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Design and Fabrication of Pneumatic Sand Molding Machine

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Abstract:- All we know the most of the casting ,forming industry has a base of metal forming process in manufacturing of components is molding process for various application. From the molding process any type of and size ,shape casting can be done with accurately. In industry molding process also have disadvantages like effected by various parameter like efficiency of product ,permeability etc. The main focus of this fabrication of pneumatic sand molding is to build automation environment in industry and adopt the industry 4.0. And although for this operation we don't required skilled worker like manually sand casting. By using pneumatic piston the sand in the mold box rammered &packed effectively through out the box.

Keywords:- *Controller, Power Supply , Connecting Rod.*

I. INTRODUCTION

The curvaceous rammer is used for crushing the beach reliably around the model. It might be involved indeed in defined compass adventures. To work this rammer an air cracker is needed. A butt which is joined to the lower a piece of the chamber bar does the action of pummeling. The strain made inside the chamber answers the chamber and latterly the butt. This rammer is managed by a head by just moving it over the neat beach. The butt crushes the beach at places moved and the beach is reliably pummeled. This rammer decreases the pummeling time and work. On account of this the cost is lowered astronomically. So, this machine finds operation in foundries.[1]

II. RELATED WORK (LITERATURE REVIEW)

Mekonnen Liben Nekere and Ajit Pal Singh (1) has anatomized ideal settings of two gatherings of aluminum clear beach projecting cycles. Single aluminum clear beach projecting and twofold aluminum spaces beach projecting for process strength examination. The issues have shown that solitary aluminum clear beach projecting cycle is more vigorous than twofold aluminum clear beach projecting commerce. The trial results affirmed the legality of involved Taguchi vigorous plan fashion for perfecting beach projecting cycle and advancing the beach projecting boundaries in aluminum clear projecting commerce. Lakshmanan Singaram (1) has concentrated on the examination of green beach process boundaries strength, moistness content, penetrability, form hardness exercising Taguchi strategy and ANN Investigation. Result is advanced green beach process boundaries which lead to further developed process prosecution, diminished process changes and accordingly least projecting defects. Rasik An Upadhye andDr. Ishwar P Keswani(2) has concentrated on the beach projecting cycle boundaries of the castings fabricated in iron foundry by accelerating the sign to clamor proportions and limiting the commotion factors exercising Taguchi strategy. The cycle boundaries considered are moistness, beach patch size, green pressure strength, form hardness, porousness, pouring temperature, pouring time and pressure test. The issues demonstrated that the chose cycle boundaries unnaturally impact the projecting defects in the foundry P. Senthil andK.S. Amirthagadeswaran (3) has explored the impact of commerce boundaries on mechanical parcels of the castings arranged through crush projecting cycle exercising Taguchi strategy. Exploratory issues showed that crush pressure, suck the dust preheating temperature and pressure holding time were the boundaries making the huge enhancement in mechanical parcels. JhonO. OJI et.al. (4) has examined the impact of form

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temperature and pouring temperatures on extreme pliantness of aluminum emulsion beach castings. The outgrowth shows that form temperature is the critical variables which impact the projecting quality.L. Ceschini et.al.(5) has explored the connections between extreme severity and atomic underpinning boundaries for the beach cast A357 aluminum compound. Beginning from the atomic underpinning boundaries and considering the material hardness, a relationship ready to prevision a definitive pliantness of the compound was set up.[2]

- *Sand Moulding Process*

Projecting cycle including the utilization of sand as an embellishment medium is known as sand forming.

- *Conventional Ramming Machine*

The cam is convinced by a customer by turning the handle, making a cam lift the weight and let it fall wholeheartedly on the packaging associated with the hammer head. This makes a standard compacting action to apre-assessed proportion of beach.

Variety of standard model for Green Sand and Silicate grounded(CO2) beach are organized using a beach rammer near by lace The beach rammer machine can be used to check likeness of organized beach by filling the model cylinder with organized beach so it's position with the most noteworthy mark of the chamber.

