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PROCESS MODIFICATION AND AUTOMATION OF POLYPROPYLENE STORAGE UNITS.

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Abstract

Today 90% of small industrial workshops do not have Automation. In order to increase productivity, Automation is very important. We have taken this initiative and are working on pick and place robot. Our robot will pick up sheets from one location with the help of end effector and place it on the next machine, wait till sheet is been operated and then pick and place the sheet to final location. Advantage of such mechanism is, that it does what can a human do in less time without interruption and thus increase productivity which will thereby increase turnover of an Enterprise and create more jobs. Robots are the next big revolution in industry which brings precision, quality and increase in productivity with it.

Index Terms: Robotics, Automation, Precision, Productivity, Enterprise, Mechanism.

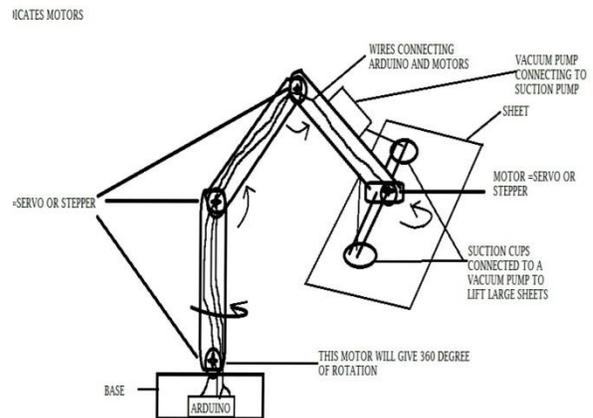
1. INTRODUCTION

Automation or automatic control, is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Some processes have been completely automated. The biggest benefit of automation is that it saves labour; however, it is also used to save energy and materials and to improve quality, accuracy and precision. The term automation, inspired by the earlier word automatic (coming from automaton), was not widely used before 1947, when Ford established an automation department [1]. There are many enterprises making industrial items for large companies like Kirloskar, Tata, Mahindra, Sulzer, etc. These enterprises have the task to provide certain parts which will be used by the large companies to make their product ready. 90% of Enterprises in India will have manual labour for producing items required by large companies. If those enterprises use automation in any way possible they will increase their productivity and thus increase the overall turnover making profits. Ranjit Enterprise is one of them, our group is making a working prototype of pick and place robot which will be beneficial for them in the long run if the company decides to adopt automation. The

robot will be used to operate between two machines which will pick up the material (in this case it's Polypropylene sheet)

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take it to the second machine which will slit the sheet in required dimension.

3. DESIGN AND MANUFACTURING

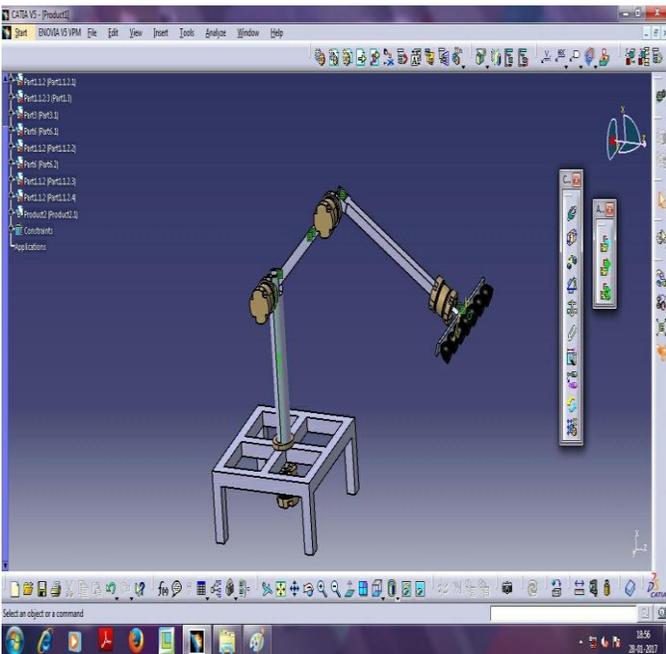
Fig-1:Early prototype sketch

The robot if made on full scale can outrun a worker used in same operation without performing any errors and working continuously without any delay with all safety precautions required.

2. LITERATURE REVIEW

Robots have been there from 1400s. Leonardo Da Vinci developed sketch of robots in late 1400. In 18th century Jacques de Vaucanson was famous for humanoid that could play flute and flap wings like duck. World's first robot company was started in 1956 by George Devol and Joseph Elenberger. In 1960, General Motors automated their assembly line using robots to move car parts from one location to another. Today robots are a part of many aspects of industry, medicine, science, space exploration, construction, food packaging and are even used to perform surgery. Watson, a robot with artificial intelligence from IBM, defeated the

