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Workstudy on Production Rejection in Pipe Plant & Blown Film Line Machines''

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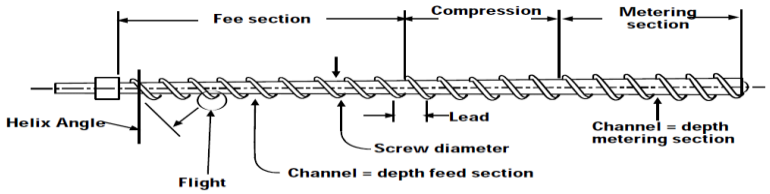
ABSTRACT: *Extrusion is the process where a solid plastic (also called a resin), usually in the form of beads or pellets, is continuously fed to a heated chamber and carried along by a feedscrew within.*
The feedscrew is driven via drive/motor and tight speed and torque control is critical to product quality. As it is conveyed it is compressed, melted, and forced out of the chamber at a steady rate through a die. The immediate cooling of the melt results in resolidification of that plastic into a continually drawn piece whose cross section matches the die pattern. This die has been engineered and machined to ensure that the melt flows in a precise desired shape.
Plastics are very common substances for extrusion. Rubber and foodstuffs are also quite often processed via extrusion. Occasionally, metals such as aluminum are extruded plus trends and new technologies are allowing an ever-widening variety of materials and composites to be extruded at continually increasing throughput rates. This article will focus only on the extrusion of plastics..

I. INTRODUCTION

Types of Pipe Extrusion Lines Machines
-Single screw pipe extrusion lines machine
-Twin screw pipe extrusion lines machine

Single Screw Pipe Extrusion Lines Machine
In this machine single screw is used in extruder as shown in fig.



Single Screw Pipe Extrusion Lines Machine

There are three section in feed screw:
(1) Feed Section
(2) Compression Section
(3) Metering Section

Features
-4th generation energy efficient extruder
-European Proven Technology ensures excellent linearity of specific output
-L/D ratio of 37 : 1 ensures excellent melt homogeneity
-"First Time in India, 45 mm Extruder, 330 kgs /hr pipe output"
-Direct coupled design ensures minimum transmission loss
-Wear resistant coating ensures long screw life at high rpm

Raw Material
-PE- Polyethylene
-PPR- Polypropylene
-HDPE- High Density Polyethylene

Twin Screw Extrusion Line Machine
In this machine Twin screw is used in extruder as shown in fig.

Twin Screw Extrusion Line Machine

Different Types Of Raw Material Used
-PVC - Polyvinyl Chloride
-CPVC - Chlorinated Polyvinyl Chloride

Features
-Minimizes energy inputs
-Achieves uniform pumping
-Front barrel with HSS sleeve offered for selected models
-Minimizes wear & tear
-Economic replacement option
-High accuracy of ±1 C
-Hard face coating on selected models

Application
-Supplying potable water for rural and urban places
-Casing and column pipes for bore well
-City sewage Pipes
-Domestic plumbing
Effluent discharge lines
-Electrical conduits
-Sprinkler irrigation system
-Inside housing telecom connections

Working of Extrusion Line Machine
In basic extruder machine Plastic pellets or beads(also referred to as resin) are fed from the hopper along a feed screw through a barrel chamber.

As the resin travels along the barrel, it is subject to friction, compression, and heated zones. The result is that the resin melts and further travel at the exit end of the screw serves to mix the melt homogeneously. The melt enters a chamber designed to ensure an evenly distributed flow to the die. In many machines, a melt pump is used to prevent any pressure surges.

