

PREPARATION OF COMPRESSED AIR FOR AIR COMPRESSED GRIPPER FOR INDUSTRIAL ROBOTS

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ABSTRACT— For preparation of compressed air for air compressed gripper for industrial robot there needs to be proper assembly for reception of air & filtering the air for any dirt molecules or moisture present in it so as to prevent the air compressed gripper for industrial robots from rusting. The research paper focuses on generating pure compressed air technology which is free from moisture & even the minutest dirt molecules present in the air.

I. INTRODUCTION:

Air compressed grippers are the safest gripper compared to Electromechanical grippers which are widely used in industry. The major drawback of Electromechanical grippers are:

1. Electromechanical grippers requires more current to drive the grippers.
2. It has open wires for live & neutral connections at gripper end which are risky in regards to accidental collision.
3. It can generate leakage current sometimes, which can be risky when handling any flammable/photoelectric material at end effectors.
4. It can cause electric shock in case of any accidental collision at high speed.
5. It can also be the reason for catching fire at the time of collision as electromechanical grippers carry heavy currents for drive excitations of gripper which can cause spark if the wires get cut or can also cause electric hazard.

Due to the drawbacks offered by Electromechanical gripper there is a need to develop a system which is safe & stable compared to electromechanical gripper. The drawbacks of Electromechanical Gripper can be overcome by using Air Compressed Gripper Technology For Industrial Robots. Air is available freely in environment without any hazard. There are many advantages of using Compressed Air for actuation of end effector for Air Compressed Gripper for

industrial robots^[1]. The advantages of using compressed air for actuation of gripper via replacing it by air compressed gripper over Electromechanical gripper are:

1. Air compressed gripper are safe compared to Electromechanical gripper.
2. In case of collision the air releases from the gripper & the gripper connection cuts down, providing safety to operations & material handling of gripper.
3. In case of high speed collision too there would be no electric hazards with regards to compressed air as it does not carry any current & is just pure air which will release itself, reducing the impact of collision.
4. Compressed air could be easily controlled for soft/hard gripping which is a major drawback of electromechanical gripper.
5. It saves power as within few minutes it can store the compressed air in reservoir/receiver tank & can be readily available at the time of gripping.
6. Air compressed gripper is flexible system & can be easily used with several types of robots at end effectors.
7. Air compressed gripper pipes carrying compressed air can be easily twisted & packed in conduit to free up gripping area.

II. REQUIREMENTS FOR AIR COMPRESSED GRIPPER:

1. Air compressor with Receiver tank & auto drain valve.
2. Filtration system to remove any dust particle in the air before processing it to gripper.
3. Dehumidifier & Moisture separator system to remove any water molecules generated through air compressor.

- Solenoid valve at gripper end receiver to remove any minute particles & provide clean air & protect gripper assembly from rusting.

