

Kaydon pitch and yaw bearing upgrades

Reduce life cycle costs with SKF and Kaydon

With the potential cost of downtime and bearing change-outs running into the hundreds of thousands of dollars, it pays to work with a supplier who can offer the upgraded bearing solution that will improve productivity and extend bearing life.

Kaydon has over 30 years experience designing and manufacturing slewing bearings for wind turbine pitch and yaw positions. Serving the wind aftermarket for the past decade, Kaydon pitch and yaw bearing solutions have been proven to reduce the total life cycle cost of wind turbines.

We've analyzed dozens of failed pitch bearings using laboratory-grade inspection systems and have documented the most common failures.

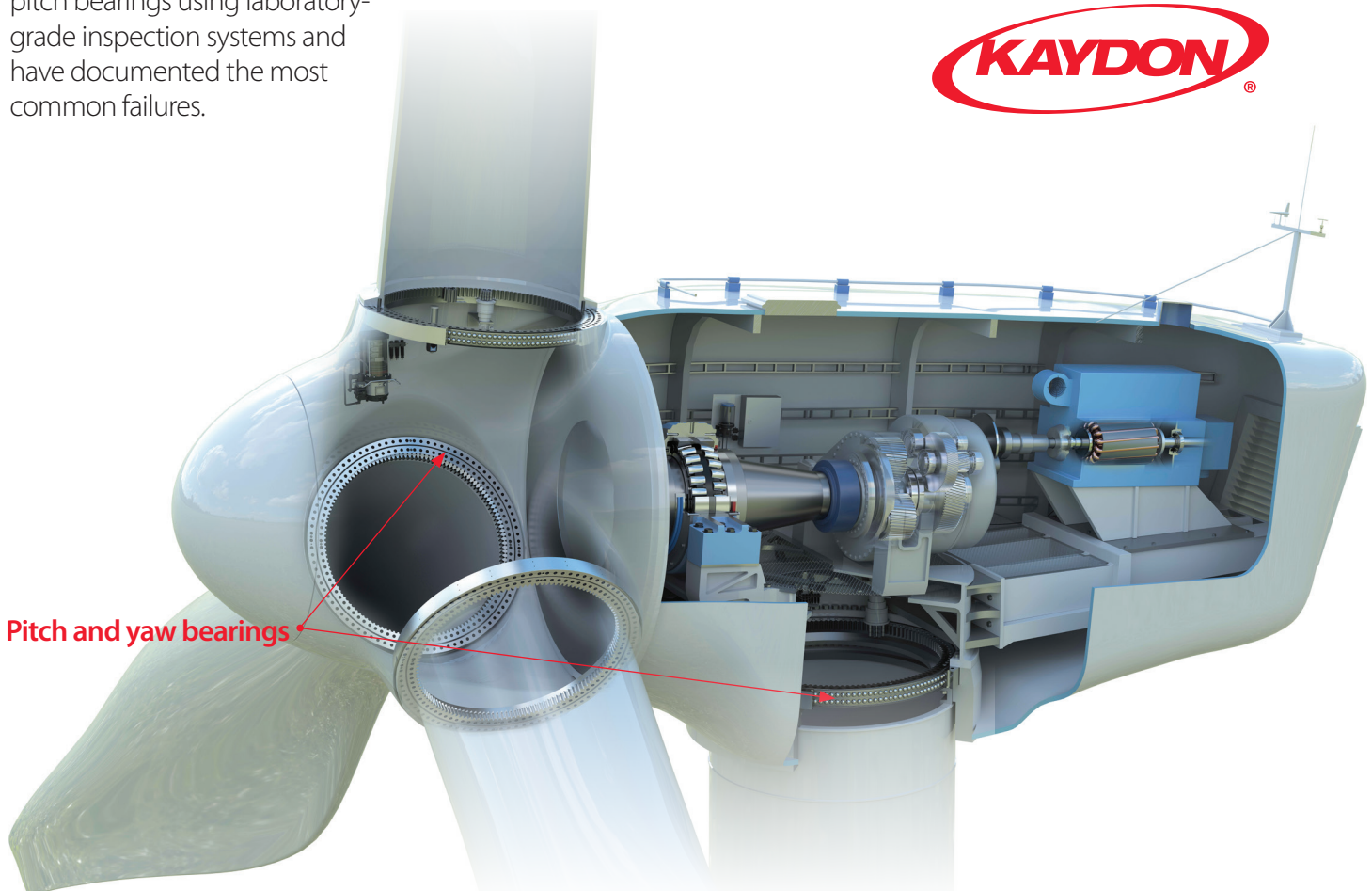
Common causes of pitch bearing failure

The classic failure modes predicted by standard bearing calculation models (i.e. fatigue spalling and brinelling) are actually very uncommon causes for failure. More often, pitch bearings fail for reasons related to lubricant degradation and/or lack of structural flexibility, including:

