

# DESIGN AND IMPLEMENTATION OF PNEUMATIC PICK AND PLACE ROBOTIC ARM WITH SPECIFIC POSITION

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## ABSTRACT

In recent years the industry and daily routine works are found to be more attracted and implemented through automation via Robots. The pick and place robot are one of the technologies in manufacturing Industries which is designed to perform pick and place operations. The system is so designed that it eliminates the human intervention to get more precise work. There are many fields in which human intervention is difficult but the process under consideration has to be operated and controlled this leads to the area in which robots find their applications. Literature suggests that the pick and place robots are designed, implemented in various fields such as in bottle filling Industry, packing industry, used in surveillance to detect and destroy the bombs etc. The project deals with implementing a pick and place robot using Robo-Arduino for any pick and place functions.

**Keywords:** - Precise work, Human intervention, Surveillance, Line follower, Metal detector

## 1. Introduction

Mechanical is the branch of engineering science & Technology related to machinery, and their design, manufacture, application, and structural disposition. Robotics is related to electronics, mechanics, and software. Robotics research today is focused on developing systems that exhibit modularity, flexibility, redundancy, fault-tolerance, a general and extensible software environment and seamless connectivity to other machines, some researchers focus on completely automating a manufacturing process or a task, by providing sensor-based intelligence to the mechanical arm, while others try to solidify the analytical foundations on which many of the basic concepts in robotics are built. In this highly developing society time and man power are critical constraints for completion of task in large scales. The automation is playing an important role to save human efforts in most of the regular and frequently carried works. One of the major and most commonly performed works is picking and placing of jobs from source to destination. Present day industry is increasingly turning towards computer-based automation mainly due to the need for increased productivity and delivery of end products with uniform quality. The inflexibility and generally high cost of hard-automation systems, which have been used for automated manufacturing tasks in the past, have led to a broad-based interest in the use of mechanical arm capable of performing a variety of manufacturing functions in a flexible environment and at lower costs. The use of Industrial mechanical arm characterizes some of contemporary trends in automation of the manufacturing process. However, present day industrial mechanical arm also exhibits a monolithic mechanical and closed-system software architecture. They are concentrated on simple repetitive tasks, which tend not to require high precision. The pick and place mechanical arm are a human controlled based system that detects the object, picks that object from source location and places at desired location. For detection of object, human detect presence of object and move machine accordingly.

## 2. Experimental Procedure

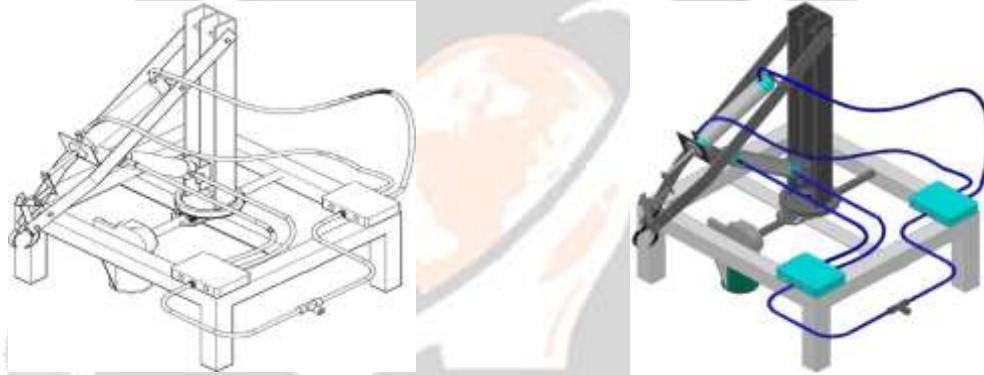
Double-acting Pneumatic cylinders (DAC) use the force of air to move in both extends and retract strokes. They have two ports to allow air in, one for outstroke and one for in stroke. Stroke length for this design is not limited; however, the piston rod is more vulnerable to buckling and bending. Additional calculations should be performed as well.

