International Journal of Engineering Works
Kambohwell Publisher Enterprises
ISSN: 2409-2770 Vol. 2, Issue 2, PP. 28-31, Feb. 2015
www.kwpublisher.com

Design of Fuel Filter Casing By Single Plate Injection Moulding Die

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Abstract— At present the large scale industries are manufacturing the fuel filter casing by means of split pattern injection moulding die. This is not much compact for the small scale industries and the medium scale industries for its production. In our project we are manufacturing the fuel filter casing by means of single plate injection moulding die. This is more compact for the small scale industries and the medium scale industries for its production of fuel filter casing. The removal of pattern is also easy by using of this single plate injection moulding die and also the manufacturing cost will be low. By inducing of high hardened material for the cavity plate and by inducing new plastic material for the component, we can able to increase the strength of the die as well as the component.

Kewords- Injection, Molding,Cavity, Fuel filter, Split pattern

I. INTRODUCTION

Our aim of this study is to design and fabricate an injection mould for fuel petrol filter. The component is used in the petrol filter assembly. The purpose of this petrol filter is to filter petrol from petrol tank and supply it to the engine. The component is a conical type with radius in smaller end. There is asmall bulge at the end of the pipe A split mould is designed for the manufacturing of petrol filter [1]-[3].We choose polyproplene(PP) for the component which has high tensile strength and impact strength with excellent abrasion resistence. Highly resistance to stress namely cracking,Unaffected by moisture.And also has the superior color fasteness with less susceptible to fading from sunlight [4]-[5]. Injection moulding is a manufacturing process for producing parts from both Thermo plastic and Thermoset plastic materials. Material is fed into heated barrel,mixed and forced into the Mould cavity where it cools and hardens to the confugiration of mould cavity[6]-[8].

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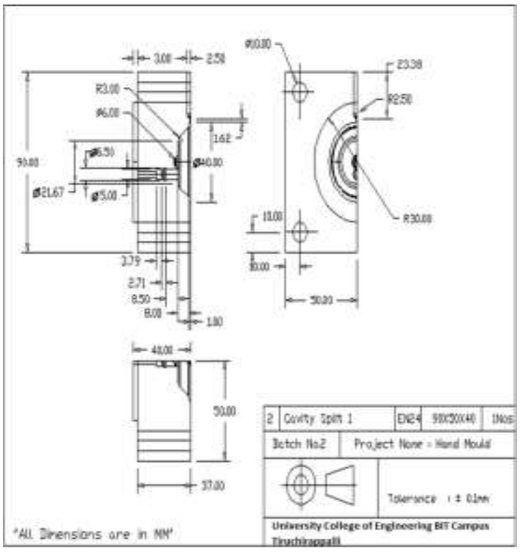
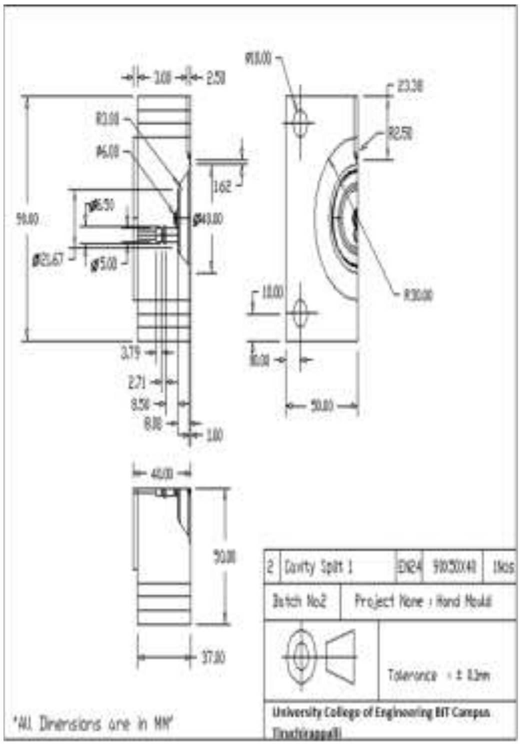
II. DESIGN DETAILS

