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An Overview Of Hydrostatic Extrusion Process

Yash Vishnu Sawant[1], Rushikesh Raju Santre[2], Shahnawaz Khalil Shah[3]

[123]STUDENT OF SECOND YEAR B. TECH, DEPARTMENT OF MECHANICAL ENGINEERING, DEOGIRI INSTITUTE OF ENGINEERING AND MANAGEMENT STUDIES.

Abstract -*In this review paper we're study about the process of hydrostatic extrusion process their significance and early history and how this hydrostatic extrusion process is important for a material with the help of former review papers, exploration papers and some former reference books. In this process, the billet in the vessel is extruded through a bone by a liquid pressure medium rather of by the direct amusement forces with a ram.*

This hydrostatic extrusion process minimizes the force conditions, allowing advanced reduction rates, faster pets, & lower billet temperatures. Disunion of the bones can be largely reduced by a film of pressurized lubricant amidst the bones face and screwing essence. On applying high pressures, the rigidity of material increases. Extrusion is a process where a material undergoes plastic distortion by the operation of a force causing that material to inflow through the perforation or die. The material adopts the cross-sectional profile of the bones and if the material has suitable parcels, that shape is retained in the final extrude. In hydrostatic extrusion, the billet is extruded through a bone via the action of a liquid pressure medium rather of the direct operation of the cargo through a ram. In cases of hydrostatic extrusion, the vessel is fully filled by a fluid. The fluid is also pressurized, and this provides. With the help of ram pressure act on the fluid and this process is occurring

1. INTRODUCTION-

Progress of technology has caused the development of new accoutrements to fulfill new engineering demands, e.g., new blends, greasepaint of pottery and superconductors, etc. These types of new accoutrements are frequently delicate to produce or give shape them. Among the new processes that were developed in recent times to produce these new accoutrements, hydrostatic extrusion appears to have the topmost eventuality. The difference between the conventional extrusion and hydrostatic extrusion is that the ultimate uses fluid (high- pressure fluid) as pressure-transmitting medium rather of direct contact. During the extrusion, this fluid transmits a hydrostatic pressure to the billet, which can largely increase the rigidity of the extrusion accoutrements. The fluid also work as a lubricant between the bones and billet and reduces disunion. This process is able of banishing numerous delicate- to- deform accoutrements. The extrusion machine can be divided into seven corridors.

1 Hydrostatic extrusion

1.1 High-Pressure extrusion process
1.2 High-Pressure seal
1.3 High-Pressure source
1.4 High-Pressure plunger

2 The hydrostatic extrusion experiments

2.1 Parameter Extrusion

2.2 Extrusion Die

2.3 Extrusion Billet

2.4 Process of Extrusion

3. Advantages and disadvantages of hydrostatic extrusion.

3.1 Advantages of hydrostatic extrusion

3.2 Disadvantages of hydrostatic extrusion

The cost of a hydrostatic extrusion device is veritably high compared to that of a traditional device, thus, to design a practical and commercially feasible device has come an important engineering content.

LITERATURE REVIEW:

1. The idea of hydrostatic extrusion was first established by Robertson,but the system was first experimented by Bridgman

2. Laterally exploration and development work was carried out by pressure system in 1964.

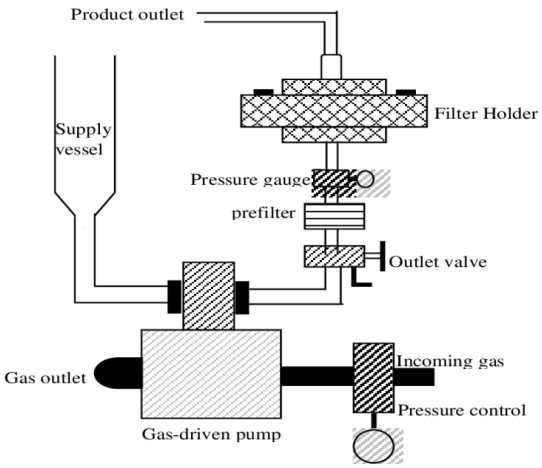
    1. That can help the cracking of brittle material in simple hydrostatic extrusion. Following this, further exploration and trial was done at High Pressure Laboratory of the Academy lures of the USSR, as well as in the USA, and Japan. The disadvantage of simple hydrostatic extrusion is that the extrusion speed is wilful. Slater and Green

