SUMMARY

Unmanned Aerial Vehicle (UVA) have been constructed for more than half a century, but it is only now that this segment of aviation has grown rapidly. UVA are expected to transform aviation. They will bring significant economic, social and developmental benefits. The wide range of applications of UVA make this sector very developmental. Saving energy or reducing its consumption is one of the main goals of today's engineering. This trend fits perfectly during the production of UVA where every extra kilogram is important.

This paper presents the design, fabrication, and evaluation of the strength properties of a new lightweight and energy-intensive sandwich composite. The composite will be an alternative to current materials in UVA manufacturing. In the first stage, the components constituting the composite were selected and verified. Attention was paid to obtaining the best possible strength parameters, considering the low density of the material. The layered composite was then produced, and its mechanical properties were studied. The last step was to select the best composite for use in UVA.

The fabricated sandwich composites consisted of cores made up of layers of foamed polyvinyl chloride (PVC) and layers with aramid fabric reinforcement connected by a polyurethane (PU) modified epoxy resin interlayer binder.

The selection of components was based on the developed experimental plan. Preliminary tests were performed, and the composite was determined. The novelty of the composite produced is the modification of the epoxy resin with a polymer capable of forming an interpenetrating polymer network (IPN).

The effect of modification of the epoxy resin (Epidian 5) with polyurethane (Desmocap 12), on the strength properties, such as the value of: impact strength, critical stress intensity factor, fracture energy, stress and strain at break, and rupture energy, was studied. Based on these studies, it was concluded that the composite with 5 and 10% polyurethane content showed the best properties.

The main area of activity was based on the manufacture of the sandwich composite and the determination of its technical/utility/strength parameters. The layered composite consisted of four layers of aramid fabric saturated with epoxy resin modified with the addition of polyurethane interleaved with 3 layers of PVC foam. To characterize the strength of the fabricated layered composites, low-speed impact tests were conducted. The place of impact was visualized using a profilometer and the failure modes of the composite were characterized. To verify the suitability of the obtained composites as BSP components,

selected parameters such as Charpy impact strength, 3-point bending strength and DMA were also determined.

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