



MSTT



Zerowatt Energy Intelligence System

How Zerowatt helped clients to optimize energy consumption

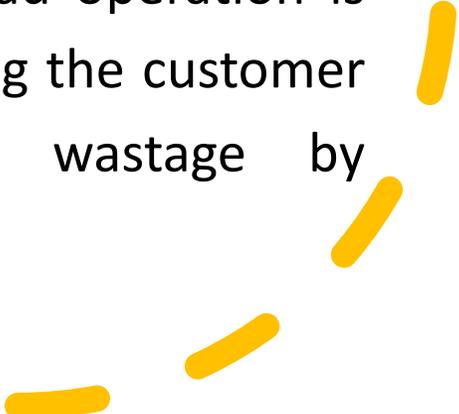




Clutch manufacturer in Bangalore

ZeroWatt System helped in reducing energy wastage by optimizing compressor utilization

Compressor operation optimization

- ZeroWatt Energy meters were installed to monitor 6 compressors
 - Zerowatt Energy Intelligence System identified that, many compressors were running at partial load for long durations. This is a wastage of electricity. Instead, less No.of compressors should be run at higher load.
 - Upon specific request from the customer, a special feature has been developed in Zerowatt dashboard to alert the customer whenever partial load operation is taking place. This initiative is now helping the customer in reducing unnecessary electricity wastage by compressors.
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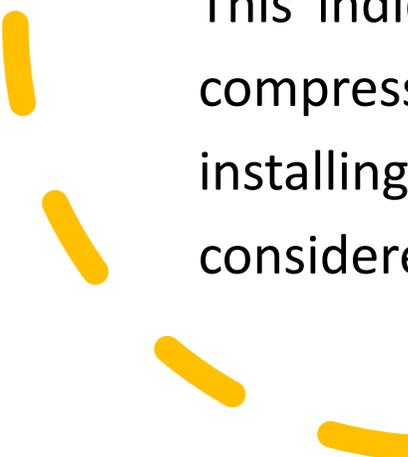
Details of recommendations given by Zerowatt

- Running hours of each compressor during the analysis duration of 320 hours is given here
- There is significant difference in utilization of compressors. This means the schedule is not being followed properly. Operators should be instructed to adhere to the schedule

Compressor No.	Running hours
Compressor 1	49
Compressor 2	141
Compressor 3	101
Compressor 4	166
Compressor 5	266
Compressor 6	276



No.of start-stops for different compressors during the period is listed here

- No.of starts-stops for compressor-1 is very high. Reason needs to be checked
 - For other compressors also, on an average, 3+ starts and 3+ stops are happening every day. This indicates a high variation in demand for compressed air. If that is the case, then installing a large air-receiver tank may be considered. This can save a lot of energy.
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Compressor No.	No.of Start-stops
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Compressor 1	190
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Compressor 2	96
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Compressor 3	78
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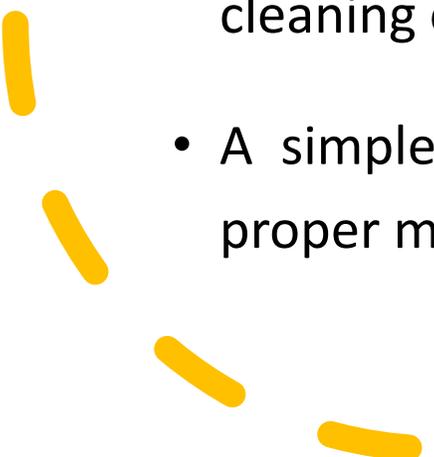
Compressor 4	66
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Compressor 5	84
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For full load operation, power taken by different compressors is listed here

- Compressor-3 is most efficient followed by compressors 1,4 and 2
- Hence, compressor 3 may be used more often than other compressors
- Also, during servicing, more focus may be given to compressor 2 & 4

Compressor No.	Avg. Power
Compressor 1	61 kW
Compressor 2	63.5 kW
Compressor 3	60.4 kW
Compressor 4	62 kW

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- From the schedule of operation, it can be understood that the compressed air requirement is usually met by running 4 compressors. But there are instances where all 6 compressors were running.
 - Usually, a system is not designed for using all machines at the same time. It seems that there is some additional air requirement happening than what is considered in the design. This could be because of leakages, use of compressed air for surface cleaning or because the compressors need servicing
 - A simple leakage test, monitoring of compressed air usage by employees and proper maintenance of compressors may be considered
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Machine Shop in Bangalore

