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METAL FORMING BY COLD EXTRUSION PROCESS

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Abstract - *Metal forming by extrusion plays a vital role in metal forming process which is widely accepted in industries. It's used that we can reduce the defects in the manufacturing side also that usage increases rapidly. Here there are two processes cold extrusion, hot extrusion each has its own merits. In our project, we take aluminum tube by using deforms 3D software. In that we analysis pressure required to create a tube, material required as well as stress-strain. At the same time, we use the material as aluminum. For these we are using advanced software of DEFORM 3D it's very useful for our process.*

Key Words: **Extrusion Process, Cold Extrusion and Deformed 3D**

1. INTRODUCTION

Metal forming by extrusion plays a vital role in metal forming process which is widely accepted in industries. It's used that we can reduce the defects in the manufacturing side also that usage increases rapidly. Here there are two processes cold extrusion, hot extrusion each has its own merits. In our project, we take aluminum tube by using deforms 3D software. In that we analysis pressure required to create a tube, material required as well as stress-strain. At the same time, we use the material as aluminum. For these we are using advanced software of DEFORM 3D it's very useful for our process.

1.1 EXTRUSION

Extrusion is a process used to create objects of a fixed cross-sectional profile. We are pushing the material through the die for getting the required shape. The same time we can use these processes for manufacturing sectors also in order to produce complex shapes and high carbon content material can also be used. The most important thing will be here we are using only compressive stress and shear stress only. Then we can get a finished product at the end for these processes no need of additional operations like surface finishing.

1.2ADVANTAGE OF EXTRUSION PROCESS

The uniform cross-sectional area over a long length. Low cost of dies making it economical to make small quantities of a shape. Good surface finish. The brittle material can use

2. TYPES OF EXTRUSION PROCESS

- Hot extrusion
- Cold extrusion

2.1 COLD EXTRUSION PROCESS

The cold extrusion process will be done at room temperature or nearly room temperature. The main advantage here will be no oxidation, very high strength, good surface finish, very close tolerance. Commonly used materials for cold forming process will be steel, aluminum, copper and vanadium.

The cold extrusion process can happen in open space between the punch and die. Here we can same material for die and work piece. The material can move forward (forward extrusion) or backward (backward extrusion). The most case we use a combination of both extrusions.

2.2 FORWARD EXTRUSION

The material can be moved forward by the punch against the die to form the required shape and here we are producing the component small that the work piece. By using forward extrusion 75% reduction is possible.

2.3 BACKWARD EXTRUSION

The material can be moved backward by the punch against the die to form the required shape here we can produce blind holes and cups. Backward extrusion 20 – 75% reduction is possible.

2.4 COMBINED EXTRUSION

The combined advantage of forwarding and backward extrusion is achieved by these processes. By means of these process, we can reduce production lead time and production cost also.

2.5 MERITS OF COLD EXTRUSION PROCESS

Many machine components can be redesigned by cold extrusion process by a sustainable reduction in cost. Here there will be no scrape so we can save material cost more than 70%. Product performance is very high than manufacturing process due to cold extrusion process the grain size rearranges to follow part configuration. The merits of cold extrusion process eliminate the porosity fatigue, increase overall strength, no heating is required so better

dimensional control; contamination problem will be eliminated to maximum cost, superior interchangeability and reproducibility and reduce the problem of material integrity.

The speed of production ranges from 50-400 pieces per minute on cold extrusion process. Surface finish will be high compared to hot extrusion and manufacturing process. There will be no heat so no change in crystal structure of the material so properties will not change mostly.

3 DEFORMED 3D

Deformed 3D is the advance version of Ansys software it enables the designer to analyze the metal forming, heat treatment, machining and mechanical joining process on the computer rather than in machine floor to find the error.

We can see the process simulation by using deformed 3D can be very lethal in cost reduction, quality and delivery improvement all sides. This software will be extremely reliable so it will be used in wide range of research applications. Scientific Forming Technologies Corporation (SFTC) is developed and supports deform 3D.SFTC is ready for training, contract simulation, training and software development for projects.

4 CROSS SECTION OF ALUMINIUM TUBE

Simulation of the aluminum tube forming (cut section) by using deformed 3D software