Also, breaker plates serve to prevent any solid particles or foreign objects from passing through the die, then it passes from the vacuum unit where it cool down and get proper shape and it prevents bending of pipe and then it goes to traction unit it pull to cutting unit where pipe is cut down as per required length

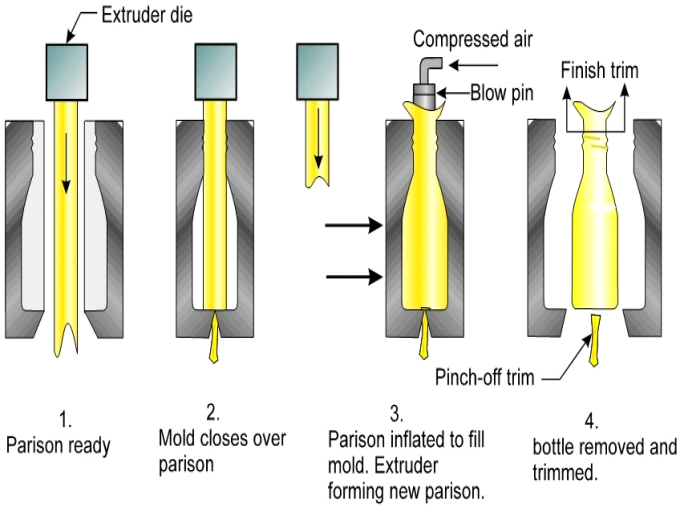
BLOW MOULDING MACHINE Introduction
Blow molding (also known as blow moulding or blow forming) is a manufacturing process by which hollow plastic parts are formed. In general, there are three main types of blow molding: extrusion blow molding, injection blow molding, and stretch blow molding.
The blow molding process begins with melting down the plastic and forming it into a parison or preform. The parison is a tube-like piece of plastic with a hole in one end in which compressed air can pass through.
The parison is then clamped into a mold and air is pumped into it. The air pressure then pushes the plastic out to match the mold. Once the plastic has cooled and hardened the mold opens up and the part is ejected.

Features of Blow Moulding Machine
-Robust design
-Faster dry cycle speed
-Forward - reverse movement on rails for ease of mould loading
-Sturdy contraction
-No vibrations even at high speed
-Extruder up-down movement [Motorised]
-Fixed height extruded in KBM 100 with up-down movement of mould clamping unit
-Above given features minimize flash and hence wastage
-A.C. motor with variable speed A.C. drive for extruder
-Helical gear box with built in thrust for efficient speed reduction
-Accumulator die head of FIFO design
-Faster colour change
-Minimized wastage
-On-off type four point hydraulic parison thickness control
-Optimally designed hydraulic power pack ensures minimum power consumption

Application of Blow Moulding Machine
-Edible oil packaging
-Lubricants packaging
-Packaging of drinking water
-Pharmaceuticals packaging
-Chemicals packaging
-Pesticides and insecticides packaging
-Automobile components
-Toys

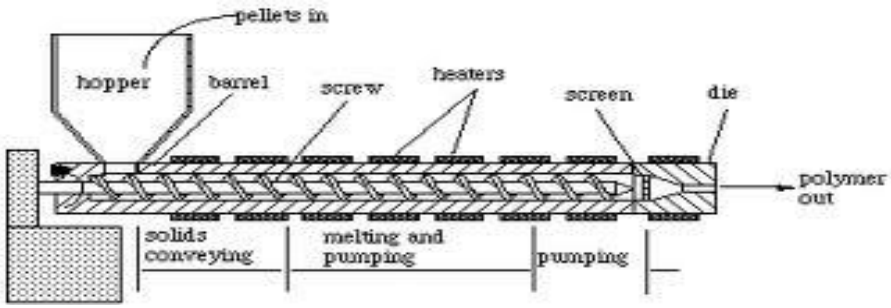
Working of Blow Moulding Machine
Extrusion blow molding is the most widely used technique.

The principle of the extrusion blow molding process is that a parison, which is formed by continuous extrusion of material and rotating of the screw in the barrel, is clamped between two halves of a mold, cut-off and inflated with air to fill the mold. The mold is cooled so that the product is frozen into the mold shape, while still under air pressure. The mold is then opened and the part removed.



