

Plastics Product & Injection Mold Design Development of Car Chassis Upper Cover

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ABSTRACT: “Product Design & Injection Mold Design Development of Car Chassis Upper Cover Part” This project fully concentrated on how to design of double impression injection Mold for wheel hub for the car sing the least economic processing and tooling method and it also helps to get the very deep knowledge about the “Split Activation Method”. Finally, the aim of the project is to estimation of the mold which should most economic and also detail about mention above things. It is all the transcendence of human race that people today reach the height of maximum, luxury upgrading from the days of their very ancient stone and cave age. What human being has achieved today was once only a dream out of reach. But man’s curiosity perhaps the most wonderful gift given to man by God was behind his quest leading to wholehearted efforts to convert all impossible dreams of yesteryears into reality. Today in the 21st century, men have reason enough to be proud for their unique achievements from stepping into the moon to cloning genes; there has been long list of tremendous success. Designing of product and mold for plastics is one of the important achievements in this century. This project is our sincere effort for the design of Bottom inlet valve components and their molds. This component has good aesthetics and optimum production cost which helps in withstanding the market competition.

INTRODUCTION

In the plastic age for converting the plastics material in to the product the tool required which is known as mold or dies. To full fill the primary requirements of human being by using the plastics we cannot go for the single type of mold or material so it is very necessary to change the variety of mold and material for the different type of product. Finally, by considering the above items in the mold we are going to prepare the project report which covers the theoretically input of the plastics Property, processing, and tooling consideration. Sandeep S. Patil, (2005) observed for the study of Various CAD tools, offer a designer the ability to create solid models that can be used to calculate mass, inertia, FEA, interference and kinematics analysis. These calculations result in a much more robust design and ultimately shortens the design and development cycle time. These new design CAD tools (created solid model) are not only helps in design stage but also helps in manufacturing stage of machine parts and tooling. Rein Küttner et. al, (2007) observed for the study of optimization of manufacturing technology processes of large composite plastic products. One of the key problems is how to integrate computer-based product design and planning of the technological process. An optimization model is proposed to control and analyses the calculated technology planning route, optimal vacuum forming processes, the technology of post-forming operations (like trimming and drilling of slots and cut-outs) and strengthening and assembling operations. Robert A. Malloy et.al, (2012) observed for the study of best to develop both models and prototype parts during the plastics product development process. The prototyping stage of product development is crucial to the success of a project, yet this aspect of development is often hurried through or underfunded. Prototype parts are used for communications, engineering studies, market studies/promotions, to evaluate product manufacturability/assembly characteristics, and to verify CAD model or print accuracy. M. Uddin and Yongsheng M etal,(2015) observed for the study of cyclically check against required product functionality, structural stability, mold ability, and cost effectiveness. Information modeling and managing associations among multiple engineering aspects is essential to maintain engineering consistency. A feature-based methodology is introduced here to facilitate cyclic processes involved in product development. The methodology starts with building product specification model based on specification features that enable capturing design intention and common product information at the onset of new product development. **MOLD:** The mold is tool which is designed to form the desire shape and size of the plastics material. Mold is robust construction, which contain mainly two parts. One is core and other is cavity. When core and cavity align correctly a space is formed between them that is known as “Impression”. Within the impression the plastics product takes its correct shape and size. There are various types of molds in use to full fill the requirements of various types of product is Injection mold, Compression mold, transfer mold, Blow mold,

SELECTION OF PLASTIC MATERIAL

I selected Polyamide 12 (Commercially known as - NYLON) material for my component because it is perfect material for my component from all aspects. Polyamide 12 material is having good abrasion strength, toughness and good thermal resistance. Polyamide 12 is a hard & tough thermoplastic co- polymer. It was introduced in the market in the late 1940's. The Polyamides (nylons) were the first materials to be recognized as engineering thermoplastics. Polyamides are polymers characterized by the amide group (CONH) as a part of the main polymer chain. Polyamides are polymers characterized by the amide group (CONH) as a part of the main polymer chain.

