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Impact Extrusion- A Review

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ABSTRACT: This paper is based on impact analysis of extrusion. The impact extrusion of axially arranged engine cylinder was studied in this research. Two different bi-material billet concepts were considered: discrete and re-joined billets.

Impact extrusion is one of the main deformation-based manufacturing processes methods for making different parts and structures via extrusion of the corresponding materials for different applications. In this article, the principle and the capability of the impact extrusion process are presented and the advantages and disadvantages of the process are summarized and delineated. The classification of the extrusion methods is given and the process route and die design for realization of the extrusions are also particularized. To illustrate the process capability, different application examples are exemplified. Through an extrusion case study, the detailed process, tooling development and process realization are articulated.

KEYWORDS: Impact extrusion, Forward extrusion, Reverse extrusion, combine extrusion, Application, Advantage, Disadvantage.

I. INTRODUCTION

Impact extrusion is used to manufacture a variety of parts, such as components for machinery and appliances. Impacted metal parts of complex geometries can be produced as long as the part is symmetrical over the axis by which it is formed. One of the best utilizations of this type of operation is in the production of hollow metal tubes with one end partially or completely closed. Hollow metal tubes may be extruded with internal and external geometry. The wall thickness of a part manufactured by impact extrusion may vary along its length, so may its interior and exterior diameters. Metal extrusions created by this manufacturing process do not need to have a circular cross section. Noncircular, but symmetrical, parts are also formed

The manufacturing industry during recent years. Both legal regulations and interest in new technologies, such as electro mobility, have expanded the demands for more efficient machine elements. Light weighting, for instance, can be achieved through multi-material designs. Since components generally do not experience uniform loads in use, steel and aluminium can be used for areas subjected to higher and lower loads, respectively. The combination of steel's high strength and aluminium's low density within a hybrid machine component enables a functional design that can provide the required strength at a lower weight. Many of the parts formed by impacting, in industry, will require further manufacturing processes, such as metal forging, ironing or machining before completion. Impact extrusion can work harden a part, this may or may not be desirable. If necessary, a component may be annealed before further processing occurs. Favourable grain structures, good surface finish and high productivity are some possible advantages of manufacturing by impact extrusion.

II. LITERATURE REVIEW

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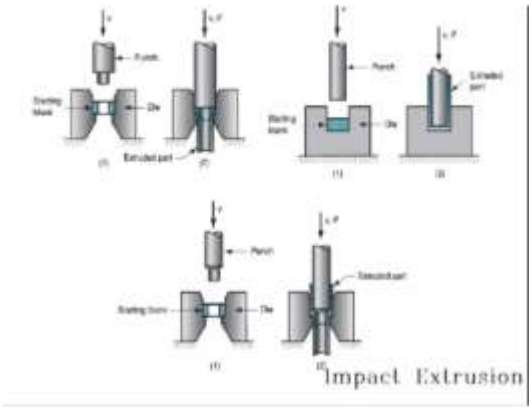


Impact extrusion is a manufacturing process similar to drawing by which products with metal slugs are made. The snail is pressed very fast with a punch into the die or mold.

Extrusion is a process where a material undergoes plastic deformation by the application of a force causing that material to flow through an orifice or die. The material adopts the cross-sectional profile of the dies and if the material has suitable properties, that shape is retained in the final extrudate. The force required for this process is normally achieved by either a moving piston or rotating auger in a barrel. In the latter case the process is continuous and discrete parts are created by cutting the extrudate into pieces of a predefined length.LITERATURE SURVEY

III. DIES AND TOOL

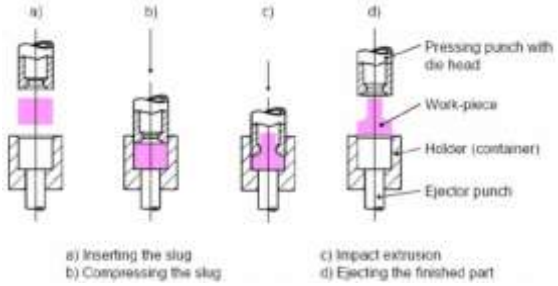
Dies empathic physium and tools are very important to the impact extrusion process that used to shape of material and final profile by the Flowing of the material throughout it opening. die design represent key step in the process optimization strong affected not only the die lifetime itself but also the profile quality and the overall process productivity. dies and tools are more harder Material by manufacture.

- stainless steel or other non Paris alloy or still alive is can be used.

IV. TYPES OF IMPACT EXTRUSION:

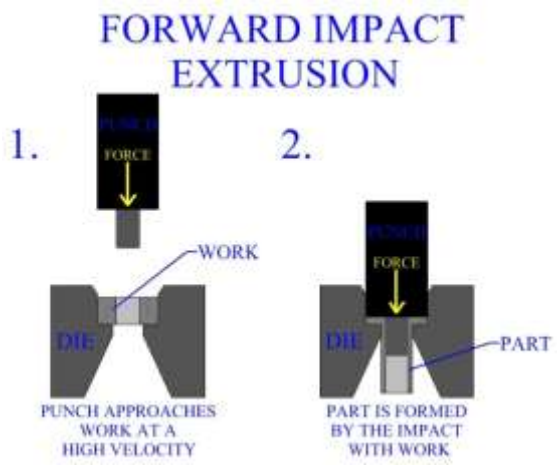
Depending upon the principal direction in which the metal is to be flown upon hit by the impacting pressure, Impact Extrusion can be Reverse, Forward or Combination Impacting

I] Reverse Impacting Here specific shell configurations are created with extruded side walls and a forged base. The cold metal billet inside the die cavity is struck by a punch or ram. The metal is forced to flow upward around the punch through an opening between the die and the punch. The opening between the die and the punch ascertains the wall thickness of the shell. The base thickness relies on the adjustment of the bottom position of the punch ram. This should ideally be 15% greater than the side wall thickness



Application of Reverse Impacting: Products include a number of configurations like internal or external rib, multi-shell walls, square and circular, oval, rectangular and other cross sections.

ii. Forward Impacting Products include straight, round, non-round, and ribbed rods, thin walled tubing with one or both ends open, and with tapered or parallel side walls.



