# PRECISION INVESTMENT CASTING OF ALUMINIUM MACHINE PARTS USING SPECIALLY DESIGN CERAMIC MOULD.

P.P.S.S. Pussepitiya* and S.U. Adikary
Department of Materials Science and Engineering, University of Moratuwa, Moratuwa, Sri Lanka
Department of Mechanical Engineering, General Sir John Kotelawala Defence University*, Rathmalana, Sri Lanka

## Abstract

Specially designed ceramic moulds can be used to cast complicated machine parts with finer details, smooth surfaces, high dimensional accuracy and good metallurgical integrity in a diversity of metallic materials. The fabrication technique of ceramic mould making technology involved in this project is capable of manufacturing ceramic moulds with good characteristics such as permeability, mechanical strength, thermal conductivity, thermal expansion, surface roughness using slurries of ceramic powders. This paper describe modeling and patterning of complex engine parts by the rapid prototyping technique and subsequent mould making for investment casting using ceramic materials. The pattern of the engine component was designed using Pro-Engineer modeling software using polycarbonate material. Fine particles of Zirconium silicate, Quartz, Refined Kaolin, Grog and binders were used for the ceramic mould as high refractory and high density materials. High density ceramic slurry was used for mould building process to avoid shell cracking. The pattern was dipped in the ceramic slurry to build a skin around the pattern. On the top of the ceramic layer, grog particles were sprayed to achieve addition thickness to the mould. The ceramic slip and the grog were applied alternatively to achieve the required wall thickness. Then the finish mould was dried in air and fired in electric furnace to remove the polycarbonate pattern leaving the required design. Finally by pouring molten aluminium metal to the ceramic mould, the engine parts were fabricated.