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EXPERIMENTAL STUDY OF WEAR IN SHEET METAL DURING VARIOUS FORCES

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Abstract

The experiments are conducted for different clearances between punch and die. It is observed that, beyond a clearance for each thickness of the steel sheet metal, however, below the critical clearance, scratches on the surface of the sheet metal were seen due to wear. Sheet metal is metal formed by an industrial process into thin, flat pieces. It is one of the fundamental forms used in metalworking and it can be cut and bent into a variety of shapes.

Keywords: Wear; Sheet Metal Forming; Lever; Guide Way.

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1. Introduction

The larger the gauge number, the thinner the metal. Commonly used steel sheet metal ranges from 30 gauges to about 8 gauge. 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). There are many different metals that can be made into sheet metal, such as aluminum, brass, copper, steel, tin, nickel and titanium. For decorative uses, important sheet metals include silver, gold, and platinum (platinum sheet metal is also utilized as a catalyst).

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2. Experimental Setup

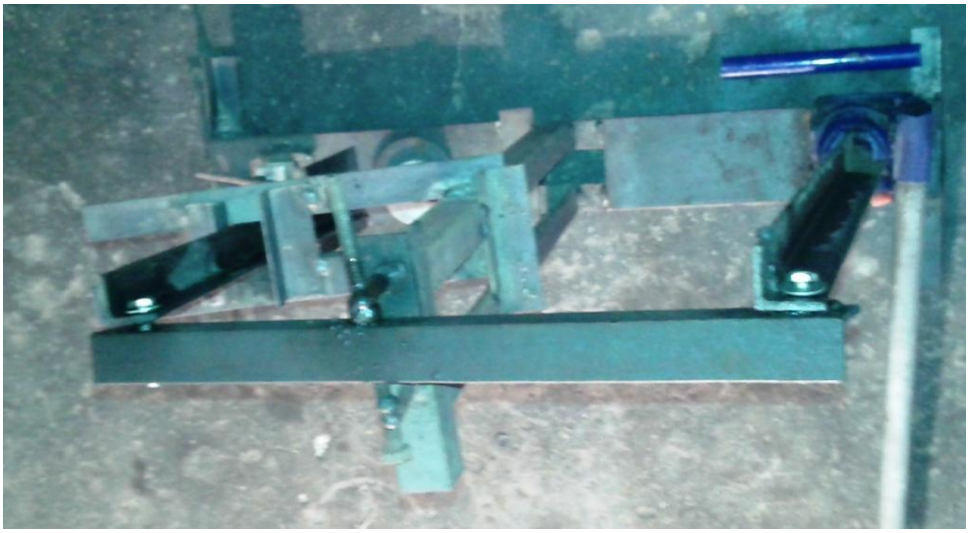

Figure 1: Experimental setup

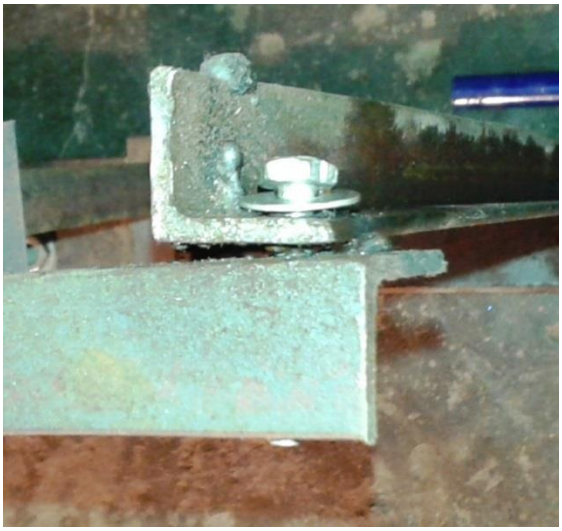

Figure 2: Linkages

Figure 3: sheet metal clamping mechanism

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Figure 4: Guide way

3. Results and Discussion

Table 1: 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	1.1	2.2
2	1.2	3.2
3	1.3	4.8
4	1.4	5.0
5	1.5	5.2