Specifications- (100\*30)-Dia\*Stroke, Max Pressure- 7bar Material- Aluminium. A 5/2-way directional valve from the name itself has 5 ports equally spaced and 2 flow positions. It can be used to isolate and simultaneously bypass a passage way for the fluid which for example should retract or extend a double acting cylinder.

Specification 5/2 Pneumatic valve Pressure-10bar. A compressor can compress air to the required pressures. It can convert the mechanical energy from motors and engines into the potential energy in compressed air. A single central compressor can supply various pneumatic components with compressed air, which is transported through pipes from the cylinder to the pneumatic components. Compressors can be divided into two classes: reciprocator and rotary. Specification-Input Voltage – 220 V, Horse Power – 0.5 HP, Pressure – 8 bar, Lubrication Method – Oil Motor Speed – 1440Rpm, Tank Thickness – 5mm, No. of Cylinder- Single Frequency – 50 to 60 Hz. A pneumatic system, energy that will be used by the system and transmitted through the system is stored as potential energy in an air receiver tank in the form of compressed air. A pressure regulator is positioned after a receiver tank and is used to position out this stored energy to each leg of the circuit. A pressure regulator is a normally open valve. With a regulator positioned after a receiver tank, air from the receiver can expand through the valve to a point downstream. As pressure after the regulator rises, it is sensed in an internal pilot passage leading to the underside of the piston. This piston has a large surface area exposed to downstream pressure and for this reason is quite sensitive to downstream pressure fluctuations. When downstream pressures near the present level, the piston moves upward pulling the poppet towards its seat. The poppet, once it seats, does not allow pressure to continue building downstream.

Specification Pressure-16bar Port Size-1/8 inch. Bevel gears are gears where the axes of the two shafts intersect and the tooth-bearing faces of the gears themselves are conically shaped. Bevel gears are most often mounted on shafts that are 90 degrees apart, but can be designed to work at other angles as well. The pitch surface of bevel gears is a cone.

Specification-Stainless Steel Spur Straight bevel gear Diameter 130mm.



**Fig 1:** Wireframe & 3D Model of Pneumatic arm

### 3. Result and Discussions

Since it is the prototype of this project, in future can also done with the full forced system i.e., completely finished robot. That is completely finished robot with microcontroller and sensors. This type of robot should be kept as robots in assembly line of automobile industry, glass handling industry, material handling industry, shopping malls, etc., for easy completion of any work with less time consumption.

#### Scope of Work:

The machines have been designed to support human beings by helping them to do tedious and back-breaking works. However, the industry has made only the limited use of high technology production concept. There is a general need to nurture the development program in automation and robotics. Machines have been employed in various tasks including material handling, various interior and exterior finishing tasks, including material handling, the high expectations of the stemmed from the very serious problems the industry is facing.

- Continuous declining productivity
- A high accident rates.
- Low quality
- In sufficient control of construction site
- Vanishing of skilled workforce.

In recent years the use of new technologies within the industry has shown great potential although little has been implemented. For example, robotic systems and other programmable machines are needed to perform tasks that involve hazardous or of a rate or in some way physically dangerous to human. The development of robotics systems in construction advances very slowly owing to several challenges. One of the obstacles in the development of the required software component such development for highly trained programmed and expert software engineers.

#### 4. Conclusion

The effective Design and Implementation of multi handling Pick and Place Robotic Arm has been performed. The operation of various arm link age sand the robotic arm has been extensively tested and the required corrective measures were taken. Hence the objective of designing and manufacturing of a pick and place robot at low cost was successful and It's been proved that running cost of the robot is also very less. This will help to cut down labour and improve profits at very low initial investment. The proposed model is demonstrated through an application of example of real world. By considering the above advantages and also by looking at various benefits, this project can be employed in the assembly industry. We hereby, conclude by saying that this project can be a factor for creating an impact on assembly section.

The project based on "DESIGN AND IMPLEMENTATION OF PNEUMATIC PICK & PLACE ROBOTIC ARM WITH SPECIFIC POSITION" was interesting to work on and was also gained in this project work..

This knowledge of project will definitely be helpful in our future. So, we must maintain that this final year project was an essential part of our engineering education enhancing our technical knowledge and practical skill.

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