ZeroWatt Energy monitoring system identified energy wastages in two CNC machines and one compressor

Miyano CNC Machining Centre

Doosan Vertical Machining Centre

Chicago Pneumatic Compressor

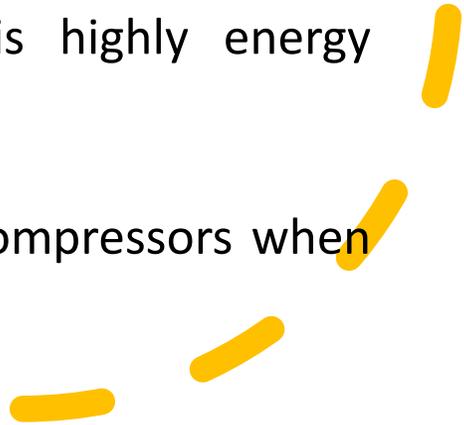
Miyano machine was running at <1 kw load for 25% of the time. This much idle running is a pure wastage of electricity.

Doosan machine was running at <1 kw load for 40% of the time. This is also idle running of equipment.

Operators were instructed to switch off the machine when long breaks are there between jobs.

The compressor was running at < 10% rated load for around 60% of the time. Running at such low loads is highly energy inefficient.

Operators were instructed to switch off the compressors when there is no requirement.





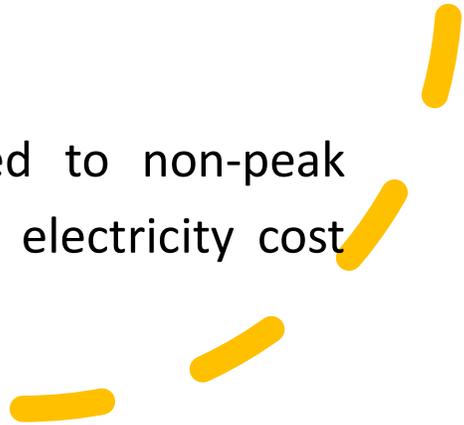
Five star resort in Munnar

ZeroWatt System helped in reducing electricity wastage by

- Resetting chiller temperature, and
 - Re-scheduling laundry operation
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Chillers

Laundry Machine

- Zerowatt Energy Intelligence System identified the unusually continuous operation of chillers. Further investigation revealed that the chiller temperature was set much lower than required.
 - The chiller set point was then increased to match the weather in Munnar. The chiller operation was thus optimized, resulting in a saving of around 3000 units of electricity per month.
 - The laundry machines were found to be running during peak-hours, when the per unit electricity cost is higher than normal hours.
 - Laundry operations were promptly shifted to non-peak hours, which resulted in around 15000 Rs electricity cost savings per month.
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Five star Hotel in Cochin

ZeroWatt System helped to identify energy wastage in electric water heaters

Water heaters

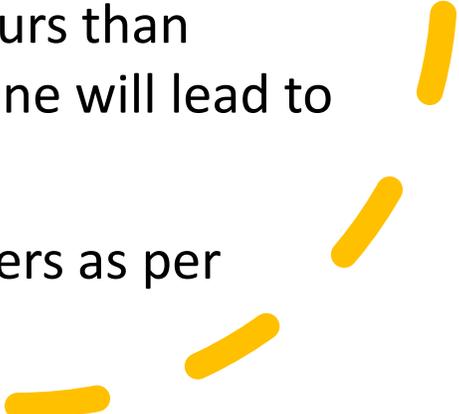
- Zerowatt Energy Intelligence System identified the unusually continuous operation of water heaters.
 - Hot water from heaters was stored in a roof-top tank. The tank did not have thermal insulation and the operators forgot to put the tank cap back for many days. This resulted in continuous heat loss and the heaters were running continuously to make up for this loss.
 - The cap was put back in place, which alone resulted in 2000 units/month savings. The management has also decided to insulate the tank.
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Five star hotel in Calicut