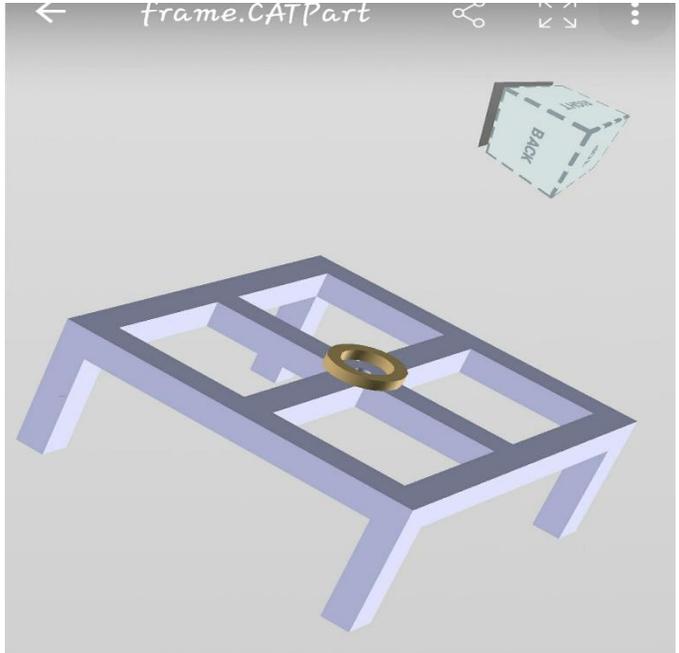
Design of prototype of pick and place robot is done using Catia. Designing includes Arms, Motors, Air cuffs, Vacuum unit, Frame. Prototype has been made to withstand sheet load of 200grams and can successfully operate with sheet of 310mmx310mm. Motors used are Stepper Motors of 1Nm capacity of 60rpm. Arm length has been kept 20-30cm. Air cuffs used are multiple. In total 4 Stepper Motors are used. 3 arms are used. Base motor has 180 degree rotation freedom while arm motors have angular motion on 90 degrees and end effector has 180 degree motion. Material used for manufacturing is PVC for its good weight to strength ratio. PVC will be coated with aluminum foil for its heat resistance



human players in an episode of Jeopardy.[2].

Fig-2: Design of robot in Catia

Robotics is part of Artificial Intelligence.(A.I.) is revolutionary and changing how people work day by day. India is developing nation and there is huge scope in AI in most of the fields. Most robots today are used to do repetitive actions or jobs considered too dangerous for humans. A robot is ideal for going into a building that has a possible bomb. Robots are also used in factories to build things like cars, candy bars, and electronics. Robots are now used in medicine, for military tactics, for finding objects underwater and to explore other planets. Robotic technology has helped people who have lost arms or legs. Robots are a great tool to help mankind.



property.

Fig-3: Design of frame



or personal allowances while working, thus producing overall productivity.

Fig-4: Design of Motors

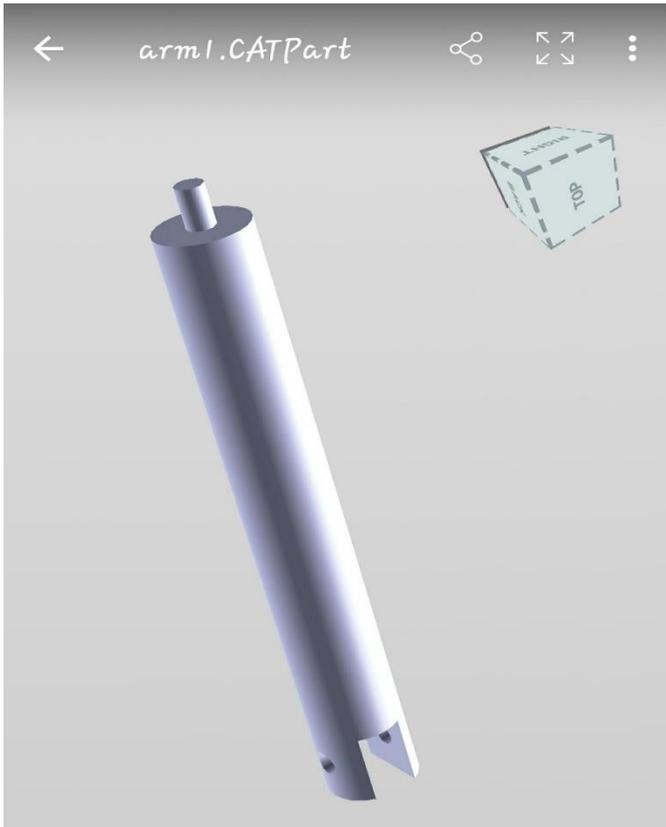


Fig-5: Design of Arms

4. RELIABILITY

Prototype has been designed and tested to operate for weight load of 200grams while the scale down weight of sheet is just less than 50grms. Thus prototype designed has 150% more the capacity of original weight. Robot can work successfully operate on 180 sheets per minute and handle 2160 sheets per shift. It is corrosion resistant and due to aluminium coating it is fire resistant up to certain limits. Robot doesn't need breaks

Fig-6: Production Rates

5. CONCLUSION

Thus we can conclude that using automation productivity of any enterprise or industry can increase though capital cost is high but in long run it is win win situation as production will increase much more than using manual labor leading to company growth overall. Automation can be used in any industry virtually and it always helps to do repetitive works more easily. In any industry, timing of launching a particular product is crucial as trends change quickly, robotics can help in fast production with more precision and make product available to all, with best quality leading to customer satisfaction.

REFERENCES

- [1] Wikipedia
- [2] <https://idahoptv.org/sciencetrek/topics/robots/facts.cfm>

CURRENT	AFTER AUTOMATION
Per shift	Per shift
1600 sheets	2200 sheets
4 W x 12000= 48,000 pm i.e 6,00,000rs pa	Capital req. = 5,00,000rs. With maintenance.