Improving Gear Tooth Bending Fatigue Life

**Problem Statement:**
Helicopter transmission life limits load carrying capacity and acceleration. Improved gear bending fatigue life will allow heavier loads and improved acceleration. New designs are costly and require long development times. A process improvement for an existing design saves time and money.

**Process Description:**
A change from conventional oil quench hardening to intensive water quenching produced higher compressive surface residual stress. This in turn resulted in a 15% increase in bending fatigue endurance in carburized Pyrowear 53 gears.

**Benefits:**
The quench process change achieved improved bending fatigue life with no gear redesign or alloy change. The water quenching method was more environmentally friendly than oil quenching and safer.

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Email: sales@dante-solutions.com
Phone: (440)234-8477
Website: www.dante-solutions.com

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Single Tooth Bending Fatigue Test Data Showing 15% Improvement in Endurance Limit Due to Increased Residual Compressive Surface Stress