

STRESS AND DEFORMATION STATES FOR STRAIGHT EDGE AND CURVED EDGE HELICAL DRILLS

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Abstract: The literature shows that HSS helical drills must be studied from several points of view: their geometric modelling, physics research of cutting formation process, durability of cutting tool, force and torsion moments sizes, thermal phenomena in the drilling process, modelling through FEM analysis, or similar, of deformation processes for cutting tools etc.

In this paper, we comparatively present through a FEM analysis, the total deformation and action when losing elastic stability for two types of helical drills: the drill with two straight edge blades and the drill with three curved cutting edges.

Keywords: helical drill, curved edge, FEM, stress, deformations

1. Introduction

Processing holes is considered a complex process applied on a large scale, representing approximately 30÷40% of all machining processes, the proportion in the aeronautics industry being higher.

Regarding the percentage of drilling from the entire number of manufacturing processes that define a certain reference, we can look at figures 1 and 2 for examples, in which you can see the share of drilling operations with HSS drills of two vehicle references (a caisson door and a hood lining), done by Renault România Group, Technical Centre - Dacia Moulds [1].

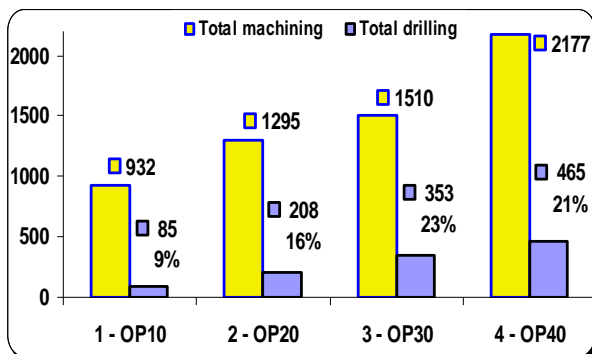


Figure 1: Percentage of drilling operations from the total processes, for the caisson door reference [1]

Technological development allowed for the emergence of some systems for graphic representation of information in a virtual medium, CAD, Computer Aided Design [2] and with these the necessity to test and analyze the virtual prototype, CAE, Computer Aided Engineering [3].

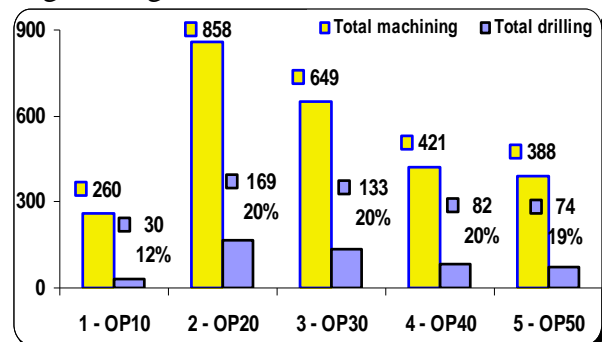


Figure 2: Percentage of drilling operations from the total processes, for the hood lining reference [2]

This analysis takes into account the digital simulation of product response to exposure to a variety of strains during their life cycles, in the stage of conformity validation with the designing specification.

The method of the finite element, as a CAE process, can offer a unitary system of virtual approach for the drilling process, the software packages of analysis with finite elements