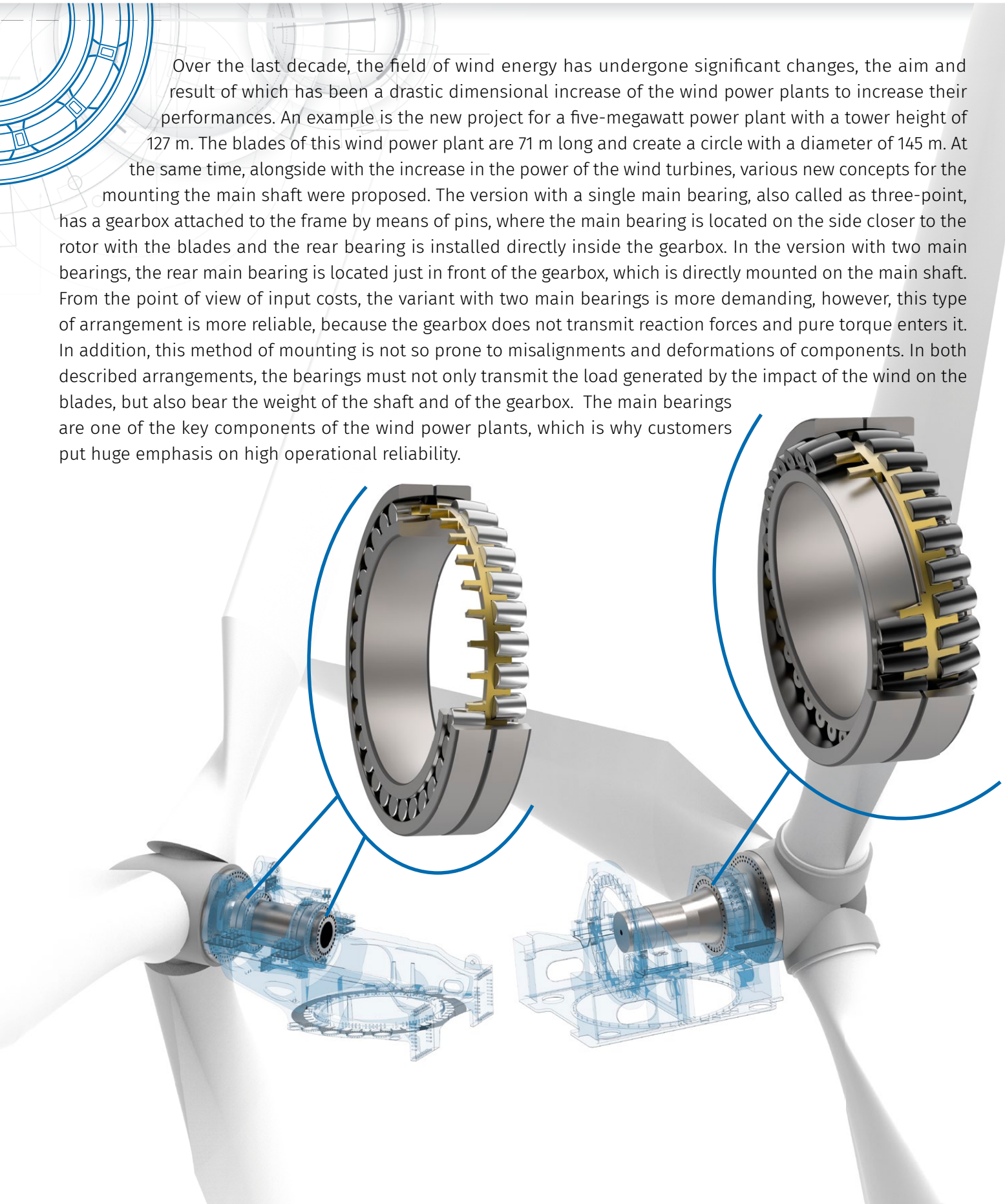


# ZKL spherical roller bearings in geared wind power plants



ZKL GROUP

Over the last decade, the field of wind energy has undergone significant changes, the aim and result of which has been a drastic dimensional increase of the wind power plants to increase their performances. An example is the new project for a five-megawatt power plant with a tower height of 127 m. The blades of this wind power plant are 71 m long and create a circle with a diameter of 145 m. At the same time, alongside with the increase in the power of the wind turbines, various new concepts for the mounting the main shaft were proposed. The version with a single main bearing, also called as three-point, has a gearbox attached to the frame by means of pins, where the main bearing is located on the side closer to the rotor with the blades and the rear bearing is installed directly inside the gearbox. In the version with two main bearings, the rear main bearing is located just in front of the gearbox, which is directly mounted on the main shaft. From the point of view of input costs, the variant with two main bearings is more demanding, however, this type of arrangement is more reliable, because the gearbox does not transmit reaction forces and pure torque enters it. In addition, this method of mounting is not so prone to misalignments and deformations of components. In both described arrangements, the bearings must not only transmit the load generated by the impact of the wind on the blades, but also bear the weight of the shaft and of the gearbox. The main bearings are one of the key components of the wind power plants, which is why customers put huge emphasis on high operational reliability.

