# SOLID PARTICLE EROSION OF ALUMINIUM ALLOY OF AIRCRAFT FUSELAGE SKIN

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## ABSTRACT

Erosion is a mechanical wear distinguished by local damage and material loss caused by the impact of particles driven by a flow (gas or liquid), if it is a gas accompanied of solid particles, then it is called solid particle erosion (SPE) [1]. SPE is commonly present in operating aircrafts during multiple operation flying at higher altitudes in which it can be found in hail and volcanic ash [2], harming the aircraft's wing surface, fuselage and engine's blades and cover, deriving in wear and thrust loss [3].

Volcanic ash is a type of pyroclastic composite of minerals produced by the fragmentation of decompressed magma, land surface material and water, traveling in clouds formations originated by volcanic eruptions, when they reach an operating aircraft it can derive in loss vision and wear in front surfaces, openings and engines [3]. There have been some studies that used aeronautic materials such as 17-4PH Steel [4], IN718 superalloy [5], Ti6-Al-4V superalloy [6] and 6061 Aluminium [7], highlighting in general ductile behaviour in mass loss and ploughing, plastic deformation and micro cracking as wear mechanisms. Figure 1a and Figure 1b show a schematic representation of the wear test set-up.

The work aims to estimate the wear rate of aluminium alloy for aircraft fuselage skin subjected to the solid impact of volcanic ashes at room temperature. The solid ash particles were characterized by giving a hardness of 5 on Mosh scale and size between 180-255 µm with angular morphology. Additionally, the particle composition was determined. The tests were performed with a particle velocity of 55 m/s at three impact angles (30°, 60°,
and 90°). The results show the wear rates for the three angles of the incidence giving low wear rate at high angles and high wear rate at 30 °. Besides, wear profiles were taken from the wear scars and microscopically images were analysed to identify the wear mechanisms.

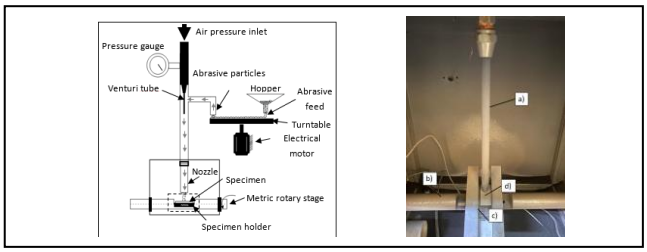


Fig.1 a) Schematic representation of the wear test set-up used and b) actual erosion test.

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