



Case Study :- 1

Shop: MQS Paint Shop

Use of Robotic painting instead of manual painting



The manual painting of the body shells were replaced by Robot painting. The production was increased by 28% i.e. from 42 body shells per shift to 54 body shells per shift in same electrical and LPG consumption. The specific energy consumption of electricity is reduced from 294 kWh / body shell to 207 kWh / body shell. The LPG specific consumption was reduced from 33 kg / body shell to 26 kg / body shell. Energy savings of 53 Lakhs per annum by this productivity improvement project. Also significant improvements seen in paint finish quality.

Picture before modification (Manual Painting)	Picture after modification (Robotic Painting)
	

Further to get increased out put, Cab and Cargo parts which were earlier painted separately now they are painted together, which has reduced the previous 2 skids by 1 skid. It increased the productivity by another 37% i.e. Earlier 54 body shells to 74 body shells per shift. The specific energy consumption of electricity is reduced from 207 kWh / body shell to 167 kWh / body shell. The LPG specific consumption was reduced from 26 kg/body shell to 13 kg/body shell.



Total savings of Rs.65 Lakhs per annum was achieved by this productivity improvement.

Picture before modification (Cab & Cargo Painting separately)	Picture after modification (Cab & Cargo Painting combined)
	



Case Study :- 2

Shop: MQS Paint Shop

Installation of Variable Frequency Drive for Air Supply Unit 2 pump

In the Paint shop to meet the air quality Air supply fans with spray pumps are installed (Humidifier).

Air supply unit -2 pump was being throttled by automatic motorized valve depending on the relative humidity (RH) inside the chamber. It has been constantly observed for the extent of throttling over a period of time. It is found the most of the time it is open only for 60 to 70%. Following are the details of the existing pump.

Design details

Flow	= 90 M ³ /hr
Head	= 32 M
Pump RPM	= 1450
Pump in put power	= 15 kW
Motor power	= 18 kW



Before VFD, Energy consumption = 61200 kWh / annum (based on 1 month energy consumption monitored with the help of portable power analyzer)

The motorized throttling has been eliminated by installing Variable Frequency Drive on the pump motor. After installation of VFD again kWh monitoring has been carried out with the help of portable power analyzer. Following are the details of observations



Motor operating at frequency range = 43 to 44 Hz
After VFD, energy consumption = 43350 kWh/annum (based on 1 month energy consumption monitored with the help of portable power analyzer)
Reduction in energy consumption = 17,850 kWh/Annum
Monitory savings achieved in FY 06-07 = Rs. 0.7 Lakhs
Investment incurred for the VFD = Rs. 1 Lakhs (including installation charges)

Investment has been paid back in 17 months.

Picture before modification (Throttling by Motorized Valve)	Picture after modification (Speed Reduction by VFD)
 A photograph showing a motorized valve assembly in an industrial setting. The valve is mounted on a metal frame and has a green motor. It is connected to a network of pipes. The background shows a long, narrow corridor with corrugated metal walls and a green floor.	 A photograph of a Variable Frequency Drive (VFD) control cabinet. The cabinet is white with an orange interior. The door is open, revealing the internal components, including a terminal block, a control panel, and various electrical connections. The cabinet is located in a room with corrugated metal walls and a green floor.



Case Study:- 3

Shop: Plant – II (Die Shop)

Installation of VFD on Two Press Hydraulic Motors

There are two presses at Die shop i.e. 800 Tons and 1300 Tons. Each press is having one hydraulic pump. Motor capacities are 90 kW & 110 kW. These motors are operating many times in a single stroke depending on die. This was leading to higher demand as motors were drawing higher power during the start up. Also we analyzed that hydraulic pressure can also be reduced to some extent without compromising output. We installed VFD initially on 90 kW motor and also reduced the speed by 10% and observed the output. Since output was not compromised another VFD installed on 110 kW motor with 10% speed reduction.

The speed reduction is resulted into following cascading benefits

1. Energy saving
= 81,172 kWh per annum worth Rs. 3.24 Lakhs per annum
2. Reduction in Maximum demand
= 73 KVA per month worth Rs. 2.62 Lakhs per annum
3. Stopped operation of one DG set of 500 KVA which were operating during load shading period. This DG was earlier operating at partial load (30% loading) of around 150 KVA along with another DG set of 500 KVA which was operating at 65% loading. Single DG of 500 KVA was not able to take up entire load due to operating kicks from hydraulic motors. HSD saving to the tune of 25.6 KL per annum amounting to Rs. 8.98 Lakhs per has been achieved.

Total monetary savings of Rs. 14.83 Lakhs has been achieved in FY 2006 -07.

Further speed reduction possibilities is under observation so that VFD can be effectively utilized.

Picture before modification (Without VFD)	Picture after modification (With VFD)