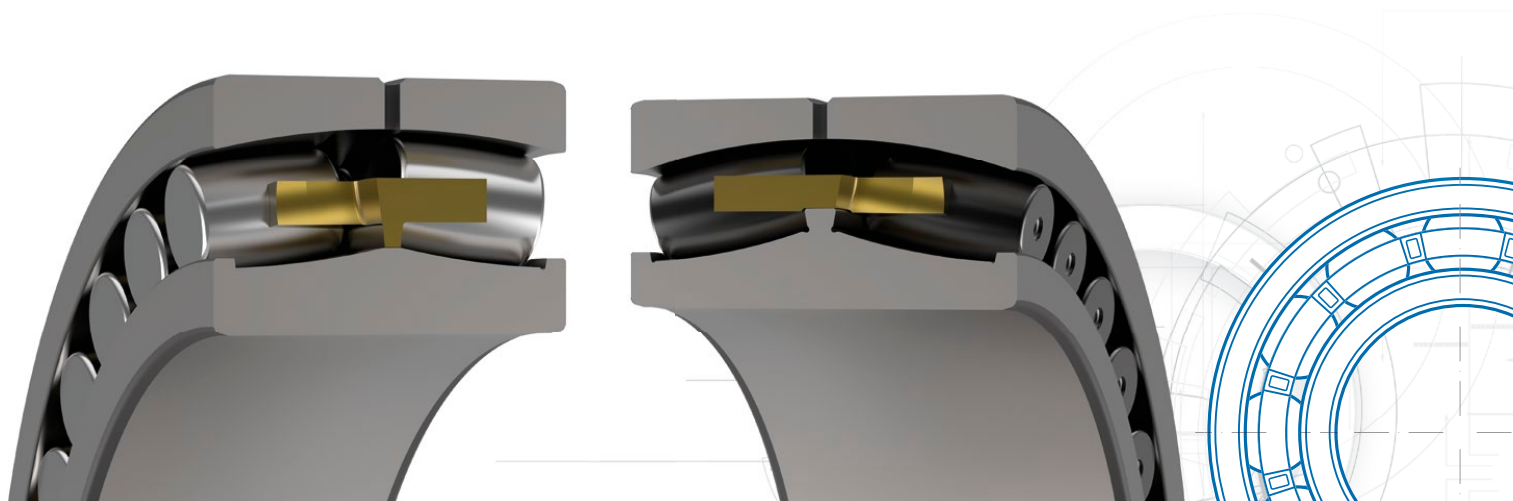


# ZKL spherical roller bearings in geared wind power plants

ZKL offers a wide range of double row spherical roller bearings for onshore wind power plants in the two basic versions EMH and CM. In the case of the EMH version, the symmetrical rolling elements are guided by means of a one-piece solid brass cage, while in the CM version the cage is made out of two parts and the inner ring is additionally equipped with a fixed guiding ring. These basic versions can be furtherly improved according to the specific wishes of the customer. An example is the application of a special coating on the surface of the rolling elements to improve the sliding properties inside the bearing. The internal geometry of the bearings is designed with respect to the applied loads. The actual production and delivery of the bearings for wind power plants is always preceded by a conceptual management of the whole project, which includes calculations of bearing's life and contact stresses based on data simulating the actual operation of the power plant. At the present time, the ZKL company supplies bearings to wind power plants with an output range of 2–5 MW while additional projects with new bearing sizes are constantly being developed.

## ZKL Spherical roller bearings for wind turbine main shafts

Spherical roller bearings for wind turbine main shafts	Bearing dimensions			Bearing parameters		
	Inner diameter	Outer diameter	Width	Dynamic load ratings	Static load rating	Mass
	d [mm]	D [mm]	B [mm]	C <sub>r</sub> [kN]	C <sub>or</sub> [kN]	m [kg]
<b>241/500</b>	500	830	325	9 500	18 000	710
<b>241/530</b>	530	870	335	10 100	19 800	800
<b>231/630</b>	630	1 030	315	11 600	21 100	1 030
<b>240/630</b>	630	920	290	8 950	19 700	660
<b>230/750</b>	750	1 090	250	9 450	19 600	780
<b>230/800</b>	800	1 150	258	10 100	21 600	880
<b>240/800</b>	800	1 150	345	11 400	29 100	1 190
<b>239/850</b>	850	1 120	200	6 490	16 900	520
<b>240/850</b>	850	1 220	365	14 200	33 700	1 430
<b>230/900</b>	900	1 280	280	11 900	26 000	1 170
<b>240/900</b>	900	1 280	375	15 000	37 000	1 600
<b>230/950</b>	950	1 360	300	13 500	29 400	1 420
<b>240/1120</b>	1 120	1 580	462	22 000	56 500	2 970



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