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Stone Fiber Reinforced Mg Alloy Composite Enclosure

HP INC

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Abstract

Stone fiber bonded in thermoplastic/thermosetting resin or organic/inorganic hybrid resin exhibits superior strength compared by normal abrasive stones. This invention is to apply high modulus stone fiber frame and/or antenna window with thixomolding Mg alloy and develop stone fiber reinforced Mg alloy composite enclosure by obtaining high mechanical strength, lightweight, and thin composite enclosure for laptop, tablet and smart phone applications.

Background

Stone fiber is a mineral-based inorganic derived from rocks, with excellent physical, mechanical and chemical properties, and derived from molten stone for millions of years retains its unique properties.

Invention Description

In comparison with the prior art, carbon fiber chassis can block signal transmission of radio frequency, which is environmentally unfavourable and not easy biodegradable.

The exposure temperature (500 °C) was regarded as the “knee-point” temperature for the tensile degradation of generic carbon fibers, which has the risk to impact mechanical strength of carbon fiber through thixomodling with Mg alloy for composite formation. The injection molded plastics such as polyphenylene sulfide (PPS), polycarbonate, and nylon has much lower tensile strength 30-210 MPa compared to that of stone fiber up to 3,000-4,000 MPa.

This invention is to resolve electromagnetic interference (EMI) shielding issue due to blocking signal transmission of antenna radio frequency. Stone fiber as frame and/or antenna window has lower carbon footprint compared to carbon fiber enclosure. In addition, apply high modulus stone fiber frame and/or antenna window with thixomolding Mg alloy and develop stone fiber reinforced Mg alloy composite enclosure.

Carbon fiber is unable to tolerate thixomolding process temperature > 500°C, and the heat resistance of stone fiber is up to 650°C, which can tolerate and incorporate with thixomolding Mg alloy at process temperature 580-630°C. Furthermore, stone fiber has high hardness 8-9 (Mohs hardness), which is much higher than carbon fiber Mohs hardness 2.

