

A METAL FORMING BY HOT EXTRUSION PROCESS

R.SATHISH¹, S.VASANTHAKUMAR², S.SASIKUMAR³, M.YUVAPPARASATH⁴

¹Assistant Professor Faculty of Mechanical Engineering Mahendra Engineering College, Nammakkal, Tamil Nadu, India

^{2,3,4}Student of Mechanical Engineering Mahendra Engineering College, Nammakkal, Tamil Nadu, India

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 steel 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 steel. 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.

1.2 ADVANTAGE 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 HOT EXTRUSION PROCESS

This process takes place normally above room temperature but below the re-crystallization temperature of the material (424 to 975 °C). The main purpose of doing these will be balance the required forces, improves ductility and important extrusion properties.

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 HOT EXTRUSION PROCESS

Reduces the yield strength very much, so less force needed for us to make component. Elevated temperatures increase diffusion which can remove or reduce chemical in homogeneities Pores may reduce in size or close completely during deformation in steel, the weak, and ductile, face-centered-cubic austenite microstructure is deformed instead of the strong body-centered-cubic ferrite microstructure found at lower temperatures.

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 STEEL TUBE

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

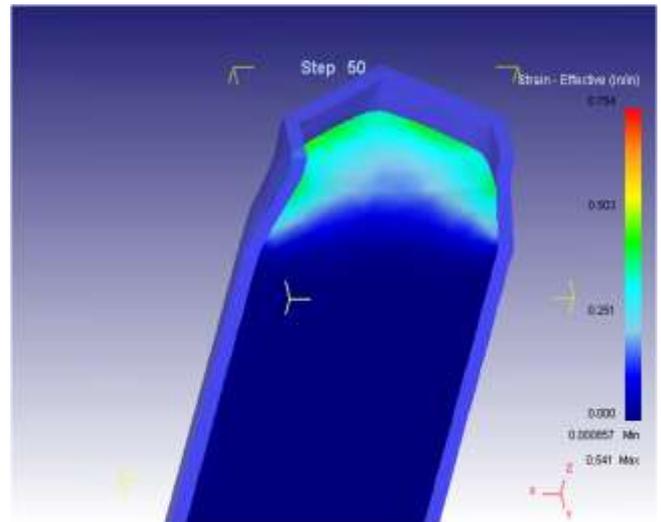


Fig -3: Cross section of Steel tube

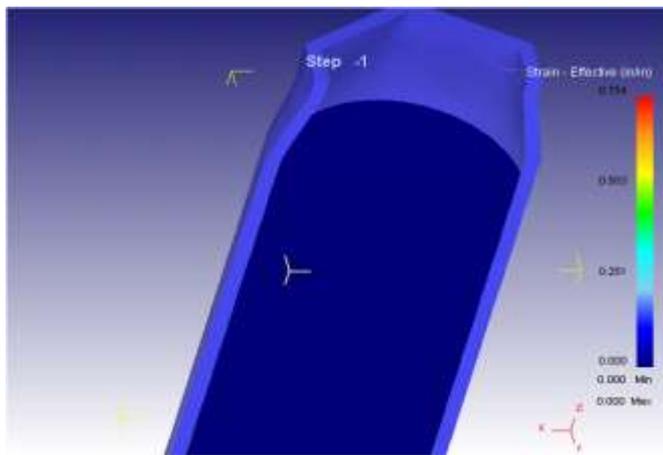


Fig -1: Cross section of Steel tube

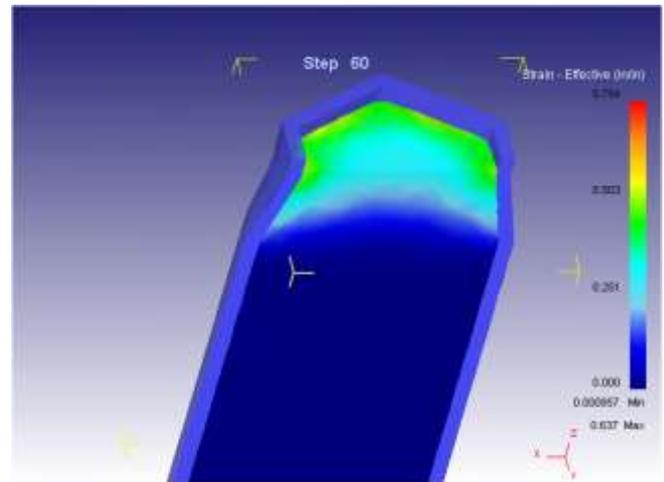


