

An innovative Fixing Solution for holding Complex Shaped Components

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Manufacturing industry faces several challenges when fixing complex shaped components, especially in the aerospace industry. The aerospace industry uses various types of dedicated fixturing systems to handle these components, but lacks a universal method of fixing. A complex shaped component does not have any symmetric lines or parallel surfaces, which makes it difficult to fix in manufacturing processes such as machining, finishing and inspection operations. A pin type fixturing system is the dominant and reliable design used in such applications to fix complex shaped components. In pin type fixturing systems, force is applied via a point contact to the workpiece. This can cause structural and/or surface damage to the component. To overcome this, a fixturing system based on jamming of materials with negative pressure is used to improve conventional pin type. A flexible diaphragm filled with jamming materials is used to increase the area of contact. By changing the diaphragm properties, it is possible to improve the quality of workpiece fixing. This work studies the effect of the diaphragm properties on fixing quality. Series of experiments were carried out to decide the best suited diaphragm properties in terms of highest holding force with best adaptability to a given complex shape. According to experimental results, increasing the thickness of granular jamming membrane has provided higher fixturing force for complex shaped components.

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