

ABOUT BALL JOINT HOUSING HOT FORGING DIE WEAR

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Abstract: *The hot forging represents a very economical procedure for obtaining a rough part, from the material consumption point of view. During the forging process, mechanical stress and strains occurs at the relative flow between the die and the workpiece, and wear will appear. This paper presents a case study of this interaction in order to highlight the areas with risk of wear, for a particular case, respectively the forging of an automotive ball joint housing. In the paper closure some practical and useful conclusions in design are presented too.*

Keywords: *hot forging, die wear, FEA.*

1. Introduction

Nowadays, in order to remain profitable, forging companies, must use modern techniques to increase the die life and the efficient use of material.

The cost of forging tools is one of the most important factors in the whole forging process. Tooling cost varies between 10% and 15% of all the forging process [1]. This cost includes: material cost for dies, die machining and the heat treatment applied to it.

Besides tool costs, we have to take into account the die setup time; these time can vary from 10 minutes to 3-4 hours, resulting in additional costs for handling, reconditioning and maintenance costs [2].

For a good market competitiveness, the forging industry must use technology to fast and efficient forging process design and die manufacturing, using computer aided design (CAD), computer aided manufacturing (CAM) and computer aided engineering (CAE). Lately, finite element analysis software have become an integral part of the

forging process design, to analyze and optimize the material flow, and to make stress analysis on to the dies before making any production trials.

One for the main reasons for using a simulation program in the die design, is to reduce the development time and the tool costs and, in the same time, to increase the quality and the productivity.

Generally, the forging process simulation can be used to develop the design process and to determine some parameters such as: to prevent defects introduced by the materials flow (such as overlapping material), the prediction of the material flow and the parts final dimension; as well as the prediction of the part and die temperature, the friction, the material relative velocity; these making it possible to control the die lifetime.

2. The issue

The forging process is characterized by high speed material flow and heat generation. High pressures occur at the corner radii, where there die has big area reduction.