DESIGN OF 10ML NECK VIAL GUARD MOULD

[1]V.Delhi Raju, [2]K Shravankumar

M.Tech Student, Assistant Professor
MLR Institute of Technology,
Dundigal, Hyderabad, Telangana-500043, India.

***ABSTRACT*: Designing plastic parts and components involve implementing wide knowledge from different engineering areas. A successful design process requires a coherent teamwork between a designer and other specialists such as a tool designer and a manufacturing operator. Regardless, a part design often passes sequentially from concept development to the manufacturing phase with features that unnecessarily complicate production and add costs.**

This project involves to developing a Mould Design for a Guard which is used for a Vial to protect due to any breakage of filled Glassed Vial with medicine. The selected product material for produce product is Polypropylene.

Mould design starts by adding shrinkage of 1.8% for Polypropylene, 2 Plate mould with Stripper Ejection and side core mechanism. Single Sprue is to be given with 3 point gate. Mould height decided by machine platen and thickness of Core and Cavity plates decided by component height. Based on requirement of production 4 cavity mould design is started.

Vero Visi Series Cad Software is used for design of mould. This is UK software which is designed for moulds design and manufacturing, very user friendly software for designers and toolmakers.

Introduction:

I. **Injection moulding** or **Injection molding** , is a manufacturing process for producing parts by injecting material into a mould. Injection moulding can be performed with a host of materials mainly including metals, (for which the process is called die-casting), glasses, elastomers, confections, and most commonly thermoplastic and thermosetting polymers. Material for the part is fed into a heated barrel, mixed, and forced into a mould cavity, where it cools and hardens to the configuration of the cavity.[1]:240 After a product is designed, usually by an industrial designer or an engineer, moulds are made by a mould-maker (or toolmaker) from metal, usually either steel or aluminium, and precision-machined to form the features of the desired part. Injection moulding is widely used for manufacturing a variety of parts, from the smallest components to entire body panels of cars. Advances in 3D printing technology, using photopolymers which do not melt during the injection moulding of some lower temperature thermoplastics, can be used for some simple injection moulds.

Parts to be injection moulded must be very carefully designed to facilitate the moulding process; the material used for the part, the desired shape and features of the part, the material of the mould, and the properties of the moulding machine must all be taken into account. The versatility of injection moulding is facilitated by this breadth of design considerations and possibilities.

Applications:

Injection moulding is used to create many things such as wire spools, packaging, bottle caps, automotive parts and components, gameboys, pocket combs, some musical instruments (and parts of them), one-piece chairs and small tables, storage containers, mechanical parts (including gears), and most other plastic products available today. Injection moulding is the most common modern method of manufacturing plastic parts; it is ideal for producing high volumes of the same object

.

II. Moulddesign:

The mold consists of two primary components, the injection mold (A plate) and the ejector mold (B plate). Plastic resin enters the mold through a sprue in the injection mold, the sprue bushing is to seal tightly against the nozzle of the injection barrel of the molding machine and to allow molten plastic to flow from the barrel into the mold, also known as cavity .The sprue bushing directs the molten plastic to the cavity images through channels that are machined into the faces of the A and B plates. These channels allow plastic to run along them, so they are referred to as runners. The molten plastic flows through the runner and enters one or more specialized gates and into the cavity geometry to form the desired part.

Types of moulds:

While there are literally hundreds of different types of molds, Matrix deals primarily in thermoplastic injection molds. Our tools are designed and built to run in presses of 500 tons or smaller. We are particularly well-suited to complex, miniature and micro-tooling projects.

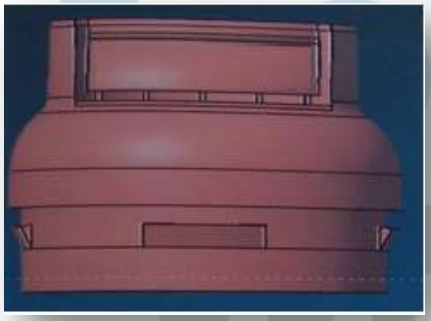
•Prototypes
•Low / High-Cavitation
•Family Mold
•Unscrewing Molds
•Multiple Shot
•Hot Runner
•Cold Runner
•Insulated Runner
•Two / Three Plate
•Unit Die
•Micromold

There is no need to:

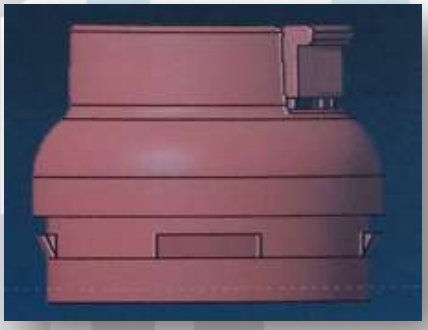
Compromise the aesthetics of your design concept for manufacturability; •Go through a lengthy trial and error process to find the most suitable material to produce the part with the highest possible quality and the lowest possible cost •Find out during trial runs that the produced part has visual blemishes, such as sink marks, weld lines, air traps or burn marks.

