

# Engineered plastics for nacelle yawing slide pads



## Key requirements

- Low to very low wear, to minimize need for replacement during lifetime
- Low stick-slip, so low noise
- Medium friction, to provide some part of required break torque
- High creep resistance
- Ductile behavior in case of concentrated loads (tilting nacelle by extreme weather conditions)
- Typical lifetime minimum 10 years, preferably last turbine lifetime (25-40 years)

## Customer benefits

- High reliability of the yawing system, due to extensive proven performance and prequalification test data provided by the Advanced Materials Division of Mitsubishi Chemical Group (MCG)
- Cost savings versus roller bearing concept (average 20%)
- Cost savings through longer time between service intervals

## Our recommendation:

- Nylatron® NSM PA6 (grey)
- Ertalyte® SLP PET-P (blue) **NEW**
- Ertalyte® TX PET-P (light grey)
- Ertalyte® PET-P (natural white)

## Ertalyte® PET and Ertalon®/ Nylatron® PA solutions for the yawing slide bearing system

### Application challenges

In order to ensure a smooth and silent yawing process within wind turbine nacelles, over an extended period of time, and in all possible weather conditions, there are several application hurdles.

The yawing slide bearing system allows the wind turbine nacelle to head perfectly into the wind, which is required to prevent blade fatigue, and for optimum energy generation.

The system also supports wind forces that are exerted in any weather condition, and the full weight of the turbine, including the nacelle and the rotor.

The yawing slide bearing system is based on a yawing ring and a number of calipers, which act as a large slew bearing. The calipers hold the slide pads in position while sliding over the yawing ring.

Typically, grease is manually applied in order to reduce noise, and to prevent the metal yawing ring from corrosion. Engineered plastics, however, can eliminate the need for manual greasing, and can significantly lower the amount of corrosion, wear, and noise levels in yawing slide bearing systems.



Material benchmarking

Slide pads that are utilized where high compressive loads are distributed, can be machined from Ertalon® / Nylatron® PA6, and Ertalyte® PET-P. Ertalyte® PET-P solutions exhibit the lowest amount of wear when moving against smooth counter surfaces, while PA6 based materials outperform all others when abrading rough counter surfaces.

Even though the internal lubricants in materials from MCG Advanced Materials decrease overall wear rates, they also possess lower friction and load-carrying capabilities as a result.

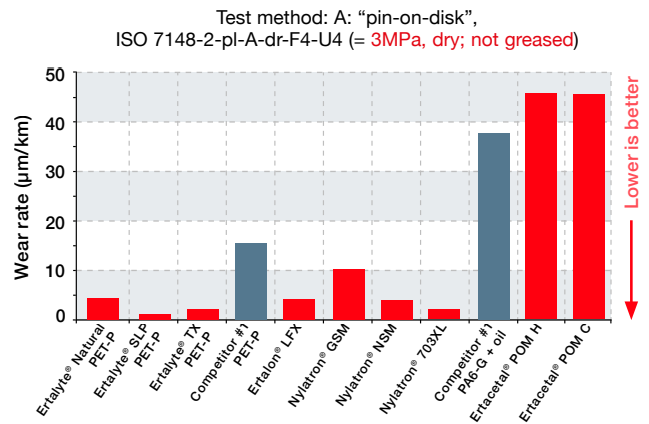
Due to these characteristics, Ertalon® / Nylatron® PA6, and Ertalyte® PET-P are the industry standard in this market and can be adapted in accordance to the roughness of the yaw rings.



Test conditions:

- Pressure 3 [Mpa] = 435 [PSI]
- Sliding velocity: 0.33 [m/sec] = 65 [ft/min]
- Unlubricated
- Counter surface type: C35 steel
- Counter surface roughness: grinded in X direction only, to Ra 0.70 – 0.90 μm
- Ambient temperature: 23 [°C] = 73.5 [°F]
- Humidity: 50% [RH]

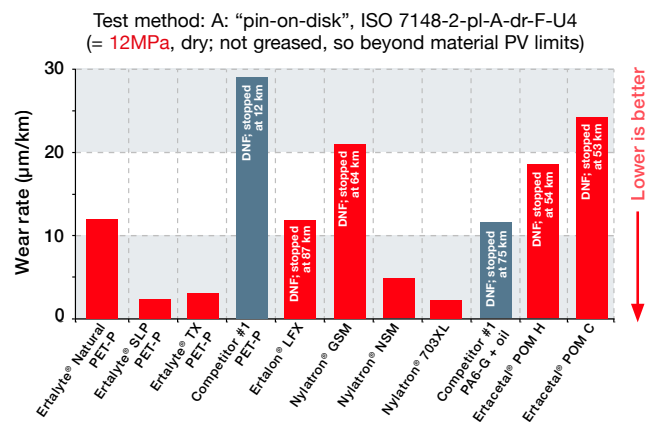
Wear at **standard** conditions



Test conditions:

- Pressure 12 [Mpa] = 1740 [PSI]
- Sliding velocity: 0.33 [m/sec] = 65 [ft/min]
- Not Lubricated
- Counter surface type: 42CrMo4 (EN10083)
- Counter surface roughness: turned; so grooves in circumferential direction only, to Ra 0.7–0.9 μm and Rmr(50%) > 50
- Ambient temperature: 23 [°C] = 73.5 [°F]
- Humidity: 50% [RH]

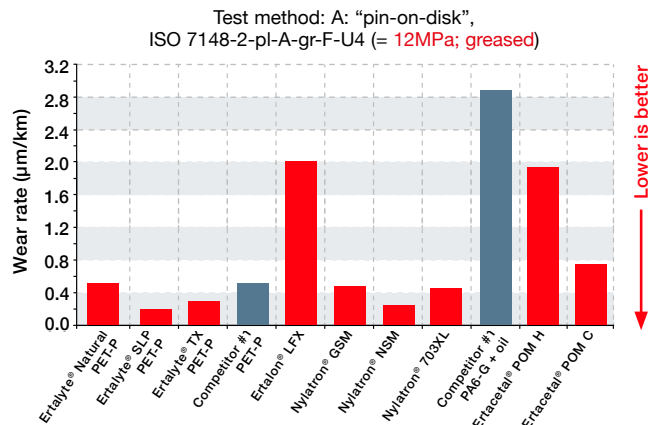
Wear at **wind power** conditions



Test conditions:

- Pressure 12 [Mpa] = 1740 [PSI]
- Sliding velocity: 0.33 [m/sec] = 65 [ft/min]
- Lubricated: Castrol-Tribol
- Counter surface type: 42CrMo4 (EN10083)
- Counter surface roughness: turned; so grooves in circumferential direction only, to Ra 0.7–0.9 μm and Rmr(50%) > 50
- Ambient temperature: 23 [°C] = 73.5 [°F]
- Humidity: 50% [RH]

Wear at **wind power** conditions



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