    2. With this system, when the fluid pressure is inadequate to banish the billet, a fresh force is applied to the hinder end of the billet by a solid ram. Still, the length of the billet is also limited by

buckling under the axial compressive force of the ram. When Bridgman experimented with hydrostatic extrusion, he observed a severe fluctuation in the pressure., like ``stick and slip phenomenon''

1.1HIGH-PRESSURE EXTRUSION VESSEL

3. Refinery processes are largely complex and expensive. Worldwide is on the rise for demand refined products. Your outfit needs to be dependable, effective and cost-effective to make sure your business is thriving. MAN Energy results have the outstanding moxie and large-scale product installations demanded to make your operations competitive and profitable. For reversals or new shops, we manufacture in our shops on the River Danube and boat directly from their Vessels importing up to 800ml featuring a wall consistence of 50 mm to 350 mm. Vessels made from special accoutrements similar as zirconium, CrMO, CrMoV, 20MnMoNi45 or other high- grade accoutrements . Our weld overlay sheathing guarantees redundant continuity.



1.2 High- PRSSURE SEAL:

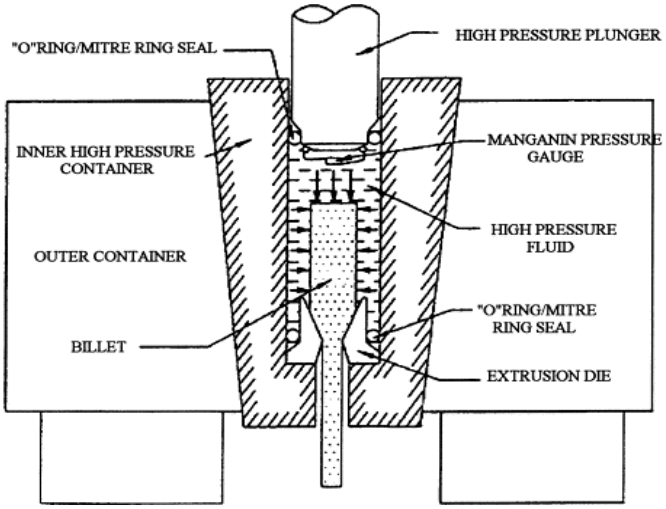
1. Section of the plunger of front side was shaped into a bevel and was good polished

2. The mitre rings of the seals were changed into V shape in sampling.

3. On top of the high- pressure vessel, an indirect groove was designed for placing O- ring and essence mitre ring.

4. The hydrostatic extrusion trials Hydrostatic extrusion trials were conducted using the below outfit to test its practicability as well as to observe the parcels of accoutrements after high- pressure extrusion. The processes of the trials are bandied in the ensuing sections.

1.3 HIGH-PRESSURE SOURCE:

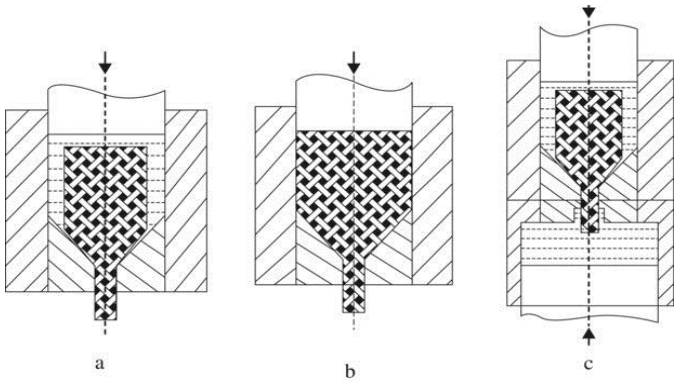


(fig: Apparatus of hydrostatic extrusion)

