

Formability in Sheet Metal Working

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Abstract - In these review paper we are going to get knowledge about the concept of sheet metal and its operations, types and its formability in sheet metal working. Sheet metal plays very essential role in today's advancing world. It is a part of manufacturing technology. Characteristics of sheet metal are so desirable that its demand is always high and it's used different-different work. There are wide variety of applications of sheet metal. It is used in every part of countries as it has countless applications. To test the quality of formability in sheet metal various experiments are carried out as to get material without damage and to achieve better quality of material. These literature paper will get you to know mostly used formability tests in industries.

Key Words: Formability, Application, Manufacturing technology and Recent advancement.

INTRODUCTION

These review is about formability in sheet metal working so firstly, let us know about the concept of sheet metal. Sheet metal is essential part of Manufacturing technology. Sheet metal is metal in which industrial process is carried out in which flat and thin pieces are obtained. The thickness of sheet metal can be vary differently and generally measured in millimeters. Sheet metals which are small in thickness are considered as "foil" or "leaf" (less than 6mm). Thickness more than 6mm is considered to be "structural steel".

There are certain types of material used in industries to make sheet metal which has the desirable properties to meet the requirement needs. Steel, carbon steel, copper, Stainless Steel, aluminum, Brass are one of the most commonly used materials used in making sheet metals. As they have desirable properties for making sheet metal like malleability, on-corrosive etc.

As we discuss earlier sheet metal has countless applications.

In today's modern day it is used in automobile sector in manufacturing car body, aircraft parts, medical devices, construction sector, electronics etc.

As we have observed diversified operations and applications of sheet metal hence, it is very important to

study about the formability of sheet metal. Performing different formability tests will provide parameters of sheet Metal.

Thus it will reveal Or provide better analysis to craftsman to manufacture sheet metal as per its needing properties for its applications.

Literature Survey

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METHODOLOGY

From the referred references formability can be defined as the ability of sheet metal to undergo plastic deformation without failure by necking or tearing. There are different types of formability tests used to determine

Formability in sheet metal. These depend upon different factors like yield strength, ductility and strain hardening, cracks formation etc.

Here, to predict forming behavior of sheet metal forming limit diagram is used which is also known as forming limit curve where it shows forming behavior of sheet metal graphical representation of materials failure test. It shows stress strain curve for different metals used in making sheet metal.

A mechanical test is performed where a circular mark is made on work piece and punch is to be done and measuring Deformation of work piece. Thus generating different ranges of different material stresses. In formability tests, a single test is unable to show characteristics of sheet metal are different states. Formability tests also rely upon the nature of forming operation to be formed.

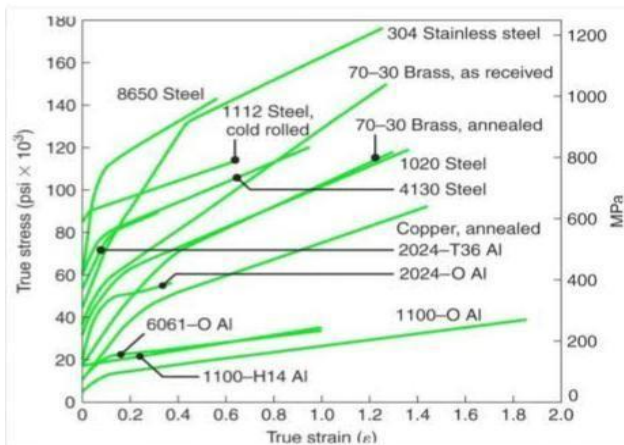


Fig 1: stress strain curve for different materials used in sheet metal.

CRUCIFORM MULTIAXIAL TENSION TEST

These test is widely used in mechanical industry where stresses, strain, Multiaxial deformation of sheet metal are calculated. Here the force applied is in both X and Y direction. From both sides force is exerted. The specimen has four grip arms which are mounted on cruciform Multiaxial tension test machine. It provides better prediction of deformation behavior and shows characteristic of forming sheet metal operation.

