

The Ten Commandments of Gear Failure Analysis

Robert Errichello



Robert Errichello

is founder and president of GEARTECH, located in Townsend, MT, and is a technical editor for Gear Technology magazine. A gear consultant, he specializes in gear failure analysis, gear research and analysis, and gear design and production.

I. Inspect failed components as soon as possible. If an early on-site inspection is not possible, someone at the site must preserve the evidence based on your instructions.

II. Make sure no work is done until you arrive. This means no disassembly, no cleaning (including exterior), or draining of oil. Verify that gearbox drawings, disassembly tools, and adequate facilities are available.

III. Devote at least two days for the inspection. After the first day, collect your thoughts and analyze the collected data. Often the first day's inspection discloses a need for other data, which you can gather on the second day.

IV. Concentrate on collecting evidence, not on determining the cause of failure. Regardless of how obvious the cause may appear, do not form conclusions until all evidence is considered.

V. Document what you see. List all observations, even if some seem insignificant or if you don't recognize the failure mode. Remember—there is a reason for everything you see, and it may become important later when you consider all the evidence.

VI. Document what you don't see. This is helpful to eliminate certain failure modes and causes. For example, if there is no scuffing, you can conclude gear tooth contact temperature was less than the scuffing temperature of the lubricant.

VII. Search the bottom of the gearbox. Often this is where you find the best-preserved evidence, such as when a tooth fractures and falls free without secondary damage.

VIII. Use time efficiently. Be prepared for the inspection. Plan work carefully to obtain as much evidence as possible. Don't be distracted by anyone.

IX. Control the investigation. Watch every step of the disassembly. Don't let the technician get ahead of you. Disassembly should stop while you inspect and document the condition of a component, then proceed to the next component.

X. Insist on privacy. Do not let anyone distract you. If asked about your conclusions, answer that you do not form conclusions until your investigation is complete. ⚙

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