Chemically the polyamides are divided into two types:

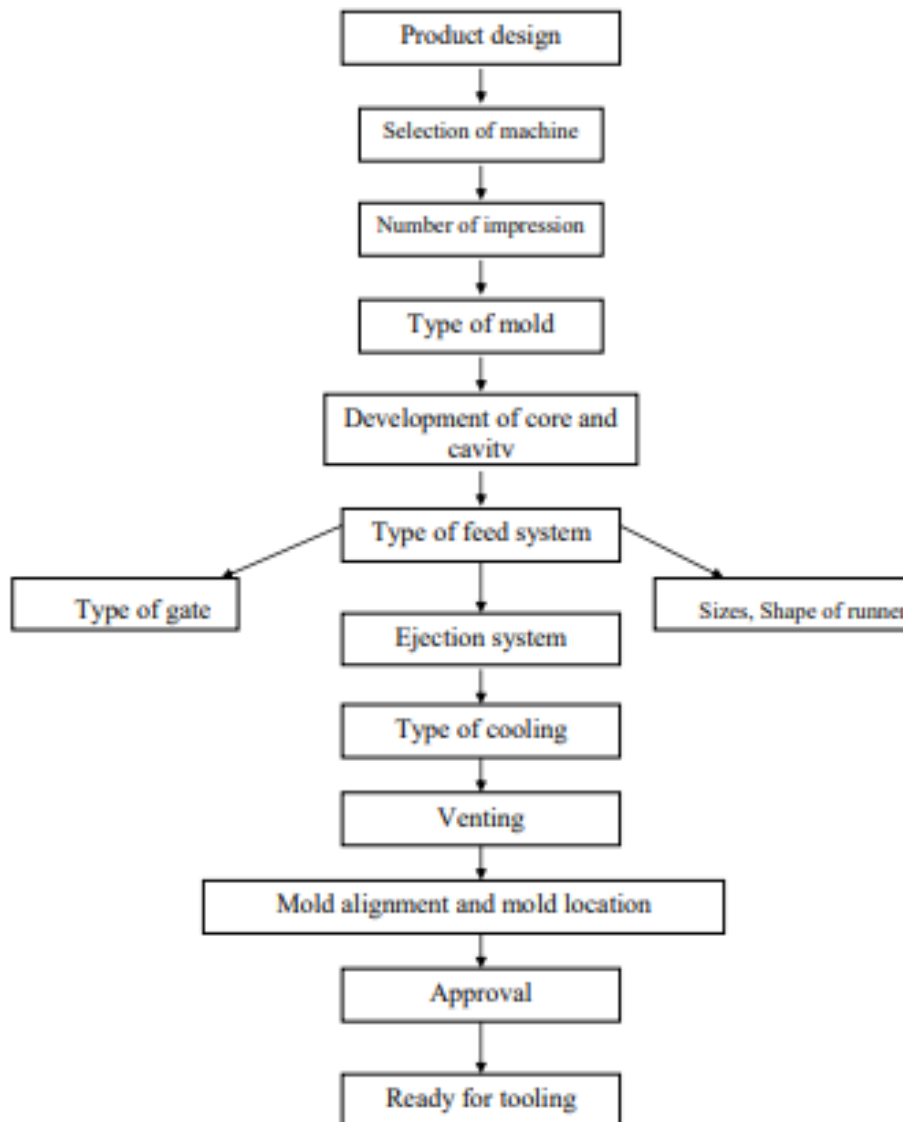
- (a) Based on diamines and dibasic acids
- (b) Based on amino acids or lactam

Aliphatic polyamides such as nylons 66, 6, 10 and 11 are linear polymers and thus thermoplastic.

The Nylon 6,6 is prepared from hexamethylene diamine and adipic acid. The polyamide 6 prepared from caprolactam.

MATERIAL PROPERTIES : Good combination of mechanical properties like Fatigue creep strength, stiffness, toughness and resilience, Good abrasion resistance, Self-lubricating characteristics, Suitable for prolonged, service temperature from 400C to 1200C, Good electrical insulator, but the electrical properties are influenced by moisture content, Resistance to fuels, oils, fats, most solvents and chemicals, Low permeability to gas and vapors, Non-toxic, Easy process able by conventional processing techniques like injection, extrusion, blow and rotational molding.

STEPS TO DESIGN MOLD



MOLD DESIGN AND DEVELOPMENT:

Mold design is an important place of any Molding part. It mainly involves with follows steps. Determined of number of cavities and its layout, Selection of parting line, parting surface Selection of injection molding machine. Development of core and cavity, Type of feed system, Type of ejection, Type of cooling, Mold lifting arrangement.

