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Dual Side Shaper Machine

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Abstract: *Most of the industries are having various types of reciprocating machines for performing machine operations on the small size of work. Usually, the shaper, broaching machine, and planner are used for machining a small area of work with less quantity. These machines are used for machining very small areas of a plain surface, vertical surface, angular surface, grooving, etc. It removes the materials from the job only at forward stroke. So it takes more machining time to complete the product. To overcome this problem, a small dual shaper machine is developed for machining two workpieces at the same time. This machine has both the direction of ram movement and removes material from two workpieces simultaneously.*

So, the machining time will be reduced and the production rate will be increased. Most of the industries are having various types of reciprocating machines for performing machine operation on small size of work. A shaping machine is mainly used for shaping the tools, which may be horizontal, vertical or inclined. In a dual shaper machine, materials are shaped from both sides, which makes it more advantageous than usual shaper. Dual Shaper machine helps industries to achieve high production rate at a minimal amount of time and cost. Dual Shaper machine reduces the production cost as well as the time.

Keywords: *Dual side cutting, Double ram shaping, Simultaneous machining, Reciprocating motion, Tool holder*

I. INTRODUCTION

In a dual shaper machine, materials are shaped from both sides, which makes it more advantageous than the usual shaper. In this project, a dual side shaper machine is designed with the help of quick return mechanism, the rotary motion of the motor is converted into linear motion of the tool which shapes the material mounted on the vice from both the side. The quick return mechanism converts rotary motion into reciprocating motion, but unlike the crank and slider, the forward reciprocating motion is at a slower rate than the return stroke. DC motor is connected with the mechanism with the help of a chain and sprocket. The whole mechanism is built on a rugged metal frame. A shaper is a machine that is used for forming (metal evacuation) procedures on the work piece., Industries attempt to accomplish a high creation rate at a negligible hindrance looked by a solitary side shaper. The fundamental position of a double-side shaper is that it diminishes time as well as creation cost. In this manner, it expands profitability. A shaper is a kind of machine apparatus that utilizes direct relative movement between the workpiece and a solitary point cutting measures of time, cost, and so on. The use of a double-side shaper machine wipes out the most device-to-machine a direct device way. Its slice is comparable to that of a machine. This experiment can be easily carried out in SolidWorks. In the rapidly evolving landscape of manufacturing technology, the demand for increased productivity, efficiency, and cost-effectiveness continues to drive innovations in machine tool design. One such innovation is the Dual Side Shaper Machine, an enhancement over the traditional single-side shaper

II. PROBLEM STATEMENT

A Shaper is a type of machine tool that uses linear relative motion between the work piece and a single-point cutting tool to machine a linear tool path. Its cut is analogous to that of a lathe, except that it is linear instead of helical. The work piece mounts on a rigid, box-shaped table in front of the machine. The height of the table can be adjusted to suit

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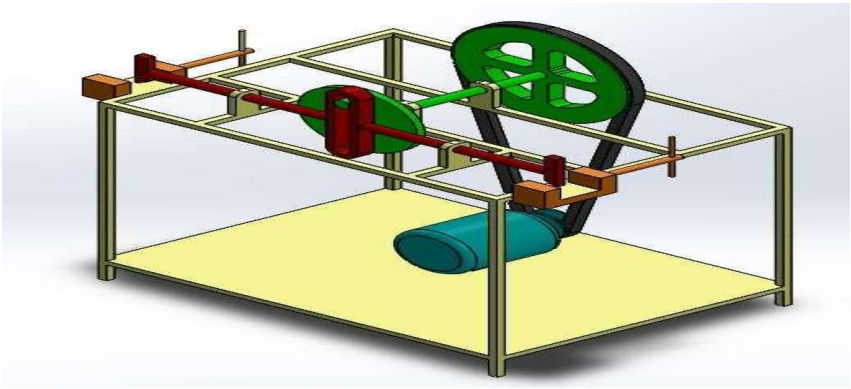
the work piece, and the table can traverse sideways underneath the reciprocating tool, which is mounted on the ram. Table motion may be controlled manually, but is usually advanced by automatic feed mechanism acting on the feed screw.

III. LITERATURE REVIEW

[1] R M Lathe, International Journal of Engineering Research and Development (IJERD), Volume 8, Issue 2, August - 2013.
[2] M.V.N Srujan Manohar, International Journal of Engineering Research and Technology (IJERT), Volume 1, Issue 6, August -2012.[3] S. Ravindran, Middle-East Journal of Scientific Research, 12(12): 1710-1714, 2012.
[4] Anand Shukla, International Journal of Science and Management (IJESM), Volume 4, Issue 2, April-June 2014.
[5] Dharwa Chaitanya Kirtikumar, International Journal for Technological Research In Engineering, Volume 1, Issue 1, Sep-2013.

