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EXPERIMENTAL STUDY AND ANALYSIS OF WEAR IN SHEET METAL DURING VARIOUS FORCES

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Abstract:
Sheet metals are metal formed by an industrial process into thin, flat pieces. It is one of the fundamental forms used in metal working and it can be cut and bent into a variety of shapes. Countless everyday objects are constructed with sheet metal. Thicknesses can vary significantly; extremely thin thicknesses are considered foil or leaf, and pieces thicker than 4 mm are considered plate.

Keywords:
Friction, Wear, Sheet Metal Thickness.

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1. INTRODUCTION

Sheet metals are available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter. The thickness of sheet metal is commonly specified by a traditional, non-linear measure known as its gauge. The larger the gauge number, the thinner the metal. Commonly used steel sheet metal ranges from 30 gauges to about 7 gauges. Gauge differs between ferrous (iron based) metals and nonferrous metals such as aluminum or copper; copper thickness, for example are measured in ounces (and represent the thickness of 1 ounce of copper rolled out to an area of 1 square foot).

2. DEEP DRAWING

Drawing is a forming process in which the metal is stretched over a form.[15] In deep drawing the depth of the part being made is more than half its diameter. Deep drawing is used for making automotive fuel tanks, kitchen sinks, two-piece aluminum cans, etc. Deep drawing is generally done in multiple steps called draw reductions. The greater the depth the more reductions are required. Deep drawing may also be accomplished with fewer reductions by heating the workpiece, for example in sink manufacture.

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Figure 1: Deep drawing

3. PRESS BRAKE FORMING

This is a form of bending used to produce long, thin sheet metal parts. The machine that bends the metal is called a press brake. The lower part of the press contains a V-shaped groove called the die. The upper part of the press contains a punch that presses the sheet metal down into the v-shaped die, causing it to bend.

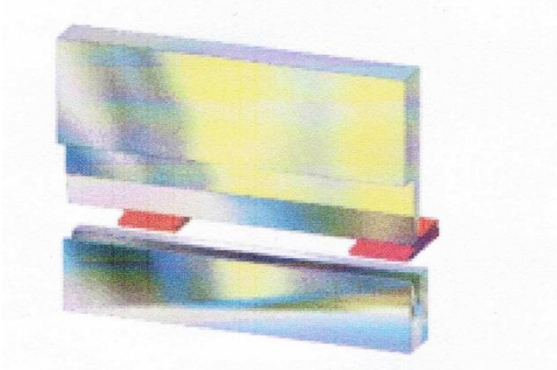

Figure 2: Press brake forming

4. ROLL FORMING

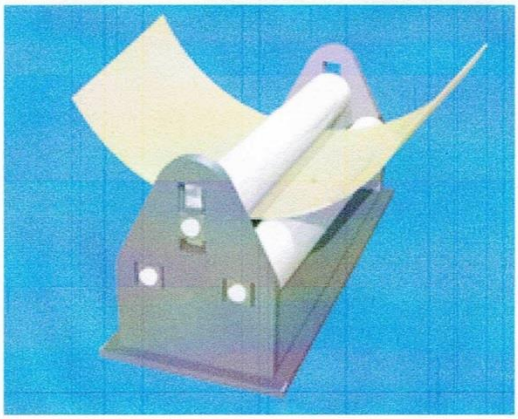

Figure 3: Rolling

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5. RESULTS AND DISCUSSION

Table 1: Spring back for 1.0 mm Steel sheet metal and applied load in 10 N

Sr. No.	Clearance in mm	Spring back in degree
1	**1.0**	**1.8**
2	**1.1**	**2.2**
3	**1.2**	**3.2**
4	**1.3**	**4.8**

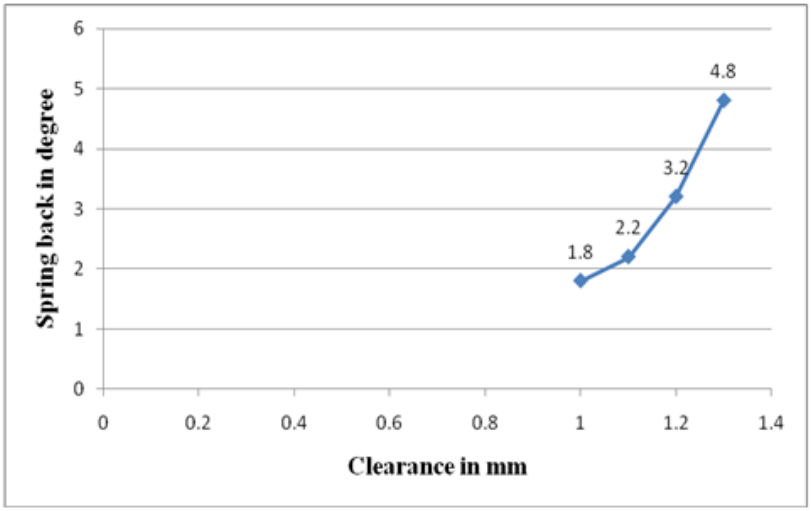

Figure 4: Spring back for 1.0 mm Steel sheet metal and applied load in 10 N

Table 2: Spring back for 1.2 mm steel sheet metal and applied load in 20 N

Sr. No.	Clearance in mm	Spring back in degree
1	**1.8**	**2.8**
2	**2.0**	**3.0**
3	**2.2**	**3.2**
4	**2.4**	**3.6**

