Investigation of Nickel Aluminium Bronze castings properties by degassing agent technique

Kavinjr1*, Rashidi M. M2 and Ahmad A. H3

Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia mugil_kavin@yahoo.com

Abstract.
Nickel Aluminium Bronze (NAB) is an excellent engineering material for maritime application due to its selective mechanical properties and relatively excellent corrosion resistant. However, NAB is susceptible to porosities due to dissolved gasses absorbed during its casting processes and adversely affects the mechanical properties. So, a degassing agent is added to the melt of NAB before the pouring process to reduce the dissolved gasses. A few parameters were initiated to investigate the effect of the degassing agent. Firstly, the effect of the degassing agent on the solidification behavior of the NAB alloy is studied using thermal analysis. Cooling curves can provide information on liquidus, eutectic, undercooling, recalescence and solidus temperature of the NAB alloy. Secondly, Differential thermal analysis (DTA) technique is employed to determine this thermal arrest temperature of NAB alloy from the cooling curves. The increasing in degassing agent addition will increase the average cooling rate of the NAB during solidification process but also slightly increasing the recalescence effect at the same time. It is discovered the higher cooling rate will reduce the dendritic growth and lead to better mechanical properties. Higher degassing addition also produced a smaller dendritic structure which promotes the higher mechanical strength. It has been proven through the tensile test, hardness test and microstructure analysis using FESEM. The relationship between, DAS average length, SDAS average length, tensile stress and hardness have been studied.