the ceramic balls as well as the other components, that the CeramicSpeed Bearings consist of. These are not standard bearings in the usual way, these are bearings manufactured with a focus on the machine, and the environment that they are used in. Although the bearings are more expensive, this is not significant. Thanks to these bearings, the costs for other machinery parts, which are typically also affected during a breakdown, as well as the lost production capacity, are avoided, reducing the total costs significantly. There is actually a lot of money to save,” says the chief of maintenance at a major Danish dairy plant.

An investment that pays off

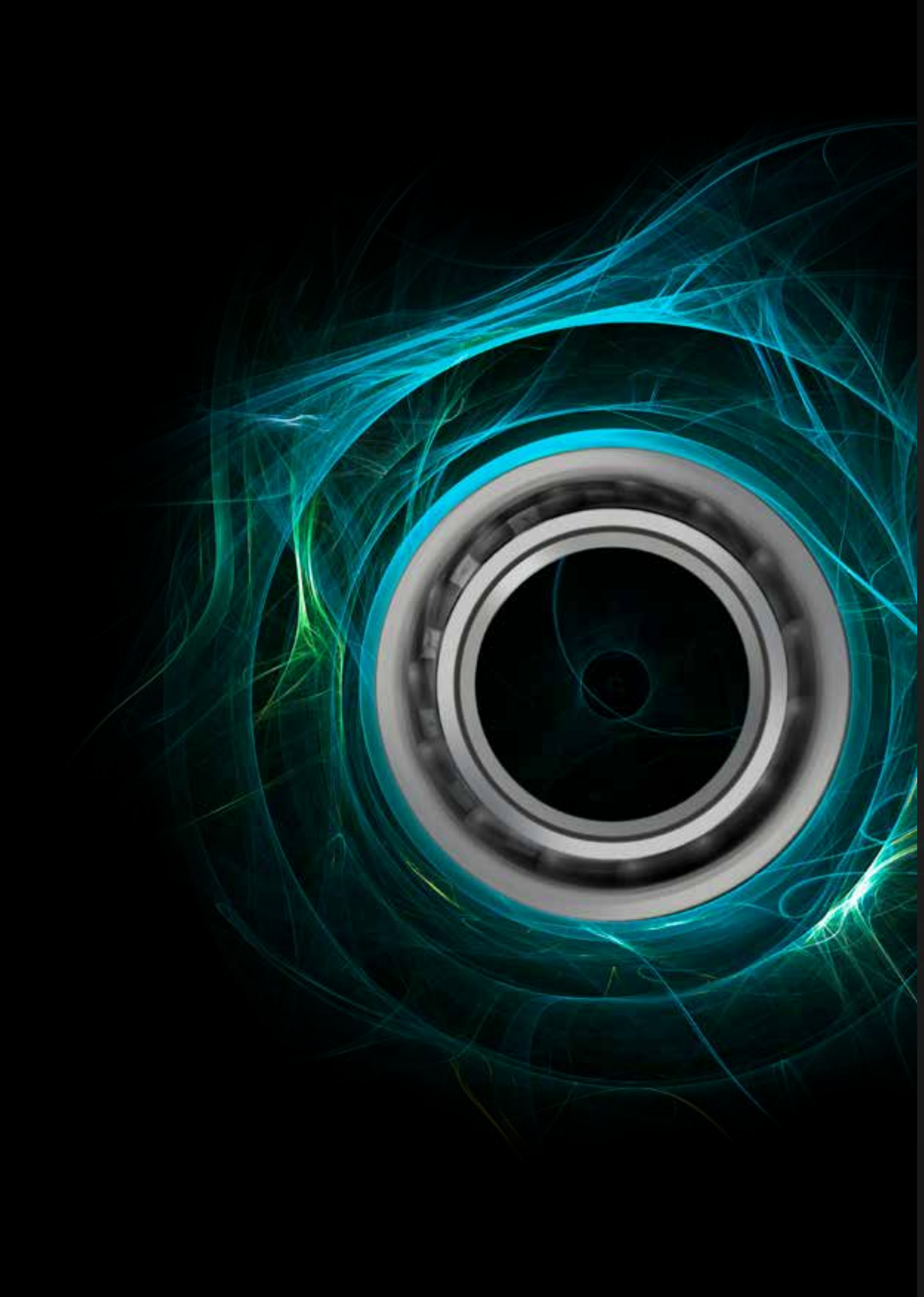


	Year 0	Year 1	Year 2	Year 3	Year 4
Hours replacements (DKK)	550.000	522.500	357.000	220.000	55.000
Hours planning (DKK)	35.000	33.250	22.750	14.000	3.500
Supplementary materials (DKK)	25.000	23.750	16.250	10.000	2.500
Standard bearings (DKK)	86.000	34.722	5.000	4.000	3.000
CeramicSpeed Bearings (DKK)	235.315	571.140	208.000	139.000	86.805
Number of replacements INDEX	100	95	65	40	10

CeramicSpeed Bearings in all production equipment

Bearings costs - a small price for greater gains

Increased production efficiency



ELECTRICAL EQUIPMENT

Electrical equipments

Applications: Electrical Motors - Generators

- Product overview
  LongLife Insulate - sealed
- Product overview
  LongLife Insulate - open

ELECTRICAL EQUIPMENT

LongLife Insulate

The CeramicSpeed LongLife Insulate series features CeramicSpeed Bearings for electrical motors, generators, and other environments, where the passage of electrical current must be avoided. The CeramicSpeed Balls are non-conductive and have an insulating capacity of at least 15 kV/mm. Another important factor to these bearings are the large energy savings that the CeramicSpeed Bearings deliver – up to 70 %.

- 4-8 times longer service life
- Typically earned back by the first saved replacement
- The operating temperature is 14-47 ^{0}C lower than the temperature in the steel bearings
- Up to 70 % less energy consumption in the bearing
- Higher insulating power
- Higher RPM - typically 50 % over steel bearings
- Can run under low lubrication conditions
- Extremely resistant to contamination
- Reduced operating costs thanks to the bearings' longer service life
- Better uptime of machinery which ensures higher competitiveness

LongLife Insulate sealed

d [mm]	D	B	C [kN]	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
5	16	5	1,14	0,38	70000	3	Insulate 005 625-2RZ/CSB.C3
6	19	6	2,34	0,95	60000	3	Insulate 006 626-2RZ/CSB.C3
7	19	6	2,34	0,95	60000	3	Insulate 007 607-2RZ/CSB.C3
7	22	7	3,45	1,37	53000	3	Insulate 007 627-2RZ/CSB.C3
8	22	7	3,45	1,37	53000	3	Insulate 008 608-2RZ/CSB.C3
10	26	8	4,75	1,96	45000	3	Insulate 010 6000-2RZ/CSB.C3
10	30	9	5,40	2,36	43000	3	Insulate 010 6200-2RZ/CSB.C3
10	35	11	8,52	3,4	39000	5	Insulate 010 6300-2RZ/CSB.C3
12	28	8	5,40	2,36	43000	3	Insulate 012 6001-2RZ/CSB.C3
12	32	10	7,28	3,1	38000	3	Insulate 012 6201-2RZ/CSB.C3
12	37	12	10,10	4,15	33000	5	Insulate 012 6301-2RZ/CSB.C3
15	32	9	5,85	2,85	36000	3	Insulate 015 6002-2RZ/CSB.C3
15	35	11	8,06	3,75	32000	3	Insulate 015 6202-2RZ/CSB.C3
15	42	13	11,90	5,4	28000	5	Insulate 015 6302-2RZ/CSB.C3
17	35	10	6,37	3,25	32000	3	Insulate 017 6003-2RZ/CSB.C3
17	40	12	9,95	4,75	28000	3	Insulate 017 6203-2RZ/CSB.C3
17	47	14	14,30	6,5	26000	5	Insulate 017 6303-2RZ/CSB.C3
20	42	12	9,95	5	26000	3	Insulate 020 6004-2RZ/CSB.C3
20	47	14	13,5	6,55	24000	3	Insulate 020 6204-2RZ/CSB.C3
20	52	15	16,8	7,8	23000	5	Insulate 020 6304-2RZ/CSB.C3
25	47	12	11,9	6,55	22000	3	Insulate 025 6005-2RZ/CSB.C3
25	52	15	14,8	7,8	22000	3	Insulate 025 6205-2RZ/CSB.C3
25	62	17	23,4	11,6	20000	5	Insulate 025 6305-2RZ/CSB.C3
30	55	13	13,8	8,3	19000	3	Insulate 030 6006-2RZ/CSB.C3
30	62	16	20,3	11,2	18000	3	Insulate 030 6206-2RZ/CSB.C3
30	72	19	29,6	16	17000	5	Insulate 030 6306-2RZ/CSB.C3
35	62	14	16,8	10,25	17000	3	Insulate 035 6007-2RZ/CSB.C3
35	72	17	27,0	15,3	15000	5	Insulate 035 6207-2RZ/CSB.C3
35	80	21	35,1	19	16000	5	Insulate 035 6307-2RZ/CSB.C3
40	68	15	17,8	11	15000	3	Insulate 040 6008-2RZ/CSB.C3
40	80	18	32,5	19	14000	5	Insulate 040 6208-2RZ/CSB.C3
40	90	23	42,3	24	13000	5	Insulate 040 6308-2RZ/CSB.C3
45	75	16	22,1	14,6	16000	5	Insulate 045 6009-2RZ/CSB.C3
45	85	19	35,1	21,6	13000	5	Insulate 045 6209-2RZ/CSB.C3
45	100	25	55,3	31,5	12000	5	Insulate 045 6309-2RZ/CSB.C3
50	80	16	22,9	16	15000	5	Insulate 050 6010-2RZ/CSB.C3
50	90	20	37,1	23,2	12000	5	Insulate 050 6210-2RZ/CSB.C3
50	110	27	65,0	38	10000	5	Insulate 050 6310-2RZ/CSB.C3
55	90	18	29,6	21,2	14000	5	Insulate 055 6011-2RZ/CSB.C3
55	100	21	46,2	29	10000	5	Insulate 055 6211-2RZ/CSB.C3
55	120	29	74,1	45	9000	5	Insulate 055 6311-2RZ/CSB.C3
60	95	18	30,7	23,2	11000	5	Insulate 060 6012-2RZ/CSB.C3
60	110	22	55,3	36	9500	5	Insulate 060 6212-2RZ/CSB.C3
60	130	31	85,2	52	8500	5	Insulate 060 6312-2RZ/CSB.C3
65	100	18	31,9	25	10500	5	Insulate 065 6013-2RZ/CSB.C3
65	120	23	58,5	40,5	8500	5	Insulate 065 6213-2RZ/CSB.C3
65	140	33	97,5	60	8000	5	Insulate 065 6313-2RZ/CSB.C3
70	110	20	39,7	31	9400	5	Insulate 070 6014-2RZ/CSB.C3
70	125	24	63,7	45	8500	5	Insulate 070 6214-2RZ/CSB.C3
70	150	35	111	68	7500	5	Insulate 070 6314-2RZ/CSB.C3
75	115	20	41,6	33,5	9000	5	Insulate 075 6015-2RZ/CSB.C3
75	130	25	68,9	49	8000	5	Insulate 075 6215-2RZ/CSB.C3
75	160	37	119	76,5	6700	5	Insulate 075 6315-2RZ/CSB.C3
80	125	22	49	40	8200	5	Insulate 080 6016-2RZ/CSB.C3
80	140	26	73	55	7000	5	Insulate 080 6216-2RZ/CSB.C3
80	170	39	130	86,5	6300	5	Insulate 080 6316-2RZ/CSB.C3
85	130	22	52	43	6700	5	Insulate 085 6017-2RZ/CSB.C3
85	150	28	87,1	64	5600	5	Insulate 085 6217-2RZ/CSB.C3
85	180	41	140	96,5	5000	16	Insulate 085 6317-2RZ/CSB.C3
90	140	24	60,5	50	6300	5	Insulate 090 6018-2RZ/CSB.C3
90	160	30	101	73,5	5300	5	Insulate 090 6218-2RZ/CSB.C3
90	190	43	151	108	4800	16	Insulate 090 6318-2RZ/CSB.C3
95	145	24	63,7	54	6000	5	Insulate 095 6019-2RZ/CSB.C3
95	170	32	114	81,5	5000	5	Insulate 095 6219-2RZ/CSB.C3
100	150	24	63,7	54	5600	5	Insulate 100 6020-2RZ/CSB.C3
100	180	34	127	93	4800	5	Insulate 100 6220-2RZ/CSB.C3
100	215	47	174	140	4300	16	Insulate 100 6320-2RZ/CSB.C3
105	160	26	76,1	65,5	5300	5	Insulate 105 6021-2RZ/CSB.C3
110	170	28	85,2	73,5	5000	5	Insulate 110 6022-2RZ/CSB.C3
110	200	38	151	118	4300	16	Insulate 110 6222-2RZ/CSB.C3
120	180	28	88,4	80	4800	5	Insulate 120 6024-2RZ/CSB.C3
120	215	40	146	118	4000	16	Insulate 120 6224-2RZ/CSB.C3
130	200	33	112	100	4300	5	Insulate 130 6026-2RZ/CSB.C3
140	210	33	111	108	4000	5	Insulate 140 6028-2RZ/CSB.C3