Blow Moulding Machine

Components of Blow Moulding Machine
Extruder
In The Extruder Raw material is Feed through hopper in barrel and goes to feed screw which is driven by the external device like motor and it forward the material.
During travelling the material it is heated by the heater at required temperature for melting purpose then this melt material pumped to the die.

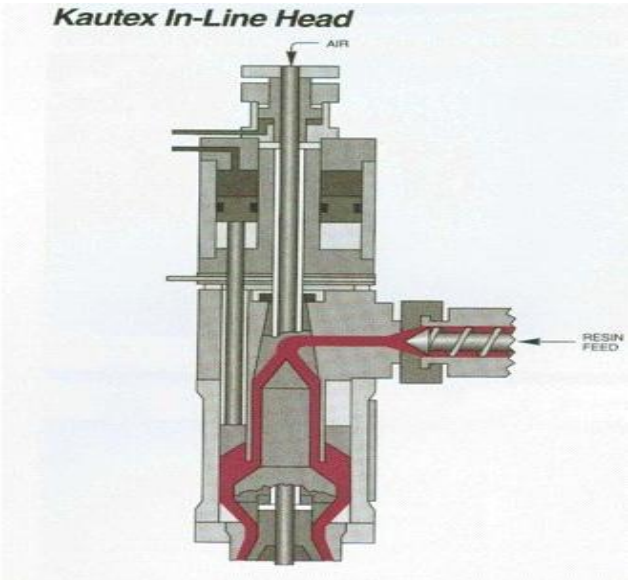


Extruder

Accumulator Head

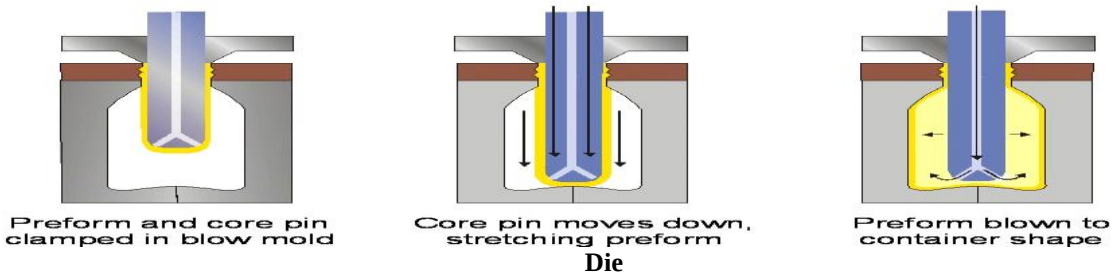
Reasons for Development of Accumulator Head
-The desire to mold even larger parts
-The need to extrude parison quickly to minimize hang time and parsonage
-Issues with parison knit line
-Strength
-Appearance
-More difficult to process high molecular weight polyethylene and form a good parison
-Circumferential wall thickness distribution
-The head can be fed polymer continuously
-Capable of fast parison extrusion rate

Working
"accumulator head", which acts like a reservoir and push-out piston, it is possible to accumulate enough resin inside the head for one part so that the part "shot" can be pushed out quite rapidly immediately before the mould closes round it to start the moulding cycle.
The extruder screw can be stopped and started as required to fill the accumulator in time for the next push-out and moulding operation. The accumulator head machine, as well as helping to minimize the effects of parison stretching in long parts, can also be useful for moulding semi-crystalline engineering resins when rapid cooling or oxidization of the parison surface may cause problems when those materials are moulded in continuous extrusion machines.



Accumulator Head

Die
The parison which comes out from the accumulator is entered into the die. This die is compressed by hydraulic unit so the parison between dir is also compressed and get the shape of die.



Die

Parison Cutter

The knife blade is operated by pneumatic cylinder through a rack and pinion arrangement. The possession of knife blade with respect to die ring is adjustable. The knife move to left to right in one cycle and right to left in next cycle.

Hydraulic unit

Almost every moving part in a blow molding machine depends upon the hydraulic system, which uses oil as a working fluid to supply the force that enables the parts to move.

