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ORIGINAL PAPER

On efficient electrode design and manufacturing techniques for hot die steel inserts

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Abstract
This paper focuses on providing economical methods for manufacturing of aluminum die casting inserts, for various optimized solutions developed the constraint of the existing manufacturing setup is also considered. The techniques are implemented on a die casting inserts of Honda Activa-Mission Case component which are made from hot die steel. The present optimized solution is derived for minimization of manufacturing rope length of the die casting dies to get an optimized solution at every stage of manufacturing. The implementation of the optimize techniques and the strategies are carried in three segments. Combine electrode concept and Re-born concept are the two segments which reduce the total physical operational time of the die which will ultimately leads to saving the overall manufacturing cost and increase the profit. The proposed solution opens up new avenues for similar automobile components by setting benchmark to reduce the manufacturing rope length and increase the profit.

Keywords Combined electrode concept · Cluster plate concept · Electrode design · Multi place electrodes · Re-born concept · Re-machining of electrodes

1 Introduction

Aluminum [1–4] material stands to be prime material when it comes to manufacturing of the automobile die casting components [5–7]. These components may be in the form of the *crank cases, butterfly valves used for air–fuel ratio mixing, carburetor for two wheels, engine tappet cover* and so on. The male and female dies which are better called as the *"inserts"* are of very much importance when it comes to the actual manufacturing rope length of insert [8]. The other important aspect which decides the actual runtime in the machine shop is the *"total depth"* of the component. This depth allows you to decide the smallest diameter cutter that can be used while any operation is performed. The length to diameter ratio of the tool decides the *out-stick (length of the tool outside the chuck)* of the tool required, which further decides the chunk of the material left in machining operation. Along with the length to diameter constraint, *higher material hardness* (above 60 HRC) [9] increase difficulty in machining and leaves higher amount of material than the

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