LongLife Insulate open

d [mm]	D	B	C [kN]	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
5	16	5	1,14	0,38	70000	3	Insulate 005 625/CSB.C3
6	19	6	2,34	0,95	60000	3	Insulate 006 626/CSB.C3
7	19	6	2,34	0,95	60000	3	Insulate 007 607/CSB.C3
7	22	7	3,45	1,37	53000	3	Insulate 007 627/CSB.C3
8	22	7	3,45	1,37	53000	3	Insulate 008 608/CSB.C3
10	26	8	4,75	1,96	45000	3	Insulate 010 6000/CSB.C3
10	30	9	5,40	2,36	43000	3	Insulate 010 6200/CSB.C3
10	35	11	8,52	3,4	39000	5	Insulate 010 6300/CSB.C3
12	28	8	5,40	2,36	43000	3	Insulate 012 6001/CSB.C3
12	32	10	7,28	3,1	38000	3	Insulate 012 6201/CSB.C3
12	37	12	10,10	4,15	33000	5	Insulate 012 6301/CSB.C3
15	32	9	5,85	2,85	36000	3	Insulate 015 6002/CSB.C3
15	35	11	8,06	3,75	32000	3	Insulate 015 6202/CSB.C3
15	42	13	11,90	5,4	28000	5	Insulate 015 6302/CSB.C3
17	35	10	6,37	3,25	32000	3	Insulate 017 6003/CSB.C3
17	40	12	9,95	4,75	28000	3	Insulate 017 6203/CSB.C3
17	47	14	14,30	6,5	26000	5	Insulate 017 6303/CSB.C3
20	42	12	9,95	5	26000	3	Insulate 020 6004/CSB.C3
20	47	14	13,5	6,55	24000	3	Insulate 020 6204/CSB.C3
20	52	15	16,8	7,8	23000	5	Insulate 020 6304/CSB.C3
25	47	12	11,9	6,55	22000	3	Insulate 025 6005/CSB.C3
25	52	15	14,8	7,8	22000	3	Insulate 025 6205/CSB.C3
25	62	17	23,4	11,6	20000	5	Insulate 025 6305/CSB.C3
30	55	13	13,8	8,3	19000	3	Insulate 030 6006/CSB.C3
30	62	16	20,3	11,2	18000	3	Insulate 030 6206/CSB.C3
30	72	19	29,6	16	17000	5	Insulate 030 6306/CSB.C3
35	62	14	16,8	10,25	17000	3	Insulate 035 6007/CSB.C3
35	72	17	27,0	15,3	15000	5	Insulate 035 6207/CSB.C3
35	80	21	35,1	19	16000	5	Insulate 035 6307/CSB.C3
40	68	15	17,8	11	15000	3	Insulate 040 6008/CSB.C3
40	80	18	32,5	19	14000	5	Insulate 040 6208/CSB.C3
40	90	23	42,3	24	13000	5	Insulate 040 6308/CSB.C3
45	75	16	22,1	14,6	16000	5	Insulate 045 6009/CSB.C3
45	85	19	35,1	21,6	13000	5	Insulate 045 6209/CSB.C3
45	100	25	55,3	31,5	12000	5	Insulate 045 6309/CSB.C3
50	80	16	22,9	16	15000	5	Insulate 050 6010/CSB.C3
50	90	20	37,1	23,2	12000	5	Insulate 050 6210/CSB.C3
50	110	27	65,0	38	10000	5	Insulate 050 6310/CSB.C3
55	90	18	29,6	21,2	14000	5	Insulate 055 6011/CSB.C3
55	100	21	46,2	29	10000	5	Insulate 055 6211/CSB.C3
55	120	29	74,1	45	9000	5	Insulate 055 6311/CSB.C3
60	95	18	30,7	23,2	11000	5	Insulate 060 6012/CSB.C3
60	110	22	55,3	36	9500	5	Insulate 060 6212/CSB.C3
60	130	31	85,2	52	8500	5	Insulate 060 6312/CSB.C3
65	100	18	31,9	25	10500	5	Insulate 065 6013/CSB.C3
65	120	23	58,5	40,5	8500	5	Insulate 065 6213/CSB.C3
65	140	33	97,5	60	8000	5	Insulate 065 6313/CSB.C3
70	110	20	39,7	31	9400	5	Insulate 070 6014/CSB.C3
70	125	24	63,7	45	8500	5	Insulate 070 6214/CSB.C3
70	150	35	111	68	7500	5	Insulate 070 6314/CSB.C3
75	115	20	41,6	33,5	9000	5	Insulate 075 6015/CSB.C3
75	130	25	68,9	49	8000	5	Insulate 075 6215/CSB.C3
75	160	37	119	76,5	6700	5	Insulate 075 6315/CSB.C3
80	125	22	49	40	8200	5	Insulate 080 6016/CSB.C3
80	140	26	73	55	7000	5	Insulate 080 6216/CSB.C3
80	170	39	130	86,5	6300	5	Insulate 080 6316/CSB.C3
85	130	22	52	43	6700	5	Insulate 085 6017/CSB.C3
85	150	28	87,1	64	6700	5	Insulate 085 6217/CSB.C3
85	180	41	140	96,5	6000	16	Insulate 085 6317/CSB.C3
90	140	24	60,5	50	6300	5	Insulate 090 6018/CSB.C3
90	160	30	101	73,5	6300	5	Insulate 090 6218/CSB.C3
90	190	43	151	108	5600	16	Insulate 090 6318/CSB.C3
95	145	24	63,7	54	6000	5	Insulate 095 6019/CSB.C3
95	170	32	114	81,5	6000	5	Insulate 095 6219/CSB.C3
95	200	45	159	118	5300	16	Insulate 095 6319/CSB.C3
100	150	24	63,7	54	5600	5	Insulate 100 6020/CSB.C3
100	180	34	127	93	5600	5	Insulate 100 6220/CSB.C3
100	215	47	174	140	5000	16	Insulate 100 6320/CSB.C3
105	160	26	76,1	65,5	5300	5	Insulate 105 6021/CSB.C3
110	170	28	85,2	73,5	5000	5	Insulate 110 6022/CSB.C3
110	200	38	151	118	4300	16	Insulate 110 6222/CSB.C3
120	180	28	88,4	80	4800	5	Insulate 120 6024/CSB.C3
120	215	40	146	118	4000	16	Insulate 120 6224/CSB.C3
130	200	33	112	100	4300	5	Insulate 130 6026/CSB.C3
140	210	33	111	108	4000	5	Insulate 140 6028/CSB.C3
140	300	62	252	245	3600	20	Insulate 140 6328/CSB.C3
150	320	65	280	290	3200	20	Insulate 150 6330/CSB.C3
160	340	68	300	325	2800	20	Insulate 160 6332/CSB.C3
170	360	72	327	367	2800	20	Insulate 170 6334/CSB.C3
180	380	75	354	412	2800	20	Insulate 180 6336/CSB.C3
190	400	78	370	440	2500	20	Insulate 190 6338/CSB.C3

FOOD PROCESSING EQUIPMENT

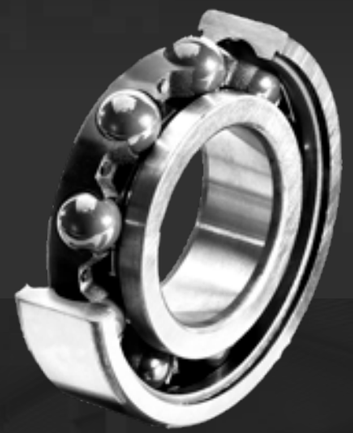
Food processing equipment

Applications: Transport Equipment – Equipment with requirements for food safety approval (FDA/EC 1935) – Equipment used in corrosive environments

- Product overview
  LongLife Corrotec – sealed
- Product overview
  LongLife Corrotec – open

LongLife Corrotec/CorroCoat

The CeramicSpeed LongLife Corrotec Bearing series is specially designed for humid environments. This type of bearings take over and continue to function, where the bearings made of clean stainless steel materials usually fail and break down. The combination of stainless steel races, ceramic balls, ball cages from synthetic material and the right lubricant, provides a unique bearing in terms of resistance and thus service life. All LongLife Corrotec Bearings use food safety approved grease. If needed, besides ball bearings, the use of CorroCoat is possible, which provides extremely high corrosion resistant and friction-suppressant properties.