The chamber is also positioned under the hammer head in the shallow mug and crushed on colorful occasions. Closeness in rate not set in gravestone from the attendant position of the beach inside the model.[2]

III. PROPOSED WORK (BLOCK DIAGRAM)

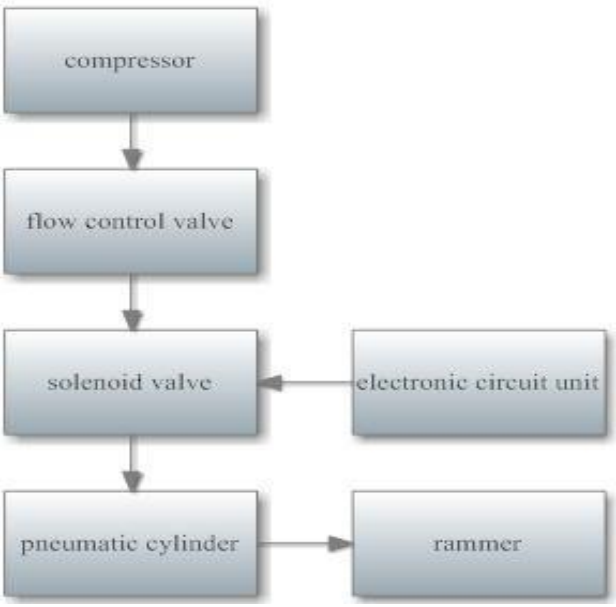

Fig 1

IV. WORKING PRINCIPLE

The pressed air goes to the sluice control stopcock. The sluice control stopcock is used to control the movement of air. It's adaptable one. We really want to change the switch, so the vital compacted air goes to the Solenoid stopcock.

In our bid, the solenoid stopcock is used as a course control stopcock. This solenoid stopcock is obliged by the electronic control timing unit. The crushing time is changed by changing the timing(timepiece 555 IC) control of the electronic unit.

The stuffed air goes to the curvaceous twofold amusement chamber. The hammer is fixed toward one side of the curvaceous chamber. The stuffed air pushes the curvaceous chamber, with the ideal that the chamber moves slipping by give air force in one direction of curvaceous chamber. The solenoid stopcock is changing the breath sluice the alternate way by the modest promptness. In this time the curvaceous chamber climbs due to changing of the breath sluice course. This breath current bearing is impelled by the solenoid stopcock.[5]

The chamber is also positioned under the hammer head in the shallow mug and crushed on different occasions. Likeness in rate not entirely set in gravestone from the attendant position of the beach inside the model.

V. DESCRIPTION OF COMPONENTS PNEUMATIC CYLINDER:

Chamber is a contrivance which changes over liquid power into liner mechanical power and movement. These chambers are astronomically employed in ultramodern curvaceous fabrics. These chambers are likewise called as direct machines and responding machines curvaceous chambers are intended for an multifariousness of administrations

The chamber is also deposited under the hammer head in the shallow mug and crushed on different occasions. Likeness in rate not entirely set in monument from the attendant position of the sand inside the model. **[4]**

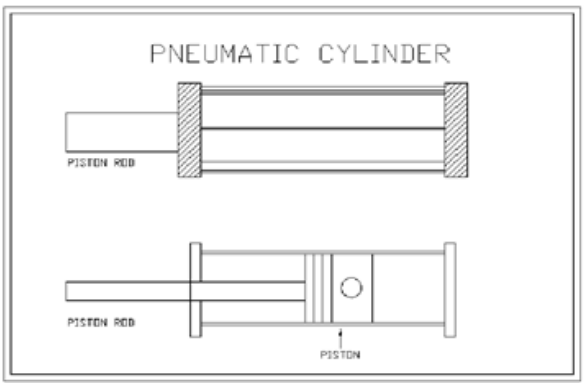

Fig 2

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Curvaceous chambers are intended for an multifariousness of administrations. Curvaceous chambers changes the progression of forced liquid into a drive or pull of the cylinder pole since out frame utilizes twofold acting chambers we will see a many perceptivity concerning them.[3]

➢ *Solinoid Control Valve*

The solenoid stopcock is responsible for repaying stir of the Ram. It's electrically powered. The trip tykes actuate the solenoid stopcock.

