

■ Downtime Solutions to High Pressure Die Casts Exchange in the Meridian

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Abstract

High pressure die casting is the process of injecting (under high pressure) melted metal into a steel die. It is one of the fastest and most economical manufacturing techniques for mass-producing high quality metal components. Dies are reusable and are machined to the exact design of the component to be casted, where molten metals are either poured or injected into the mould. Die casting has the advantages of producing uniform components with good surface finish, accurate dimensions, and little post-machining. The process is suitable for producing high volumes of complex-shaped-thin-walled parts, with high degree of repeatability and accuracy.

Magnesium alloys enjoy unique solidification characteristics over other metals, thus they are said to have better castability. Unlike molten aluminium, magnesium does not attack iron, therefore, it can be melted and held in steel crucibles. Magnesium alloy casting goes back to 1921 when Dow Chemical began producing magnesium pistons, and by the World War II their casting technology was well developed.

The Meridian started magnesium die casting back in 1981, and remains to be the world's largest components producer. The company caters for international clients in the automotive industry. The process utilises heavy die casting machines with other secondary machining. To cater for different products, it is necessary to replace or exchange these heavy die casts. It is the time taken to shift or switch these dies that increases the downtime. The problem is further magnified when client companies place small orders, which makes the overall process economically unsound.

It is the aim of this research to improve downtime by proposing three innovative alternative die casting machines, along with alternative deploying mechanisms. These are: high-power-hydraulics-robot deployment of currently used die cast structures; robot deployment of light-weight-sliced-type structures; and robot deployment of light-weight-wedge-locked type structures.

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