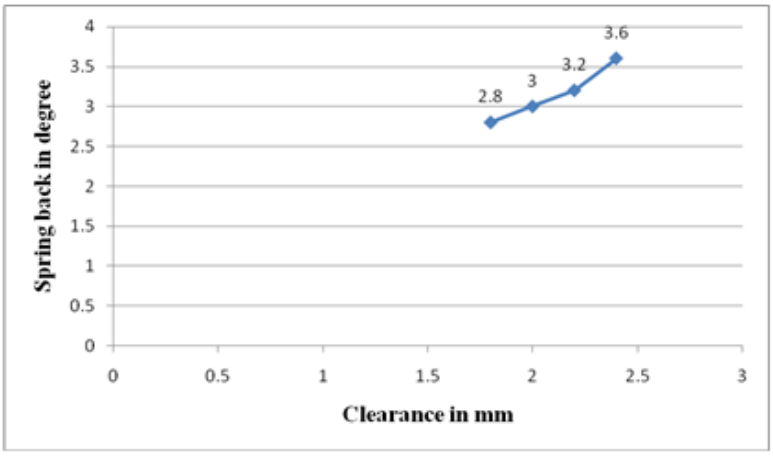

Figure 5: Spring back for 1.2 mm steel sheet metal and applied load in 20 N

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Table 3: Spring back for 1.4 mm steel sheet metal and applied load in 30 N

Sr. No.	Clearance in mm	Spring back in degree
1	2.8	2.8
2	2.9	3.0
3	3.0	3.2
4	3.2	3.7

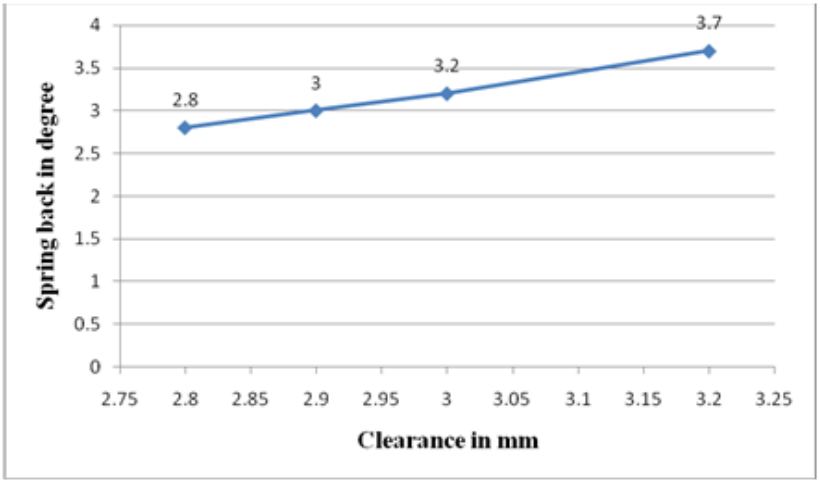

Figure 6: Spring back for 1.4 mm steel sheet metal and applied load in 30 N

Table 4: Spring back for 1.5 mm steel sheet metal and applied load in 40 N

Sr. No.	Clearance in mm	Spring back in degree
1	3.2	3.2
2	3.5	3.8
3	3.8	4.0
4	4.0	4.2

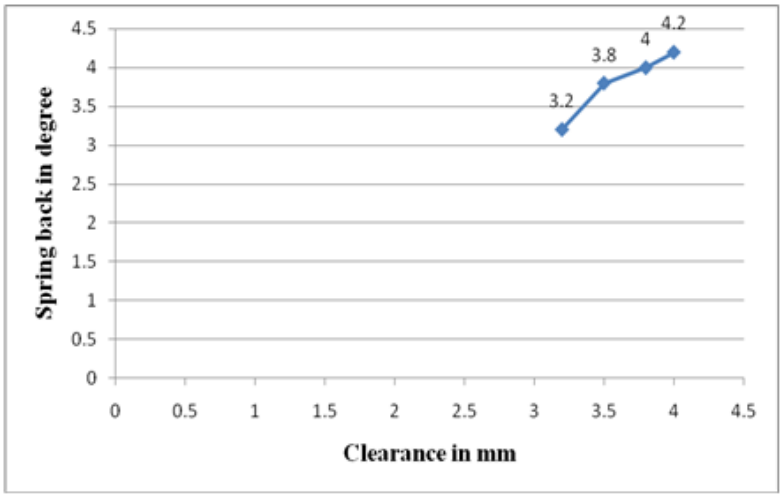

Figure 7: Spring back for 1.5 mm steel sheet metal and applied load in 40 N

6. CONCLUSIONS

The experiments are carried out for different clearances. it is observe that as the clearance reduces, the wear rate increases on the punching surface. There was an increase in the spring back effect as well as the fracture propagation as the clearance between punch and die was increased. We are finding out the maximum spring back are 4.2 degree using of Clearance are 4.0 mm which are shown in Table.4.

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