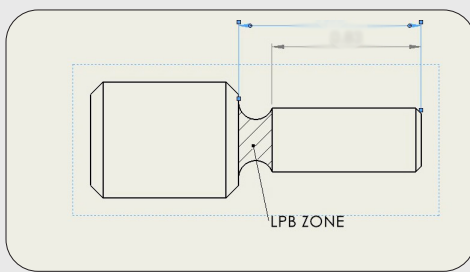
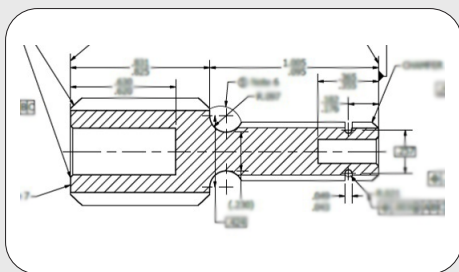


All aircraft depend on hydraulic pumps to power critical systems like brakes, wing flaps, landing gear, and flight controls. The drive shafts for these pumps frequently undergo shot peening to enhance surface durability. A leading aircraft component manufacturer was facing challenges of long lead times and inconsistent residual stress results from their shot peening supplier. Lambda was approached to replace their shot peening with low plasticity burnishing (LPB®) while maintaining identical coverage and compressive residual stress. LPB is a highly repeatable alternative to shot peening, offering a consistent result that is crucial for the quality control and reliable part performance needed in aerospace applications. The primary outputs of LPB are compressive residual stress and surface finish improvement. No masking or other part preparation is required. The process is accepted by the FAA for repair and alteration and has been used on military and commercial aircraft components since the early 2000s.

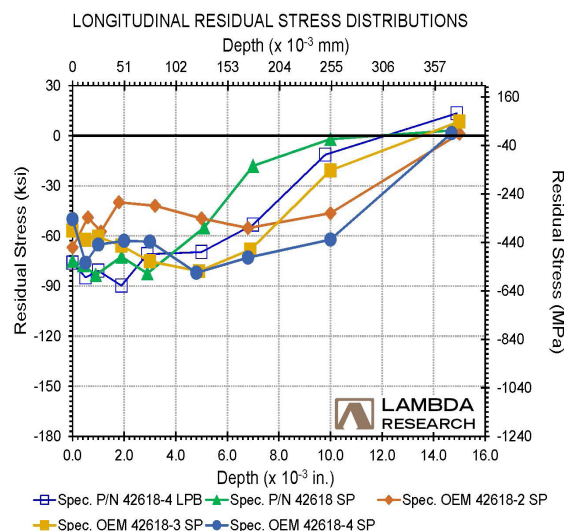


Hydraulic Pump Drive Shaft



**SOLUTION:** Lambda successfully replicated the residual stress and coverage of the existing shot peening process using LPB. X-ray diffraction residual stress measurements were performed on the drive shafts to confirm success. The measurements indicated that while shot peening yielded a range of compression from -50 to -80 ksi (-345 to -552 MPa) with depths of 0.010 inches (0.25 mm) to 0.014 inches (0.36 mm), LPB consistently rendered compression of -80 ksi (-345 MPa) and a depth of 0.010 inches (0.25 mm). With no need for masking or other part preparation, the cycle time and resulting cost of LPB was more competitive than the original shot peening.

**IMPACT:** The successful adoption of LPB in place of shot peening brought several significant improvements. Lead times for processing were dramatically reduced, addressing the manufacturer's concerns over production delays. LPB inherently yields 100% coverage, ensuring uniformity and repeatability. The precise depth of compression achieved with LPB is optimal for quality control, ensuring identical processing results for each application. The transition to LPB not only resolved operational inefficiencies, but also improved the quality assurance of the drive shafts.



**Contact us to discuss how replacing shot peening with LPB can improve your manufacturing process.**