- 4-8 times longer lifetime
- FDA/EC1935 approved bearings for the food production
- Bearings with long service life and no corrosion
- Corrosion resistant bearings that prevent seizing
- Grease types and quantity optimised for the specific application
- Food safety approved grease
- Load capacity is not changed by switching from stainless to LongLife Corrotec Bearings
- Reduced load on the races because of less inertia produced by the balls
- Reduced operating costs due to the bearings' longer service life
- Better machinery uptime that ensures higher competitiveness

Bearings approved for contact with food

With the CeramicSpeed LongLife Corrotec Bearing series, it is possible to make use of bearings that are FDA/EC 1935 approved for use in the food industry. What makes these bearings unique is the fact that both the bearings' components and lubricant are food safety approved, meaning that they can come in direct contact with food. In addition to being FDA approved, several bearing components are also approved in accordance with EC 1935.

The components are approved in accordance with FDA 21 CFR: Code of Federal Regulation, an area of legislation that covers medicine and food in the United States. These components also have an EC No. 1935/2004 authorisation.

The lubricant used is NSF-H1 registered, in other words approved for use in contact with food and suitable for both sealed bearings and bearings that are continuously lubricated within the production process. A specification of the authorisations for CeramicSpeed Corrotec product series can be seen in the following table:

LongLife Corrotec product series

Corrotec	Silicium Nitrid balls	Grease	Bracket	Inner and outer ring	Seals		Coatings	
					Stainless	Rubber	CorroCoat	WearCoat HardCoat
EC 1935	X	X	X	X	X	X	X	X
FDA+	X	X	X	X	X	X	X	X

LongLife Corrotec sealed

d [mm]	D	B	C [kN]	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
10	26	8	3,97	1,96	19000	5	Corrotec 010 6000-2RS/CSB
10	30	9	4,36	2,32	16000	5	Corrotec 010 6200-2RS/CSB
10	35	11	7,02	3,4	15000	5	Corrotec 010 6300-2RS/CSB
12	28	8	4,42	2,36	16000	5	Corrotec 012 6001-2RS/CSB
12	32	10	5,72	3	15000	5	Corrotec 012 6201-2RS/CSB
12	37	12	9,75	4,15	14000	5	Corrotec 012 6301-2RS/CSB
15	32	9	4,88	2,8	14000	5	Corrotec 015 6002-2RS/CSB
15	35	11	6,37	3,6	13000	5	Corrotec 015 6202-2RS/CSB
15	42	13	9,94	5,4	11000	5	Corrotec 015 6302-2RS/CSB
17	35	10	4,94	3,15	13000	5	Corrotec 017 6003-2RS/CSB
17	40	12	8,06	4,75	12000	5	Corrotec 017 6203-2RS/CSB
17	47	14	11,7	6,55	10000	5	Corrotec 017 6303-2RS/CSB
20	42	12	9,36	5,1	11000	5	Corrotec 020 6004-2RS/CSB
20	47	14	12,5	6,55	10000	5	Corrotec 020 6204-2RS/CSB
20	52	15	13,8	7,8	9500	5	Corrotec 020 6304-2RS/CSB
25	47	12	10,1	5,85	9500	5	Corrotec 025 6005-2RS/CSB
25	52	15	13,8	7,8	8500	5	Corrotec 025 6205-2RS/CSB
25	62	17	20,8	11,2	7500	5	Corrotec 025 6305-2RS/CSB
30	55	13	13,3	8,3	8000	5	Corrotec 030 6006-2RS/CSB
30	62	16	19	11,4	7000	5	Corrotec 030 6206-2RS/CSB
30	72	19	22,9	15	6300	5	Corrotec 030 6306-2RS/CSB
35	62	14	13,8	10,2	6700	5	Corrotec 035 6007-2RS/CSB
35	72	17	22,1	15,3	6000	5	Corrotec 035 6207-2RS/CSB
35	80	21	28,6	19	5600	5	Corrotec 035 6307-2RS/CSB
40	68	15	14,6	11,4	6300	5	Corrotec 040 6008-2RS/CSB
40	80	18	25,1	17,6	5600	5	Corrotec 040 6208-2RS/CSB
45	75	23	18,2	15	5600	5	Corrotec 045 6009-2RS/CSB
45	85	19	28,1	20,4	5000	5	Corrotec 045 6209-2RS/CSB
50	80	16	19	16,6	5000	5	Corrotec 050 6010-2RS/CSB
50	90	20	30,2	23,2	4800	5	Corrotec 050 6210-2RS/CSB

LongLife Corrotec open

d [mm]	D	B	C [kN]	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
10	26	8	3,97	1,96	40000	5	Corrotec 010 6000/CSB
10	30	9	4,36	2,32	36000	5	Corrotec 010 6200/CSB
10	35	11	7,02	3,4	34000	5	Corrotec 010 6300/CSB
12	28	8	4,42	2,36	36000	5	Corrotec 012 6001/CSB
12	32	10	5,72	3	34000	5	Corrotec 012 6201/CSB
12	37	12	9,75	4,15	30000	5	Corrotec 012 6301/CSB
15	32	9	4,88	2,8	32000	5	Corrotec 015 6002/CSB
15	35	11	6,37	3,6	30000	5	Corrotec 015 6202/CSB
15	42	13	9,94	5,4	26000	5	Corrotec 015 6302/CSB
17	35	10	4,94	3,15	28000	5	Corrotec 017 6003/CSB
17	40	12	8,06	4,75	26000	5	Corrotec 017 6203/CSB
17	47	14	11,7	6,55	22000	5	Corrotec 017 6303/CSB
20	42	12	9,36	5,1	24000	5	Corrotec 020 6004/CSB
20	47	14	12,5	6,55	22000	5	Corrotec 020 6204/CSB
20	52	15	13,8	7,8	20000	5	Corrotec 020 6304/CSB
25	47	12	10,1	5,85	20000	5	Corrotec 025 6005/CSB
25	52	15	13,8	7,8	19000	5	Corrotec 025 6205/CSB
25	62	17	20,8	11,2	17000	5	Corrotec 025 6305/CSB
30	55	13	13,3	8,3	17000	5	Corrotec 030 6006/CSB
30	62	16	19	11,4	16000	5	Corrotec 030 6206/CSB
30	72	19	22,9	15	14000	5	Corrotec 030 6306/CSB
35	62	14	13,8	10,2	15000	5	Corrotec 035 6007/CSB
35	72	17	22,1	15,3	14000	5	Corrotec 035 6207/CSB
35	80	21	28,6	19	13000	5	Corrotec 035 6307/CSB
40	68	15	14,6	11,4	14000	5	Corrotec 040 6008/CSB
40	80	18	25,1	17,6	12000	5	Corrotec 040 6208/CSB
45	75	23	18,2	15	12000	5	Corrotec 045 6009/CSB
45	85	19	28,1	20,4	11000	5	Corrotec 045 6209/CSB
50	80	16	19	16,6	11000	5	Corrotec 050 6010/CSB
50	90	20	30,2	23,2	10000	5	Corrotec 050 6210/CSB

HIGH TEMPERATURE APPLICATIONS

High temperature applications

Applications: Ovens - Boilers - Hot air ventilation

- Product overview
  LongLife HighTemp - 260 °C
- Product overview
  LongLife HighTemp - 350 °C

HIGH TEMPERATURE APPLICATIONS

LongLife HighTemp

The CeramicSpeed LongLife HighTemp Bearings feature ceramic balls and high-tech components that offer a unique HighTemp-program of up to 260 ^{0}C and 350 ^{0}C respectively. Amongst other things, the reason why this is possible is that the CeramicSpeed Balls expand 70 % less than steel balls.

- 4-8 times longer lifetime
- CeramicSpeed Balls are extremely stable at high temperatures
- The bearings can be designed with common clearance classes because of their high stability
- No micro fractures and damage under powerful cooling
- High resistance to corrosion and contamination
- Tolerates temperatures up to 350 ^{0}C
- Reduced operating costs due to bearings' longer service life
- Better machinery uptime that ensures higher competitiveness

LongLife HighTemp 260

d [mm]	D	B	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
10	35	11	3,4	400	5	HighTemp 010 6300/CSB.260ºC
12	32	10	3,1	400	3	HighTemp 012 6201/CSB.260ºC
15	35	11	3,75	360	3	HighTemp 015 6202/CSB.260ºC
17	35	10	3,25	340	3	HighTemp 017 6003/CSB.260ºC
17	40	12	4,75	310	3	HighTemp 017 6203/CSB.260ºC
17	47	14	6,55	280	5	HighTemp 017 6303/CSB.260ºC
20	42	12	5	290	3	HighTemp 020 6004/CSB.260ºC
20	47	14	6,55	260	3	HighTemp 020 6204/CSB.260ºC
20	52	15	7,8	250	5	HighTemp 020 6304/CSB.260ºC
25	47	12	6,55	250	3	HighTemp 025 6005/CSB.260ºC
25	52	15	7,8	230	3	HighTemp 025 6205/CSB.260ºC
25	62	17	11,6	200	5	HighTemp 025 6305/CSB.260ºC
30	62	16	11,2	190	3	HighTemp 030 6206/CSB.260ºC
30	72	19	16	170	5	HighTemp 030 6306/CSB.260ºC
35	72	17	15,3	160	5	HighTemp 035 6207/CSB.260ºC
35	80	21	19	150	5	HighTemp 035 6307/CSB.260ºC
40	80	18	19	150	5	HighTemp 040 6208/CSB.260ºC
40	90	23	24	130	5	HighTemp 040 6308/CSB.260ºC
45	85	19	21,6	130	5	HighTemp 045 6209/CSB.260ºC
45	100	25	31,5	120	5	HighTemp 045 6309/CSB.260ºC
50	90	20	23,2	120	5	HighTemp 050 6210/CSB.260ºC
50	110	27	38	110	5	HighTemp 050 6310/CSB.260ºC
55	100	21	29	110	5	HighTemp 055 6211/CSB.260ºC
55	120	29	45	100	5	HighTemp 055 6311/CSB.260ºC
60	110	22	36	100	5	HighTemp 060 6212/CSB.260ºC
60	130	31	52	90	5	HighTemp 060 6312/CSB.260ºC
65	120	23	40,5	90	5	HighTemp 065 6213/CSB.260ºC
65	140	33	60	80	5	HighTemp 065 6313/CSB.260ºC
70	125	24	45	90	5	HighTemp 070 6214/CSB.260ºC
70	150	35	68	80	5	HighTemp 070 6314/CSB.260ºC
75	130	25	49	80	5	HighTemp 075 6215/CSB.260ºC
75	160	37	76,5	70	5	HighTemp 075 6315/CSB.260ºC