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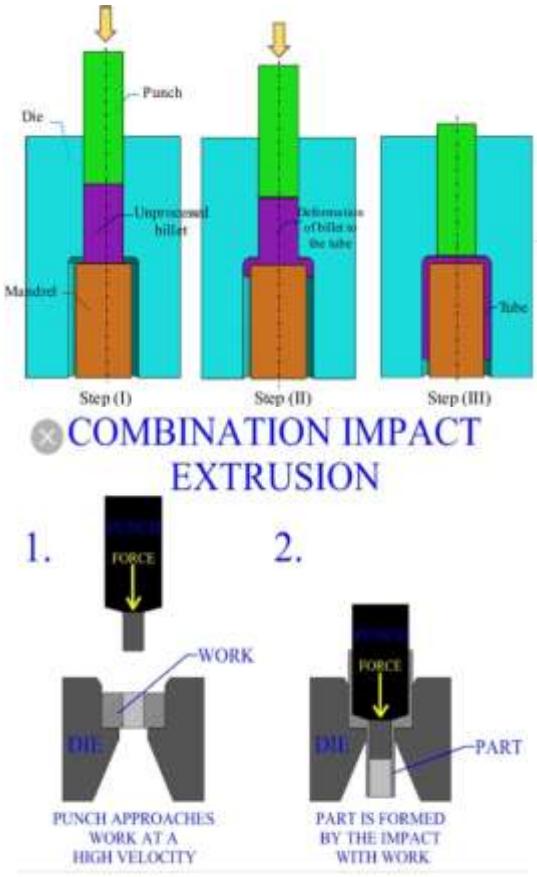
III. Combination Impacting This process punches the combination of forward and reverse metal flows. This method is best suited for the formation of complex shaped arts. Here the metal is allowed to flow upward into the punch, until the cavity is filled. This is done by incorporating a lower punch and a cavity in the upper punch. Punch movements causes forward extrusion of the remaining metal and results in the formation of a web.

VI .PROCESSES

Impact extrusion is a discrete manufacturing process, in which a metal part is extruded through the impact of a die with the work stock. The part is formed at a high speed and over a relatively short stroke. In standard metal extrusions, the force to extrude the work is commonly delivered by way of a hydraulic press. In impact extrusions, mechanical presses are most often employed. The force used to form standard extrusions is usually delivered over a horizontal vector, producing a long continuous product. Force used to form impact extrusions is usually delivered over a vertical vector producing a single part with each impact of the punch Impact extrusion is most often performed cold. Occasionally with some metals and thicker walled structures, the work is heated before impact forming it. This process is best suited for softer metals, aluminium is a great material for forming by impacting.

The Mechanics And Design Of Impact Extrusions During the manufacturing operation of impact extrusion, a work piece is placed in a mold and struck with great force, causing the metal to flow into position in an instant. The forces acting on the machinery are extreme, particularly on the punch and die. Tooling must have sufficient impact resistance, fatigue resistance and strength, for extruding metal by impact. There are three basic types of impact extrusion processes, forward, reverse and combination. The different categories are based on the kind of metal flow that occurs during the process. In forward impact extrusion, metal flows in the same direction that the force is delivered. In backward impact extrusion, the metal flows in the opposite direction that the force is delivered. In combination, the metal flows in both directions. forword and combination impact extrusions are illustrated as follows.



VII. TOOL MATERIAL

Material AISI steel	Rockwell C hardness	Applications
W1	65 to 67	Solid die
	55 to57	Ejector
D2	58 to 60	Punch
	60 to 62	Die Sleeve
L6	56 to 58	Stripper
	52 to 54	Ejector
S1	54 to 56	Mandrel
		Punch

VIII. EARLY HISTORY

Development of extreme process or Technology. One of the most deformation base manufacturing process is a relating young process in metal farming in the early decades of the 19th century.

Generally the development of extrusion Technology is from soft metal to hard one and from manual to mechanised procedure. From the late 1950 to the early 1980 advance d country America and Japan had rapidly increase the impact extrusion

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product. since the last 20 years of the 20th century the Rapid development of industrial Technology.

ADVANTAGES

1. It reduces the material cost, as the impacting process typically uses 100% of the metal slug so nothing wasted
2. Low tooling costs
3. Long tool life
4. production output
5. Economic material usage
6. Increased physical properties
7. Corrosion resistances
8. High degree of forming in single step
9. Low weight
10. Highly uniform grain alignment
11. Eliminates machining either completely or significantly

DISADVANTAGES

1. Variations in size of product
2. Product limitations because of only one type of cross section can be obtained at a time
3. High initial cost setup

APPLICATION

1. fasteners
2. screws and bolts
3. Cylinder
4. Spur gear teeth
5. Crank, piston, piston rod

IX. CONCLUSION

Impact extrusion is a manufacturing-related extrusion process that uses a press, along with a punch and die set, to form metal slugs. It involves placing a metal slug between a punch and die, followed by engaging the press so that it forces the metal slug through the die.

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