Technical Data:

Size	:	¼”
Pressure	:	0 to 10 kg / cm2
Media	:	Air

➢ *Working Principle:*

Twofold acting chamber are constrained by 2-way 5 harborage two position stopcock as displayed in the fig. This stopcock has one gulf harborage(P), two chamber anchorages(An and B), and two exhaust anchorages(R and S).

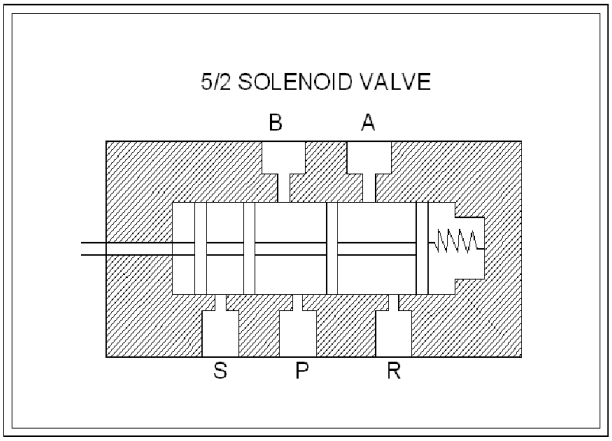

Fig 3

➢ *Clock Circuit:*

Chief motivation to clock circuit is to initiate the solenoid valve at standard time period to achieve fitting oil at the best range.

➢ *Electronic Control Unit:-*

Then the 555 IC has been used as a multi vibrator. The consequence of IC 555 is dealt with to the data pin(pin no 14) of Collection 4017 counts. The resultant of the IC opens up at pin Nos. 3, 2 and 4. The outgrowth beat of any of result leg triggers (Puts ON) the Triac and current starting points discovering across the store related. This connection moves forward with colorful legs at different time extends and the cycle continues. The reprise stretch of time the cycle can be changed by thepre-set look related with pin 6 of 555 timer IC.[1]

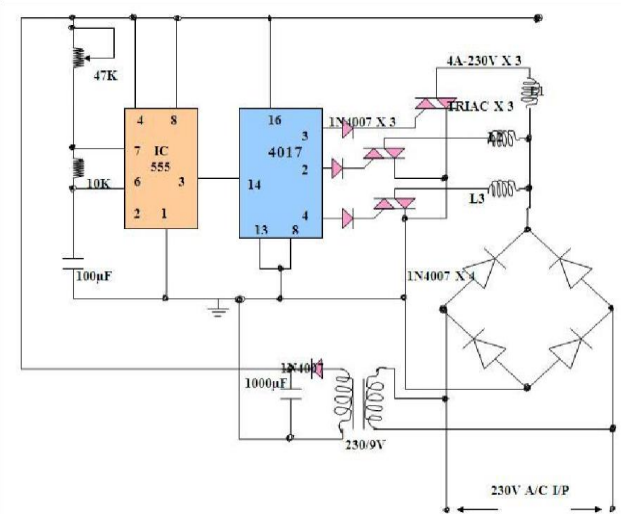

Fig 4

➢ *IC 555 Clock*

The IC SE/ NE 555 solid circuit is an exceptionally steady controller equipped for creating precise time detainments or movements. redundant outstations are accommodated setting off or resetting whenever wanted.

In the timing tasks, the time is unequivocally constrained by one external resistor and a capacitor, by the exertion as an oscillator, the free handling rush and the obligation cycle are both precisely contributed with the outside RC constants.

