UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Industrial Energy Efficiency Project
Motor System Optimization

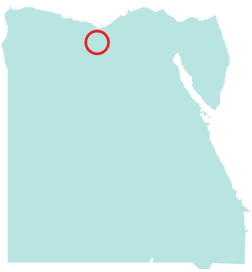
Electric motor driven systems globally consume approximately 70% of the electrical consumption in industrial sector. This case reviews the optimisation of motor systems regarding the aeration blowers and membrane filter blowers within a large industrial plant in the chemicals sector in order to identify opportunities for saving the energy efficiency, use and consumption by that system. The study revealed that for the major motor system savings assessed in this plant save 536,900 kWh (or 311,350 EGP) per annum at an investment cost about EGP 60,000.

EGYPT

A Case Study of Galaxy Company

Galaxy Snapshot

Industry:Chemicals
Location: Suez, Egypt
Product: surfactants and specialty chemicals



Implementation cost: 60,000 EGP
System: Aeration blower and membrane filter systems
Annual energy savings: ~536,900 kWh
Financial savings: ~311,350 EGP/year
GHG reduction: ~290 tCO_2eq (10 y)
Overall payback: 3 months

Galaxy Chemicals Egypt is the Egyptian business unit for Galaxy Surfactants limited, which is an Indian Group of companies having manufacturing facilities in India, Egypt & the USA. The company produces surfactants and specialty chemicals used by manufacturers of home & personal care "H&PC" products including shampoos, Shower gel, liquid soaps… etc. The company has one production facility with capacity around 80,000 MTon annually.

MSO at Galaxy and the IEE Project

The Industrial Energy Efficiency Project (IEE) is a program developed and initiated by UNIDO to promote energy efficiency in industry as part of its primary objective of "promoting and accelerating inclusive and sustainable industrial development in developing countries and economies in transition."

The Motor Systems Optimization (MSO) Project forms part of the IEE Project and has the specific objectives of developing local personnel to become competent in the application of energy efficiency in industry in order to unlock the potential for energy savings within their respective local industries.

Galaxy Company is considered as a pilot plant for the IEEP in the MSO as well as other components. The company is one of the pioneer companies in Egypt, working on the manufacturing of surfactants and special chemicals. They are in the process of developing an Energy Management System (EnMS) with the assistance from the IEEP, and the MSO serves pretty well in developing saving opportunities for the company.

Summary of Optimization Strategies

Saving Opportunity	Energy Savings (kWh/year)	Financial Savings (EGP)	Capital Cost (EGP)	Payback (Year)
Aeration Blower: Install VSD with feedback	407,400	236,300	25,000	0.11
Aeration Blower: System maintenance	7,000	4,050	---	Immediately
Membrane Filter Blower: Install VSD	111,300	64,550	35,000	0.54
Membrane Filter Blower: Maintenance	11,200	6,450	---	Immediately
Total:	536,900	311,350	60,000	0.20

Case Description

The plant makes use of the latest and best food processing techniques and innovative layout that maximizes efficiency. It employs high-speed processing machinery, and is capable of producing a diverse variety of dairy, juice and dairy-based products to the highest standards of hygiene and safety.

The Galaxy Chemicals uses the latest Bio-Membrane technology throughout degradation of organic matter present in the effluent by aerobic microorganisms. As a part of this technology two types of air blowers are required. First one is Aeration Blower (Tag no. 74K2A) for ensuring that enough O2 for the aerobic microorganisms to survive and function with three phase induction 75 kW motor with 94.7% efficiency Second one Membrane Filter Blower (Tag no. 74K1), for ensure the membrane filter will not get shocked and also help in supplying O2 for the aerobic microorganisms with three phase induction 22 kW motor with 92.6% efficiency.

Optimization Strategies

Based on measurements and analysis of the data obtained from the system, we have identified the five possible opportunities.

First Install VSD's for aeration blower motor system with low payback. Second doing maintenance for same motor system with immediately payback .

Third, install VSD's for membrane filter motor system with low payback .Finally, periodically maintenance for membrane filter motor system with immediately payback.

Outcome

Motor and System Optimization for Galaxy Chemicals Aeration and membrane filter motor systems in ETP include great opportunities to reduce its energy consumption with high attractive investment returnees. It is highly recommended to implement Install VSD's for with investment cost is EGP 25,000 and payback period is 0.1 year with total annual energy saving 407,400 kWh, and total annual saving EGP 236,300.

Lessons Learnt

Applying a structured approach to MSO can often realize with no or low cost requirements.

Galaxy Chemical has Energy management system for continuous energy improvement and sustainability along all plant systems.

Energy cost can be reduced significantly some may not require financial investment. A systematic approach as demonstrated in this study will lay the foundations for significant and sustainable cost reduction in energy use for organizations of all sizes.

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