Figure shows schematically the principal parts of a hydraulic system.
Hydraulic oil is stored in an open reservoir tank (1).

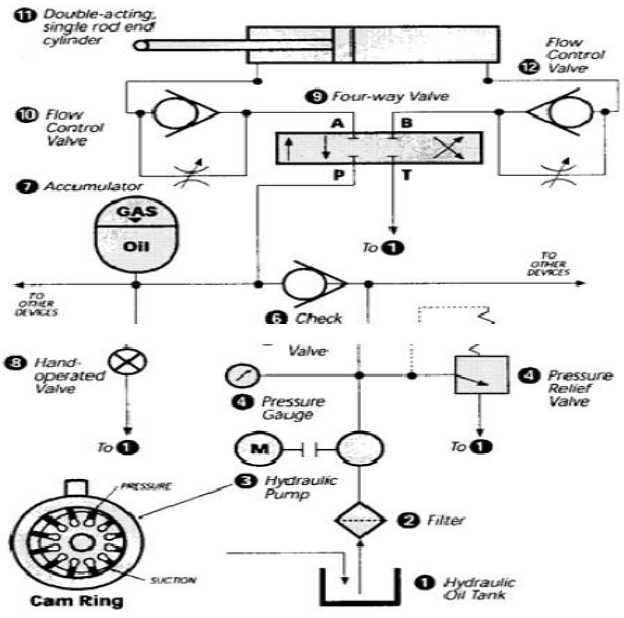
Every time the oil is withdrawn from the tank, it passes through a filter (2) containing a pack of fine mesh screens and usually a magnet. The screens remove any particles of dirt or other foreign matter and the magnet grabs any tramp iron that may get into the system.

A hydraulic pump draws oil from the tank and moves it to the points of use. Pressure in the system is indicated by a pressure gauge (4).

Because the hydraulic pump runs constantly, but the demand for the working fluid is intermittent, some method of relieving pressure is necessary. A press relief valve (5) opens and releases oil back to the oil reservoir whenever a specified maximum pressure is sensed.

When the system pressure decreases because of a valve opening and calling for oil, the relief valve instantly closes to maintain the desired pressure level. Oil flowing along the other leg of the branch moves through a check valve (6). This valve permits flow from right to left. The flow of oil branches again, with one path leading to an accumulator (7). This is a storage device internally equipped with a piston or flexible bladder. The main purpose of the accumulator is to supplement flow from the pump when a large volume of oil is required within a short time interval.

A hand-operated valve (8) is in another leg of the branch so that if a fitting must be disconnected, the oil under pressure in the accumulator can be discharged back to the oil tank instead of at the fitting being opened. Another branch in the oil line leads to a solenoid-piloted, two-positioned, four-way valve (9).



Hydraulic Unit

When the inner position of this valve is shifted to the right, port P is connected to port A and port T is connected to port B. Pressurized oil then passes freely through the flow control valve (10) into the rod end of the double-acting, single-rod, end cylinder (11), forcing the piston to move to the right and expelling oil from the front of the piston at a controlled rate through the flow control valve(12) back to the oil tank.

II. BLOWN FILM LINES MACHINES

Introduction

Blown film extrusion is one of the most commonly used thin-gauge fabrication processes in the world. The process of producing film by extruding molten resin into a continuous tube is simple.

A simple blown film line consists of an extruder, die, air ring, iris or bubble cage, collapsing frame, and a winder.

Types of Blown Film Lines Machines

- Monolayer Blown Film Lines Machine
-Three layer Blown Film Lines Machine
-Five layer Blown Film Lines Machine

Monolayer Blown Film Lines Machine

Introduction

Monolayer Blown Film Lines Machine is one type of Blown Film Line machine which is used to produce a one layer film.

One layer film generally used for packing purpose but it consist only one layer so it can't be used for packing a costly material.