VI. DESIGN AND CALCULATIONS

Pressure available from the compressor = 1000000Pa (10 bar)

Diameter of the piston = 32mm

Cross sectional Area of the cylinder = π*32* = 804.352mm

Force = Area * Pressure

➢ *Piston And Piston Rod:*

The chamber is machined to the foreordained to the predefined standpoint in a machine and chamber post is slept(tight fit) in the drag of the chamber and latterly turned in a machine. face pounding is done on chamber and chamber shaft. [3]

The idea of fit among chamber and cylinder is leeway fit - running fit. Tolerance = 32 ± 0.02

Total stroke length	=	135 mm
Working stroke length	=	65mm
The diameter of the piston	=	32mm
The piston force F	=	P * A

= 10□*804.352*10^□□

= 804.352 N

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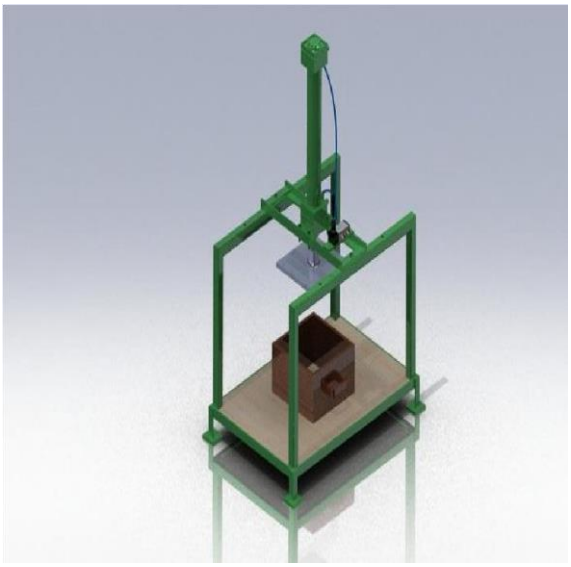

Fig 5

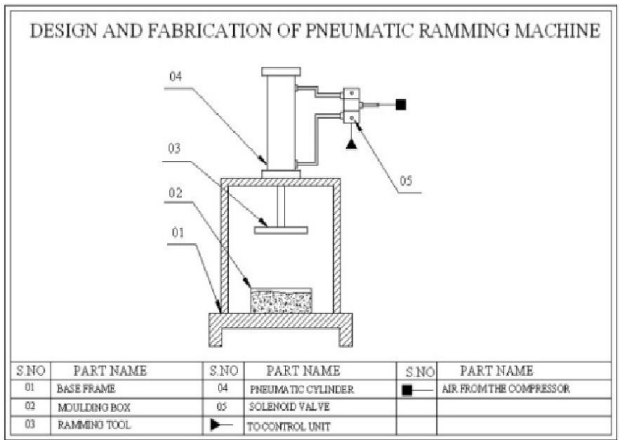

Fig 6

VII. RESULTS AND DISCUSSIONS

The rammer can be dealt with by a director without feeling restlessness. The same skill is supposed to work this rammer. The movement is fast and therefore it's a complete bone. The movement is straightforward and consumes lower cost. Due to the below reasons it finds its wide operation in collecting adventures.

It has an extensive operation in both colossal extension and confined compass associations considering its frugality and straightforward managing. strength Livery banging of beach is attained by this rammer. The time operation for forging is lowered astonishingly.

- Blessed work is not demanded.
- Simple exertion
- It tends to be packed effectively starting with one spot also onto the coming since destroying and gathering is introductory.
- It decreases further work for smashing exertion.
- Upkeep is simple.

Livery smashing of beach is gotten by this rammer. The time application for slamming is lowered impressively. It wipes out further work for smashing exertion and latterly the work cost is dropped. Blessed work is not anticipated to work this machine. Transportation of this machine is simple. Upkeep is likewise simple, The drop of creation time and end of further work for slamming exertion lessen creation cost, in this way the frugality is significantly fulfilled.

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