

Filament Winding Spindle Repair

Air Purge Spindle modifications cuts downtime by 800%

Application

30,000 RPM spindle for spool winding of filament material.

Challenge

Gilman Precision was contacted by a high volume, U.S.-based manufacturer experiencing a critical, premature, bearing-failure complication with their European-manufactured spindles. While their original design had called for 24-month spindle life, actual spindle life was averaging a costly and unacceptable three months. Gilman engineers were asked to remedy the problem.

Solution

To determine the cause of shortened spindle life, a team of Gilman engineers interviewed the manufacturer and conducted an exhaustive investigation of parts, processes and environmental conditions. The “customer-manufacturer” investigation team concluded the following: during the 30,000 RPM filament winding operation, fine dust-like particles of filament material were becoming airborne. Upon entering and

contaminating the bearing chamber, these particles were creating friction and destroying the bearings.

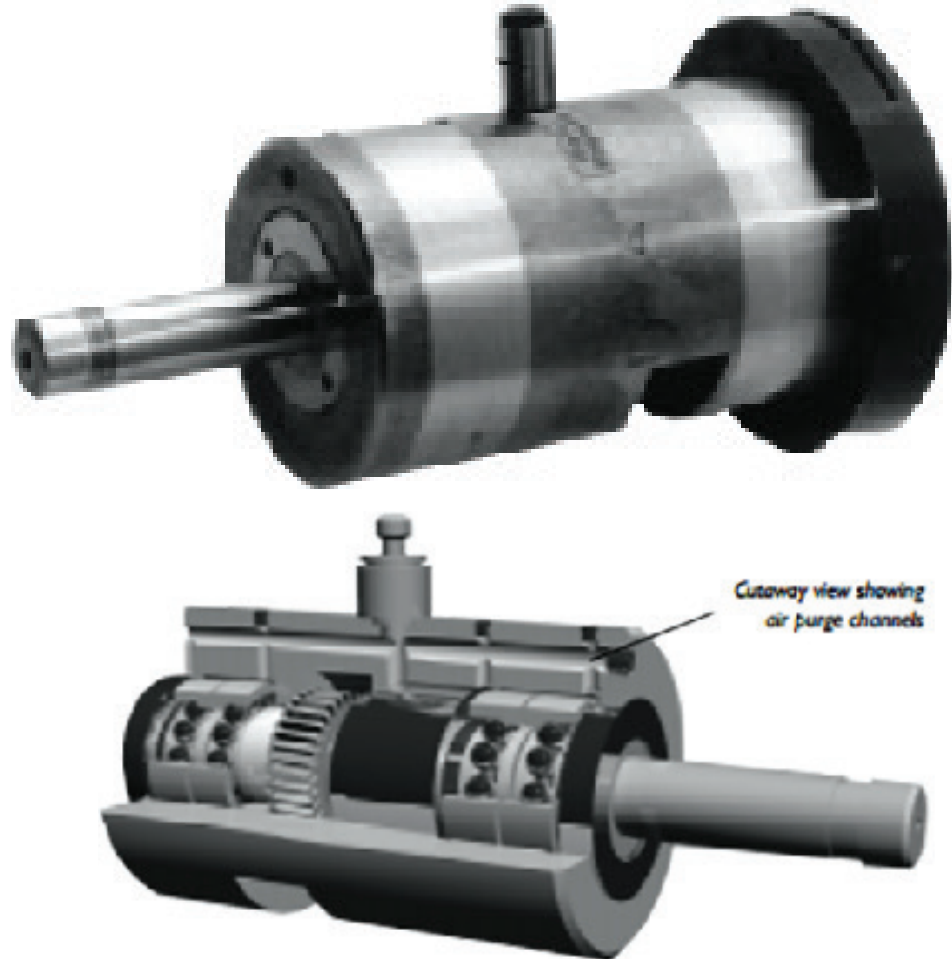
After isolating the cause, Gilman engineers offered a creative solution to increase spindle life: they modified the housing by drilling passageways to allow for low-pressure, clean, dry air to be pumped into the bearing case, pressurizing the area. The pressurized airflow

forced the contaminants out of the bearing case, achieving a substantial increase in spindle life consistent with the customer’s original 24-month specification.