The high pressure of this experimental hydrostatic extrusion outfit comes from the compressed fluid in a pressure vessel. This spherical pressure vessel has an inner drag, 16 mm in periphery, plotted to a plunger. When a universal- testing machine with maximum capacity of 20.2 t is used to compress the fluid in the vessel through this plunger, a magnified fluid pressure as high as 1000 kg/cm2 (about 10000 atmospheric pressure) will be attained in the pressure vessel.

1.4 HIGH-PRESSURE PLUNGER:

The functions of the high- pressure plunger are both to seal the vessel and to make the pressure. When the plunger is forced into the vessel, the pressure of the compressed fluid will increase. When the pressure reaches a certain value, the billet will also be extruded. Generally, the plunger will sustain a great axial force that might beget buckling, thus, the clauseNo.1.5.13 of the American Institute of sword construction (AICS) was stuck to, for the design of plunger. Principally, AICS stipulates the allowance of compressive stress for taking axial force.



Schematic representation of plunger extrusion

The substance utilize for the high- pressure plunger is tungsten carbide(USA C10), which can repel a pressure of 395 kg/mm2 After calculating the slenderness rate and the geometrical parameters according to AICS, it was set up that plastic- accidence standard should be used for the design.

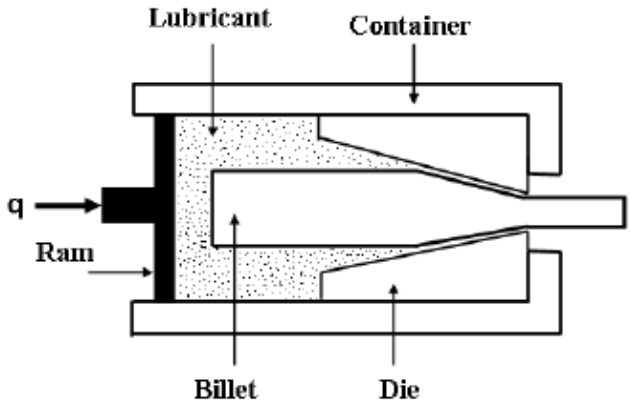
The frontal section of the plunger has a lower periphery (f 12 mm) and an inclined aeroplane. This design is for fitting both a high- pressure O'' ring seal and a beryllium bobby mitre ring. An essence barrel is squinched on the top to help the O'' ring seal and mitre ring from sticking in the extrusion vessel when repudiated from the vessel

2. HYDROSTATIC EXTRUSION EXPERIMENT:

Hydrostatic extrusion trials were conducted using the below outfit to test its practicability as well as to observe the parcels of accoutrements after high- pressure extrusion. The processes of the trials are bandied in the ensuing sections.

2.1EXTRUSION DIE:

The design of a hydrostatic extrusion bones is more complicated than that of a traditional bones. Special enterprises include the big- pressure sealing and big material strength. In this trial the inner periphery of the extrusion vessel is 16 mm, which limits the size of the billet. Thus, the upper section of bones was set to 14 and mm in external periphery with a graduation- shape. Between these two situations a 458 inclined aeroplane was designed to hold the Essence mitre ring of high- pressure seal. For the present specific extrusion rate, the exit periphery of bones was set to mm. The material used for the extrusion bones is SKD61 that had been heat- treated to a hardness of HRC53.



