

## Effect of Casting and Mould Cooling Temperatures on the Warping Phenomenon of Aluminium at High Pressure Die-Casting

H. B. Aaron<sup>1</sup>, M. H. Idris<sup>2</sup>, B. H. Ang<sup>3</sup>, I. P. Nanda<sup>4</sup>, A. Arafat<sup>5,\*</sup>

<sup>1</sup>JCY HDD Technology Sdn. Bhd, Malaysia

<sup>2</sup>Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Malaysia

<sup>3</sup>MAGMA Engineering Asia Pacific Pte. Ltd, Singapore

<sup>4</sup>Dept. of Mechanical Engineering, Faculty of Engineering, Universitas Andalas, Indonesia

<sup>5,\*</sup>Dept. of Mechanical Engineering, Faculty of Engineering, Universitas Negeri Padang, Indonesia

\*Corresponding Email : [arafat@ft.unp.ac.id](mailto:arafat@ft.unp.ac.id)

**Abstract.** The effect of molten aluminium pouring temperature and hot oil temperature for mould heating and cooling on the warping phenomenon of thick-thin section aluminium high-pressure die-casting process was investigated on a four cavities hard disk drive mould. Nine combinations of molten aluminium A380 pouring temperature of 660°C, 690°C and 720°C and hot oil temperature of 150°C, 200°C and 250°C were being studied. Magmasoft simulation software was used to simulate the molten aluminium flow in the mould and distortion to understand the die-casting cooling pattern in response to different molten aluminium temperature and mould cooling parameters settings. Actual casting was carried out to produce the parts according to simulation settings. Warping data was collected and analysed using Minitab 17. It was found that each mould cavity had different cooling pattern resulting in different warping magnitude. Pouring temperature at 660°C and 720°C both had higher warping distortion than 690°C. Hot oil temperature at 150°C had higher warping distortion than 200°C and 250°C. The lowest warping distortion was established at molten aluminium pouring and hot oil temperature of 690°C and 200°C respectively.