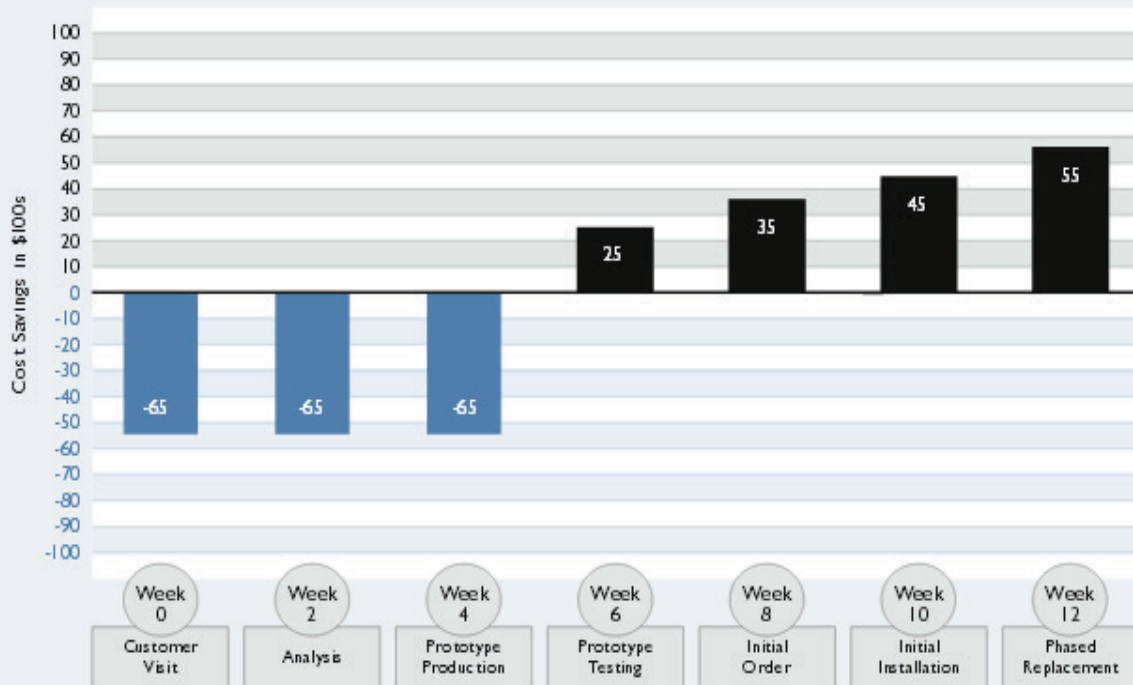
With the contamination problem solved, the spindle was repaired.

Finally, Gilman Spindle Service proposed a phased replacement program to ensure that the hundreds of spindles involved

in the filament winding process were modified on a systematic basis, sparing the costly inconvenience of shutting down production.



TIME LINE & COST SAVINGS ON AIR PURGE REBUILT SPINDLE PROJECT:



Spindle Modification Process

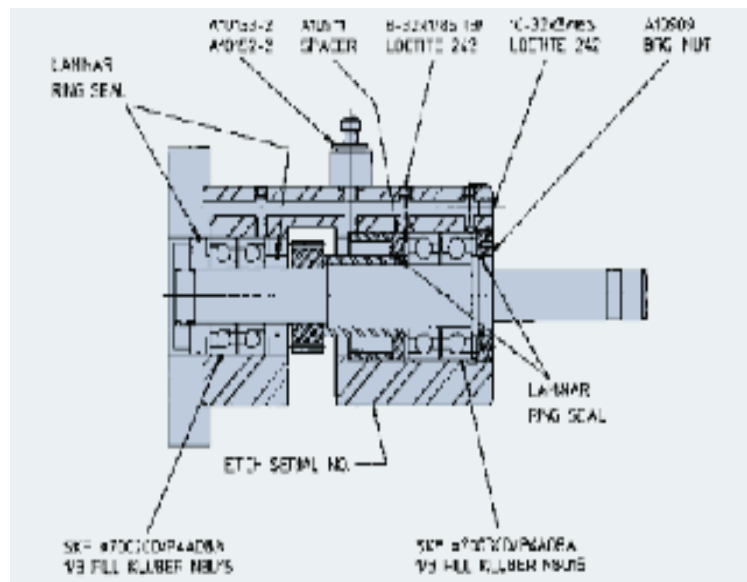
- Disassembly and inspection of spindles
- Inspect shaft-bearing journal diameters
Front-bearing journal diameter $.6693 \pm .0001$ Rear-bearing journal diameter $.5906 \pm .0001$ Rear journal concentric to front journal within $.0001$ TIR
- Inspect housing-bearing bores
Front-bearing bore diameter $1.3779 \pm .0002$ Rear-bearing bore diameter $1.2599 \pm .0001$ Front bore concentric to rear bore within $.0001$ TIR
- Re-manufacturing spindle parts as necessary and in-line tolerances brought back into specifications for Class 7/9 bearings
- Air-holes drilled in the spindle casing for pressurization
- Make spacer, replace laminar ring seals, make front-bearing nut and replace bearings
- Each spindle receives a run-off test and carries a new spindle warranty upon leaving the Gilman Service Center

Spindle Characteristics

Helical Gear-Driven Bearings:

SKF 17mm Bearings - Front

SKF 17mm Bearings - Rear



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Gilman Precision
1230 Cheyenne Avenue
Grafton, WI 53024
Telephone: 1 262 377 2434
Fax: 1 262 377 9438
Email: sales@gilmanprecision.com
www.gilmanprecision.com