Fig 41: Cross section of Steel tube

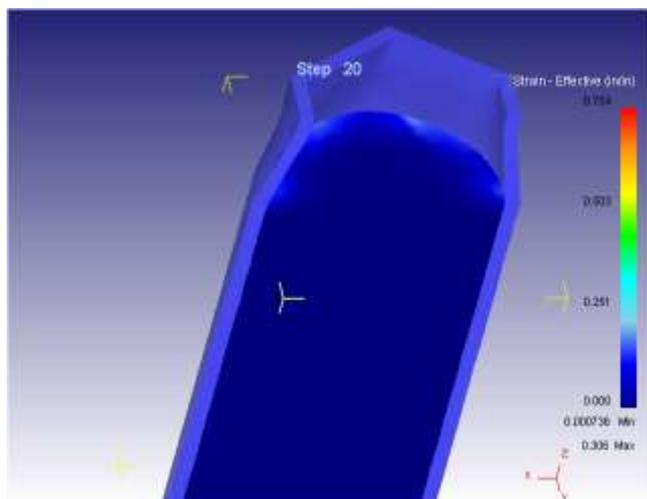


Fig -2: Cross section of Steel tube

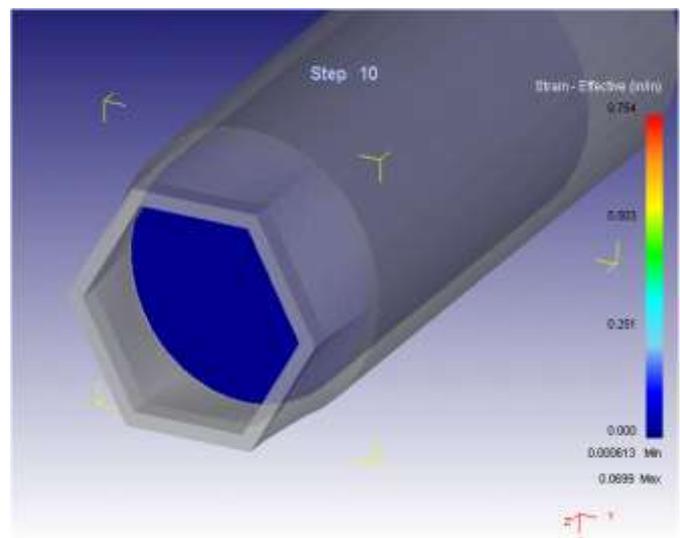


Fig 1: Cross section of steel tube

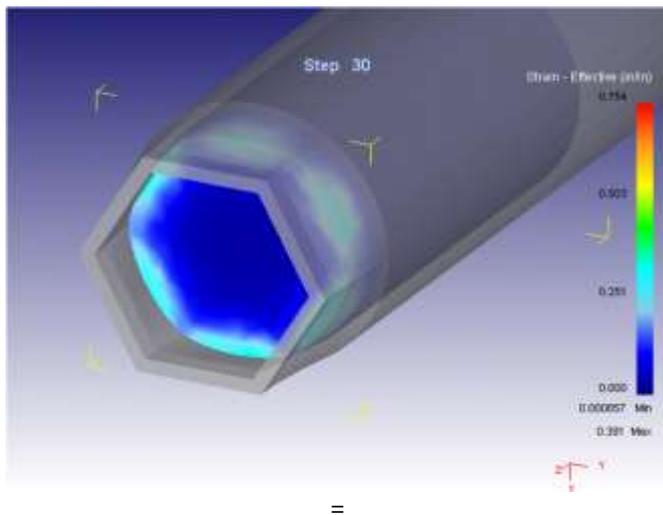


Fig 2: Cross section of steel tube

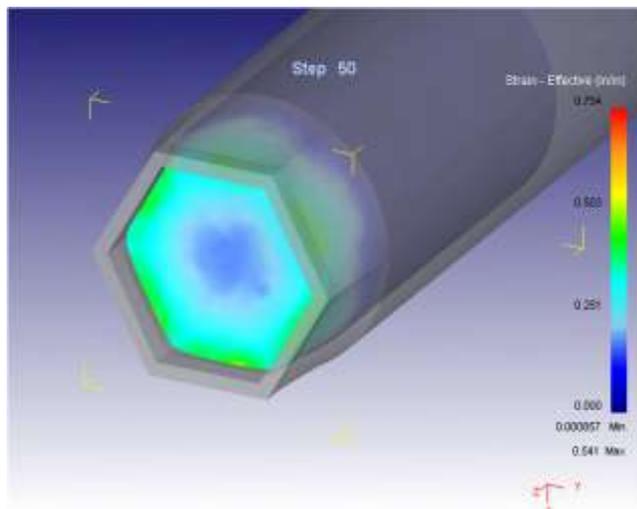


Fig 3: Cross section of steel tube

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.

REFERENCES

[1] 1.R.Narayanasamy, P. Srinivasan, R.Venkatesan, An upper bound solution to extrusion of circular billet to circular shape through cosine dies, J Mater. Process Technol. 138 (2003) 262-264

[2] J.S. Gunasekaran, S. Hoshino, Extrusion of Non-circular sections through Shaped Dies. Annals of CIRP (1980) 141-145

[3] R.Narayanasamy, P. Srinivasan, R.Venkatesan, Computer aided design and manufacture of streamline extrusion dies, J Mater. Process Technol. 138 (2003) 262-264

[4] C.-Y. Wu and Y.-C. Hsu, Optimal Shape Design of an Extrusion Die Using Polynomial Networks and Genetic Algorithms, Int J AdvManufTechnol (2002) 19:79-87

[5] R. Ponalagusamy, R. Narayanasamy and P. Srinivasan, Design and development of streamlined extrusion dies a Bezier curve approach. J. Matl.Process.Techl (161),2005: 375-380

[6] CAD/CAM by Ibrahim Zied for introduction of B-splines curve.

BIOGRAPHIE



R SATHISH received his Bachelor of Engineering degree in Mechanical engineering from Muthayammal engineering college (Anna University) in 2009. Master of Engineering degree in Mechanical engineering (Product Design and Development) Sona College of Technology in 2013.He is currently working as Assistant Professor in Mahendra Engineering College.