

Moisture Separator

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ABSTRACT: The principle objective of this project is to remove the moisture present in the compressed air provided to the machineries in the textile industries. The compressed air provided for proper working of machineries in the textile industries consist of a small amount of moisture which is not possible to remove by centralized refrigerated dryer. This moisture afterward resulting in problems like internal corrosion, pressure fluctuation. This project is capable to remove all moisture particles and provide dry compressed air with in technical and non-expensive manner by replacing expensive air dryer. This project based on the principal that heavy moisture particle settle down and dry air light weight particle scattered in air, when compressed air strikes on stainless steel scrubbers.

I. INTRODUCTION

Present State of Art

The present scenario in the “Morarjee Textiles Ltd.” is that all the machineries in industry works on dry compressed air. The process in the morarjee textiles ltd. Consists of 6 stages, they are as follows:-

1.1.1 Stage 1:- 2 Stage Reciprocating Compressor

In this stage, the air from the atmosphere is compressed and the pressure and temperature is increased. In industry, reciprocating compressors are the most widely used type for both air and refrigerant compression. They work on the principles of a bicycle pump and are characterized by a flow output that remains nearly constant over a range of discharge pressures. Also, the compressor capacity is directly proportional to the speed. The output, however, is a pulsating one. Then the compressed air is delivered to after cooler.

1.1.2. Stage 2:- After Cooler

The compressed having high temperature and high pressure enters into the aftercooler. The main function of the after cooler is that it reduces the temperature of compressed air. It is a cylindrical assembly which consist of vertical plates and water at the bottom. The air is passed from the top of vessel and travels along the vertical downward path guided by the plate. the temperature of the air decreases due to the water present at the bottom of the vessel. Then, the air is delivered to the condensate extractor.

1.1.3. Stage 3:- Condensate Extractor

The main function of the condensate extractor is to reduce the moisture content in the compressed air. The compressed air comes directly in contact with water due to which temperature of air reduces but the moisture content in air increases. The condensate is continuously draining out throughout the process through drainage pipe.

1.1.4. Stage 4:- Air Receiver Tank

It is a large cylindrical assembly in which the compressed air is collected. In the whole plant, where there is compressed air requirement for the various processes, air is delivered from air receiver tank, via refrigerant dryer.

1.1.5. Stage 5:- Centralized Dryer (Refrigerant Dryer)

Refrigerated compressed air dryers remove moisture from compressed air systems by lowering the temperature of the compressed air to condense the water vapors. A cool drink on a hot day illustrates this process. Warm, moist air comes in contact with the cold glass causing water droplets to condense from the ambient air and form on the outside of the glass. Refrigerated dryers use a heat exchanger and refrigerant circuit to lower the temperature of the compressed air to initiate condensation. The condensate generated in the heat exchanger is then directed to a moisture separator and drained away.

1.1.6. Stage 6:- header and delta machine

The air from the refrigerant dryer is den passed through header (which is a cylindrical hollow pipe), from which air is then supplied to the delta machine. Delta machine is responsible for providing dry air to various machines for various operations.

The following shows the block diagram of present process:-

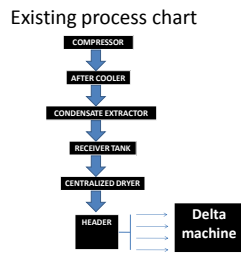


Fig.1. Existing Process In Morarjee Textile Industries

1.2. Problem Identification

Since all the machineries in the industry working on compress air hence we require the compress air having desired Temperature, Pressure and Moisture content. If temperature and Pressure is excess then it may cause damage to the various critical component but this parameter can easily control compressor and aftercooler. If moisture content in compress air is exceed than the desired content then it may harm ducting, walls in critical component of machine by rusting, corrosion etc. This is the main problem which is occurred during the dry and compressed air supply to the Delta machine. Compressed air leaving the receiver tank enters into the refrigerant dryer in which the moisture content in compressed air is removed but the distance between the centralize dryer and the delta machine is about 500 meter. When this compress air flows through the pipe towards the delta machine, due to the temperature difference between inside and outside of the pipe certain amount of condensate(in the form of moisture) form in the compress air which leads to various problem in the operation of Delta machine.

1.3. Proposed Solution

For above problem we suggest a moisture separator with simple construction and design.

Design Of Moisture Separator

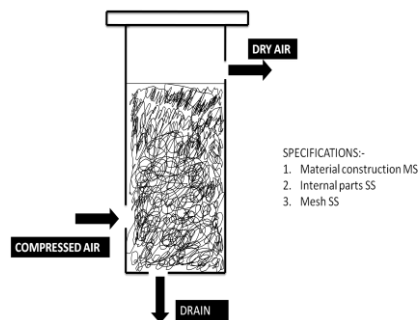


Fig.2. Proposed Design of Moisture Separator

Figure shows a schematic arrangement of moisture separator. The external part for the construction is MS seamless pipe. The internal parts ie Stainless steel scrubber which is filled into the hollow cylindrical pipe with pressure on which the stainless steel mesh having each hole diameter of 2mm and is welded inside the pipe. The assembly has three ports that are inlet, outlet and drainage.

1.3.1. Separation Process

When the compress air full of undesired moisture enters into the moisture separator through the inlet port then it strikes on the stainless steel scrubber due to which the moisture present in compress air is deposited on the surface of scrubber and air pass through the SS scrubber and hence we get the dry compress air from outlet port for subsequent operation. Moisture which is deposited on the surface of SS scrubber is accumulated slowly at the bottom of the moisture separator. This accumulated moisture content is then drained out with the help of drain valve. This drain valve may be manual or automatic operated.

SOLUTION SUGGESTED

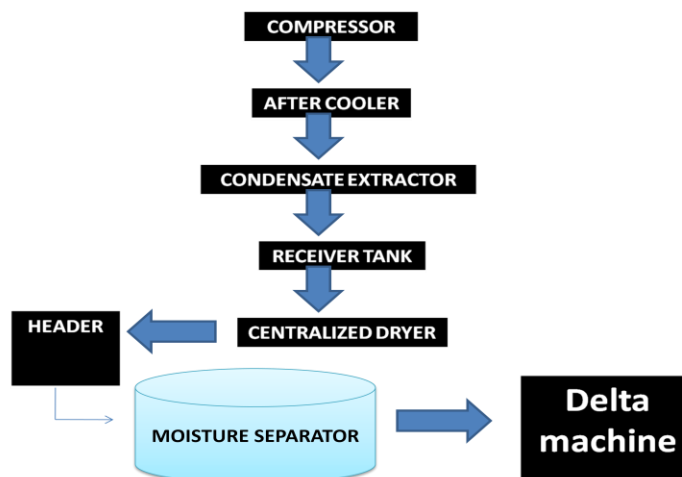


Fig.3.Block diagram for suggested solution

II. CONCLUSION

We had visited Morarjee Textiles Ltd and studied that the dry air supplied to the various yarn formation and yarn design machineries has been containing the moisture which could damage the parts of machineries and can make the pressure fluctuation.

So it was required to make some change in the existing condition to overcome this problem. For this problem we have recommended a solution i.e. “Moisture Separator” which is better than the existing process and have its individual advantages over the existing process i.e.

Applicatoin

- It provides dry and compressed air to the various machineries
- Due to more efficiency input pressure get reduce.
- It can be used by replacing costlier air dryer.
- Easy and simple in construction.
- It required small space.
- Low maintainence.

Disadvantage

- 2.2.1. The life span of the scrubber is up to one year, but it can be replaced within low cost.

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