

# CASE STUDY

Howrah foundry saves over ₹4 lakhs annually by replacing its fixed speed air compressor with a new, energy efficient PMSM inverter air compressor



## BACKGROUND

Howrah, in the state of West Bengal, is one of the major foundry clusters in India. Compressed air is required by the foundries for mould cleaning and various equipment like pneumatic rammers, moulding machines, CNC machines, sand plant, pneumatic pusher cylinders, shot blasting machine, paint booth, bag filter and so on. Energy consumed by the air compressors is a significant component of the total electricity consumption in the plant.

Replacing the existing fixed speed air compressor with an energy efficient variable frequency drive (VFD) permanent magnet synchronous motors (PMSM) screw air compressor will lead to substantial energy and CO<sub>2</sub> savings.

## Baseline

A foundry unit was having a fixed speed air compressor of the following specifications.

Parameters	Values
Year	2014
Type	Screw
Capacity (CFM)	190
Pressure (kg/cm <sub>2</sub> )	7.1
Motor (kW)	30
Operating hours per day	16
Specific power consumption (kW/cfm) at 7 bar	0.28

The screw air compressor installed in the unit is shown in Figure 1.



**Figure 1:** Existing fixed speed air compressor

The air compressor was operating in unload mode for 55% of the time. During unloading operation, the fixed speed compressor consumes about 1/3 of loading power but does not deliver air. It was recommended to replace the existing screw air compressor with a new permanent magnet synchronous motors (PMSM) inverter screw air compressor.

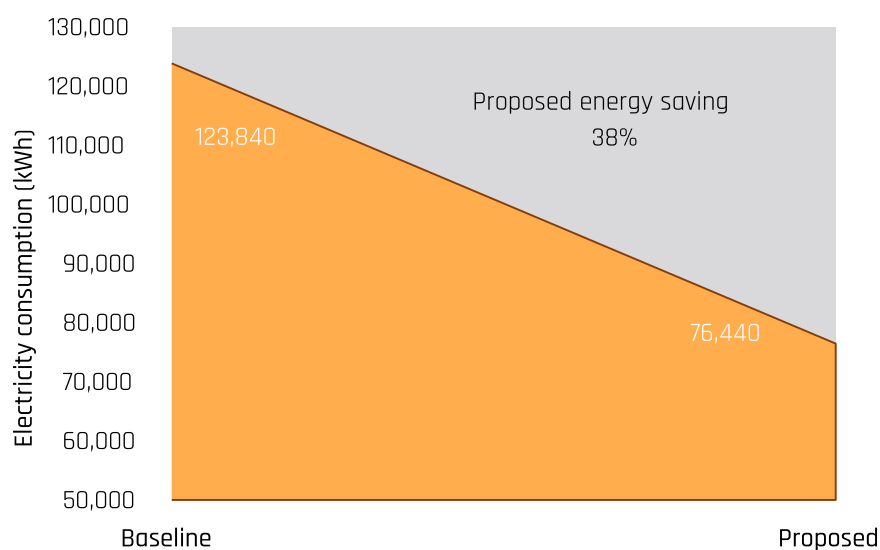
## PMSM INVERTER SCREW AIR COMPRESSOR AND ENERGY SAVINGS

The specifications of the new PMSM inverter air compressor were as follows:

Parameters	Values
Type	Screw
Capacity (CFM)	190
Pressure (kg/cm <sub>2</sub> )	7.1
Motor (kW)	30
Operating hours per day	16
Specific power consumption (kW/cfm) at 7 bar	0.175

Adoption of the new EE air compressor will lead to an annual energy savings of 47,400 kWh which is equivalent to a monetary savings of ₹4.1 lakh per annum. The investment in the recommended measure will be about ₹6.0 lakh. The payback on investment will be 1.5 years. The GHG emission reduction from the recommended measure is 39 tCO<sub>2</sub> per annum.

The energy savings due to no unloading power is substantial, and is depicted in Figure 2.



**Figure 2:** Energy savings

Additional advantage of PMSM air compressors is that their start is smooth without any kicks and suitable for catering to low air demand typical of 2nd and 3rd shift operation. Normally when induction motor compressor stops on no demand, then it has to vent internal pressure so that next start is without load. In PMSM motor, it can start against a load.

**For more details, please contact**

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