TOPOLOGICAL OPTIMIZATION OF VICE JAWS MODEL FOR PIPE CLAMPING

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Abstract

This paper presents a model of the clamping vice jaw that is being developed for clamping the aluminium pipes. This model will be used on an available band saw for cutting the pipes on desired length for further processing. In order to increase the stiffness to weight ratio of a given model, and thus optimize the material usage, the Topology Optimization method is implemented. The geometry of the jaw needs to adjust to the shape of the tube, so it does not deform it when the clamping force is applied, and also be made from a material softer than that aluminium, so that it does not damage the surface of the pipe. These conditions make the jaws a good candidate to manufacture by FDM 3D printing technology, from frequently used ABS material. As this process is a method of Additive Manufacturing, Topology Optimization benefits it not only in material usage but also in production time and cost. The presented procedure has a general character and as such can be applied to many mechanical parts, especially those made by Additive Manufacturing technologies.

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