Monolayer Blown Film Lines Machine consist only one Extruder and one type of raw material to produce a Mono layer film.

Different Raw Material Used

-LDPE- Low Density Polyethylene
-LLDPE- Linear Low Density Polyethylene
-HDPE- High Density Polyethylene

Application

-Shopping bags, Grocery bags, T-shirt bags ect.
-Liners & lamination film for aluminum foil, jute paper and board
-Liner for woven sacks, Cans and other industrial needs

Three layer Blown Film Lines Machine

Introduction

Three layer Blown Film Lines Machine is one type of Blown Film Line machine which is used to produce a Three layer film.

Three layer Blown Film Lines Machine

Different Raw Material Used

-LDPE- Low Density Polyethylene
-LLDPE- Linear Low Density Polyethylene
-HDPE- High Density Polyethylene
-Nylon

Application

-Milk film
-Rice packaging
-Tomato catch up packaging
-Liquid packaging

Five layer Blown Film Lines Machine

Introduction

A five layer Blown Film Lines Machine consist five Extruder and five type of raw material to produce a five layer film.

Five layer Blown Film Lines Machine is one type of Blown Film Line machine which is used to produce a five layer film. One layer film generally used for packing purpose but it consist only five layer so it can be used for packing a costly material.

Different Raw Material Used
-LDPE- Low Density Polyethylene
-LLDPE- Linear Low Density Polyethylene
-HDPE- High Density Polyethylene
-NYLON
-MLLDPE- Metallocene Linear Low Density Polyethylene

Pipe Plant Machine:
There are some reasons of output failure in Pipe Plant Machine, which are explained below.
- **Improper wall thickness**
- **Inside rough surface**
- **Brittle pipes**

Improper wall thickness
~ when the thickness of output pipe's are somewhere is thin or somewhere is thick it's call improper wall thickness

Inside rough surface
~ when the inside surface of pipe is rough and improper
Brittle pipes
~ when the pipe is broken on low pressure is cold is brittle pipe

Blown Film Line Machine
There are some reasons of output failure in Blown Film Line Machine, which are explained below.
- **Over-heating motor**
- **Gauge variation (transverse)**
- **Creases of film**

Over-heating motor
- **Causes**
  - Insufficient cooling

Gauge variation
- **Causes**
  - Non uniform die gap

Creases of film
- **Causes**
  - Film is over cooled at first nip
  - Dirt on rollers tension
  - Over or under
  - Improper folding & collapsing of bubble

SOLUTION OF PIPE PLANT MACHINE
Solution of improper wall thickness

- Align take off equipment
- Adjust rpm of machine and take off equipment
- Profile and rpm of the screw.
- Check heaters on the die

Solution of inside rough surface

- Adjust temp. profile so as to melt polymer completely
- Avoid melt fracture by increasing die temperatures, lowering shear by reducing screw rpm
- Avoid moisture by pre-drying

Solution of brittle pipe

- Temperatures and adjust rpm of screw (avoiding faster and cold extrusion)
- Avoid excessive draw down of the pipe
- Avoid using excessive regrind material

SOLUTION OF BLOW FILM LINE MACHINE

Solution of over heating motor

- Check blower working
- Check direction of blower
- Clean screen at blower inlet
- Make sure blower sucks fresh cool air

Solution of gauge variation

- Adjust die gap
- Clean air ring
- Protect bubble from outside air breeze

Solution of creases of film

- Reduce cooling
- Clean all rollers
- Adjust film tension
- Set slats properly

III. CONCLUSION

1) After completion of project part-I the skill for problem definition has been developed and we started to think about the real problem.
2) We studied the problem in detatil and quote some expected thoughts for problem solution of thrust bearing and stamping of submercible pump.
3) During this study we learn how to face the real technical problem and its effect to the industry and community in terms of life of product and economy of product.
4) Project-1 can give us opportunity's to familiar with industries environment and enhance the knowledge of production process and also know the requirements of proper production planning and control.

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