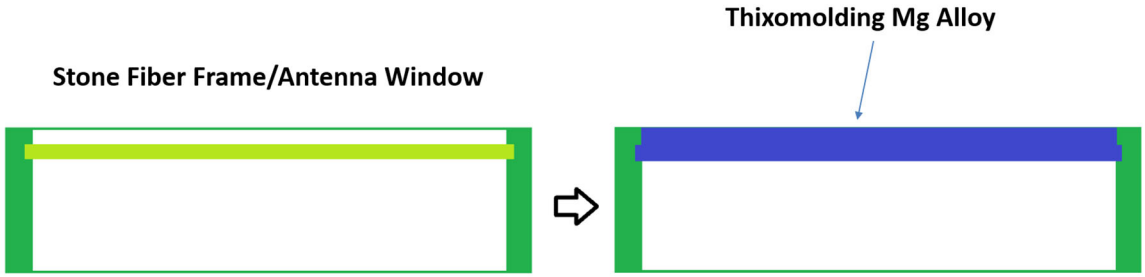

Figure 1. Mg Alloy Injection Molded Stone Fiber Frame Composite

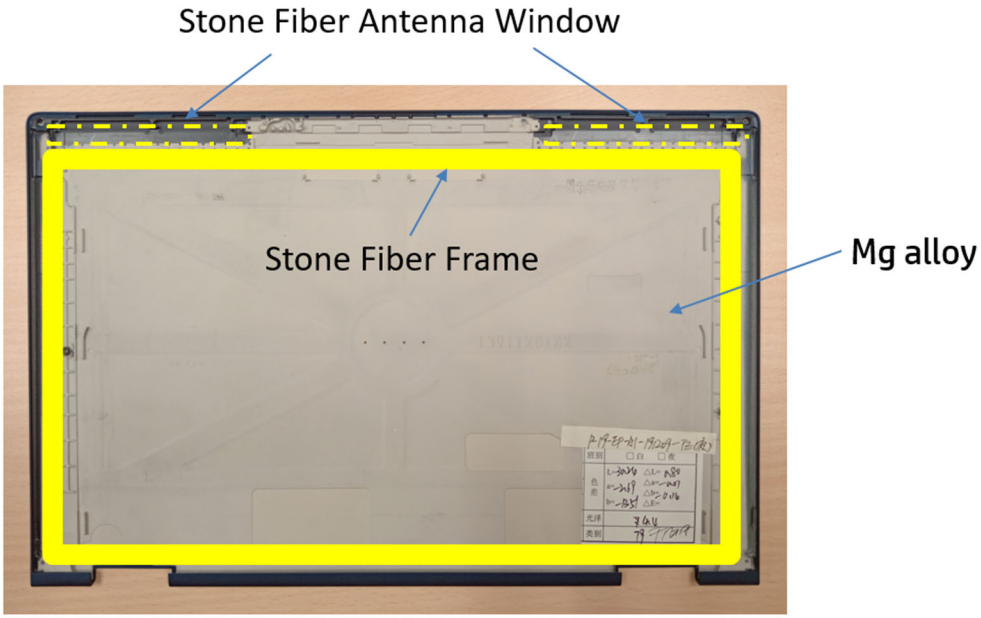

Figure 2. High Modulus Stone Fiber Reinforced Mg Alloy Composite Enclosure

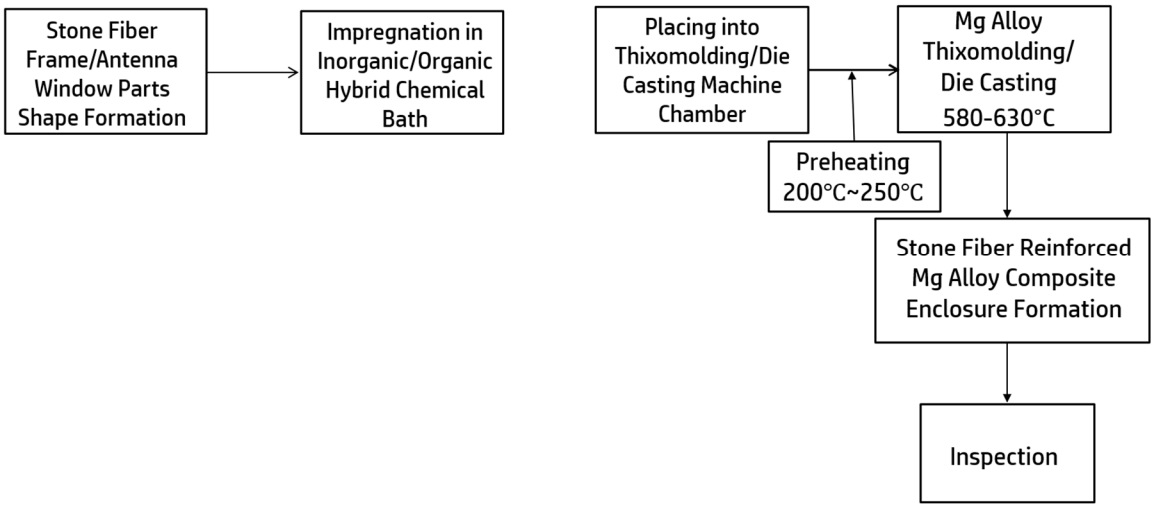

Figure 3. Process Flow

Advantages

- Obtain high mechanical strength, lightweight, and thin stone fiber reinforced Mg alloy composite enclosure for laptop, tablet and smart phone applications.
- The injection molded plastics such as polyphenylene sulfide (PPS), polycarbonate, and nylon have much lower tensile strength 30-210 MPa compared to that of stone fiber up to 3,000-4,000 MPa.
- Stone fiber also has much higher tensile strength 3,000-4,000 MPa than that of aluminum alloy 195-310 MPa.
- This invention resolves electromagnetic interference (EMI) shielding issue due to blocking signal transmission of antenna radio frequency.
- Stone fiber has lower carbon footprint compared to carbon fiber enclosure and polymer resin.
- Stone fiber is non-flammable and sustainable.

Disclosed by Kuan-Ting Wu/Hendry Huang/James Chang, HP Inc.