

1.7 A New Aluminum Alloy

Statement: A modified aluminum alloy that has superior properties over its predecessor, A356-T6.

Problem addressed: The mechanical properties of A356 alloy, such as tensile strengths and ductility, are restricted by the coarseness of the microstructure and casting defects. To overcome the mechanical property deficiency, the prior art approach is to design cast aluminum components with much thicker cast sections than necessary to meet crash safety requirements. This will result in relatively heavier weight than components made from a forging approach. Therefore, there is a need to improve the prior art approach for aluminum A356 alloy.

Solution: This technology uses precise chemistry to improve the mechanical properties of cast aluminum products, which demonstrate substantial increases in impact toughness due to the improvement in tensile strength and ductility.

Technology description: The technology improves at least one mechanical property of an aluminum alloy by heating the aluminum alloy at a solution treatment temperature for a first period of time, quenching the aluminum alloy, heating the aluminum alloy for a second time period at a second temperature, and cooling the aluminum alloy. By modifying the A356 aluminum alloy, the mechanical properties, and specifically the impact toughness coefficient, of the component being cast may be further improved.

Benefits of the product: The new technology provides many advantages over existing aluminum alloys, including:

- Strength: Improvements in tensile strength and ductility result in high impact toughness.
- Light weight: a stronger alloy means less aluminum is required.
- Cost-effective: requiring fewer material results in reduced materials cost.
- Energy-efficient: shorter processing time saves energy and reduces cost.
- Corrosion-resistant: meets or exceeds the corrosion resistance of other commonly used alloys at a lower cost.

Areas of application: The technology has several potential applications:

- Aluminum wheels.
- Control arms.
- Steering knuckles.
- Brake calipers.
- Automotive cross members.
- Differential carriers.