A Review on Design and Analysis of Ceiling fan Regulator Knob

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Abstract- **Injection moulds are divided into two types based on runner design (i.e.) Cold runner moulds and Runner less moulds (i.e.) hot runner moulds. In cold runner moulds, for multi-cavity and multi-point injection moulds, there is wreckage of material in runner area. Sometimes wreckage of material is more than component weight. For avoiding the above problem, the technique used is hot Runner moulds. Hot runner mould is the advanced manufacturing methods for multi-cavity type moulds. These types of moulds are widely used for large production rate. While producing plastic components using normal/standard multi-cavity mould, we are facing the problems like partial filling, cavities in components, less product quality, injection pressure and temperature drop age and warpage etc. Thus we are redesigning the Ceiling Fan Regulator Knob by doing some modification in and this will be beneficial for our using purpose. We are making design of the component, mould flow analysis using software Solidworks.**

Index Terms- mould, core-cavity, warpage, etc.

I. INTRODUCTION

Injection moulding is a method of forming a plastic product from thermoplastics by feeding the material through the machine component called the hopper to a heated chamber in order to melt it and force the material into the mould by the use of the screw. In this whole process, clamping force should be constant till the material is solidified and is ready to be ejected from the mould. This is the most vernacular and preferable way of producing plastic products with any complexity and size.

The runner system congruous the molten plastic material coming from the barrel and guides it into the mould cavity. Its configuration, dimensions, and connection with the moulded part influence the mould filling process and, therefore, largely the quality of the product. In other words, the runner system prescribes part quality and productivity. Runner systems in ordinary moulds have the same temperature level as the rest of the mould because they are in the same mould block. The ideal injection moulding system delivers moulded parts of uniform density and free from all runners, flash, and gate stubs. To obtain this, a hot runner system, in contrast to a cold runner system, is employed. The material in the hot runners is preserve in a molten state and is not ejected with the moulded part. Unlike an ordinary cold runner, the hot runners are heated, so the plastic melt in the hot runners never solidified.

A. Construction and Working

Plastic injection moulding is the process of heating a plastic in resin in pallet form, (raw material) to its melting point, forcing the viscous material into a mould, and allowing it to cool into a hardened shape. Injection mould parts are used virtually every product you encounter, from electronics to house wares to automotive to food packaging. At the highest level, it's a very simple process, but their's a very complex science that goes into doing its well form creating the mould to understanding the chemical and physical properties of materials.

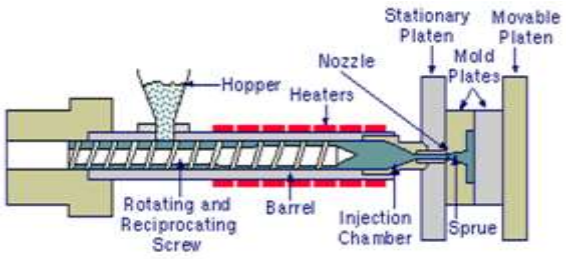

Figure no. 1. A Single Screw Injection Moulding Machine

B. Basic Parts of Injection Moulding Machine

- The hopper
- The barrel
- The reciprocating screw
- The nozzle
- Mold system
- Cooling channels (circuits)
- Hydraulic system
- Control system
- Clamping system
- Molded system
- The delivery system.

C. Injection Moulding Cycle

The upshot of events during the injection mould of a plastic part is called the injection moulding cycle. The cycle starts when the mould closes as the injection of the polymer into the mould cavity. Once the cavity is filled, a holding pressure is used maintained to recoup for material shrinkage. In the next step, the screw turns, filling the next shot to the front screw. This results the screw to retract as the next shot is prepared. As the part is sufficiently cool, the mould opens and the part is ejected. Generally cycle times vary from 10 to 100 seconds and are controlled by the cooling time of the thermoplastic or curing time of the thermosetting plastic material Injection moulding is a cyclic operation shown in fig.2.

The cycle consist of

a) Mould close and clamp, (few seconds -depends on machine speeds).
b) Injection - Fill (speed) phase, (few econds)
c) Switchover and Pack (pressure) phase,(few seconds)
d) Cooling time, (40 to 60% of cycle time).

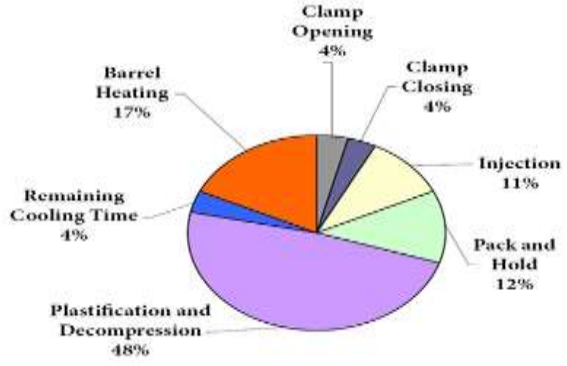

Figure no.2 Injection moulding cycle.