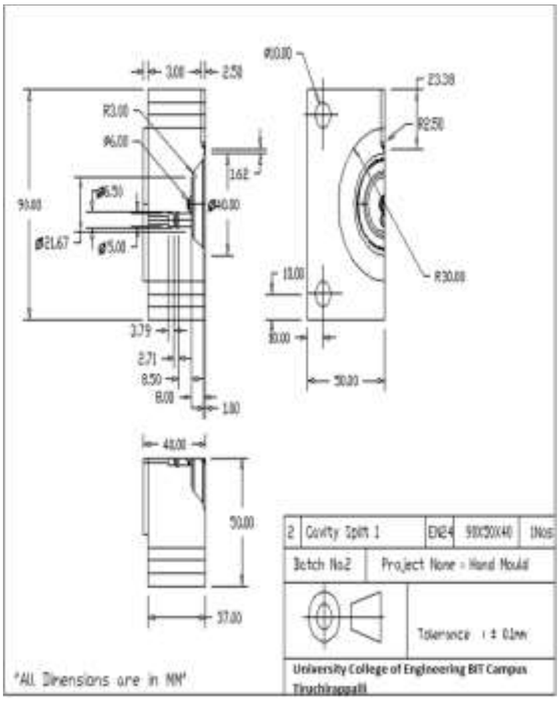
A. *Cavity Retainer plate and side core*



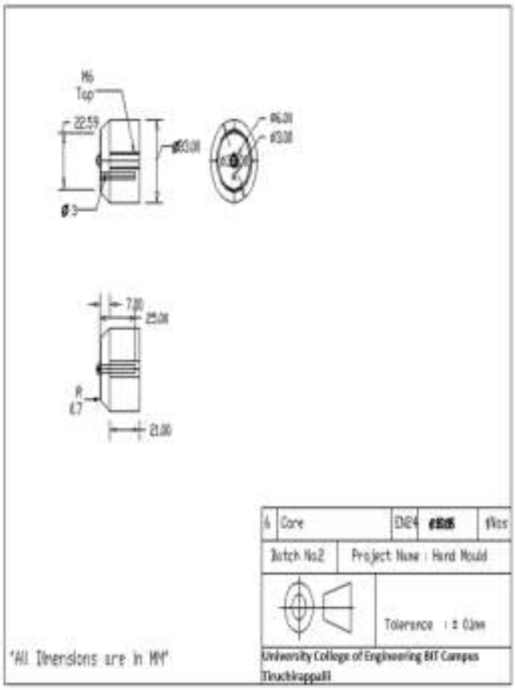
B. *Cavity split mould 1*



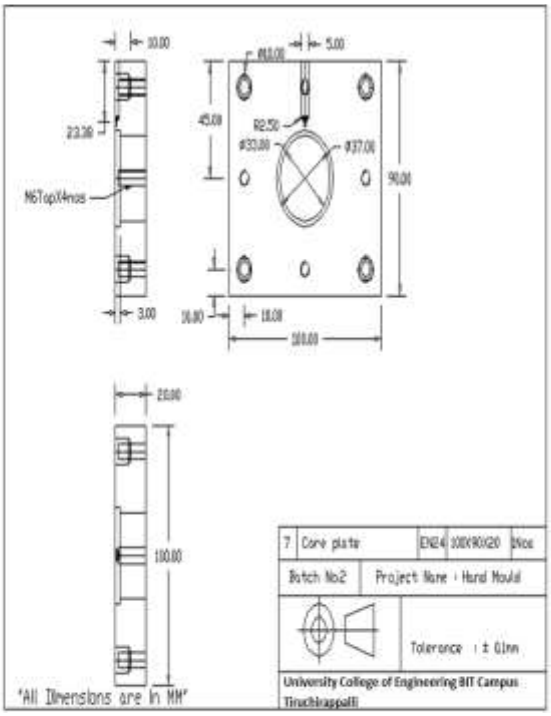
C. Cavity split mould 2



D. Core



E. Core plate



F. Designing calculation:

a) Volume and weight:

Volume of the component = 2.4597cc

Mass of the component = volume x density

Density of the plastic material

Used (nylon 6,6) = 0.95 gm/cc

Mass of the component = 2.3 gm

b) Shot capacity:

Shot capacity of the mould = [Total weight of the component]
+
[Total weight of feed system]

Total volume of the component = 2.3 gm

Total Weight of the feed system = 20%of thecomponent weight

= 0.46 gm

Thus, the shot capacity = [Total weight of the component X No. of Cavities]
+
Weight of the feed system

= 2.76 gm

III. MOLD DESIGN

A. Mould

Mould or die are the common terms used to describe the tooling used to produce plastic parts in molding.

B. Shrinkage of various materials:

Materials	% of shrinkage	Materials	% of shrinkage
Acrylic	0.3-0.6	polycarbonate	0.8
Nylon 6-GR	0.5	Acetal	2
Nylon 6/6-GR	0.5	PVC-rigid	0.5-0.7
LDPE	1.5-3	PVC-soft	1-3
HDPE	2-3	ABS	0.4-0.6
Polystyrene	0.5-0.7	Nylon-6/6	1-1.5
Styrene acrylonitrile	0.4-0.6	Cellulose acetate	0.5
Nylon-6	1-1.5	Cellulose acetate butyrate	0.5
Delrin(placental)	1.5-2.5	Cellulose propionate	.5
polypropylene (PP)	1.2-2	Polyethylene	1.5-3.0

C. Shrinkage Allowance:

All the shrinkage allowance calculated to obtain the dimensions is given below.

