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Aluminum Profile Extrusion:

Alumium profile extrusion, is a process which used to shape aluminum. In this technique, we apply pressure on aluminum mold, it passes the preformed hole and aluminum mold turns the preformed holes (die holes) shape. The basic principle of this process is similar like squeezing toothpaste tube.

Evolution of Aluminum Profile Extrusion:

Alexander Dick discovered hot extrusion technique for non-ferrous alloys in 1894. Aluminum extrusion process started to be used to produce automotive parts in 1904 in USA. It was a very important technique in World War II for providing the military requirements [1].

Steps Of The Aluminum Profile Extrusion Process:

- Aluminum mold which used in this process is called ‘billet’. When the process starts, billets are heated up to 300-350°C.
- The aluminum billets are transferred to a loader and lubricant is added on the billets for avoiding sticking the machine, the ram or handle.
- When pressure applied on the aluminum billet, it outs of the die hole. Because aluminum billet is bigger than the die hole. In this step, liquid nitrogen used to cool the aluminum billet (Fig. 1).
- Extruded profile is cooled along the cooling table by using fans.
- Oxidized part of the aluminum billet is discarded.
- Extruded profile is cut by using saw when it reaches the desired length.
- Aluminum billet is transferred to stretcher for straightening and work hardening.
- Final step is transferring aluminum to ovens for hardening with the aging process [2].

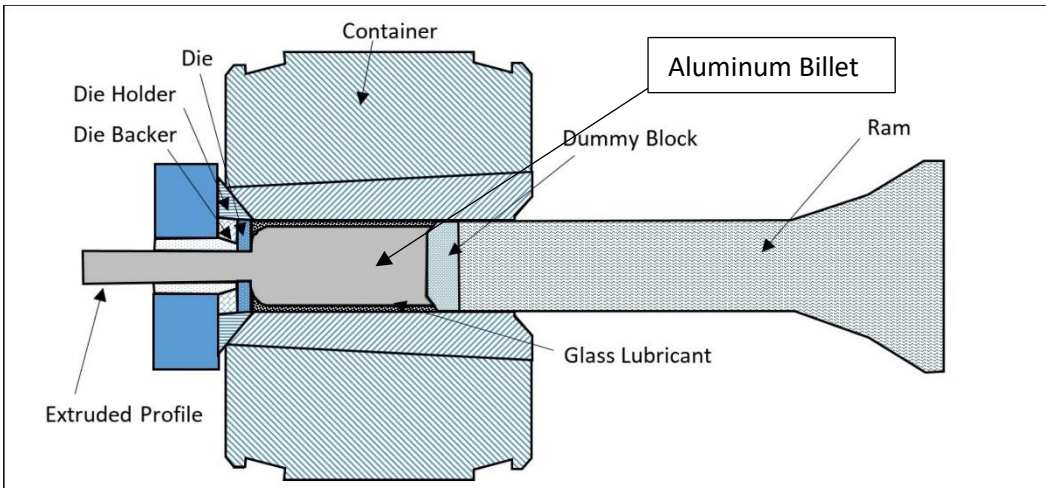

Fig. 1 Schematic of aluminum profile extrusion process [3].

Advantages of Aluminum Profile Extrusion:

- Some rolled shapes, riveted together, can be replaced by a single extruded profile for higher strength and less costs.
- Aluminum extruding can be used for reducing costs of machining detailed parts.
- Aluminum can be placed where it needed, hence weight decreases very important amount.
- Most welded assemblies, can be eliminated by using aluminum extrusion. Strength and accuracy increase while costs decreasing.
- Sturdy multi-void hollow profiles can be replaced with roll-formed alternatives. It decreases the costs and lead time.
- In this method, we can obtain improved stiffness and strength at decreased costs [4].

Important Properties of Profile Design in Extrusion:

- Hollow parts of a profile, should be symmetrical.
- Open screw channels have better a geometrical accuracy than close screw channels, hence open screw channels give a long life to the die.
- Peaks should be rounded to avoid filling problems.
- Spacers should be added in narrow splits for improving the tolerance.
- Contours must be connected with correct material to avoid the tolerance problems.
- Stiffeners should be added in the polygonal formed open cross sections for improving the tolerance.
- Small parts of a thick profile sometimes cannot be extruded.

- Small connections of a thick profile are hard to fill out and sometimes cannot be extruded.
- Too thin or too wide walls are not useful in the hollow sections. Spacers should be used for supporting the hollow [5].

Conlusion:

As a result, aluminum is a cheap, easy processable and abundant metal. Hence, aluminum is commonly used in industrial area. Aluminum profile extrusion is the most efficient way to process aluminum. Because aluminum's properties (e.g. easy processable) are most suitable properties for using in extrusion.

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