- Lubrication-induced failures from vibratory wear (false brinelling), corrosion, denting, and surface-induced fatigue
- Load and operation-induced failures such as component fracture (rolling elements, separators, races), separator lockup, and core crushing

Ellipse truncation failure

In a pitch bearing, the contact area between the ball and the raceway forms an elliptical shape that is centered over the race contact angle. When the races are very thin or inadequately supported, deformation can cause the ellipse to drop off the physical raceway surface, resulting in truncation. Under severe truncation, stress can cause the ball path edges to break or the balls to fracture.



Kaydon upgraded pitch bearing solutions

Every turbine system has unique challenges. With over 30 years experience in the industry, SKF and Kaydon are able to address these challenges to decrease life cycle costs and improve productivity.

Kaydon can offer upgraded pitch bearing solutions that:

- mitigate edge loading and strengthen the races
- address separator load and wear
- prevent contamination ingress
- retain lubricant
- result in a better bearing

Kaydon pitch bearings address the following critical design features:

Edge loading

- Increased path surface area minimizes or eliminates contact truncation
- Added material strengthens rings and reduces deformation



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Separator design

- Splitting the separator ring into segments with limited individual freedom of movement reduces tensile/compressive load
- Use of high-strength steel alloys improves durability, reducing contact wear and abrasion

Raceway geometry

- GD&T controls on path form and spacing improve load sharing and balance
- Smooth path finishes reduce skidding and internal friction

SKF patented high-endurance seal design

- 'H' seal cross-section profile and labyrinth retention groove prevent contaminant ingress

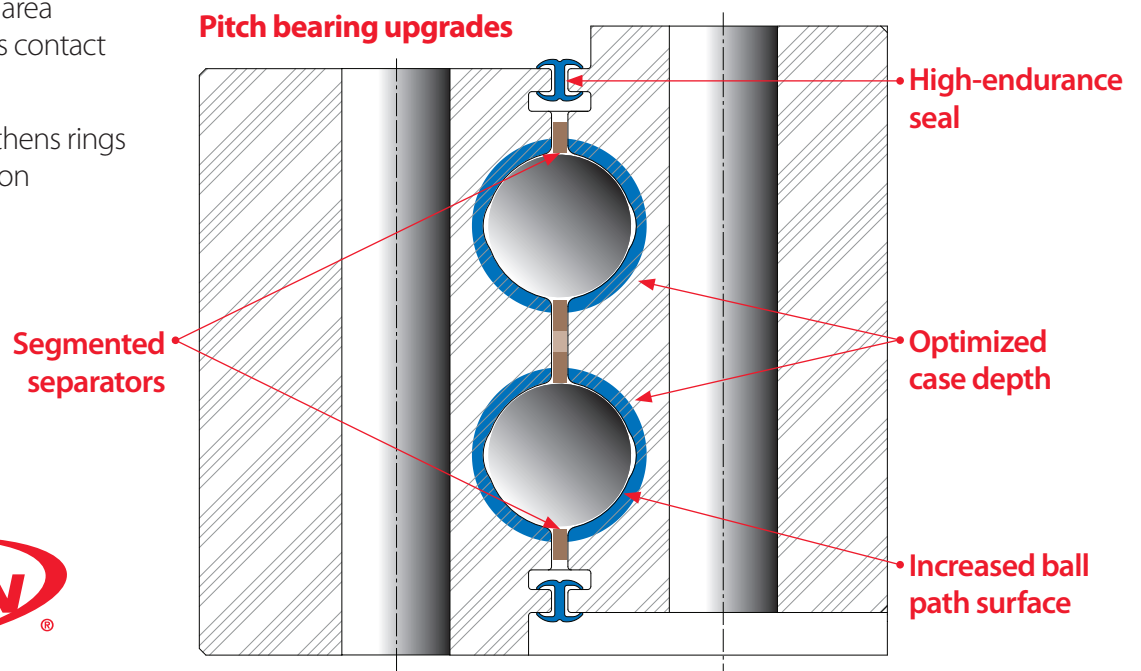
- Wear-resistant ECOPUR® thermoplastic polyurethane lasts longer than conventional rubber
- Responsive floating design provides seal pressure when deformed

Raceway hardening

- Case depth tailored to application requirements prevents core crushing failure
- Uniform hardness pattern along path surface absorbs heavy loads

Packaging

- Coating of mounting holes helps prevent corrosion
- Wrapping in VCI paper and packaging in vacuum-sealed bags
- Individual crating stacked in two-high sets



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