ZeroWatt System helped to reduce energy wastage by optimizing chiller usage

Chiller Optimization

- The total chiller load was less than 5 kW for 25% of the operating time. This is idle run without contributing to any cooling.
 - Operators were instructed switch off chiller when load is very low
 - For around 20% of the operating time, 2 chillers were running when the cooling requirement could be handled by only one chiller.
 - Operators were instructed switch off one chiller when requirement is low.
 - Chiller-1 was running for 4 times more hours than chiller-2. Over utilization of one chiller alone will lead to unnecessary breakdowns.
 - Operators were instructed to run the chillers as per schedule
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Large Machine shop in Coimbatore

ZeroWatt System helped to reduce energy wastage by avoiding extensive idle running of machines

Idling of Machines

- The facility comprises 80 machines including lathes, grinding machines, vertical turning centres, Vertical machining centres etc
- Zerowatt Energy Intelligence System was able to identify that many machines were kept idling during lunch breaks and snack breaks, consuming 1.8 - 2.3 kw per machine for a duration of 2 hours each day.
- Subsequently, employees were asked to switch off machines during breaks and management is able to monitor this remotely using Zerowatt dashboard. Around 10,000 units/month electricity is saved by this single initiative
- By comparing electricity consumption of similar machines, it was identified that some machines are consuming much higher power than average. These machines are being serviced now. This initiative is also projected to yield substantial energy savings.



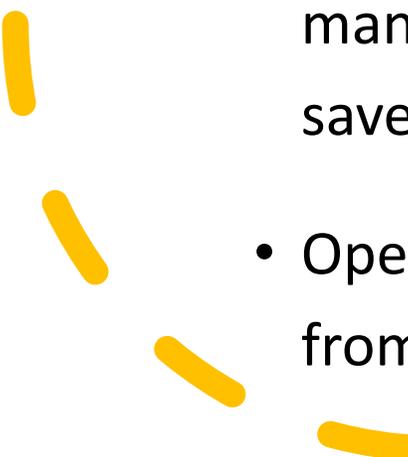
Gear Manufacturer in Coimbatore

ZeroWatt System identified energy wastages as well as machine health issues in multiple areas

Compressors : Observations

- Running hours of each compressor during the analysis duration of 600 hours is given in table.
- There is significant difference in utilization of compressors. Unequal utilization will lead to unnecessary wear & tear and breakdown.
- Operators are instructed to adhere to a proper schedule for compressors

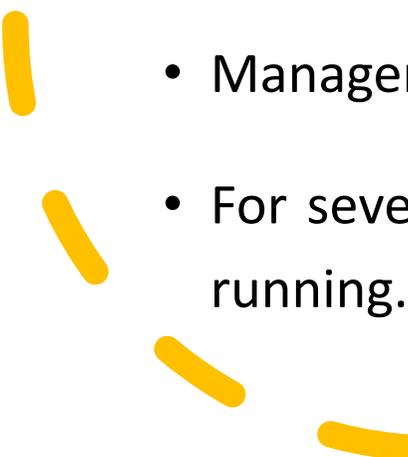
Compressor	Running hours
Compressor 1	285
Compressor 2	0
Compressor 3	447
Compressor 4	531
Compressor 5	496
Compressor 6	0

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- Compressor-4 run for <50% load for 15% of the time.
 - Compressor-5 run for <50% load for 22% of the time.
 - Running compressors at <85% of rated load is inefficient in terms of power consumption.
 - For 145 hrs, 2 compressors were running, whereas the load could be managed with only one. Running extra equipment may be avoided to save electricity.
 - Operators are instructed to run the compressor as per the alerts coming from Zerowatt system.
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Cooling pumps : Observations