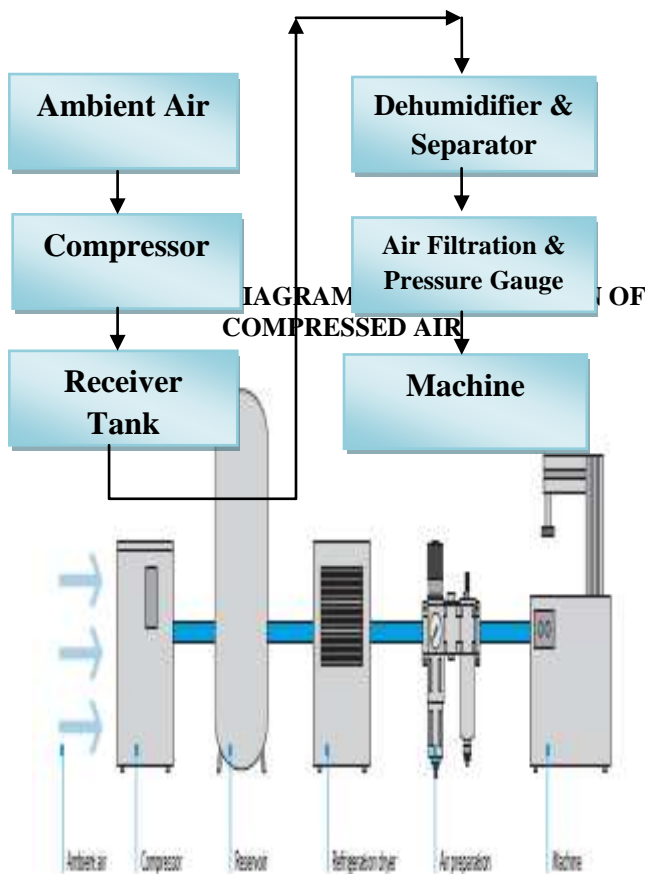


FIG.2: ACTUAL DIAGRAM OF PREPARATION OF COMPRESSED AIR

III. HOW COMPRESSED AIR REACHED THE GRIPPER/MACHINE?

- Air compressor produces vacuum through its inlet valve through which ambient air is suctioned & through its outlet valve it stores the suctioned air in Receiver Tank/Reservoir.
- The air from the receiver tank/reservoir is further processed through dehumidifier & separator/refrigerant dryer through which any moisture content in air is eliminated.
- Further the air is filtered by air filtration & pressure gauge through which it filters out any dirt particle present in air & providing pure compressed air to the solenoid valve.
- Solenoid valve is responsible for transferring air to gripper for opening & closing of air compressed gripper.

A. TECHNICAL DETAILING OF AIR COMPRESSOR:

- Air is compressed & stored inside the air receiver.
- The function of the air compressor is to reduce volume & induce pressure in the compressed air.
- The main function of the compressor is to convert electric energy into kinetic energy^[4].

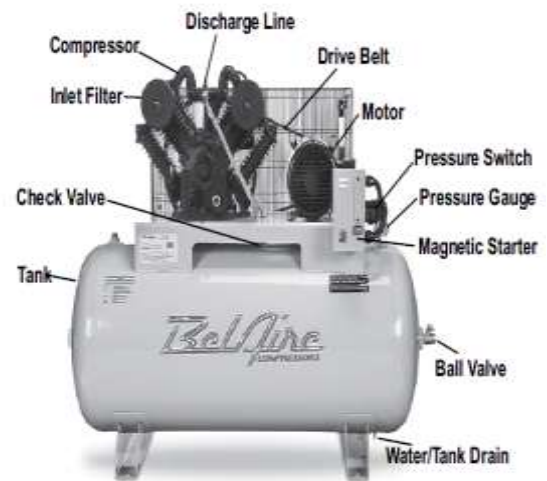


FIG.3: TECHNICAL DETAILING OF AIR COMPRESSOR

B. DEHUMIDIFIER & SEPARATOR:

- The moist air from air receiver of compressor is sent to dehumidifier.
- The cooling coil of dehumidifier comes in contact with moist air & evaporation process takes place & water molecules generated are separated from air.
- The water molecules are then drained through drainage tank.
- The air then comes in contact with reheating coil which further removes any dampness present in compressed air & gives out dried air which is sent to air filtration to remove minute dirt molecules thus providing pure compressed air which prevents gripper from rusting^[2].