LongLife HighTemp 350

d [mm]	D	B	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
25	47	12	6,55	120	3	HighTemp 025 6005/CSB.350ºC
25	52	15	7,8	230	3	HighTemp 025 6205/CSB.350ºC
25	62	17	11,6	200	5	HighTemp 025 6305/CSB.350ºC
30	62	16	11,2	190	3	HighTemp 030 6206/CSB.350ºC
30	72	19	16	170	5	HighTemp 030 6306/CSB.350ºC
35	72	17	15,3	160	5	HighTemp 035 6207/CSB.350ºC
40	80	18	19	150	5	HighTemp 040 6208/CSB.350ºC
40	90	23	24	130	5	HighTemp 040 6308/CSB.350ºC
45	85	19	21,6	130	5	HighTemp 045 6209/CSB.350ºC
50	90	20	23,2	120	5	HighTemp 050 6210/CSB.350ºC
50	110	27	38	110	5	HighTemp 050 6310/CSB.350ºC
55	100	21	29	110	5	HighTemp 055 6211/CSB.350ºC
55	120	29	45	100	5	HighTemp 055 6311/CSB.350ºC
60	110	22	36	100	5	HighTemp 060 6212/CSB.350ºC
65	120	23	40,5	90	5	HighTemp 065 6213/CSB.350ºC
65	140	33	60	80	5	HighTemp 065 6313/CSB.350ºC
70	125	24	45	90	5	HighTemp 070 6214/CSB.350ºC
75	130	25	49	80	5	HighTemp 075 6215/CSB.350ºC
90	160	30	101	70	5	HighTemp 090 6218/CSB.350ºC
95	170	32	114	60	5	HighTemp 095 6219/CSB.350ºC
100	180	34	127	60	5	HighTemp 100 6220/CSB.350ºC

DEMANDING APPLICATIONS

Demanding applications

Applications: Equipment with accelerations – in contaminated environments – or in a controlled atmosphere/environment

- Product overview
  LongLife Xtreme – sealed

- Product overview
  LongLife Xtreme – open

DEMANDING APPLICATIONS

LongLife Xtreme

The CeramicSpeed LongLife Xtreme product series are bearings designed for application in contaminated environments, where particles can penetrate the bearing and affect the bearing performance. Characterised by unmatched hardness, the CeramicSpeed Balls tolerate a high degree of contamination, crushing the particles that penetrate into the bearing races. The CeramicSpeed Balls are also highly resistant against water and detergents, because Silicon Nitride does not corrode.

The LongLife Xtreme bearings can also be manufactured and optimised specifically for slow applications. These applications match special machines where a bearing without full rotation is needed. This product category is ideal for processors characterised by many starts/stops, and where the longest bearing service life is wanted.

- 4-8 times longer service life
- Lower energy consumption
- Extreme resistance to contamination
- Lower friction – the friction coefficient between the CeramicSpeed Balls and the races is reduced by 75 %
- Reduced wear and tear – fewer seizures on the bearing races
- Lower operating temperature – 10-20 ^{0}C lower than steel bearings
- Higher RPM (open bearings) – typically 50 % over steel bearings
- Reduced need for lubrication
- Grease type and quantity optimised for the specific application
- Reduced operating costs due to the bearings' longer service life
- Better machinery uptime that ensures higher competitiveness

LongLife Xtreme sealed

d [mm]	D	B	C [kN]	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
6	19	6	2,34	0,95	24000	3	Xtreme 006 626-2RS/CSB
7	19	6	2,34	0,95	24000	3	Xtreme 007 607-2RS/CSB
7	22	7	3,45	1,37	22000	3	Xtreme 007 627-2RS/CSB
8	22	7	3,45	1,37	22000	3	Xtreme 008 608-2RS/CSB
10	26	8	4,75	1,96	19000	3	Xtreme 010 6000-2RS/CSB
10	30	9	5,40	2,36	17000	3	Xtreme 010 6200-2RS/CSB
10	35	11	8,52	3,4	15000	5	Xtreme 010 6300-2RS/CSB
12	28	8	5,40	2,36	17000	3	Xtreme 012 6001-2RS/CSB
12	32	10	7,28	3,1	15000	3	Xtreme 012 6201-2RS/CSB
12	37	12	10,10	4,15	14000	5	Xtreme 012 6301-2RS/CSB
15	32	9	5,85	2,85	14000	3	Xtreme 015 6002-2RS/CSB
15	35	11	8,06	3,75	13000	3	Xtreme 015 6202-2RS/CSB
15	42	13	11,90	5,4	12000	5	Xtreme 015 6302-2RS/CSB
17	35	10	6,37	3,25	13000	3	Xtreme 017 6003-2RS/CSB
17	40	12	9,95	4,75	12000	3	Xtreme 017 6203-2RS/CSB
17	47	14	14,30	6,55	11000	5	Xtreme 017 6303-2RS/CSB
20	42	12	9,95	5	11000	3	Xtreme 020 6004-2RS/CSB
20	47	14	13,5	6,55	10000	3	Xtreme 020 6204-2RS/CSB
20	52	15	16,8	7,8	9500	5	Xtreme 020 6304-2RS/CSB
25	47	12	11,9	6,55	9500	3	Xtreme 025 6005-2RS/CSB
25	52	15	14,8	7,8	8500	3	Xtreme 025 6205-2RS/CSB
25	62	17	23,4	11,6	7500	5	Xtreme 025 6305-2RS/CSB
30	55	13	13,8	8,3	8000	3	Xtreme 030 6006-2RS/CSB
30	62	16	20,3	11,2	7500	3	Xtreme 030 6206-2RS/CSB
30	72	19	29,6	16	6300	5	Xtreme 030 6306-2RS/CSB
35	62	14	16,8	10,25	7000	3	Xtreme 035 6007-2RS/CSB
35	72	17	27,0	15,3	6300	5	Xtreme 035 6207-2RS/CSB
35	80	21	35,1	19	6000	5	Xtreme 035 6307-2RS/CSB
40	68	15	17,8	11	6300	3	Xtreme 040 6008-2RS/CSB
40	80	18	32,5	19	5600	5	Xtreme 040 6208-2RS/CSB
40	90	23	42,3	24	5000	5	Xtreme 040 6308-2RS/CSB
45	75	23	20,8	14,6	5600	5	Xtreme 045 6009-2RS/CSB
45	85	19	35,1	21,6	5000	5	Xtreme 045 6209-2RS/CSB
45	100	25	55,3	31,5	4500	5	Xtreme 045 6309-2RS/CSB
50	80	16	22,9	15,6	5000	5	Xtreme 050 6010-2RS/CSB
50	90	20	37,1	23,2	4800	5	Xtreme 050 6210-2RS/CSB
50	110	27	65,0	38	4300	5	Xtreme 050 6310-2RS/CSB
55	90	18	29,6	21,2	4500	5	Xtreme 055 6011-2RS/CSB
55	100	21	46,2	29	4300	5	Xtreme 055 6211-2RS/CSB
55	120	29	74,1	45	3800	5	Xtreme 055 6311-2RS/CSB
60	95	18	30,7	23,2	4300	5	Xtreme 060 6012-2RS/CSB
60	110	22	55,3	36	4000	5	Xtreme 060 6212-2RS/CSB
60	130	31	85,2	52	3400	5	Xtreme 060 6312-2RS/CSB
65	100	18	31,9	25	4000	5	Xtreme 065 6013-2RS/CSB
65	120	23	58,5	40,5	3600	5	Xtreme 065 6213-2RS/CSB
65	140	33	97,5	60	3200	5	Xtreme 065 6313-2RS/CSB
70	110	20	39,7	31	3600	5	Xtreme 070 6014-2RS/CSB
70	125	24	63,7	45	3400	5	Xtreme 070 6214-2RS/CSB
70	150	35	111	68	3000	5	Xtreme 070 6314-2RS/CSB
75	115	20	41,6	33,5	3400	5	Xtreme 075 6015-2RS/CSB
75	130	25	68,9	49	3200	5	Xtreme 075 6215-2RS/CSB
75	160	37	119	76,5	2800	5	Xtreme 075 6315-2RS/CSB
80	125	22	49	40	3200	5	Xtreme 080 6016-2RS/CSB
80	140	26	73	55	3000	5	Xtreme 080 6216-2RS/CSB
80	170	39	130	86,5	2600	5	Xtreme 080 6316-2RS/CSB
85	130	22	52	43	3000	5	Xtreme 085 6017-2RS/CSB
85	150	28	87,1	64	2800	5	Xtreme 085 6217-2RS/CSB
85	180	41	140	96,5	2400	16	Xtreme 085 6317-2RS/CSB
90	140	24	60,5	50	2800	5	Xtreme 090 6018-2RS/CSB
90	160	30	101	73,5	2600	5	Xtreme 090 6218-2RS/CSB
90	190	43	151	108	2400	16	Xtreme 090 6318-2RS/CSB
95	145	24	63,7	54	2800	5	Xtreme 095 6019-2RS/CSB
95	170	32	114	81,5	2400	5	Xtreme 095 6219-2RS/CSB
95	200	45	159	118	2200	16	Xtreme 095 6319-2RS/CSB
100	150	24	63,7	54	2600	5	Xtreme 100 6020-2RS/CSB
100	180	34	127	93	2400	5	Xtreme 100 6220-2RS/CSB
100	215	47	174	140	2000	16	Xtreme 100 6320-2RS/CSB
105	160	26	76,1	65,5	2400	5	Xtreme 105 6021-2RS/CSB
105	190	36	140	104	2200	5	Xtreme 105 6221-2RS/CSB
105	225	49	182	153	1800	20	Xtreme 105 6321-2RS/CSB
110	170	28	85,2	73,5	2400	5	Xtreme 110 6022-2RS/CSB
110	200	38	151	118	2000	16	Xtreme 110 6222-2RS/CSB
110	240	50	203	180	1800	20	Xtreme 110 6322-2RS/CSB
120	180	28	88,4	80	2200	5	Xtreme 120 6024-2RS/CSB
120	215	40	146	118	1900	16	Xtreme 120 6224-2RS/CSB
120	260	55	208	186	1700	20	Xtreme 120 6324-2RS/CSB
130	200	33	112	100	2000	5	Xtreme 130 6026-2RS/CSB
130	230	40	156	132	1800	16	Xtreme 130 6226-2RS/CSB
140	210	33	111	108	1800	5	Xtreme 140 6028-2RS/CSB
150	225	35	125	125	1700	5	Xtreme 150 6030-2RS/CSB
160	240	38	143	143	1600	5	Xtreme 160 6032-2RS/CSB

