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## **Nondestructive ultrasonic evaluation of additively manufactured AlSi10Mg samples.**

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### **ABSTRACT**

Pulse-echo ultrasonic method was carried out to investigate possible anisotropy in selective laser melting additively manufactured (AM) AlSi10Mg samples. Three types of ultrasonic analyses were employed: time of flight (TOF) sound velocity measurement, frequency depended attenuation and exponential fitted attenuation. Analysis of the transverse waves TOF sound velocity as a function the oscillation angle relative to the build direction reveals that the AM AlSi10Mg material has anisotropy in both transverse wave velocity and attenuation with respect to the build direction. Such an anisotropy is with symmetry around the build direction. Three transverse wave velocity zones were identified, low-velocity zone, where the transverse oscillation direction perpendicular to the build direction, high-velocity zone where the transverse oscillation direction parallel to the build direction and a transition zone. This behavior held even after heat treatments. The transverse velocity and the frequency depended attenuation seems to be sensitive tools that enable detection of subtle changes in AM products.

**Keywords:** Ultrasonic, Time of flight, Attenuation, Additive manufacturing, Al alloy, Anisotropy.

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