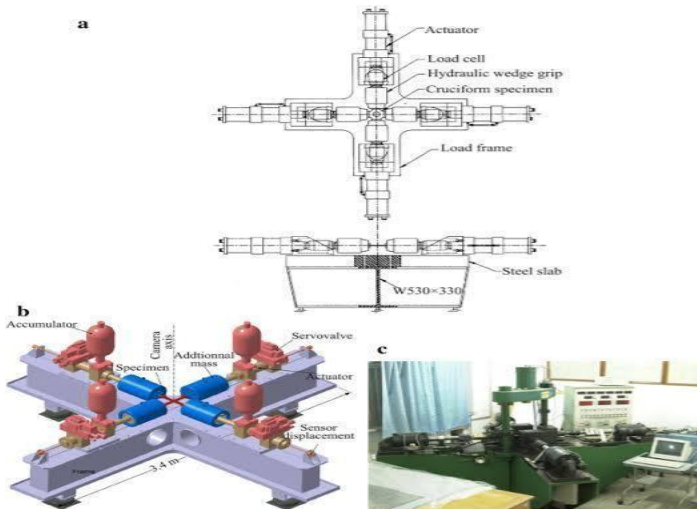


Fig 2 : cruciform Multiaxial tension test machine

ERICSON AND OLSEN TEST

Ericson and Olsen tests both are used to determine ductility in sheet metals. Currently Olsen test is popularly used in European countries while Ericson test is used in U. S. A. In Ericson test sheet metals formability under biaxial deformations Observed. These test is sheet sticking test .In which there is a hemispherical punch is presses upon the work piece on the die and then it is subjected to biaxial

loading until stress, strain and cracks are seen. Thus different sheet metal characteristic are checked. In Olsen Test is carried out to determine how long /deep material can be stretched before its failure or cracking. Here materials two end strips are

locked over a 22.3 diameter hemispherical punch then it is subjected to biaxial loading until formation of cracks or it get teared .Maximum travel of punch traveled after loading is recorded.

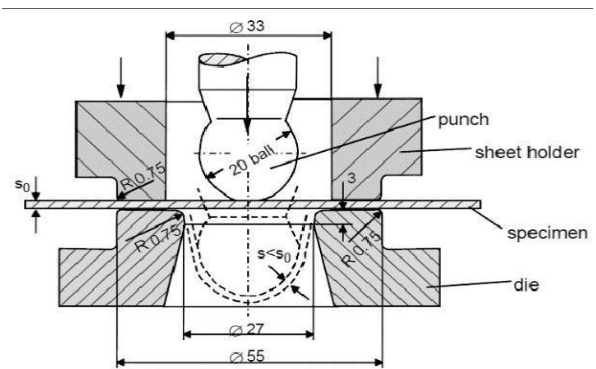


Fig 3 : Ericson test

CONCLUSION

We have concluded and understand the concept of sheet metal and Formability in sheet metal working. We have observed different parameters of formability in sheet metal.

By referring forming Limit diagram sheet metal materials stress strain characteristics can be recorded Using different tests of checking formability of sheet metals we can get knowledge about variety of Characteristics of Sheet metal.

RECENT ADVANCEMENT

The sheet metal industry is one of the largest and fastest growing industry in the world. It has considered as traditional in its approach.

Still it has experienced the influx of emerging technologies earlier manual tools are used mainly used for sheet metal industry such as cutting, machining, welding as well as the assembly of the final project However, today many of these tools are replaced by advanced and effortless versions.

The growth of the sheet metal fabrication industry is fueled by two factors improved supply chain practices, and technology advancements. After reading all these, you might be intrigued to know about the major trends in the sheet metal industry.

SUMMARY

The Our objective behind this review is to let understand the concept of sheet metal and formability in sheet metal working. We have observed different parameters of formability in sheet metal . By referring forming Limit diagram sheet metal materials stress strain characteristics can be recorded Using different tests of checking formability of sheet metals we can get knowledge about variety of characteristics of sheet metal .



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BIOGRAPHIES



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