



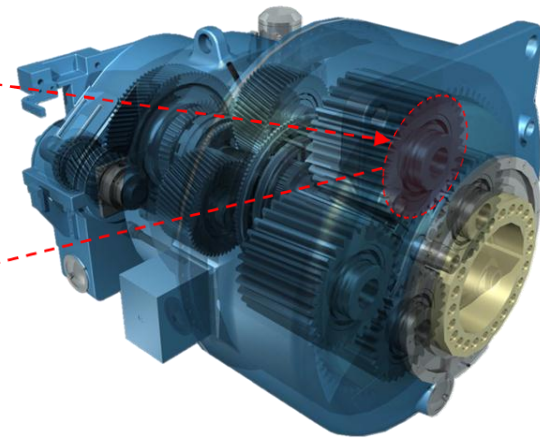
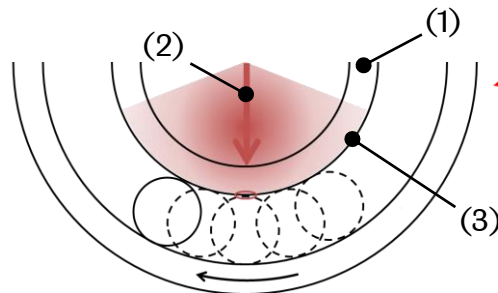
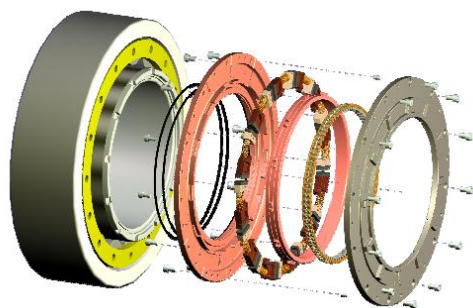
## Development of a novel bearing concept and sensor system for improved wind turbine gearbox reliability



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- Wind turbine gearboxes suffer from high failure rates resulting in extensive turbine downtime
- Fatigue failure of rolling element bearings is often to blame
- Planetary support bearings are particularly problematic
  - Static inner raceways (1)
  - One directional radial load (2)
  - Rapid onset of fatigue to a localised arc of the bearing inner raceways (3) leads to wear



Bespoke Bearing Test Rig

### Solution: *The MultiLife™ Bearing*

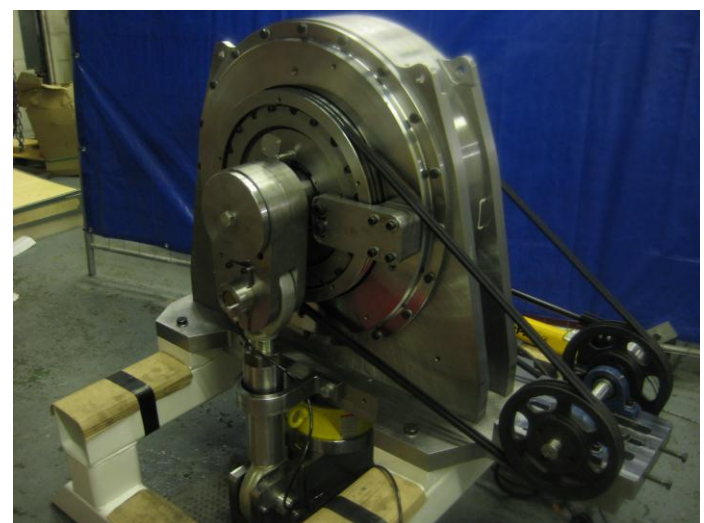
- An indexing mechanism retrofit to current bearings
- Periodically rotates the “stationary” inner raceway
- Distributes damage around the entire bearing circumference

### Benefits:

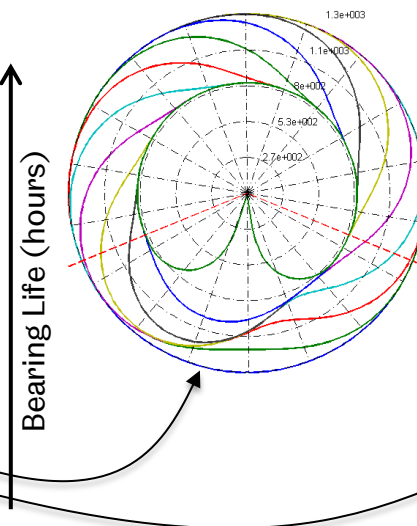
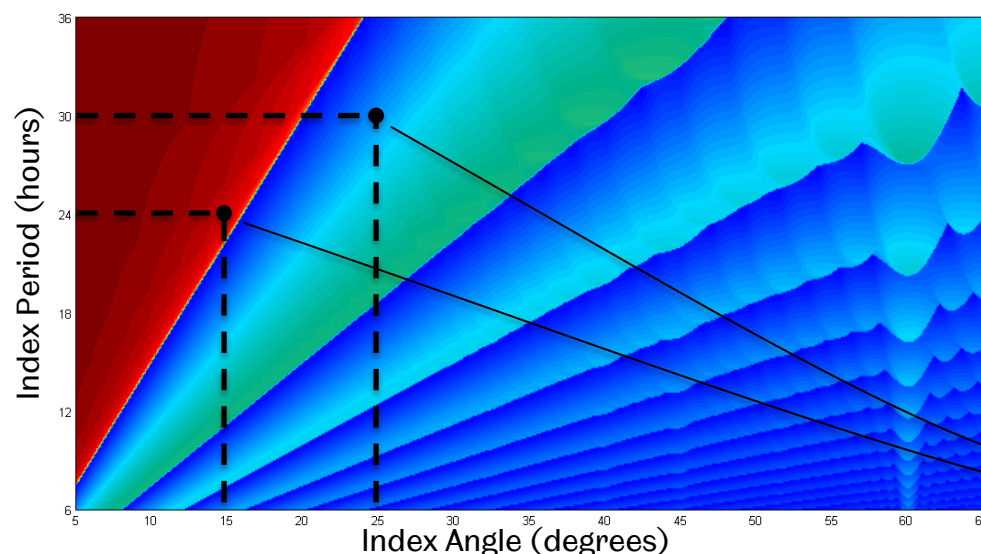
- Improves planetary bearing reliability by up to 5 times
- Failure rates of wind turbine gearboxes reduced
- Less maintenance costs and downtime thus increasing economic viability of wind turbine technology

### Research Objectives:

- Obtain proof-of-concept through testing on a bespoke test rig
  - Life-to-failure comparisons of standard bearings vs. MultiLife bearings
- Development of an *Ultrasound Sensor System* to monitor oil film formation within the bearings for condition monitoring
- Development of an analytical model for life predictions of indexing bearings and optimum indexing strategies



### Life Matrix for an Indexing Bearing



Bearing Wear per Index Cycle

