

Non Implemented Case Study– Energy Conservation Measure

Measure
Use of electronic chokes for the 40 W fluorescent tube fixtures in the production shop
Equipment
Lighting
Industry / Sector
Electronic
Year of Implementation
1996
Cost Benefit Analysis
⦿ Type of Measure: Medium term
⦿ Annual Energy Savings: 7603 kWh
⦿ Actual cost savings: Rs.0.266 lakh
⦿ Actual investment : Rs. 0.60 lakh
⦿ Payback: 2.23 years
Implementation Highlights
<ul style="list-style-type: none"> ☞ Very simple measure. ☞ Easily retrofitted by the plant itself without any external expertise. ☞ Energy savings is about 50% in choke consumption. ☞ 12-15% savings when compared to total power consumption by the tube. ☞ The plant has implemented but many of the chokes failed with in one year. The failures are due to <ul style="list-style-type: none"> ⦿ Initial stages of market entry, the electronic chokes were failing frequently due to various factors such as power quality (voltage variations and frequency variations), product quality, etc. ⦿ Poor after sales service from the suppliers. ⦿ Non-durable. ☞ Now-a-days the electronic chokes available are of very high quality and with stand to prevailed power quality conditions. More over the suppliers are guaranteeing for life and savings.

Summary

Replacing the conventional choke with electronic choke in fluorescent lamps will results saving to the tune of 12-15% of the total power consumption by the tube.

Background

Production shop of an electronics unit has 120-twin tube light fittings. All the fittings were having conventional choke, which consume power of 15 W per tube. These tube lights are used at least 12 hours per day

No of twin tube light fittings	: 120
Power consumption for fitting (2x55W)	: 110 W
Total power consumption	: 13.2 kW

Proposal:

Use of electronic choke would consume only about 7W for a single tube choke. Replacements of all conventional chokes with electronic chokes will results in significant savings.

Estimated power consumption after replacement:

Power consumption per fitting (2X47 W)	: 94 W
Total power consumption	: 11.28 kW
Power savings	: 1.92 kW

Techno-economics:

Power savings	: 1.92 kW
Operating hours (12 h per day 330 days/year)	: 3960 h
Annual energy savings	: 7603 kWh
Annual cost savings	: Rs. 0.266 lakh
Investment required (@ Rs.250 per choke/tube)	: Rs 0.60 lakh
Payback period	: 2.25 years

Principle

The efficiency of fluorescent tube increases when working at a high frequency of 20-30 kHz than at the normal 50 HZ frequency. The electronic choke is a device which converts the 50 Hz supply to 25-30 kHz supply

The basic circuit of an electronic choke, converts the input AC to DC and then inverts it to AC to run the lamp at a high frequency. Fluorescent lamps exhibit high efficiency at higher frequency by virtue of low reactive circuit components and they have practically no losses.

The electronic ballast or choke (solid state choke) does not require starters or capacitors to be used with it. It consumes only 7 W when compared to 15 W of power in conventional choke. Moreover the efficiency of the lighting improves by 10%. The power factor is improved.

The electronic choke offers a rapid start to the system, which lights in less than one second. Stroboscopic effect, otherwise known as flickering effect is more pronounced in conventional choke which are operated at the mains frequency.

The life of the tube also increases as compared to a tube used with conventional choke.