Laser Translational Speed and Overlap Positions Improvements of Joint Strength

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Laser trajectory and pathways for circular press-fit geometries involve a combination of translational speed and overlap position. The translational speed occurs along the longest distance of the parts, while the overlap position is applied on the smallest dimension, typically the circumference. This research investigates the impact of laser translational speed and overlap positions on joint strength in circular press-fit geometries, specifically focusing on shaft and hub assemblies. An experimental method was employed, keeping the overlap position constant while varying the laser translational speed. The study aimed to determine which component (shaft or hub) should be textured in the initial phase of the process to optimize joint strength. Results indicate that texturing the hub improves joint strength in reverse assembly, while texturing the shaft yields lower performance. The stability of the fixture was found to depend on the width-to-length ratio of the components, with higher width ratios enhancing texture displacement and solidification, leading to more stable joints with higher performance.

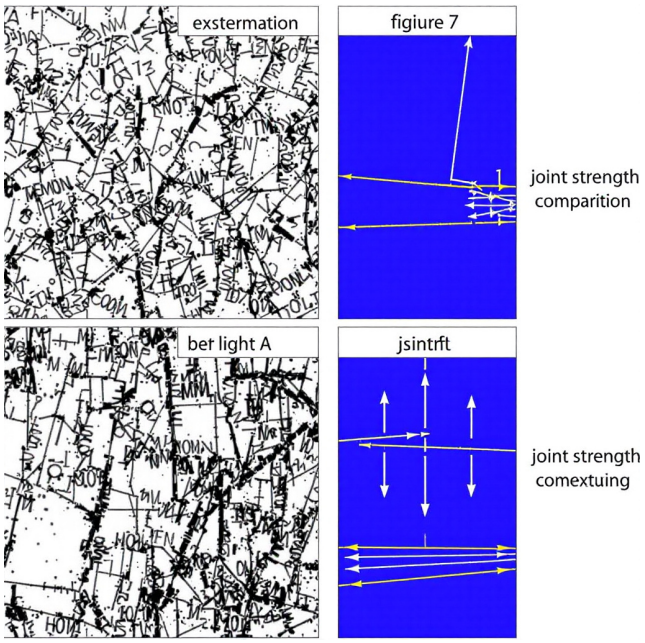

Figure 1: Joint Strength Comparison for Shaft Texturing