LongLife Xtreme open

d [mm]	D	B	C [kN]	C0	Limiting Speed [rpm]	Ball Grade [ISO3290: 20010]	Designation
5	16	5	1,14	0,38	70000	3	Xtreme 005 625/CSB
6	19	6	2,34	0,95	60000	3	Xtreme 006 626/CSB
7	19	6	2,34	0,95	60000	3	Xtreme 007 607/CSB
7	22	7	3,45	1,37	53000	3	Xtreme 007 627/CSB
8	22	7	3,45	1,37	53000	3	Xtreme 008 608/CSB
10	26	8	4,75	1,96	45000	3	Xtreme 010 6000/CSB
10	30	9	5,40	2,36	43000	3	Xtreme 010 6200/CSB
10	35	11	8,52	3,4	39000	5	Xtreme 010 6300/CSB
12	28	8	5,40	2,36	43000	3	Xtreme 012 6001/CSB
12	32	10	7,28	3,1	38000	3	Xtreme 012 6201/CSB
12	37	12	10,10	4,15	33000	5	Xtreme 012 6301/CSB
15	32	9	5,85	2,85	36000	3	Xtreme 015 6002/CSB
15	35	11	8,06	3,75	32000	3	Xtreme 015 6202/CSB
15	42	13	11,90	5,4	28000	5	Xtreme 015 6302/CSB
17	35	10	6,37	3,25	32000	3	Xtreme 017 6003/CSB
17	40	12	9,95	4,75	28000	3	Xtreme 017 6203/CSB
17	47	14	14,30	6,5	26000	5	Xtreme 017 6303/CSB
20	42	12	9,95	5	26000	3	Xtreme 020 6004/CSB
20	47	14	13,5	6,55	24000	3	Xtreme 020 6204/CSB
20	52	15	16,8	7,8	23000	5	Xtreme 020 6304/CSB
25	47	12	11,9	6,55	22000	3	Xtreme 025 6005/CSB
25	52	15	14,8	7,8	22000	3	Xtreme 025 6205/CSB
25	62	17	23,4	11,6	20000	5	Xtreme 025 6305/CSB
30	55	13	13,8	8,3	19000	3	Xtreme 030 6006/CSB
30	62	16	20,3	11,2	18000	3	Xtreme 030 6206/CSB
30	72	19	29,6	16	17000	5	Xtreme 030 6306/CSB
35	62	14	16,8	10,25	17000	3	Xtreme 035 6007/CSB
35	72	17	27,0	15,3	15000	5	Xtreme 035 6207/CSB
35	80	21	35,1	19	16000	5	Xtreme 035 6307/CSB
40	68	15	17,8	11	15000	3	Xtreme 040 6008/CSB
40	80	18	32,5	19	14000	5	Xtreme 040 6208/CSB
40	90	23	42,3	24	13000	5	Xtreme 040 6308/CSB
45	75	16	22,1	14,6	16000	5	Xtreme 045 6009/CSB
45	85	19	35,1	21,6	13000	5	Xtreme 045 6209/CSB
45	100	25	55,3	31,5	12000	5	Xtreme 045 6309/CSB
50	80	16	22,9	16	15000	5	Xtreme 050 6010/CSB
50	90	20	37,1	23,2	12000	5	Xtreme 050 6210/CSB
50	110	27	65,0	38	10000	5	Xtreme 050 6310/CSB
55	90	18	29,6	21,2	14000	5	Xtreme 055 6011/CSB
55	100	21	46,2	29	10000	5	Xtreme 055 6211/CSB
55	120	29	74,1	45	9000	5	Xtreme 055 6311/CSB
60	95	18	30,7	23,2	11000	5	Xtreme 060 6012/CSB
60	110	22	55,3	36	9500	5	Xtreme 060 6212/CSB
60	130	31	85,2	52	8500	5	Xtreme 060 6312/CSB
65	100	18	31,9	25	10500	5	Xtreme 065 6013/CSB
65	120	23	58,5	40,5	8500	5	Xtreme 065 6213/CSB
65	140	33	97,5	60	8000	5	Xtreme 065 6313/CSB
70	110	20	39,7	31	9400	5	Xtreme 070 6014/CSB
70	125	24	63,7	45	8500	5	Xtreme 070 6214/CSB
70	150	35	111	68	7500	5	Xtreme 070 6314/CSB
75	115	20	41,6	33,5	9000	5	Xtreme 075 6015/CSB
75	130	25	68,9	49	8000	5	Xtreme 075 6215/CSB
75	160	37	119	76,5	6700	5	Xtreme 075 6315/CSB
80	125	22	49	40	8200	5	Xtreme 080 6016/CSB
80	140	26	73	55	7000	5	Xtreme 080 6216/CSB
80	170	39	130	86,5	6300	5	Xtreme 080 6316/CSB
85	130	22	52	43	6700	5	Xtreme 085 6017/CSB
85	150	28	87,1	64	6700	5	Xtreme 085 6217/CSB
85	180	41	140	96,5	6000	16	Xtreme 085 6317/CSB
90	140	24	60,5	50	6300	5	Xtreme 090 6018/CSB
90	160	30	101	73,5	6300	5	Xtreme 090 6218/CSB
90	190	43	151	108	5600	16	Xtreme 090 6318/CSB
95	145	24	63,7	54	6000	5	Xtreme 095 6019/CSB
95	170	32	114	81,5	6000	5	Xtreme 095 6219/CSB
95	200	45	159	118	5300	16	Xtreme 095 6319/CSB
100	150	24	63,7	54	5600	5	Xtreme 100 6020/CSB
100	180	34	127	93	5600	5	Xtreme 100 6220/CSB
100	215	47	174	140	5000	16	Xtreme 100 6320/CSB
105	160	26	76,1	65,5	5300	5	Xtreme 105 6021/CSB
105	190	36	140	104	2200	5	Xtreme 105 6221/CSB
105	225	49	182	153	1800	20	Xtreme 105 6321/CSB
110	170	28	85,2	73,5	5000	5	Xtreme 110 6022/CSB
110	200	38	151	118	4300	16	Xtreme 110 6222/CSB
110	240	50	203	180	1800	20	Xtreme 110 6322/CSB
120	180	28	88,4	80	4800	5	Xtreme 120 6024/CSB
120	215	40	146	118	4000	16	Xtreme 120 6224/CSB
120	260	55	208	186	1700	20	Xtreme 120 6324/CSB
130	200	33	112	100	4300	5	Xtreme 130 6026/CSB
130	230	40	156	132	1800	16	Xtreme 130 6226/CSB
140	210	33	111	108	4000	5	Xtreme 140 6028/CSB
140	300	62	252	245	3600	20	Xtreme 140 6328/CSB
150	225	35	125	125	1700	5	Xtreme 150 6030/CSB
150	320	65	280	290	3200	20	Xtreme 150 6330/CSB
160	240	38	143	143	1600	5	Xtreme 160 6032/CSB
160	340	68	300	325	2800	20	Xtreme 160 6332/CSB
170	360	72	327	367	2800	20	Xtreme 170 6334/CSB
180	380	75	354	412	2800	20	Xtreme 180 6336/CSB
190	400	78	370	440	2500	20	Xtreme 190 6338/CSB

MACHINE DIAGNOSTICS

Machine diagnostics

Applications: Condition monitoring – Alignment – Calibration – Online data gathering

- Monitoring – the safest way to optimisation
- Offline analysis
- Online monitoring with OptimiZe
- Condition monitoring matrix

Machine diagnostics

Monitoring – the guaranteed way to optimisation

The overall optimisation as well as optimisation with bearings share the same common purpose – namely, to make the maintenance process easier, to cut down on operating costs and increase the production efficiency. With the overall optimisation package, we can cover more areas and achieve better results. Condition-based monitoring and vibration analysis are the guaranteed and most effective way to optimisation.

Regarding monitoring, the seamless operation is ensured through:
- Analysis of the situation
- We carry out all necessary measurements with professional monitoring equipment
- You receive a report, which describes the situation assessed and solution options – clear and easy

After conducting the monitoring, CeramicSpeed also offers:
- Balancing
- Mounting and dismounting kits
- Induction bearing heaters

Online monitoring with OptimiZe - much more than just monitoring

Online monitoring is gaining more and more attention in the industry. More companies switch to the condition-based maintenance instead of fixed time intervals, where there is a risk of replacing components before it is necessary, or at an inappropriate time, where a breakdown occurs with large consequential costs.

What can OptimiZe do for you?
- Provide a basis for the full integration of sensor data
- Create a foundation for the future of AI-based decision support systems
- Collect the data, analyse it and share it with all common interfaces
- Can be fully integrated in existing SCADA systems and across the already installed hardware

The possibility of complete integration of the existing sensors in your system or application ensures a faster detection of incipient errors, wear and tear and inappropriate mode of operation. Consequently, we are working not only with the traditional vibration analysis methods, but also with our newly developed methods and the existing flow data. OptimiZe can do more than conventional systems, quite simply, and it ensures a good and future-proof solution.