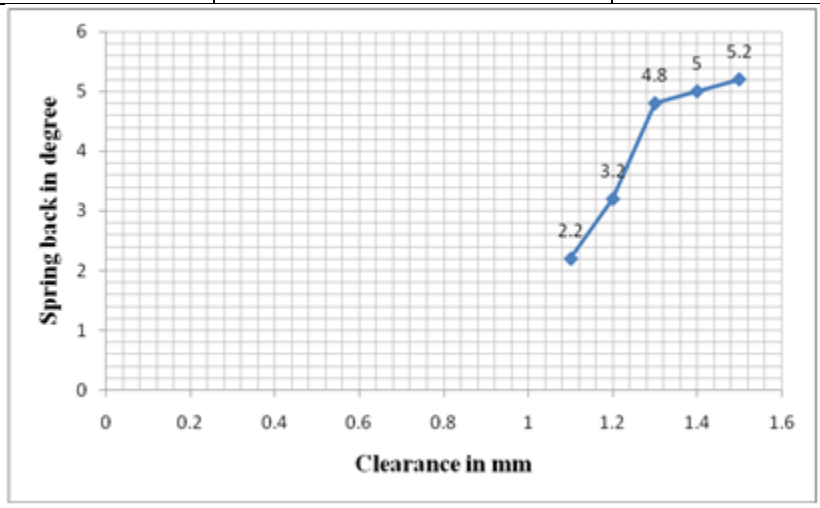

Figure.5. Graph of clearance and spring back

Table 2: Spring back for 1.4 mm steel sheet metal and applied load in 40 N

Sr. No.	Clearance in mm	Spring back in degree
1	2.0	3.1
2	2.2	3.5
3	2.4	3.8
4	2.6	4.0
5	2.8	4.4

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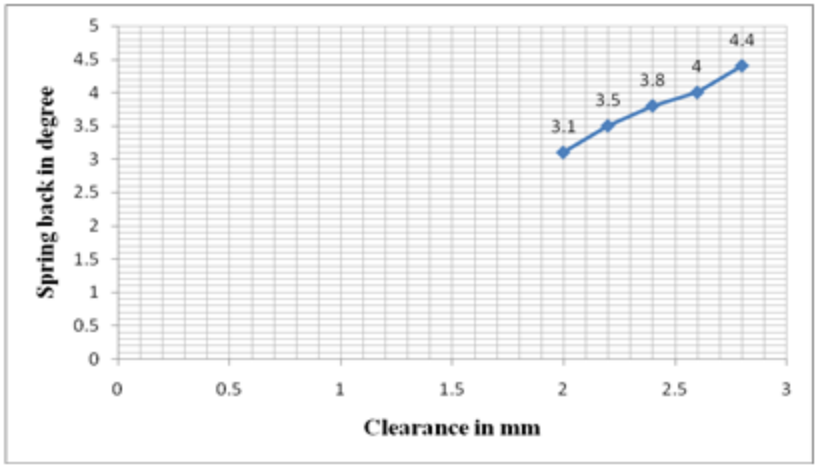

Figure 6: Graph of clearance and spring back

Table 3: Spring back for 1.6 mm steel sheet metal and applied load in 60 N

Sr. No.	Clearance in mm	Spring back in degree
1	3.1	2.9
2	3.2	3.1
3	3.4	3.3
4	3.6	3.6
5	3.8	3.8

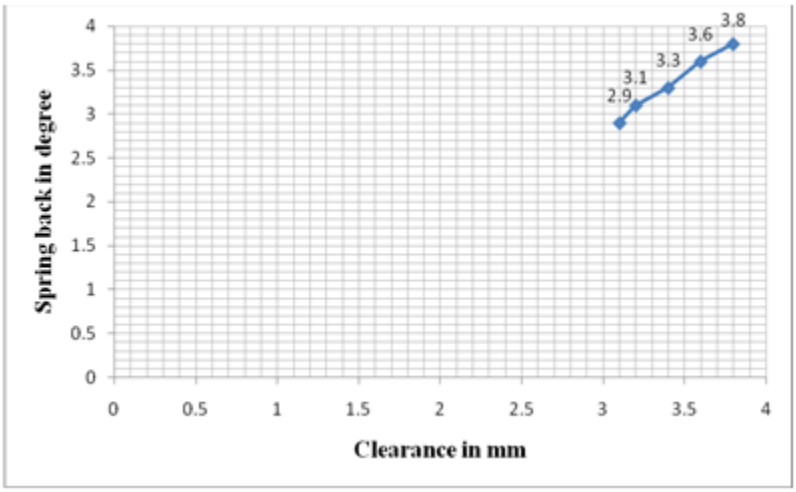

Figure 7: Graph of clearance and spring back

Table 4: Spring back for 1.8 mm steel sheet metal and applied load in 80 N

Sr. No.	Clearance in mm	Spring back in degree
1	4.0	3.4
2	4.2	3.6
3	4.4	5.4
4	4.6	4.8
5	4.8	4.6

