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# Effect of Shot Peening Intensity on the Fatigue Life of A356 Aluminum Suspension Brackets

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This document is a fictional sample created for an AI training video. All names and numbers are invented.

## Abstract

Cast A356-T6 aluminum suspension brackets were shot peened at three intensities and tested in rotating bending fatigue. A moderate intensity of 0.25 mmA gave the largest improvement in mean fatigue life, while the highest intensity increased surface roughness and reduced the benefit. Limitations and directions for further work are discussed.

## 1. Introduction

Lightweight aluminum castings are increasingly used for chassis parts. Their fatigue performance is often limited by surface defects. Shot peening introduces compressive residual stress at the surface and is a common post-treatment, but the optimal intensity for cast brackets is not well documented.

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## 2. Materials and Methods

Brackets were cast from A356 alloy and heat treated to T6. Brackets were shot peened at 0.15, 0.25 and 0.35 mmA using steel shot (S230). Unpeened brackets served as the baseline. Rotating bending fatigue tests were conducted at a stress amplitude of 120 MPa in laboratory air at room temperature.

Surface roughness (Ra) was measured with a stylus profilometer before testing.

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## 3. Results

Table 2 summarizes the results. Peening at 0.25 mmA increased mean fatigue life by 2.1 times compared with unpeened brackets. At 0.35 mmA, surface roughness rose to Ra 3.2 µm and the improvement dropped to 1.4 times.

Table 2. Mean fatigue life and surface roughness (fictional data)

| Condition | Ra (µm) | Mean life (cycles) | Ratio vs. unpeened |
|---|---|---|---|
| Unpeened | 1.1 | 210,000 | 1.0 |
| 0.15 mmA | 1.6 | 315,000 | 1.5 |
| 0.25 mmA | 2.2 | 441,000 | 2.1 |
| 0.35 mmA | 3.2 | 294,000 | 1.4 |

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## 4. Limitations and Conclusion

Only six specimens per condition were tested, so scatter could not be fully characterized. No corrosion testing was performed, and the effect of peening in salt-spray or road-salt environments remains unknown. Within these limits, a moderate peening intensity (0.25 mmA) is recommended as a starting point for cast aluminum brackets.