Why OptimiZe?
- Detect errors BEFORE they evolve
- Create an overview of the development by comparing data and operation patterns
- Optimise the machine operation on performance and energy saving
- Predict the remaining operating time until next service
- Reduce maintenance and the risk of unplanned stops

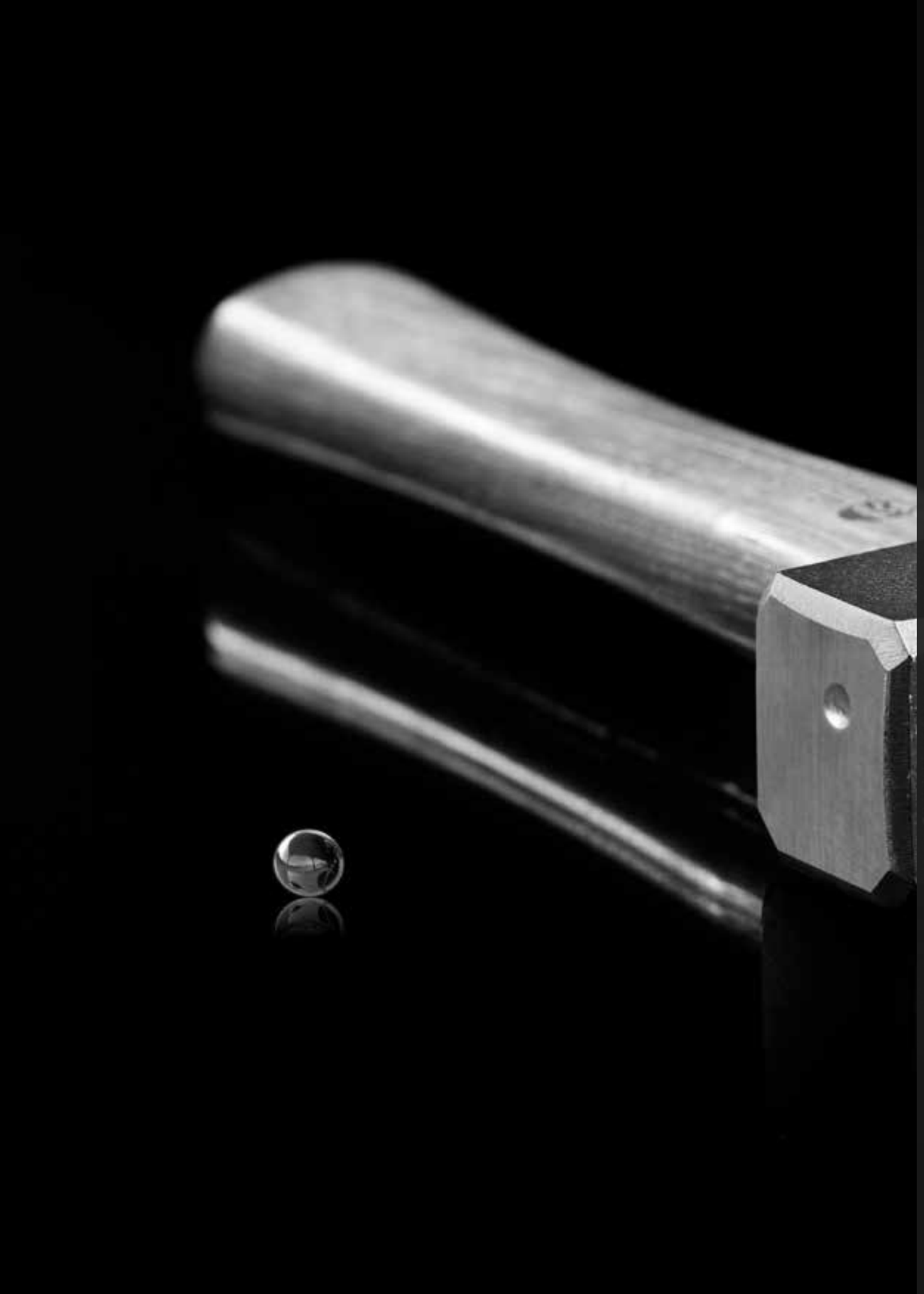
OptimiZe is available in different configurations, each of which opens up for opportunities that fit your needs and budget. The system can always be upgraded when new needs arise, or when you are ready for the next step.

OptimiZe is built from standard hardware, which provides maximum flexibility and the opportunity to customize the system based on the client's unique needs. The entire foundation for OptimiZe is based on our wide knowledge in the field of software development, our advanced analysis models, historical data, knowledge and understanding of machinery and processes, as well as technologies within machine learning and IoT.

In order to ensure the best source for analysis and system output, OptimiZe is based on the high demands of both hardware and software quality, as well as data quality.

	Basic	Standard	Professional	Enterprise
Computer: Computer for Data collection, storage and visualisation.		X	X	X
VPN Access: Secure external access for CeramicSpeed technician and cloud connection.	X	X	X	X
PLC: Programmable logic controller used to control eg. pump, valve also used to interface with sensors.			(X)	X
Graphical user interface: An external display is used to visualise process values and alarms.		(X)	X	X
Vibration analyse modules: Module to analyse and monitor vibration, each module has 4 sensors. Maximum modules per box is 6. Included in the package.	2	2	4	Ska-ler-bar
Interface hardwire: Digital I/O, analog I/O and special signal I/O. eg. Temperature, pressure, flow sensors.		(X)	(X)	(X)
Interface serial fieldbus: We support almost all serial based fieldbus systems.		(X)	(X)	(X)
Interface Ethernet fieldbus: We support almost all Ethernet based fieldbus systems.		(X)	X	X
Interface with OPC DA:		(X)	(X)	(X)
Interface with OPC UA:			X	X
Data acquisition local: Data collection from the analysis modules and other sensors/plc there is connected to our system through digital, serial or Ethernet. Data is stored locally on the hard drive.		X	X	X
Data acquisition cloud/backup: Data collection from the analysis modules and other sensors/plc there is connected to our system through digital, serial or Ethernet. Data is stored locally on the hard drive and uploaded to our cloud based storage.			X	X
Graphical user interface standard.		X	X	X
Graphical user interface custom: Custom made user interface like showing external sensors and custom machines.			(X)	X
SMS notification:		(X)	X	X
E-mail notification:		X	X	X
External storage/backup: We can use the customers own storage for log files and backup.			(X)	X
External database: We can use the customers own SQL database. Versions supported Microsoft SQL server from 2014		(X)	(X)	X

	Basic	Standard	Professional
Analysis packages online			
Online check without report	X	X	X
Online check with report	X	X	X
Online check with report and optimisation recommendations	X	X	X
Service packages onsite			
Function test. Alarms, SMS, Email		X	X
Sensor check. Accelerometers	X	X	X
Visual inspection. Sensors, system, installation	X	X	X
Alignment	X	X	X
Backup. Configuration, log data, database	X	X	X
Software update	X	X	X



Technical data

This is why CeramicSpeed Bearings and Coated Roller Bearings make a difference

Ball bearings

The CeramicSpeed Bearings can be used as means of optimisation within a wide range of issues. Amongst other things, these can be applied in areas with a lot of contamination from water, dust, dirt and metal, whether it is about bearings with many starts/stops, or where there is a need for fast acceleration.

In harsh environments with insufficient lubrication, high temperature, vibrations, bearing stray current and other forces as such, you will find that CeramicSpeed Bearings have a much longer service life and thus a better overall economy. CeramicSpeed's designation system for ball bearings:

CeramicSpeed Designation System

Example 1:	Corrotec	030	6206	-	2Z		/CSB	.		FB		
Example 2:	Insulate	030	6206	-	2RZ		/CSB	.	C3			
Example 3:	Xtreme	130	6226			M	/CSB	.	C3		IO.	HCoat

Series	Shaft mm	Type	2Z 2RZ 2RS	Cage	CSB	C2 C3 C4 C5	Special design	Coat

LongLife Series
Xtreme
Insulate
HighTemp
Corrotec
CustomBuild

Shaft mm
xxx

Type

Seals
~ Open
2Z Two no contact seals
2RZ Two no cantact rubber seals
2RS Two rubber seals

Cage
~ Polyamide
~ Steel
M Brass

~ = Blank/No symbol

Coating
~ No coating
WCoat WearCoat
HCoat HardCoat
CCoat CorroCoat
I. Inner ring
O. Outer ring
IO. Inner and outer ring

Special design
FB Full ball
260° C HighTemp 260 degrees
350° C HighTemp 350 degrees
SPG Special grease

Clearance
~ Normal clearance
C2 Less than normal
C3 Greater than normal
C4 Greater than C3
C5 Greater than C4

Balls
~ Steel balls
CSB CeramicSpeed Balls

Coated roller bearings

The CeramicSpeed Roller Bearings are ideal for solving issues with bearings that do not run optimally in contaminated environments such as water, dust, dirt, metal, etc. In these environments, the CeramicSpeed Roller Bearings have a much longer service life. The same applies for the environments, where conditions are problematic; this can be everything from frequent starts/stops to high temperatures or lack of lubrication. Our CeramicSpeed Coated Roller Bearings ensure a better overall economy because of their unique properties. CeramicSpeed designations system of coated roller bearings:

CeramicSpeed Designation System

Example 1	Xtreme	025	NU2210		C3	R.	Wcoat	**(WearCoat)**

Series	Shaft mm	Type	Cage	C2 C3 C4 C5	R I O	Hcoat Wcoat Ccoat

Series
Xtreme

Shaft mm
xxx

Size/Type

Cage
~ Polyamide
M Brass

~ = Blank/No symbol

LongLife Series
HCoat HardCoat
WCoat WearCoat
CCoat CorroCoat

Coated elements
R. Rollers
I. Inner ring
O. Outer ring

Clearance
~ Normal clearance
C2 Less than normal
C3 Greater than normal
C4 Greater than C3
C5 Greater than C4

CeramicSpeed Balls

The CeramicSpeed Balls are superior to those of steel in all measurable physical properties. This provides our bearings with a wide range of advantages:

- Extreme durability
- It does not corrode
- Does not cause surface fatigue in the rings (micro pitting)
- Lower friction coefficient
- Electrically insulating
- Increased precision and stiffness - fewer vibrations
- Increased resistance to contamination
- Increased resistance to fluctuating speed (acceleration)
- Lightweight

	Density [g/cc]	Hardness [Vickers]	Elastic Modulus [GPa]	Thermal Expansion Coefficient ($10^{-6}K^{-1}$) [RT to 800 °C]	Max Usage Temperature [°C]	Surface Finish Grade 5 [micron]	Material Fatigue, Life Wear Resistance	Hardness [Vickers]
Steel Balls (100 Cr 6)	**7.6**	**700**	**190**	**12.3**	**320**	**0.02**	**-**	**10^{-8}**
Ceramic Balls (Si3N4)	**3.2**	**1600**	**310**	**3.7**	**1000**	**0.005**	**< 10x**	**10^{14}**
Difference	**58 % lighter**	**128 % harder**	**63 % stiffer**	**- 70 %**	**+ 680 °C**	**400 % smoother**	**< 10 x**	**10^{16}**=insulator **0**=superconductor