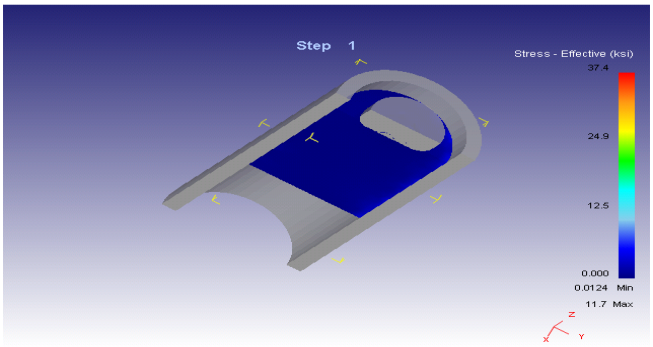

Fig -1: Cross section of aluminum tube

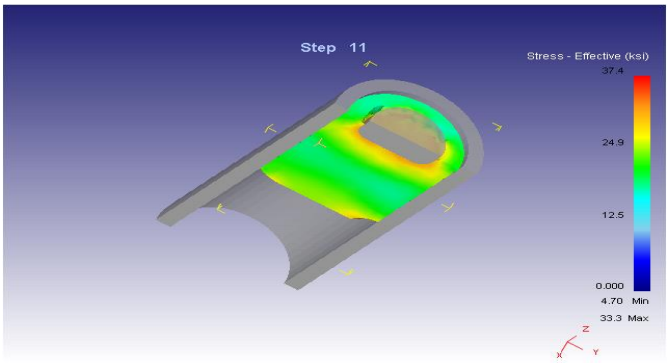

Fig 2: Cross section of aluminum tube

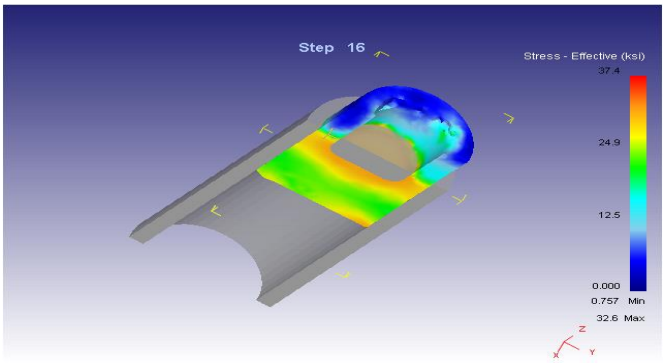

Fig -3: Cross section of aluminum tube

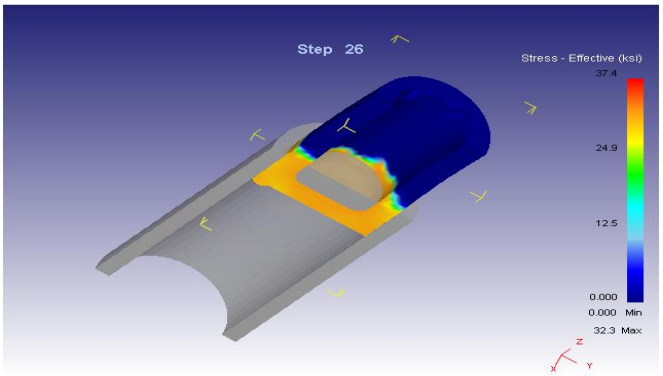

Fig 4: Cross section of aluminum tube

5 STAGE OF ALUMINUM TUBE MAKING

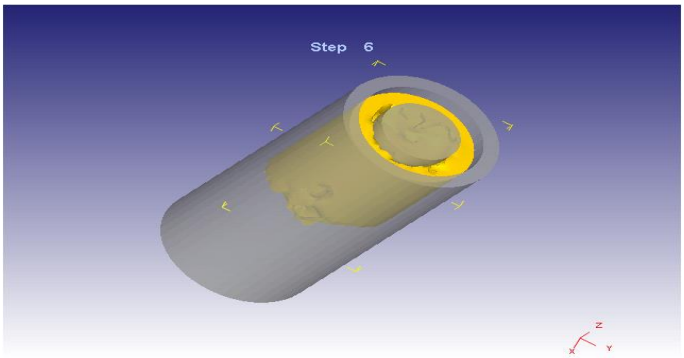

Fig 1: Stage of tube making

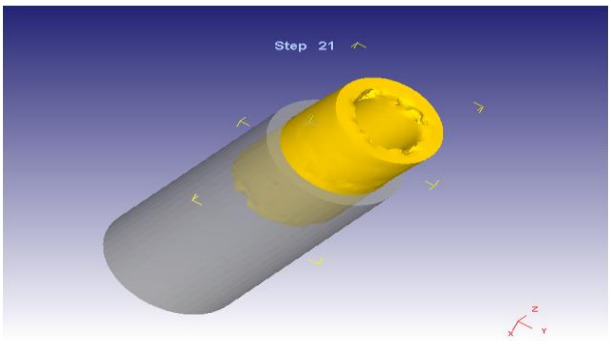

Fig 2: Stage of tube making

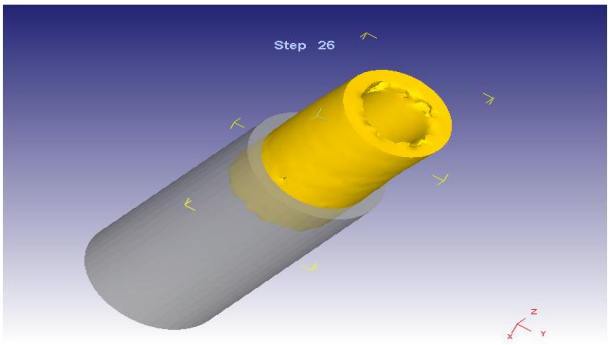

Fig 3: Stage of tube making

CONCLUSION

We are in the place to reduce our precious time as well as we can predict the material flow. And we can predict the pressure required to create the tool, the tool required to make the tube, dimensional tolerance, crystallization and temperature required.

It's the method and software where we can reduce the problems in existing manufacturing process and we can improve the surface finish simultaneously not only finishing we can reduce material wastage, production lead time and more. So it's a better choice for existing analysis software.

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BIOGRAPHIES

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