Shrinkage for polypropylene (pp) is 0.3%

Dimension with shrinkage allowance = Actual dimension + Shrinkage allowance.

Cavity:

Actual dimension = 40mm
Shrinkage allowance = 0.3
= 0.12mm

Actual dimension = 27mm
Shrinkage allowance = 0.08mm

IV. DESIGN OF FEED SYSTEM

1. The flow way that connects the nozzle of the injection moulding machine to the impression is called feed system.
2. The feed system consist of a sprue,runner and gate
3. The feed system is removed from the moulding after ejection.

V. DESIGN OF RUNNER

Runner size

The runner size will be decided based on:

- The wall section and volume of the moulding
- The overall length of the runner
- Runner cooling consideration
- Standard cutter size
- The plastic material to be used.

$$\text{Runner diameter } D = \frac{\mathbf{W \times \sqrt[4]{L}}}{3.7}$$

Runner diameter for our mould = 1.31mm

Even though the runner diameter is 1.31mm, since we used 4mm standard cutter for runner. And also the advisory of senior mould maker in the industrial areas.

The calculated size should be increased to the next suitable cutter size

Recommended runner diameters for common unfilled materials:

VI. DESIGN OF GATE SYSTEM

A. Gate Design:

Gates are a transition zone between the runner system and the cavity. The cavity location of gate is of great importance for the properties and appearance of the finished part.

We choose pin point gate for our mould.

B. Gate Area

Gate Area = h x w =0.5 x 1.5= 0.75mm

$$\text{Gate width } W = \frac{n. \sqrt{A}}{30}$$

Depth of gate, h = n. t

Land length L = 0.5 – 1.5 mm.

VII. Development of the Project

When we designed out component, we got few ideas to develop our project further fore better usage. the following data, described the development of our project in both designing and manufacturing aspects. We designed the petrol filter according to its profile; this makes the easy machining. We removed the screw type fixing arrangement for assembling the core in the coreplate of the petrol filter, instead of this arrangement we designed core in the coreplate itself. The wall thickness of our product is 1mm.we choose poly propylene (pp) as material for our component which has higher transparency then other material.

Conclusion

Thus it is safe to conclude that solid pattern injection molding diehelps to increase the production in both small scale and mediumscaleindustries. Here we are using EN24 material for thecavityplateandpolyproplene for the molding material,so it improves the strength ofthe mold and the component too. It also reduced the cost of theproductThis is the brief description about our mould and component.

Acknowledgement

I sincerely acknowledge my Project Guide V.Gopinath, M.E., (Ph.D), Assistant Professor – Mechanical Department Kongunadu College of Engineering and Technology for his valuable guidance and encouragement to complete the project in a successful manner.

References

[1] A.S. Sabau and S. Viswanathan, "Material properties for predicting wax pattern dimensions in investment casting", Material Science and Engineering A, vol. 362, 2003, pp 125–134.

[2] V.F. Okhuysen, K. Padmanabhan, and R.C. Voigt, "Tooling allowance practices in investment casting industry", Proceedings of the 46th Annual Technical Meeting of the Investment Casting Institute, Orlando, USA, 1998, Paper no. 1.

[3] J.C. Gebelin and M.R. Jolly, "Modeling of the investment casting process", Journal of Material Processing Technology, vol. 135, 2003, pp 291 – 300.

[4] W. Bonilla, S. H. Masood and P. Iovenitti, "An investigation of wax patterns for accuracy improvement in investment casting parts", Bulletin of Industrial Research Institute of Swineburne, Melbourne, Australia, vol. 18, 2001, pp 348 – 356.

[5] B. Singh, P. Kumar, and B.K. Mishra, "Optimization of injection parameters for making wax patterns to be used in ceramic shell investment casting", Proceedings of Asian Symposium on Materials and Processing, 2006, Thailand.

[6] Q. Liu, G. Sui and M.C. Leu, "Experimental Study on the ice pattern fabrication for the investment casting by rapid freeze prototyping (RFP)", Computers in Industry, vol. 48, 2002, pp 181 – 197.

[7] Q. Liu, V.L. Richards, M.C. Leu, and S.M. Schmitt, "Dimensional accuracy and surface roughness of rapid freeze prototyping ice patterns and investment casting metal parts", International Journal of Advanced Manufacturing Technology, vol. 24, 2004, pp 485–495.

[8] S.A.M. Rezavand and A.H. Behravesh, "An experimental investigation on dimensional stability of injected wax patterns of gas turbine blades", Journal of Materials Processing Technology, vol. 182, 2007, pp 580–587.

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