Venting:When plastic material enters inside the impression the air is displaced normally the air can be escape between the fire main mating mold plates. However, of the plate have fine lapped Finish the air may trapped with the impressed so that the Molding defects such as discoloration, Sinks, shorts etc, may develop. The main good design practice to provide vents in the mold to allow air to escape freely the vent is normally 0.0002-inch-deep by 1.8 inch width machined in the land. In the case venting has been provided at parting line. So that the can escape freely from the cavity and compare not will be perfect.

Selection of Parting Surface: Parting surface of the mold are those portions of the mold plates adjacent to the Impression, which built together to form a seal prevent the loss of plastic material form of the Impression

Classification of Parting Surface: Flat parting surface, Stepped parting surface, Profiled parting surface, and Angled parting surface.

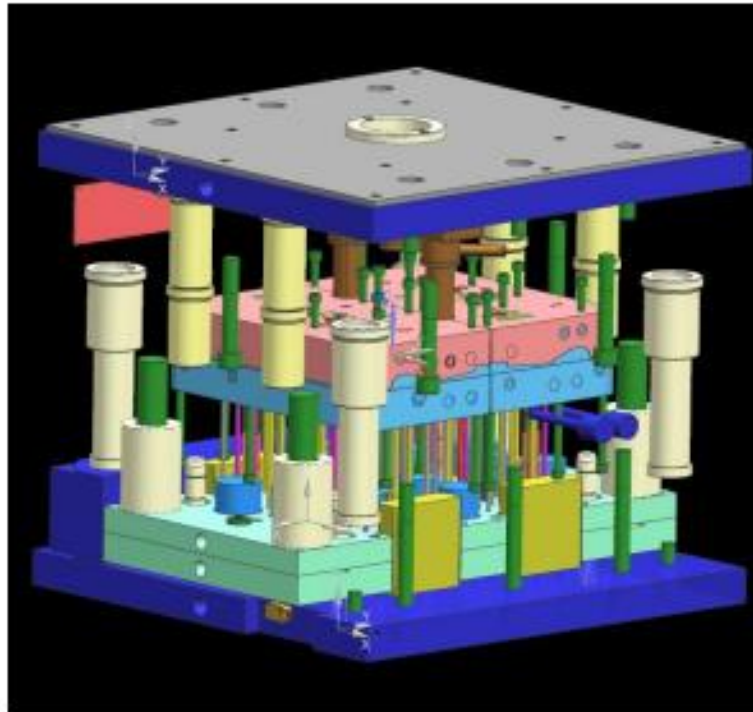


FIGURE 2. Exploded view of mold

PROCESS PLANNING: Process planning is concerned with determining the sequence of individual manufacturing operations needed to produce a given part or product. The resulting operation sequence is documented on a form, referred as operation sheet. Process planning is an important stage of product development since production; tooling can be designed only after the process is finalized. Process plans have a direct bearing on the cost of the part.

FOLLOWING STEPS INVOLVED IN PROCESS PLANNING

- Selection of processes and tool Selection of machine tools/manufacturing equipment→
- Sequencing of operations→
- Selection of work piece holding devices and datum surfaces→
- Selection of inspection instruments→
- Determination of production tolerances→
- Determination of proper cutting conditions→
- Determination of the cutting times and non-machining times for each operation.
- Editing the process sheet→

FUNDAMENTAL PRINCIPLE OF PROCESS PLANNING

First datum surface should be selected. Surface, whose machining will not reduce the rigidity of work, should be→ machined earlier. Internal operation should be performed should performed in advanced of→ external principal reason for performing internal operation. The operation in the sequence should begin with removing the largest layer→ of material. Operation, in which increases the numbers. Reject is to be expected should→ performed as near as possible to the beginning of the machining sequence. Finishing operation should be performed at the end of operation sequence.→

Roughing and finishing operation should be performed on separate machine.

Inspection should be introduced.

1. After roughing.
2. Before operation in other department.
3. After the last machining. The sequence of machining operation should be coordinated with heat treating operation.

Selection of proper material handling equipment. →

Waiting of material is avoided.

CONCLUSION

The aim of work under taken in our institution “AEC” is a part in scientific and Technological way, this improves not only practical skill but also various managerial functions Such as planning the project, scheduling, designing, collections of data, with respect to the Project work etc, this project is programmed and completed as per scheduled and with available facilities in our design department. By accomplishing this project “plastics product design & injection mold design development of car chassis upper part” Successfully. We felt that objectiveness mentioned for this project is completely full filled. So Our project is completely full filled our demands and requirements. So we are satisfied for our project is Concern.

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