# MOLDING OF PLASTIC INJECTION, INVESTIGATION, PROCESS OF SIMULATION

# THE PLASTIC INJECTION MOLDING AND ITS ANALYSIS SIMULATION PROCESS WITH THESOURCE OF MATERIAL TEMPERATURE AND PRESSURE INJECTION

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**ABSTRACT:**

***Analysis of Plastic injection is mainly described in this pape.***

***The study of this paper is about a plastic product which represents about the investigation of plastic injection. Two different types of the plastic product are 1. First part is using clip function 2. Second part is using tick function. By using SIEMENS 8.0 parametric software, the plastic parts were drawn in 3 different dimension (3D) in the computer-aided design (CAD)*** In the computer-aided ***manufacturing (CAM), DELCAM 12.0 software was used to develop the machining program. As a part of mould design plastic product was manufactured into two changeable inserts to produce two varieties of plastic product in one mould base., the product was designed into two changeable inserts as a part of mould design. Further, proceeding to injection machine and mould design, this part was analyzed and simulated by using Anasys 15.0***

***Most suitable location for injection can be described as investigation and simulation, pressure for injection through material temperature. In the present work Component selected for conveyor chain locking links.***

**Keywords: Changeable insert mould, injection pressure, air traps, injection location, mould design.**

**1.0 Introduction:** Properties of plastic material effectively change during the manufacturing process, which is one of the complicated factors for injection-molded plastic parts.

As this is not a problem with plastic material and of itself, difficulties may arise, provided if the structural analyses are based on generic material data that will not certainly represents the features of the molded part. Engineering of components can also over included, which may also lead to material usage and its cost which is found to be un necessary, or under-engineering, which can result in part failure. In metal applications, material of plastic which are filled with Fiber are used very frequently.

This paper makes an attempt to determine the plastic process flow. For the usage of human being in their routine life, with the material of plastic, by designing, we can produce many shapes. Like the manufactured plastic applied currently, Plastics were also used similarly in general as a frequent usage.

Plastic can be manufactured in different processes, which are as follows: injection moulding, blow moulding, compression molding, film insert moulding, gas assist moulding, rotational moulding, structural foam moulding, extrusion and Thermoforming. injection moulding is explained in detailed, in this paper.

Parts which are made from thermoplastic material, material made by plastic is injected into a mould forming a plastic product by using the technique, it is a process of Injection moulding.

Heated solid plastic material is injected in moulding machine and pressed to mould.

The material which is used for injection moulding are plastic pellets or granules.

Heating chamber pushes the plastic by plunger or screw, due to this activity, a fluid state soft material is formed. Resin is being forced into a cooled and closed mould at the last point of this chamber. Mould opens and the finished part is ejected, once the plastic cools to a solid state,

In the process of producing complete mould (CAD) Computer Aided Design plays a crucial role in machining raw material and also in designing as per the current and modern technology. In present-day automation, (CAD) Computer Aided Design software can be used to design mould and complete mould is produced by machining raw material.

In injection mould, Feeding system helps for the plastic flow and this element is very significant. The analysis is concentrate for plastic flow in two plate injection mould presented-code is the common name for the numerical control (NC) most widely known as programming language, which has many implementations. Used mainly in automation, it is part of computer-aided engineering. At some situations G-code is well known as G programming language. G-codes can be called as preliminary codes, In a CNC program and any word that begins with the letter G. The activity to be performed by machine tool is informed through a code in general.

## 2.0 INJECTION MOLDING AND ITS PROCESS:

Feeding of a polymer through hopper to barrel is a first step of Injection molding process, injection molding it is heated with the sufficient temperature to flow,

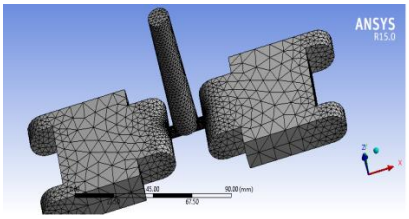
Melting the molten plastic and injecting under high pressure into the mold, this process is commonly known as injection

In the direction to hold the mold tool together, once the product is set to cool, it helps for the solidification process. To both the platens of injection molding machine (movable and immovable platens) injection pressure will be applied to both the platens.

Once the plastic product forms into a shape after molding, in order to separate the mold tool the two platens will move from its place from each other, which is also called as mold opening and finally the molder product is either taken away from the mold or ejected. And the process will repeat itself. An attempt done on the flow analysis will be observed and simulations will generate with different temperatures and pressures by using ANSYS.

A 3-Dimension tetrahedron mesh element was used for meshing the Mold. Flow inlet and wall has been defined as boundary

conditions. The flow rate of mass which is 0.05kg/sec was assigned and no slip stationary wall for the wall. The inlet temperature of 400K was used. The materials used in this process are Propylene (c3h6), Density 1.7kg/m$^3$, Specific heat (j/kg-k) Piecewise-polynomial, Thermal Conductivity(w/mK) 0.0168, Viscosity (Kg/m-s) 8.7e-06.