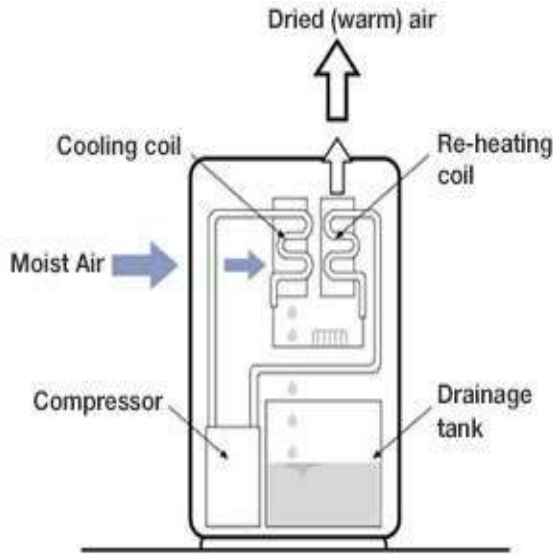


FIG.4: DEHUMIDIFIER & SEPARATOR

C. AIR FILTRATION & PRESSURE GAUGE:

The compressed dried air enters the filtration unit where the air filtration unit performs two tasks i.e. filtering the air so that even the minute dust particles from air can be removed & also controls the pressure of air through which the user can set a limited PSI through gauge settings & control the flow of compressed air to solenoid valve unit.



FIG.5: AIR FILTRATION & PRESSURE GAUGE

D. SOLENOID VALVE:

1. The compressed air from air filtration unit enters the solenoid valve.

2. The solenoid valve passes the air to the gripper & holds the air pressure to maintain gripping by creating vacuum when the gripper mouth is closed.
3. The moment the gripper is switched "ON / OFF", the solenoid valve reacts to that signal & it either opens or closes the valve for that instance, which allows the air to flow through gripper jaws via air cylinders & causes it to either "Open or Close"^{[3][5]}.

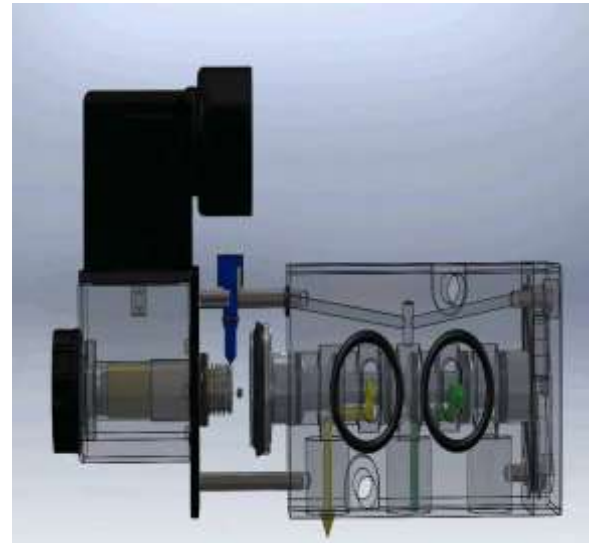


FIG.6: SOLENOID VALVE

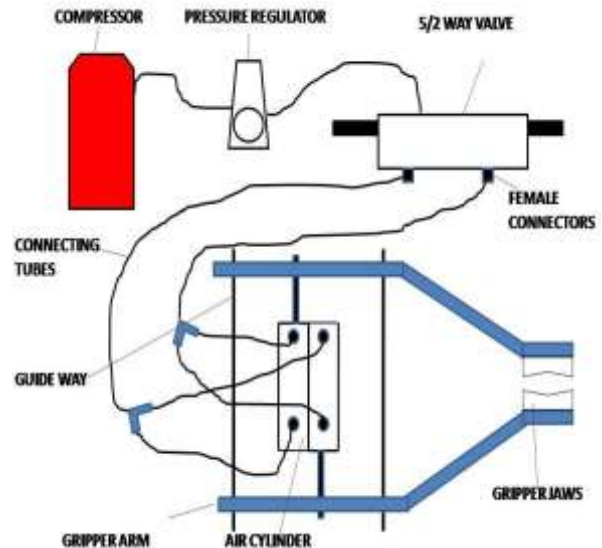


FIG.6: FINAL ASSEMBLY OF AIR COMPRESSED GRIPPER TECHNOLOGY

IV. CONCLUSION:

From the above discussion it is clear that preparation of compressed air is simple & is cost effective. Only the initial cost of installation might be little high but is advantageous over electromechanical gripper which

consumes more power & is even dangerous to use inside industrial environment.

V. REFERENCES:

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