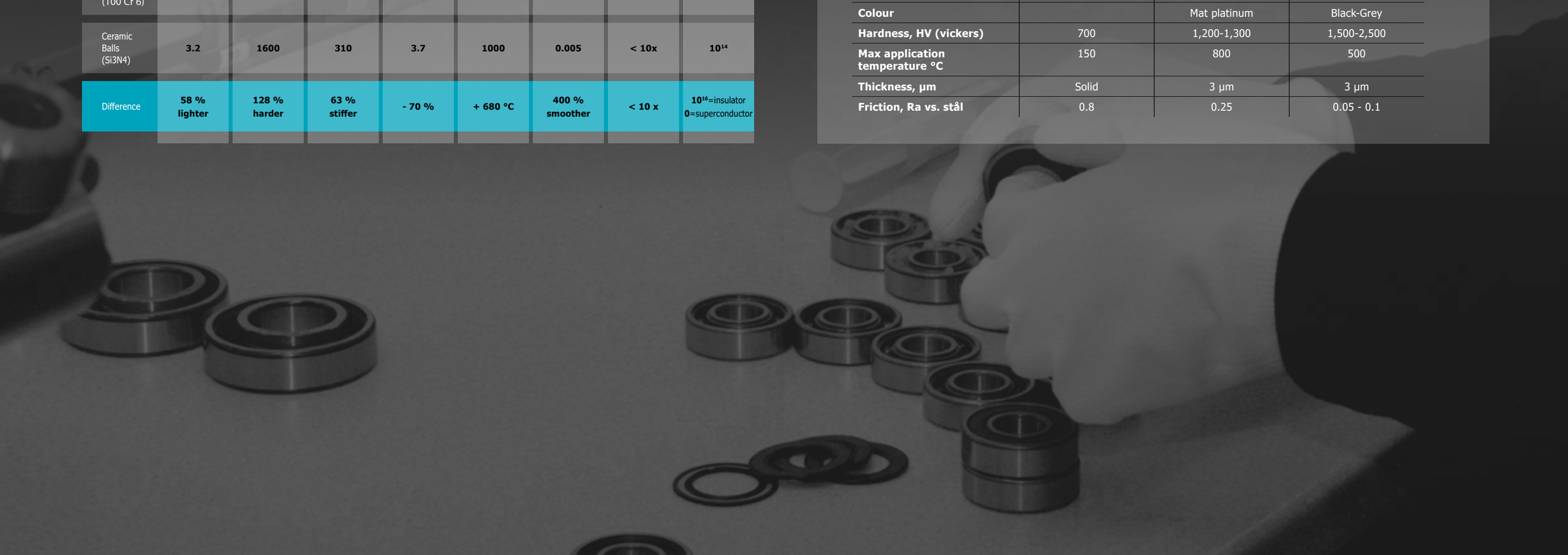
Technical coatings

Bearing rollers, races and other wearing parts can acquire, in many cases, resistance to wear, and thus service life, thanks to the CeramicSpeed's range of technical coatings. The coating's properties can contribute to delivering the following benefits:

- Increased resistance to wear
- Increased resistance to corrosion
- Reduced risk of surface fatigue in the rings (micro pitting)
- Lower friction coefficient
- Increased resistance to contamination
- Increased resistance to fluctuating speed (acceleration)

Material properties of the CeramicSpeed coatings vs. hardened steel

	Hardened steel	**CorroCoat**	**WearCoat/HardCoat**
Process		"Dipping"	Nanotechnology applied with PVD process
Process- temperatures °C		< 80	170
Colour		Mat platinum	Black-Grey
Hardness, HV (vickers)	700	1,200-1,300	1,500-2,500
Max application temperature °C	150	800	500
Thickness, µm	Solid	3 µm	3 µm
Friction, Ra vs. stål	0.8	0.25	0.05 - 0.1



Bearing lubrication

The lubricant is a vital part of every ball and roller bearing's optimal function. The correct lubricant, in the right volume, is essential for the bearing noise, temperature and service life.

With proper lubrication, the CeramicSpeed Bearings have even longer service life, are more reliable and secure that the bearing is even more resistant to contamination and corrosion.

What does the lubrication grease contain?

Base oil: Mineral or synthetic oils, which is the actual lubricant in the grease.

Soap/thickener: A fastening factor, which ensures that the oil remains in the bearing.

Additives: Added to the oil to optimise the properties.

Important parameters when choosing the optimal lubricant

Temperature range
The selected lubricant should be able to operate within the same temperature range, as the bearing runs at. Exceeding the lubricant's temperature limits will shorten its service life dramatically. The service life is reduced to half, at only 15 °C above the limit.

Base oil viscosity
Generally, high load and low rotation speed require a high base oil viscosity. Contrariwise, low load and high rotation speed require a lubricant with low base oil viscosity.

Typical choice of viscosity:
- Spindle bearings > 10.000 RPM/min.: 20 – 40 [cSt] v/40 °C
- Electrical motors < 3.000 RPM/min.: 80 - 120 [cSt] v/40 °C
- Main bearing in a windmill rotor < 20 RPM/min.: 200 – 400 [cSt] v/40 °C

Other significant input
- Requirements for use in the food industry (FDA/EC 1935)
- Noise requirements
- Protection against corrosion

Lubrication interval

The optimal lubrication interval is 0.5 – 0.7 times the theoretical lubricant service life, which can be difficult to calculate, but it can often be found in the charts and technical documentation of the lubricant supplier.

A representative lubricant can for example have a service life of up to 80,000 hours at 70 °C but only 15,000 hours at 100 °C.

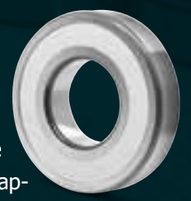
Lubrication volume

The recommended lubrication quantity can be found by simply applying the following formula: D x B x X = M [cm^3]
- D = the bearing's outer diameter in mm
- B = the bearing's width in mm
- X = 0.002 (weekly lubrication) / 0.003 (monthly lubrication) / 0.004 (annual lubrication)

Introducing SolidLube

SolidLube is a polymer matrix saturated with lubrication oil. The matrix secure to retain oil right on the functional surfaces of the bearing under even very harsh conditions while at the same time preventing moist and foreign particles in entering the bearing.

Focus applications
- Environments with sever particle contaminating
- Applications in moist surroundings - even under splash water influence
- Chemical, pharmaceutical or other applications, where no liquid lubricant can be allowed.



Miscibility matrix

Miscibility is always associated with the risk of mixing different types of lubricant. If necessary, the risk can be reduced by examining whether the lubricant's main components (oil and soap/thickener) can be mixed according to the table below.

Miscibility of base oils

	Mineral oil	Synthetic hydrocarbon	Ester oil	Polyglycol	Silicone oil (Methyl)	Perfluoroalkyl ether	Silicone oil (Phenyl)	Polyphenyl ether oil
Mineral oil	+	+	+	-	-	-	+/-	+
Syntethic hydrocarbon	+	+	+	-	-	-	-	+
Ester oil	+	+	+	+	-	-	+	+
Polyglycol	-	-	+	+	-	-	-	-
Silicone oil (Methyl)	-	-	-	-	+	-	+/-	-
Perfluoroalkylether	-	-	-	-	-	+	-	-
Silicone oil (Phenyl)	+/-	-	+	-	+/-	-	+	+
Polyphenylether oil	+	+	+	-	-	-	+	+

+ Miscible +/- Partially miscible - Immiscible

Miscibility of thickeners

		Metal soap				Complex soaps					Other thickeners		
		Al	Ca	Li	Na	Al	Ba	Ca	Li	Na	Bentonit	Polyurea	PTFE
Metal soap	Al	+	+/-	+	+/-	+	+/-	+	+	+/-	+	+	+
	Ca	+/-	+	+	+	+	+	+	+/-	+	+	+	+
	Li	+	+	+	-	+	+	+	+	-	+/-	+/-	+
	Na	+/-	+	-	+	+	+	+/-	+/-	+	-	+	+
Complex soaps	Al	+	+	+	+	+	+	+/-	+	+/-	+/-	+/-	+
	Ba	+/-	+	+	+	+	+	+/-	+/-	+	+	+/-	+
	Ca	+	+	+	+/-	+/-	+/-	+	+	+	+/-	+	+
	Li	+	+/-	+	+/-	+	+/-	+	+	+/-	+	+/-	+
	Na	+/-	+	-	+	+/-	+	+	+/-	+	-	+	+
Other thickeners	Bentonit	+	+	+/-	-	+/-	+	+/-	+	-	+	+	+
	Polyurea	+	+	+/-	+	+/-	+/-	+	+/-	+	+	+	+
	PTFE	+ +	+	+	+	+	+	+	+	+	+	+	+

+ Miscible +/- Partially miscible - Immiscible

Bearing steels

CeramicSpeed standard steel rings

High carbon chrome steel 100Cr6 / ASTM52100 with Ovako steel quality purity Q or better.

	C%	Si%	Mn%	P%	S%	Cr%	Ni%	Mo%	Cu%
Min	0.93	0.15	0.25			1.35			
Max	1.00	0.35	0.45	0.025	0.025	1.60	0.25	0.10	0.30

Specification	Macro inclusions mm/dm²	Oxygen content (ppm)			Titanium content (ppm)	Micro inclusions							
						A		B		C		D	
		C* <.5%	.5<C<.8	C*>.8%		Th	He	Th	He	Th	He	Th	He
CQ	According to customer requirements												
Q	5	15	15	15	-	2.5	1.5	1.0	0.5	0	0	0.5	0.5
BQ	2.5	11	9	7	30	2.0	1.5	0.5	0.1	0	0	0.2	0.1
PBQ	1	9	8	7	30	1.0	0.5	0.5	0	0	0	0.2	0

CeramicSpeed stainless steel rings

CeramicSpeed use races made of martensitic stainless steel like SUS440C (X102CrMo17) or KS440 (X65CR13).

MATERIAL		**STAINLESS STEEL**	
Symbol		**SUS440C** SUS440C	**KS440** KS440 (ACD34)
Chemical Composition %	C	0.95 ~ 1.20	0.60 ~ 0.75
	Si	≦ 1.00	≦ 1.00
	Mn	≦ 1.00	≦ 1.00
	P	≦ 0.040	≦ 0.030
	S	≦ 0.030	≦ 0.020
	Cr	16.00 ~ 18.00	11.50~13.00
	Mo	≦ 0.75	≦ 0.30
Equivalent		AISI440C, X102CrMo17	X65Cr13

Seals

CeramicSpeed offers three options of seals integrated in deep groove ball bearings.


Type 2RZ

Seals type RZ (2RZ)
A low-friction rubber seal, which grants optimal protection for the bearing, also at higher engine speed, without creating undue friction.


Type 2RS

Seals type RS (2RS)
A friction seal, which provides optimal protection for the bearing, but limits the potential rotation speed and creates friction.


Type 2Z

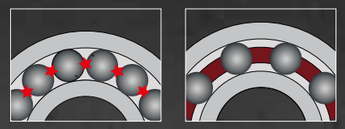
Seals type Z (2Z)
Labyrinth seals that provides a fundamental protection of the bearing without creating friction and without limiting the bearings' potential rotation speed.

Seal type	Protection	Fricion	High speed	Temperature (max)
RZ	++	++	+++	120 °C
RS	+++	+++	-	120 °C
Z	-	+++	+++	360 °C

(+) Suitable (-) Less suitable

Ball cages and roller cages

The ball cages or roller cages are supposed to keep the distance between the rolling elements of the bearing, and thus to reduce friction.



