

TOUGH JOBS



50,000 Hours Life Specification

Achieving tough specifications such as 50,000 hours of continuous operation requires a quality product and a detailed understanding of the application. When this OEM faced expensive product recalls and field retrofits with another vendor's motor, he stepped back from his application and with the classic engineer's approach, asked the objective question "what affects the life of the motor?"

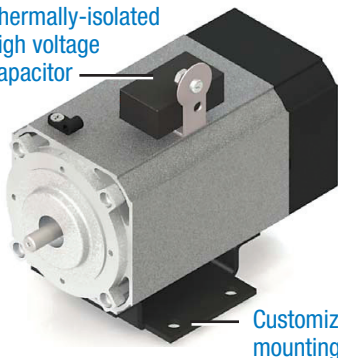
A manufacturer of positive displacement pumps and leak testing equipment, this OEM prides themselves in performance, flexible and innovative design, and gear pump engineering excellence. After failures with the other manufacturer's motor that prompted recalls, they came to Groschopp to determine what could be done to extend motor life and achieve higher reliability.

The design team had a simple response to that question—"temperature". Starting with their standard motor design, they identified three areas that could lead to failure in this particular application before 50,000 hours.

One problem that could be contributing to premature bearing failure related to the fit between the steel bearing and aluminum bearing pocket. Since the bearing and pocket materials have different rates of thermal expansion, the fit is different at various operating temperatures. Even a few thousandths of an inch of movement could damage the bearing over time. To address the problem, they inserted a rubber o-ring between the bearing and bearing pocket.

The analysis also resulted in adjustments to the bearing grease and capacitor used in the motor. "The key to long life is the analysis of the application and looking in detail at the motor design and making fine adjustments to the motor," said Arlo Heynen, Regional Account Manager at Groschopp.

Thermally-isolated
high voltage
capacitor

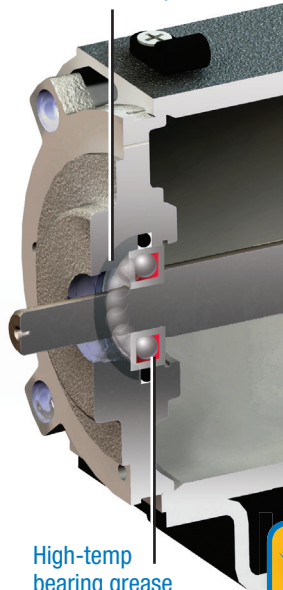


Customized
mounting foot

After gathering extensive data on operating and maximum speeds, temperature range and vibration, the engineering team came up with an optimized lubricant for the application and selected a new capacitor. "Two things that shorten the life of a capacitor in a motor application are temperature and voltage," Heynen says. "What's interesting is that the two are interchangeable. When you run the motor at higher than rated temperatures, you can calculate and specify a capacitor voltage that will achieve longer life." Groschopp has special analytical tools that they use specifically to make the voltage calculations necessary for these capacitor selections.

A life testing scheme was devised to meet the rigorous temperature and continuous operation specifications, and yielded excellent results. Theoretical calculations of test results suggested well over 70,000 hours continuous performance.

O-Ring to compensate
for thermal expansion



High-temp
bearing grease



Arlo Heynen, Regional Account Manager,
Groschopp Inc.

The Challenge

An OEM making cooling pumps for medical diagnostic imaging machines needed:

- Highly reliable, long-life motor
- Product design and testing support
- Dependable vendor as critical link in supply chain

The Solution

- Single Phase AC Motor
- 50,000 Hour Life Testing in high temperature, continuous duty environment
- Custom designed mounting foot, capacitor bracket, end bell and shaft

The Groschopp solution resulted from extensive qualification of components, operating temperature tests, sampling of various materials and lubricants, and ultimately predicting potential operating issues that the customer hadn't yet experienced.

TOUGH JOB

Design Checklist

Temperature: For every 10°C above rated temperature that the motor operates, its life is reduced by ONE HALF. Temperature ratings should always be taken seriously.

Electrical: The electrical components must be rated for not only the operating temperature, but the ambient temperature. Take BOTH into consideration.

Mechanical: LOAD is the watchword. Evaluate the application for radial, axial or overhung loads. Loads impact choices of bearings, lubrication and clearances.

Test, Test, Test: Even the most detailed, well-designed solutions can deliver surprising results when tested in a simulated operating environment.

For complete OEM design checklists and an application data worksheet:

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