During the preliminary design stages and avoid poten-tial downstream problems, which can lead to delays and cost overruns. Following are the benefits: •Optimize the part wall thickness to achieve uniform filling patterns, minimum cycle time and lowest part cost Identify and eliminate cosmetic issues such as sink marks, weld lines and air traps. •Determine the best injection locations for a given part design Mould flow analysis gives you the ability to maintain the integrity of your product designs. It provides you the tools to quickly optimize part designs and check the impact of critical design decisions on the manufacturability and quality of the product early in the design process.

10ML NECK VIAL GUARD:



FRONT VIEW



SIDE VIEW

TOP VIEW

ISOMETRIC VIEW

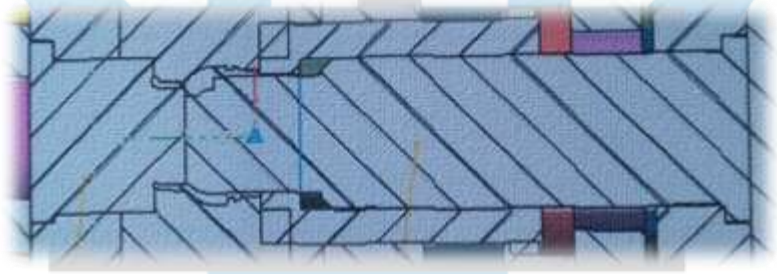
This product is called Guard and it is used as a guard for Vial. This is inserted from top of the Vial and bottom of the guard. The ribs inside of this component guide the Vial. It has a seal at front side of this Vial guard will made of Polypropylene plastic material which has 1.8% of shrinkage. This shrinkage percentage will calculated while extraction of core and cavity assembly.

III.MOULD DESIGN CONSIDERATIONS

- Draft: Required in both the core and cavity for easy ejection of the finished component.
- Shrinkage allowance: Depends on shrinkage property of material core and cavity size.
- Cooling circuit: In order to reduce the cycle time, water circulates through holes drilled in both the core and cavity plates.
- Ejection gap: The gap between the ejector plate face and core back plate face should hold dimension within the core. It must allow component to be fully removed from the mold.
- Air vents: Removes gases entrapped between core and cavity (usually less than 0.05 mm gap), because excessive gaps can result in flash defects.
- Mold polishing: The core, cavity, runner and sprue should have good surface finish and should be polished along material flow direction.
- Mold filling : The gate should

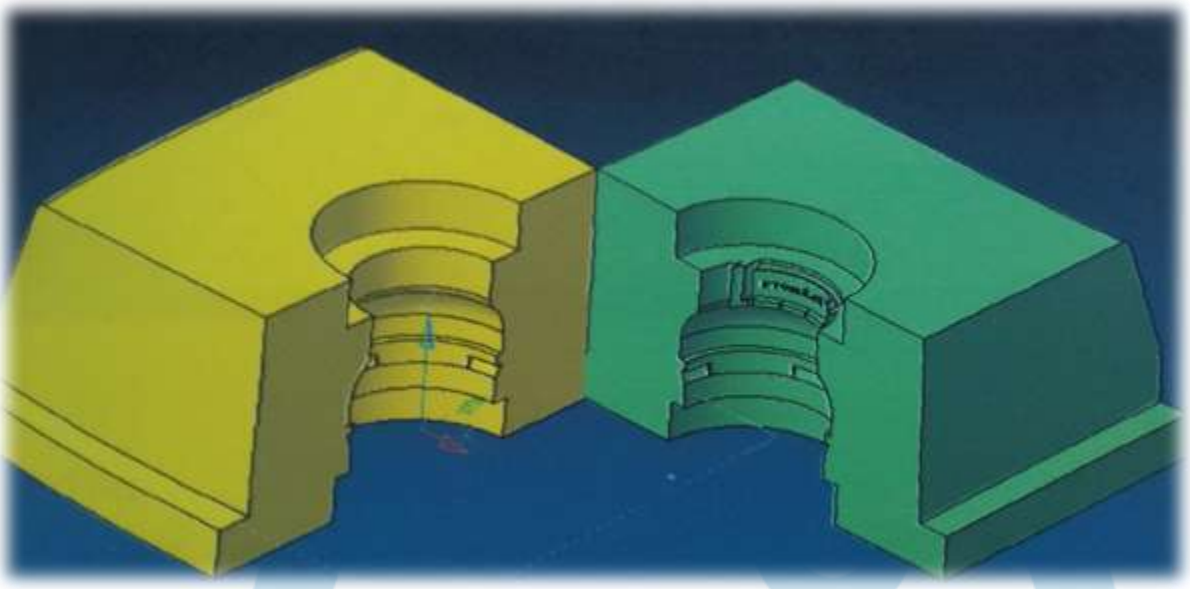
CORE AND CAVITY EXTRACTION:

Core and Cavity extraction starts by adding 1.8% shrinkage to component, 1.8% taken based on material of product. Extraction process done by VISI Cad software.In this process initially parting line taken. The line between the mating of parts of core andcaviy is called Parting line ,thisline is very important while extraction core and cavity. The male part of the mould called Core and female part of mould called Cavity.

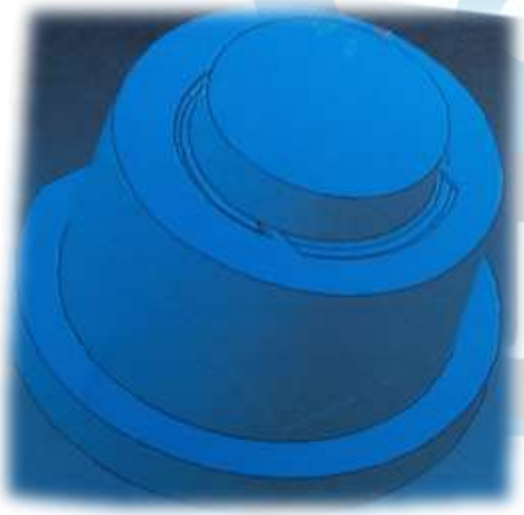


CORE AND CAVITY INSERTS ASSEMBLY

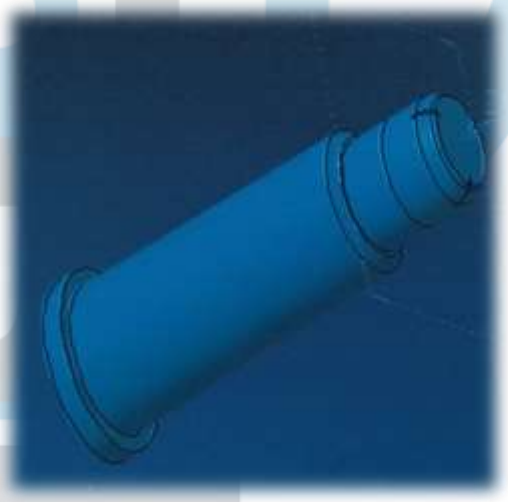
SIDE CORE INSERTS:



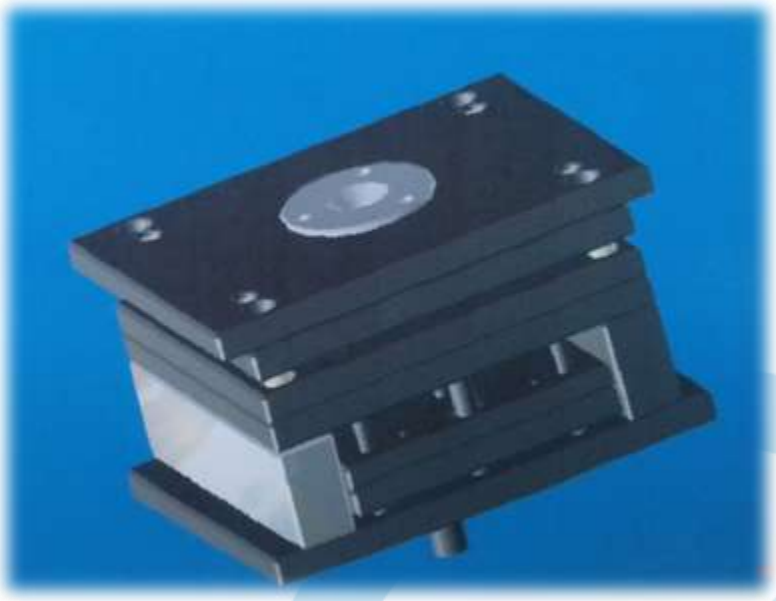
CORE INSERT:



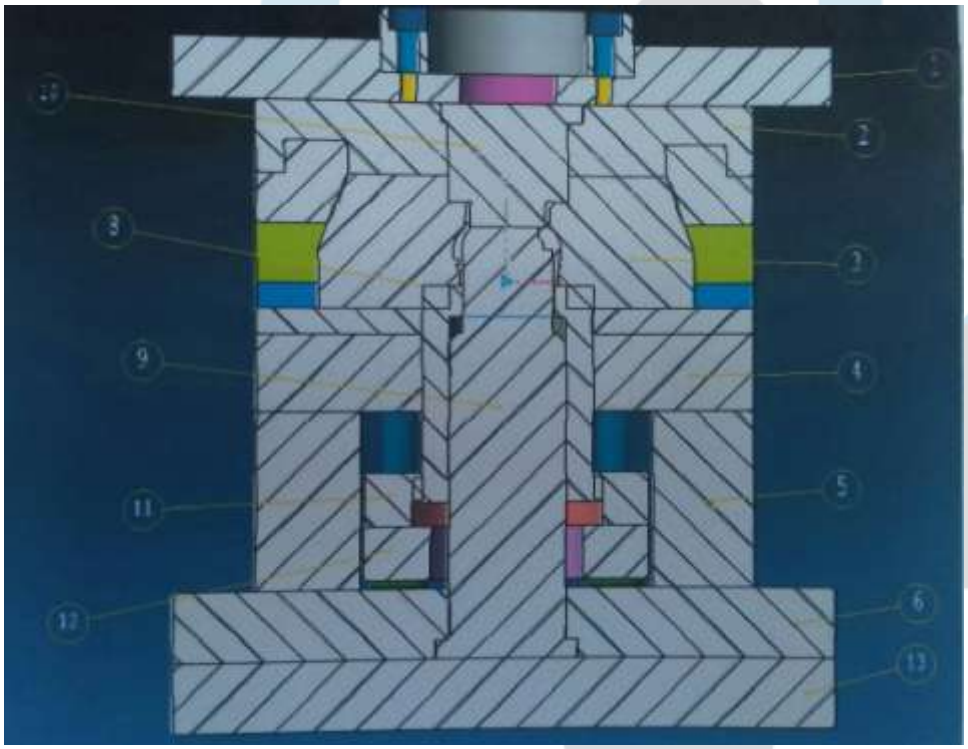
CAVITY INSERT:



MOULD ASSEMBLY:



ISOMETRIC AMBLY VIEW



CROSS SECTIONAL VIEW OF ASSEMBLY

VISI Modelling 15.0

INTRODUCTION

VISI Modelling consists of two integrated packages in which a solid and surface modelling environment is added to the three dimensional wireframe capabilities of VISI Design.

VISI Design consists of three main components to facilitate sketching and conceptual design, 3D geometry construction and full drafting facilities for the addition of text, dimensions etc. VISI Design also contains a constraint manager to ease modification of any design by forming and maintaining associations between elements.

VISI Modelling is a particularly advanced and robust solid modeller (based on the Parasolid core by UGS) and allows the creation of three-dimensional forms, with all their details such that all the properties of the form (internal and external) are known to the system. The modeller also includes a fully integrated surface library, which forms part of the solid model by considering each surface as a sheet solid of zero thickness.

CONCLUSION:

This paper deals with complete cold runner mould tool design as per the parameters provided by client.Core and Cavity is extracted for the 10ml neck vial guard with the usage of operational tool bar in visimodeling.Mould Flow Analysis is done on 10ml neck vial guard set which is made for the cavity patterned components.Usage of mould flow analysis for finding the material filling, pressure distribution, air traps, weld lines formed during injection molding process.By simulating the plastic-filling process for injection-molded parts,VISI CAD Plastic Advisor enables engineers to design for manufacturability, uncover problems, and propose remedies, reducing development time and expense. By using mould we can obtain safty for Vial ,By using this design and manufacture process Vial Guard mould design can be done without any failures.

REFERENCES:

1)Design and manufacturing of air conditioner panel hot runner injection mould based on CAD/CAE/CAM by“WUJI JIANG” and “ZHIGANG JIN”.

2)The applied study on hot runner technology and design of injection moulds by “HUANG and YANG”.

3)Machine design, R.S.Khurmi/J.K.Guptha (S.CHAND)

4)Design data book: P.S.G.College of Technology (Kalaikathirachchagam),

5)Drag material change in hot runner injection moulding by “LEE”.

6)Design of machine element: V.B.Bandari (TATA McGraw-hill

7)Injectionmould design: R.G.W. PYE (East-West press Pvt. Ltd