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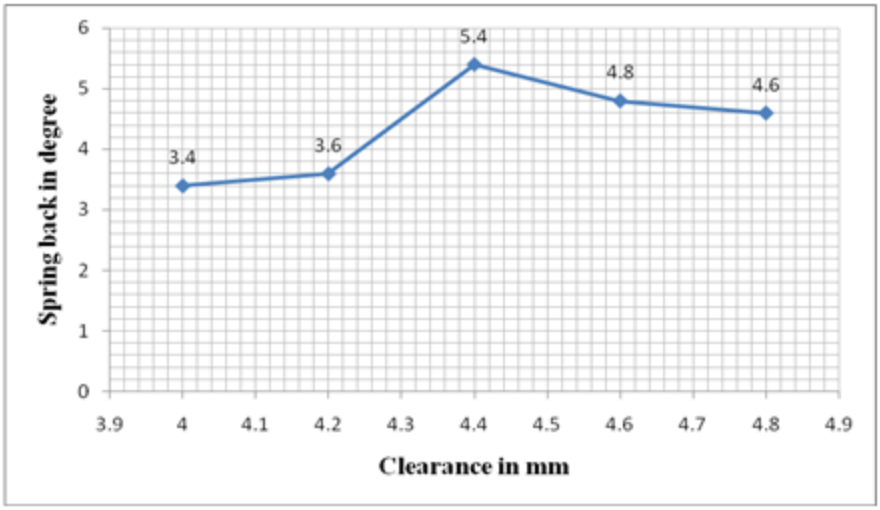

Figure 8: Graph of clearance and spring back

Table 5: Spring back for 2 mm steel sheet metal and applied load in 100 N

Sr. No.	Clearance in mm	Spring back in degree
1	5.0	4.0
2	5.2	4.2
3	5.4	4.6
4	5.6	4.7
5	5.8	4.8

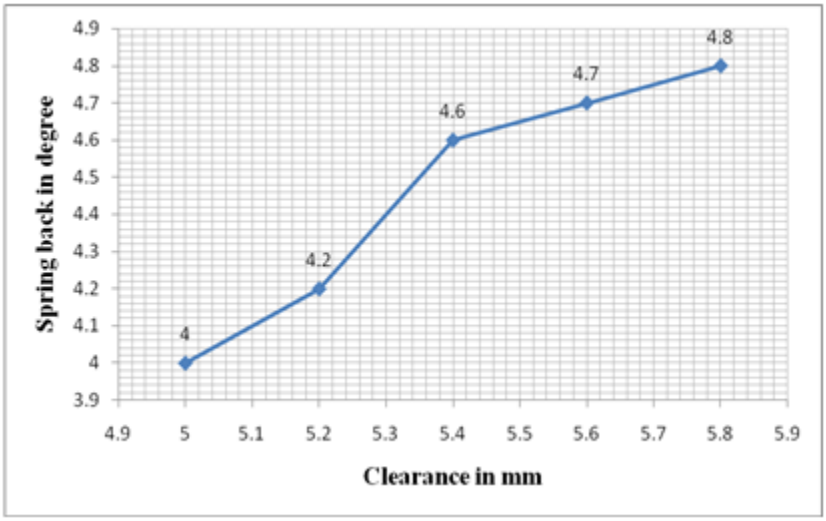

Figure 9: Graph of clearance and spring back

4. Conclusions

Numbers of specimens with various thicknesses are prepared and the experiments are carried out for different clearances. it is observing 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

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propagation as the clearance between punch and die was increased. We are found out the maximum spring back are 5.4 degree using of Clearance are 4.4 mm which are shown in Table.4.

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