IV. FABRICATION DUAL SIDE SHAPER MACHINE



V. WORKING

A single point cutting tool is held in the tool holder on both sides that is mounted on the ram. The work piece is held in a vice on the frame. The ram reciprocates and cutting tool mounted on the tool holder travels forward and backward strokes over the blank specimen HSS. The High-speed steel is fixed in both sides. The feed is given to the work piece and the depth of cut is controlled by moving the tool downward Towards the work piece. The both sides of the tool will remove the metal in work piece. The grinding wheel is attached to the shaft at the back side of the pulley. When the

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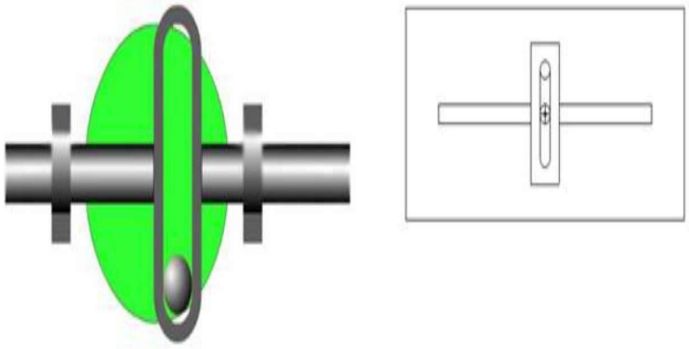
shaft rotates in clockwise direction shaping will be done in front side and backward grinding will be done in back side. Thus, in single machine two machining operations can be done in same time with good machinability & surface finish.

V. METH0DOLOGY

SCOTCH YOKE MECHANISM

The scotch yoke mechanism (also known as slotted link mechanism) is a reciprocating motion mechanism, converting the linear motion of a slider into rotational motion, or vice versa. The reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. The location of the reciprocating part verses time is a sine wave of constant amplitude, and constant frequency given a constant rotational speed.



VI. DESIGN AND SPECIFICATION

Table. 1

Sr. No	Part Description	Material	Dimensions
1	Frame is a rigid body that supports the entire mechanism.	Mild steel tubes-rectangular Cross section	Mild steel tubes-rectangular Cross section
2	Crank is a rotating part, which is either a hand driven or motor driven. hand driven or motor driven.	Mild steel	Ø210mm
3	Slotted bar has a slot in which the crank pin engages or slides over it	Mild steel	185x 65x25mm
4	Crank pin is welded on a crank at a pitch circle diameter (PCD)of 130 mm	Mild steel	Ø25 mm and 70mm length
5	Shaft is a rotating machine element, which is shaft is connected to the handle slot and other end of the shaft is welded to the center of the crank disc	Steel	Ø30 mm and 200 mm length

VII. DESIGN CALCULATION

1. Design Parameters:
Diameter of Crank = 0.21m.
Length of slotted bar = 0.185 m.
Length of connecting rod= 0.45m.

2. Cutting Force:
Assume,
Power = 736
Watts Speed = 200 RPM
P = 2 PIA x N x T / 60 T = 35.159 Nm
We Know that,

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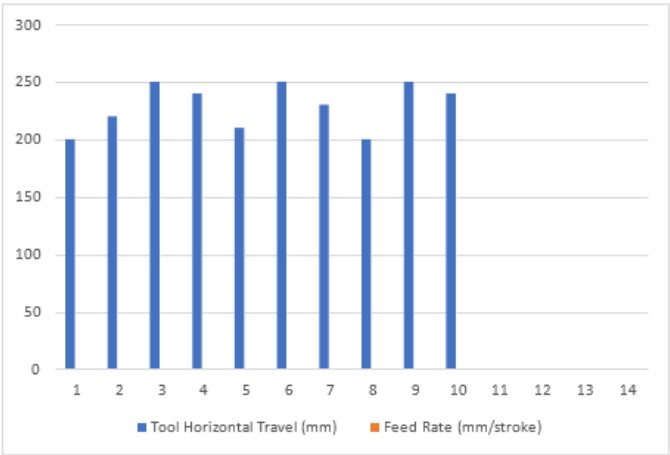
Torque = Force X Radius of crank
F = 296.75 N

3. Design of Shaft:
Diameter of the shaft = 0.03 m
Permissible shear stress for mild steel = 34 N/mm2
T1 = π/16*(f s)*d3
35.159 = π/16*(f s)*0.033
Fs = 6635338.5 N/m2
Fs = 6.635 N/mm2< Fs (permissible)=34 N/mm2 T
herefore, the design is safe.

VIII. PERFORMANCE VALUES (GRAPHS AND TABLES)

Table 2

Set	Stroke Length (mm)	Strokes/ min	Table Size (mm)	Workpiece Height (mm)	Motor Power (kW)	Tool Vertical Travel (mm)	Tool Horizontal Travel (mm)	Feed Rate (mm/stroke)	Ram Speed (F/R m/min)	Weight (kg)
1	400	40	800 × 400	300	5.5	100	200	0.4	06-Oct	4200
2	500	45	900 × 450	350	6	120	220	0.5	07-Nov	4600
3	600	50	1000 × 500	400	7.5	150	250	0.6	08-Dec	5500
4	550	55	950 × 480	380	7	140	240	0.5	Aug-13	5200
5	450	50	850 × 420	320	6.5	130	210	0.4	07-Nov	4800



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IX. CONCLUSION

In this work, a dual side shaper is designed and fabricated. The dual side shaper machine is used to manufacture components similar to a standard shaper machine. The machining time required for this dual shaper is less as compared to the normal shaper. Hence, the production rate is increased. The designed dual shaper has been used for only trial production. In the future, it would be used for commercial production in industries. The double side shaper apparatus looks like amassing of two existing shaper machines. Subsequently, the machine consumes less space, the number of gears is diminished

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[1] R M Lathe, International Journal of Engineering Research and Development (IJERD), Volume 8, Issue 2, August -2013.
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