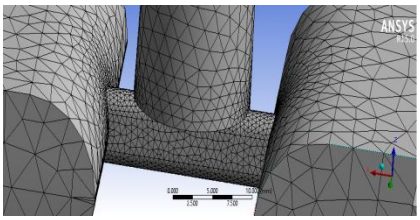




**Fig.2.1: Meshed model Fig. 2.2 Zoomed Meshed Model at the Gates**

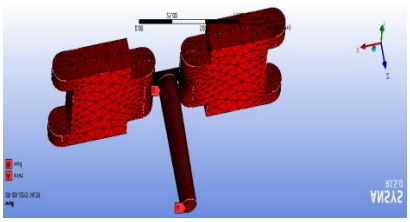
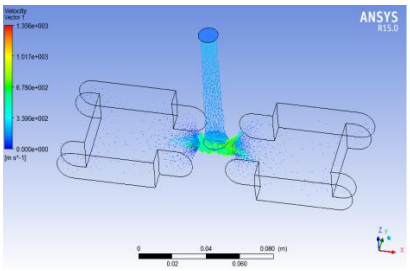
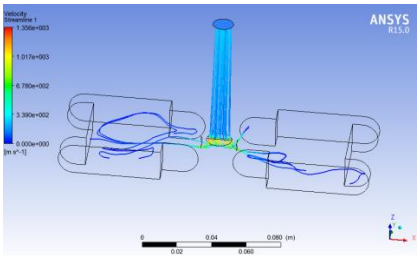


**Fig. 2.3 Boundary Conditions**

**3. 0 RESULTS AND DISCUSSIONS:**

Figure shows the velocity vectors across the mold. The velocity was initially decreased and then increased at the opening of the mold this is due to inlet's divergent section.




**3.1 Velocity Vectors across mold**

**3.2Velocity Stream Lines**

Figure 3.1 and Figure 3.2 shows the Velocity stream lines across the mold and the fluid which rushes into the mold's cavity.

Figure 3.3 shows the temperature contours across the plane at horizontal axis defined at the Top of the mold, Maximum temperature of 403K was observed at the exit of the inlet and was reduced to 300K at the walls.

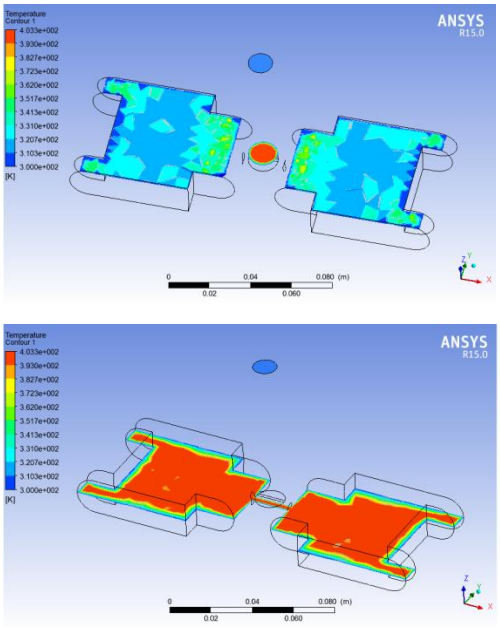



**Fig 3.3 At the Top section, Temperature Contours in horizontal plane at mold.**

**Fig 3.4 Temperature Contours in horizontal plane of the mold at the Middle section,.**

Figure 3.4 Represents clearly the difference of temperature across the horizontal plane at the Mold's middle section, The area of maximum temperature was found to be more at this section. Maximum temperature as previously said it was found to be 403K.Figure 3.5 below shows the temperature contours at the horizontal planes For the 3 different sections at top, center and bottom of the mold.

At the area of center plane maximum temperature was observed, next at bottom plane then and in the top plane. Center plane of the mold Intel exit is placed.

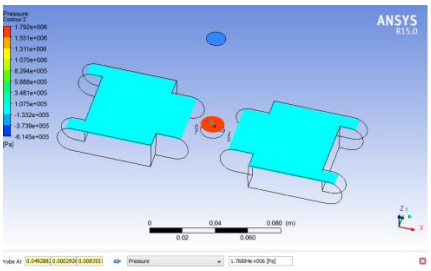



**Fig 3.5 At the Top, Middle and bottom section, Temperature Contours in horizontal plane at mold.**

**Fig 3.6 Pressure is Probed at the gate of the Mold**

Pressure variation while leaving the inlet is represented in the figure 3.6, the maximum pressure of injection was found to be 1.792Mpa at inlet's exit. Ansys software helps to measure the pressure which is probed.

Combination of using tools in ANSYS software are injection mold stiffness and strength analysis tools, which can comprehensively reflect the cavity's force and distortion situation in injection process of molding, theoretical foundation of

scientific and reliable in mold design are consecutively for the development which can be seen through strength and stiffness analysis system of injection mold002E

**3.0 CONCLUSIONS:** In making the mold it was necessary to have the possible product design as a best one. So that it won't complicate the mold designing process. With all the necessary dimensions product design was achieved. In this phase there were lots of good and bad times in trying to interpret the best closing order for the wallet might be, many designs were drawn due to the fact that wallet closing system complication complicates the mold design which intern complicates the fabrication activities of the mold, It was very difficult to find out the flaws in the designed product, also in finding values like material selection which is very significant, Fill time, Fill pattern and Clamping force.

By using the simulation and analysis software in Mold flow, the above values have been achieved without any flaws in the product design.

**4.0 FUTURE SCOPE:**

Going forward, upon the above designs a research can be carried on to put the layout for mold of cooling system. .

Thermal regulations are provided during the function of a cooling system and in the process of molding injection, cooling system is very significant for production activity, in general cooling phase occurs about two-thirds of the total cycle time.

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