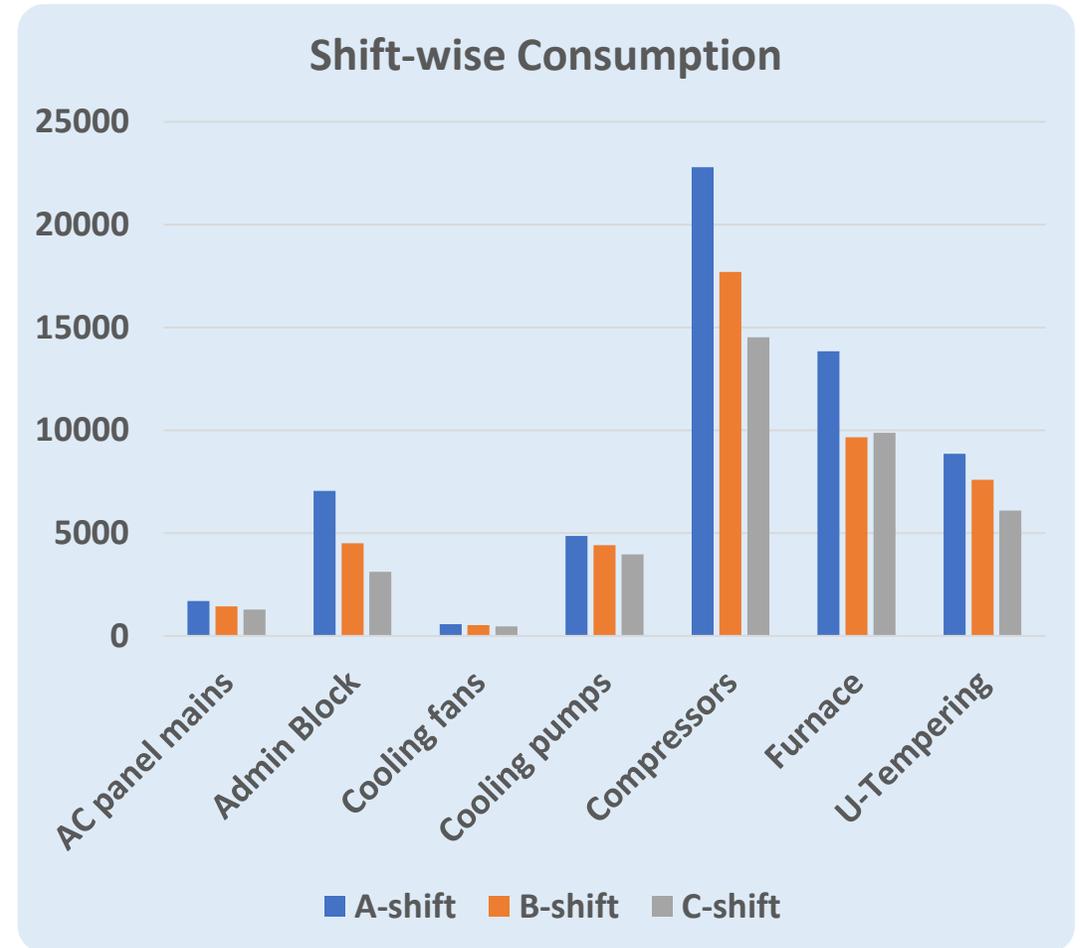
- Running hours of each cooling pump during the analysis duration of 600 hours is given in table.
- There is significant difference in utilization of pumps. Unequal utilization will lead to unnecessary wear & tear and breakdown.
- Operators are instructed to ensure equivalent utilization of pumps.

Cooling Pump	Running hours
Cooling pump 1	487
Cooling pump 2	557
Cooling pump 3	551
Cooling pump 4	556
Cooling pump 5	0
Cooling pump 6	71

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- The rated load of pumps are 5.5 kw. But most of the cooling water pumps were running at much higher than rated load. Out of 600 hrs analysed,
 - Pump-1 run for 68 hours with >180% rated load.
 - Pump-2 run for 372 hours with >150% rated load.
 - Pump-3 run for 110 hrs with >160% rated load.
 - The manager was informed to check whether there is any chock in piping or if the motors are rewound multiple times.
 - Management has decided to replace the motors.
 - For several hours, cooling pumps were observed to be running without cooling fans running. This is an electricity wastage. Operators were asked to adhere to SOP
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Shift-wise equipment usage

- Zerowatt identified that equipments are not utilized equivalently in A,B,C shifts.
- Manager was informed to check whether this is purely because of operational requirements or if there is a lack of monitoring





Diamond polishing Unit in Bangalore

ZeroWatt System identified instances when

- Sintering machine was running without cooling water pump ON – This is detrimental to the health of the machine
 - Cooling water pump running without Sintering machine ON – This an unnecessary electricity wastage
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Food processing Unit in Coimbatore

- ZeroWatt System identified instances when two Ammonia compressors were running at overloaded condition for $> 50\%$ of the time
 - Manager was informed to check if there are any internal issues in the compressors
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Thank you for giving us an
opportunity to build a sustainable
future together

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