

Experimental Study on Electrical Maintenance and Energy Consumption with its Improvement Measures in FIBC Industry at Flexituff Ventures International Ltd. (SEZ), Pithampur

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Abstract: For every industry efficiency being most important aspect and higher the efficiency less are the losses for which maintenance plays a vital role. Periodic maintenance ensures lesser number of breakdowns in industry and eventually this increase overall production of industry. With increase in demand of energy and conventional source being limited in quantity it is necessary to have an additional energy source which is renewable such as solar, wind etc. The study is completely based on improving quality of maintenance and use of renewable source of energy mainly solar, to meet some part of energy demand.

Keywords: solar energy, electrical maintenance, increase efficiency, renewable energy, possibility of installation of solar panel.

1. Introduction

Maintenance is process of checking and performing corrective measures on a machine or component so as to ensure its smooth functioning and reduce the chances of breakdown. The maintenance can be classified into two types preventive and corrective. Preventive maintenance is done before the breakdown occurs and corrective maintenance is done after the component fails. With the increase in production the power consumption of industry is increasing to meet energy requirement and also keeping economical aspect in mind it is suitable to use renewable source of energy to meet some part of required energy demand.

2. Components requiring maintenance in FIBC industry.

It is necessary to identify the electrical components that require maintenance so as to plan maintenance schedule and strategy to perform effective maintenance. The major components that require preventive maintenance in FIBC industry are:

Tape plant: Motors, Heater, Chillers, Thermocouple, panels.

Multifilament, Liner and Lamination: Motors, Heater, Panels, Thermocouple, Chillers.

Circular looms: Control panel, Color and magnetic sensor, Wrap indication lamp, Contactor kits, Motor.

Substation: Transformers, Brushing insulator, CT and PT unit, Isolators, Circuit breakers, Wiring connection junction and nut bolts.

Backup system: Diesel generator set, Inverter, Panel.

3. Energy consumption in FIBC industry

For understanding the overall energy consumption in the FIBC industry we need to calculate the energy consumption of each section i.e. of each plant so that we can find suitable section of industry where measures can be taken to reduce energy consumption without compromising productivity. The overall consumption of plant is 1.5- 1.6 million units per month. The majority of consumption is from production plant and a small amount of consumption is made from office buildings.

4. Causes of improper maintenance

Proper maintenance is very important. As poor maintenance leads to breakdown and thus affecting efficiency and productivity of industry. Following are the causes of improper maintenance.

- Industrial fire or hazard.
- Short circuit.
- Shocks.
- Frequent Breakdown.
- Loss of productivity.
- Financial losses

5. Electrical maintenance done in FIBC industry

As the company is divided into different sections which

comprises of step wise production of the FIBC i.e. the final product, so maintenance is done plant wise

A. Tape, Lamination, Liner, Multifilament

- Cleaning of control panel by dry vacuum cleaner (duration –fourth night)
- Cleaning and checking of motor by dry vacuum (duration-weekly)
- Checking and cleaning and tightening of power wires of panel. (Duration-Quarterly).
- Checking of motor bearing and I-R values of motor (duration-6 months)

B. Substation

- Tight nut- bolts: - (duration-6 months)
- Check and tight all fix and moving contact of AB switch: - (duration-6 months)
- Check, clean and fix moving contact of VCB: (duration-6 months)
- Check, clean and tight moving contact of VCB:- (duration-Yearly)
- General visual inspection inspection and cleaning of VCB and tightening of Nut- Bolts: (duration-6 months)

C. Transformer

Manual checking of combined temperature, current and tap position: (duration-daily)

Check for any unusual noise and oil level in tank: - (duration-Daily)

Cleaning of Brush insulator and check tightness of connection: (duration-6 months)

Checking of breathers: (duration-6 months)

Test operation of all protection alarms and relay battery wiring: (duration-6 months)

Test insulation resistance: (duration-6 months)

Check earth resistance and record: (duration-6 months)

Test for oil, strength, L.A and tight all nut-bolts: (duration-6 months)

D. Main Distribution Board

- Cleaning and checking of panel by dry vacuum cleaner: (duration-4 months)
- Check and tight control wiring : (duration-6 months)
- Cleaning and checking fixed and moving contact and SFD: (duration-6 months)

E. Panel

- Cleaning and checking of panel by dry vacuum cleaner: (duration-4 months)
- Check all panel doors are closed: (duration-weekly)
- Check for any burning smell and heating wire: (duration-weekly)
- Tight all cables and control wiring: (duration-weekly)

F. Circular machine, Needle loom, Recycling Plant

- Cleaning of panel by dry vacuum: (duration-weekly)
- Check color and magnetic sensor: (duration-weekly)
- Check of wrap indication lamp: (duration-weekly)
- Check and tight wire and contactor kit: (duration-4 months)
- Check motor bearing and I-R values: (duration-6 months)

G. Inverter

- Cleaning of UPS by dry cotton cloth: (duration-weekly)
- Cleaning of fuse: (duration-weekly)
- Checking of control and power wiring: (duration-monthly)
- Checking of emergency light: (duration-monthly)

H. Emergency exit light

- *Cleaning of light by cotton cloth:* (duration-weekly)
- *Cleaning of power supply:* (duration-4th night)
- *Cleaning of lights and batteries:* (duration-monthly)

6. Study on future improvement in electrical maintenance which can be done in flexituff (FIBC) industry.

- Arrangement for rewinding of coils of motors in case of burning of winding for motor
- Timely availability of electrical spare parts in order to avoid reduces maintenance time.
- Employing of Skilled technician for handling PLC {Programmable logic controller} software issues.
- Ensuring availability of standby motors and other components.
- Timely availability of skilled men power.

7. Safety

Safety is the most important aspect in every industry the safety of workers and skilled technician should always be the priority for which various safety elements are used such as

- Rubber hand gloves
- Safety belt
- Helmet
- Discharge rod
- Rubber shoes



Fig. 1. Safety

8. Energy conservation and management

Keeping in mind idea of sustainable development it is very essential to minimize the consumption of energy obtained from nonrenewable resources and meet a portion of energy demand from renewable resources. After studying the plant we saw that with higher energy demand another sources of energy other than non-renewable energy sources are not present and after studying the plant we concluded that a part of energy demand can be fulfilled by harvesting solar energy in plant premises.

Places where solar panel can be installed:-

- Roof of office building.
- Street light of premises
- Recycling Plant

The HYBRID type system can be installed in the plant in which energy demand can be fulfilled by both solar energy system and grid. Although practically considering the case of this industry using battery to store energy is not practical therefore direct supply of energy generated is to be done. For better understanding below figure can be considered to get an idea of suggested power supply system.

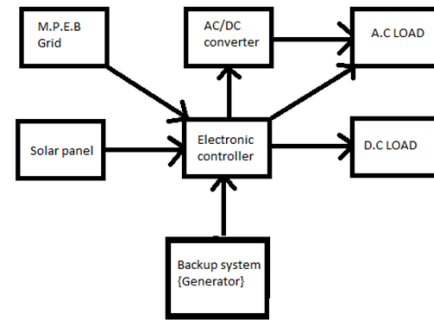


Fig. 2. Energy conservation

9. Conclusion

At last during whole study the final result concludes that maintenance is one of the most important factors that affects the productivity and efficiency of the plant. The study includes how maintenance plays vital role in productivity and also the use of renewable energy sources in industrial areas that supports sustainable development and financial condition of industry.

References

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