II. LITERATURE REVIEW

For this study and observation are focused on existing system. The literature survey has been frontliner effort in this regard. Various design concepts and CAD/CAE concepts from literatures help to establish comparative study between existing and new experimentation. The jargons referred from literatures for designing are discussed as follows:

[1]Design and Analysis of Cold Runner Injection Mould for Ceiling Fan Regulator Knob. N.Divya Dr.Ch.V.S.Parameswara Rao, Dr. S.S.N.MalleswaraRao P.G.Student, PBR Visvodaya Institute of Technology and Science, Kavali, S.P.S.R.Nellore, Andhra Pradesh, India Professor, PBR Visvodaya Institute of Technology and Science, Kavali, S.P.S.R.Nellore, Andhra Pradesh, India Professor, PBR Visvodaya Institute of Technology and Science, Kavali, S.P.S.R.Nellore, Andhra Pradesh, India

Hot runner systems were first developed and came into sporadic use in the early 60s with generally negative results. They become famous in the 80s and 90s as technological advantages allowed improved reliability and the roll up of plastic materials prices made hot runner systems more desirable and cost effective. Hot runners are fairly complicated systems, they have to maintain the plastic material within them heated uniformly, while the rest of the injection mould is being cooled in order to solidify the product quickly.

Injection moulding is a manufacturing process for producing parts by feeding material into a mould. Injection moulding can be bring off with a host of materials, including metals, glasses, elastomers, and most commonly thermoplastic and thermosetting polymers. Material for the part is board into a heated barrel, mixed, and forced into a mould cavity where it cools and hardens to the configuration of the cavity. The manufacturing of thin-wall products is very essential for the automotive industry because thinner components allow considerable overall weight savings, beneficial effects on the reduction of fuel consumption and improvement of environmental impact. All materials used for automotive applications such as metals, foams, plastics and composites are investigated in order to achieve reductions in product thickness. In particular, thin-wall fabrication of plastic products allows the

accomplishment of smaller and lighter parts which can withstand day-to-day use while maintaining their aesthetic appearance.

III. OBJECTIVES

- Design and analysis of Ceiling Fan Regulator Knob.
- To improve the aesthetic view and reduce material wastage.
- Provide strength to the Knob.
- Provide grip to the knob.
- Apply a shrinkage that corresponds to the part material, geometry and moulding conditions.
- Make conceptual design of mould.

IV. RESEARCH METHODOLOGIES

A. Problem identifications

Figure no. 3: component of existing model

- In the present model the product life cycle is less and their is poor locking of the knob.
- Poor strength, poor grip, wear and tear occurrence.
- Poor aesthetic view.
- Material wastage.
- Poor strength in centre.

V. COMPUTER AIDED MODELING

SOLIDWORKS is 3D CAD which is used in designing model. With the intuitive SOLIDWORKS user interface to speed your design method and get you to instantly productive. It's a strong 3D design solution

A. Steps in creating 3D model:

New document

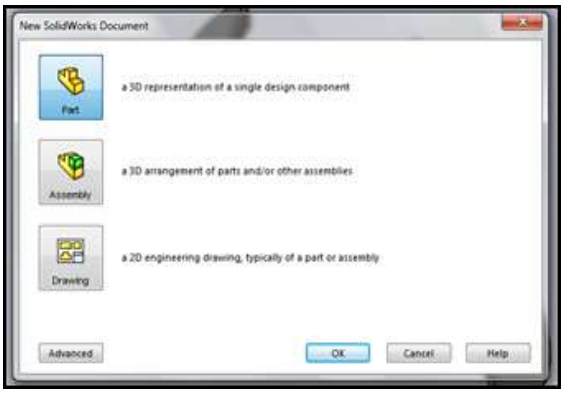

Figure no. 4:- New SolidWork Document dialog box

B. Basic Sketch creation

- Open a new part and choose the Front plane.
- Click Line (Sketch toolbar), and coincident with the origin, sketch a horizontal line.
- Click Smart Dimension (Dimensions/Relations toolbar), and dimension the line.

C. Feature creation

Create circle from single or multiple sketch entities. With cylindrical, you'll be able to quickly develop abstract models of mechanisms or linkages. These models mostly include many components that pivot, slide, or rotate.

The benefits of modelling mechanisms with layout sketches is that the speed and adaptability with that designer will experiment with design variations

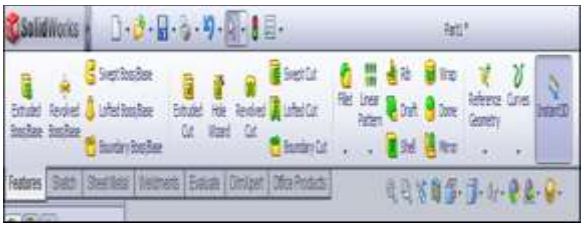

Figure no.5: -Command Tool Bar

VI. CONCLUSION

In this way we have designed the review paper. Design and Analysis of Ceiling fan Regulator Knob will be analysed by using CAD software i.e. SOLIDWORK and take result.

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