

Sample Contacting Face Seal Application: Aircraft Engine

- **Background**

- ▶ Main shaft in a commercial aircraft engine had an existing carbon face seal experiencing high leakage and seal failures

- **Operating Conditions**

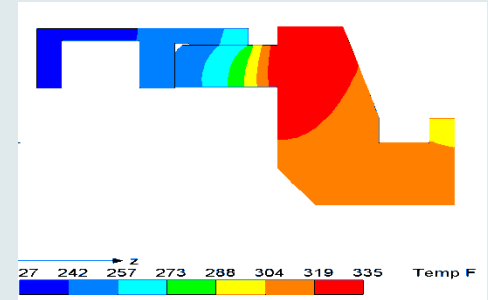
- ▶ High speed (51,000 rpm)
- ▶ Gear box oil (MIL-R-23699)
- ▶ 20 psid

- **Determining Cause and Failure Modes**

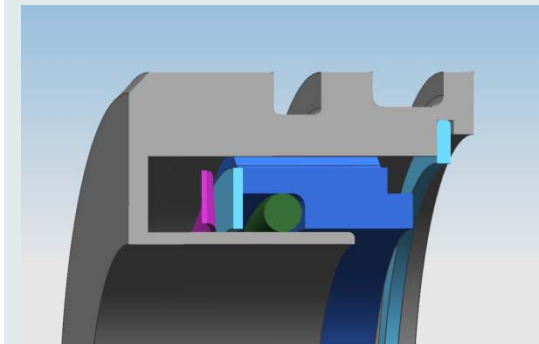
- ▶ QT FEA model indicated significant face tapering and waviness in the two-piece seal nose design
- ▶ Existing design also enabled anti-rotation wear, causing the part to hang up and further contribute to the significant leakage

- **QT Solution**

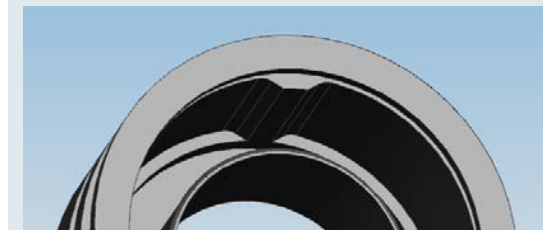
- ▶ Designed a new carbon face seal with a mono-block seal nose design
- ▶ Integral anti-rotation heat treated to high hardness for wear resistance
- ▶ Final design solution required NO COST INCREASE over original product



FEA Isotherms Two-Piece Design



Mono-Block Seal Design



Integral Anti-Rotation Design