Design of Thermo Forming Machine

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Degree of Master of Science.

By

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DECLARATION

The work submitted in this dissertation is the result of my own Investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being Concurrently submitted for any other degree.

UOM Verified Signature

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27/10/2009

Date

I endorse the declaration by the candidate.

UOM Verified Signature

Dr. Olga Gunapala

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Abstract of the study

An attempt has been made to design vacuum forming machine which is capable of producing "Small plant growing Horticultural HIPS tray" in a economical speed. these trays has high demand in all over the world's horticultural industry but used thermo-forming as a manufacturing process which tooling cost quite high compared with vacuum forming. at the same time small quantity of product not accepted by the manufactures and simple epoxy moulds and wood mould can't used in this thermoforming machine. at the same time European made thermoforming machine is high expensive compared with normal roll feed vacuum forming machines. so my aim was to design vacuum forming machine which is capable of producing this type of product at a economical way.

This research aimed to design most critical components of this vacuum forming machine with clear understanding of it's practical operational requirement. Basically heater oven ; vacuum system ; mold and plug moving system and mould design covered in this research.

High Impact Polystyrene (HIPS) used as the plastic material for this "Horticulture tray production" and this machine capable of using 0.8mm – 0.25mm thick HIPS and PP (polypropylene) sheets reels as input material. Pneumatically operated mould and plug moving system incorporated with chill water cooling jacket as a mould base for each and every mould used.

Electric Infra-red ceramic heaters used as the heating source for sheet heating. These heaters mounted on top and bottom ovens where sheet feeding through these two. Vane type vacuum pump selected according to match the vacuum requirement and this vacuum system consists of vacuum surge tank, vacuum line and operating solenoid valves.

Finally moulds were designed according to the product specifications which is more important to get final outcome through this machine. Aluminium alloy grade 5083 used as mould material and "Auto cad" design software used for 2D mould design and solid works for 3D mould design and CNC mould machining program generation.

Finally I come across this study which cover the most important area of vacuum forming machine design. The same time world reputed component manufactures standard product were selected for this machine according to the calculated values and practical requirements.

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