CeramicSpeed produces bearings with ball and roller cages in the following materials:

Cage material	Fatigue strength	Friction	Chemical constancy	Temperature (max)
Steel	++	+	+	360 C
Brass	++	+	++	250 C
PA66	+++	++	+	120 C
PEEK	++	+++	+++	200 C

(+) Suitable (-) Less suitable

Steel:
Typically pressed into the plate and assembled with rivets or screws

Brass:
Machined and assembled with rivets or screws

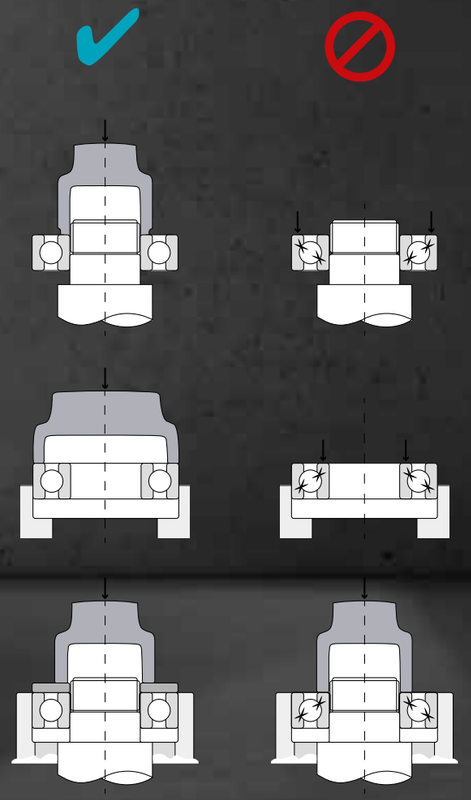
PA66:
Polyamide. Injection moulded in one piece in a material reinforced with glass fibre

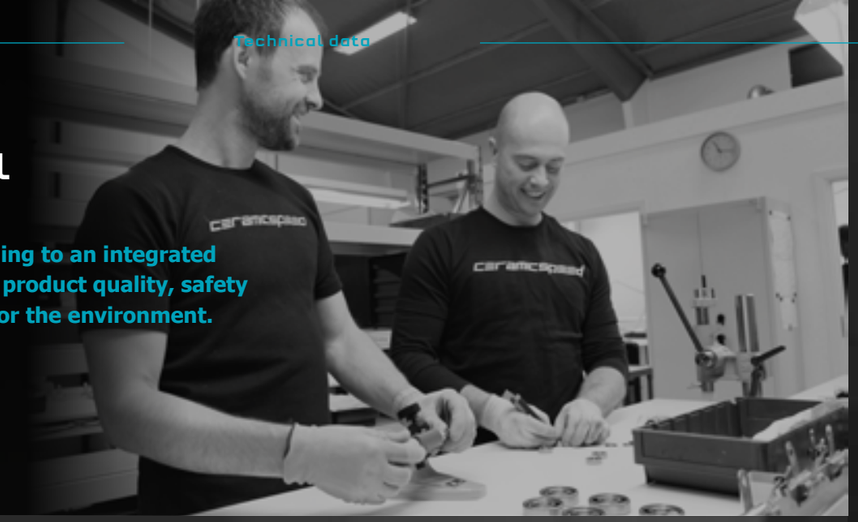
PEEK:
Polyether-ether-ketone. Injection moulded in one piece

Handling and bearing installation

The CeramicSpeed Bearings have to be mounted with the same careful consideration as standard steel bearings:

- **NEVER** knock the bearing directly with a hammer or hard objects
- **ALWAYS** use the correct tools; impact sleeve or bearing heater
- **NEVER** apply mounting power through the bearing's balls/rollers
- **NEVER** leave a new bearing uncovered for a longer time
- **ALWAYS** keep the bearing and its surroundings clean during assembly





Quality control

CeramicSpeed works according to an integrated quality system that ensures product quality, safety for employees and respect for the environment.

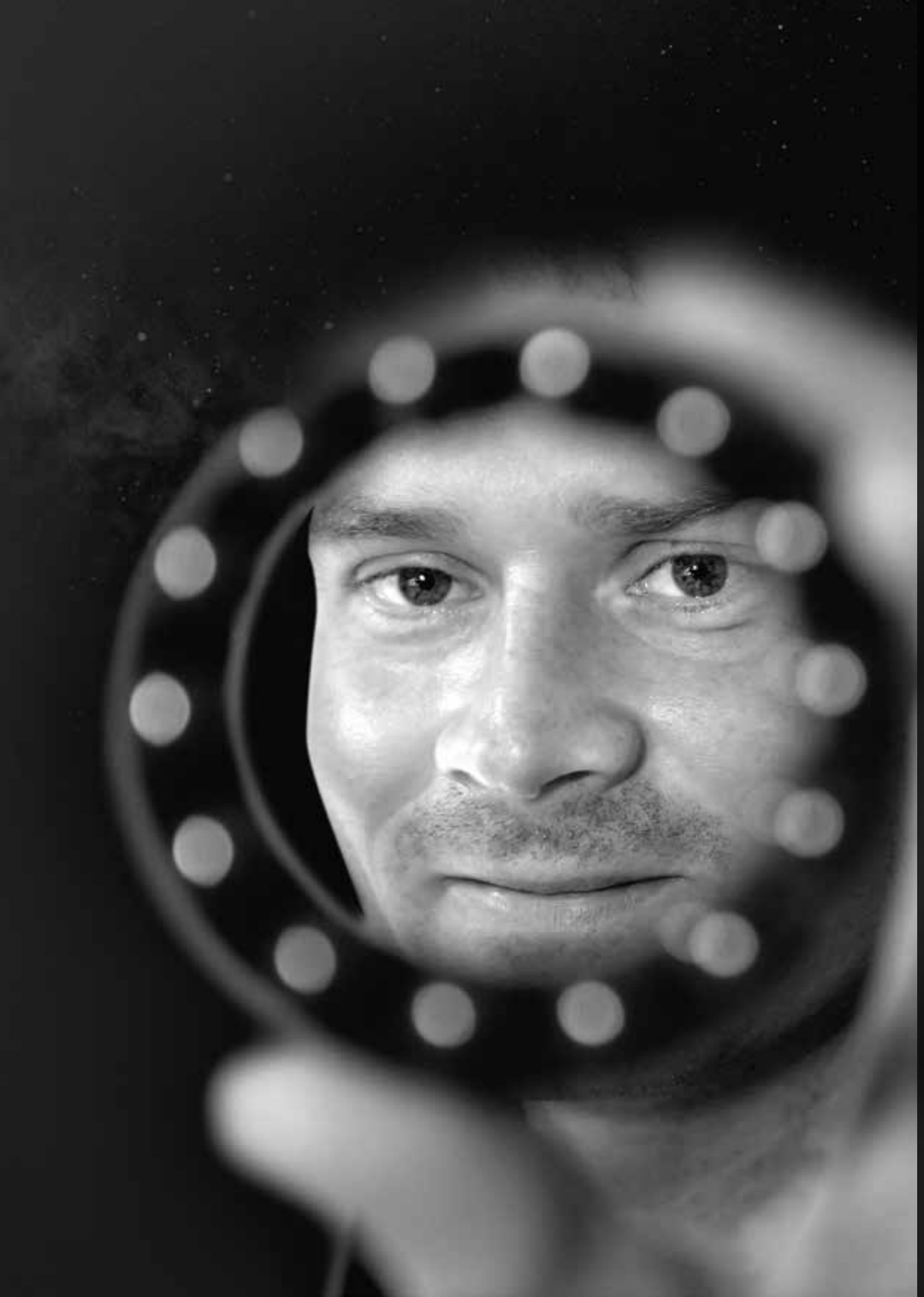
Product quality

Incoming goods inspection
All components are checked geometrically and visually before assembly.

Analytical control
CeramicSpeed performs random checks via vibration analysis on finished components. The data analysis is logged on batch-level and shared with customers upon request

Mounting
At CeramicSpeed, the final assembly is always done by hand, and our staff checks the finished product both visually and auditory after each step of the process.

Environment and safety
CeramicSpeed is a safe place to work and our processes ensure that all employees can perform their tasks safely and with consideration for the surroundings and the environment. In the few processes where chemicals and solvents are included, we always work to reduce their amount for the benefit of our employees, environment and the economy.



CeramicSpeed history

A focused effort turned CeramicSpeed into the world’s leading manufacturer

Jacob Csizmadia, founder of CeramicSpeed, was the first person in the world to introduce ceramic bearings to the world of professional cycling, back in 2000.

Knowledge from bicycle bearing was the stepping stone for optimisation in industrial applications.

CeramicSpeed was founded in 2004, and in 2009, CeramicSpeed Bearings was established with a focus on products for industrial use. Ever since, the company has been on a growth spurt. CeramicSpeed is one of the few companies in the world that focuses exclusively on optimisation with the use of bearings. This means that the company, in its more than 15 years of existence has specialised in the optimisation and application of ceramic bearings.

”Since the company was established, there has been an increasing demand for our products, and now it looks like the industry has had their eyes opened to considering bearings, as a part of their corporate optimisation,” says CeramicSpeed’s CEO, Jacob Csizmadia and adds.

”There is a lot of money to save, and we have several cases from large Danish companies, which talk about the great savings achieved and, at the same time, about the improved production efficiency. It is a very good investment for our customers, and it does not stop here. CeramicSpeed now also offers monitoring and optimisation as a part of our product selection. It means that through several measurements we can now analyse even more accurately and find the right optimisation solution for our customers.”

All CeramicSpeed balls used in the bearings that we manufacture, as well as the rest of the components, are of the highest quality. Thanks to this, our bearings feature unique properties and a lifetime, which is 4-8 times longer than standard steel bearings.

In 2013, CeramicSpeed won the ELFORSK Award for a project, which documented that CeramicSpeed Bearings can reduce energy loss in the bearings by up to 70 %.

In 2014, the CeramicSpeed Bearings are FDA approved as the only bearings in the world qualified to come in direct contact with food.

The CeramicSpeed Bearings are gaining more and more foothold in the industry, as there is a great potential for considering bearings as a part of production optimisation, and thereby decrease operating costs and increase the competitiveness of companies.

World record paves the way

Jacob holds the world record from 1998 for 24-hour in-line skating, and was at the time the first person to break the 500 km barrier. The main reason for setting the world record and for going from 402 km to 505 km in 1998, was the replacement of steel bearings with ceramic bearings in his skates. This world record paved the way for CeramicSpeed, which today is a global company that produces ceramic bearings for applications in both sports and industrial use.

Today, CeramicSpeed is an international company, where products for sports application are available in more than 40 countries. We are the only ceramic bearing manufacturer to sponsor several World Tour Teams as well as a number of other top athletes from road cycling, triathlon and MTB.

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Bearings that last!