2.2 EXTRUSION BILLET:

The billets designed for hydrostatic extrusion trial has the shape of a pellet. The frontal ends of the billets were turned to a cone shape of 30 and were polished in order to fit into the bones entrance tightly without any leakage of fluid

Two types of billets were tested to explore the goods of hydrostatic extrusion. The first type of billets was made from solid rod of aluminium amalgamation (A6061). The other types of billets were grease paint/ solid essence compound sheathe rods. For this type of billets, the same aluminium amalgamation used in the first type

Was used for the shells of the compound rods, and superconductive greasepaint(Y ± Ba ± Cu ± O with an average periphery of 5 m) was fitted into the shells as the core. Two core compasses, 3 and 4 mm, were tested in the trials.

2.3PROCESS OF EXTRUSION:

The extrusion outfit was set up with the following

Way. First, the high- pressure seal was set on top of extrusion die, and also the billet was forced to make tight contact with the bones. Latterly, this assembled bones set was placed at the bottom of the high- pressure vessel. Eventually, after the vessel was filled up with pressure fluid, the plunger was placed on top of the vessel and the extrusion process started.

For the greasepaint/ solid compound clad rod, an redundant step of greasepaint filling was needed. The weight of greasepaint was first measured and also converted into a viscosity value through computations. Two consistence, 2 and 3 g/ cm3,

were named for the billets with 3 mm periphery cores, and one viscosity, 2 g/cm3 was chosen for the billets with 4 mm periphery cores. After the greasepaint had been poured into the concave billets

Slightly and the lids covered tightly, the compound clad rods were ready for extrusion. The speed of extrusion was maintained at roughly1.2 mm/ min.

3. ADVANTAGES AND DISADVANTAGES OF HYDROGEN EXTRUSION

3.1 ADVANTAGES OF HYDROSTATIC EXTRUSION

1. No disunion amidst the vessel and billet. This minimizes the force conditions, allowing advanced reduction rates, faster pets, & lower billet temperatures.

2. Disunion of the bones can be largely reduced by a film of pressurized lubricant amidst the bones face and screwing essence.

3. On applying high pressures, the rigidity of material increases.

4. Indeed inflow of material.

5. Large billets & large cross-sections are extruded.

6. Livery hydrostatic pressure inside the vessel eliminates the demand of billets being uncurled and extrusion of curled line.

7. No billet residue is left on the walls of vessel.

3.2 DISADVANTAGE OF HYDROSTATIC EXTRUSION

1. Increased Running for the injection and junking of the fluid for every extrusion cycle.

2. Dropped control of speed of the billet & stopping because of implicit stick slip and enormous stored energy in the compressed fluid.

3. Dropped process effectiveness in terms of billet- to-vessel volume rate.

4. Enhanced complications, when extrusion is done at elevated temperatures.

4 . CONCLUSIONS:

In this exploration, an experimental hydrostatic extrusion outfit was designed, erected and modified with stresses on both simplicity of structure and low cost with commercially available accoutrements.Two types of billets were extruded using this outfit to corroborate its practicability. Satisfactory testing results were attained together with some informationon the material geste under hydrostatic pressure. Whilefarther examinations on the goods of hydrostatic extrusion parameters are going to be carried out, several conclusions may be epitomized at this stage.

1. The high- pressure vessel with a two- subcaste phased compound cylinders design has been proven to sustain a outside working pressure of 10 000 kg/ cm2 safely.

2. Although the design of portable seals is more simple than that of fixed seals, it still can not sustain high pressure constantly. Thus fixed seals are suggested for high- pressure hydrostatic extrusion outfit.

3. For precisely controlling the magnitude of the hydrostatic pressure at which the billets are extruded, a backpressure device is demanded.

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BIOGRAPHIES:

1.Yash Vishnu Sawant Pursuing Btech in Mechanical from Deogiri Institute of Engineering and Management Studies College (Aurangabad).

2. Shahnawaz Khalil Pursuing Btech in Mechanical from Deogiri Institute of Engineering and Management Studies College (Aurangabad).

2.Rushikesh R Santre Pursuing Btech in Mechanical from Deogiri Institute of Engineering and Management Studies College (Aurangabad).