Case Study

M&M is delighted with the performance of HMX's evaporative cooling solution

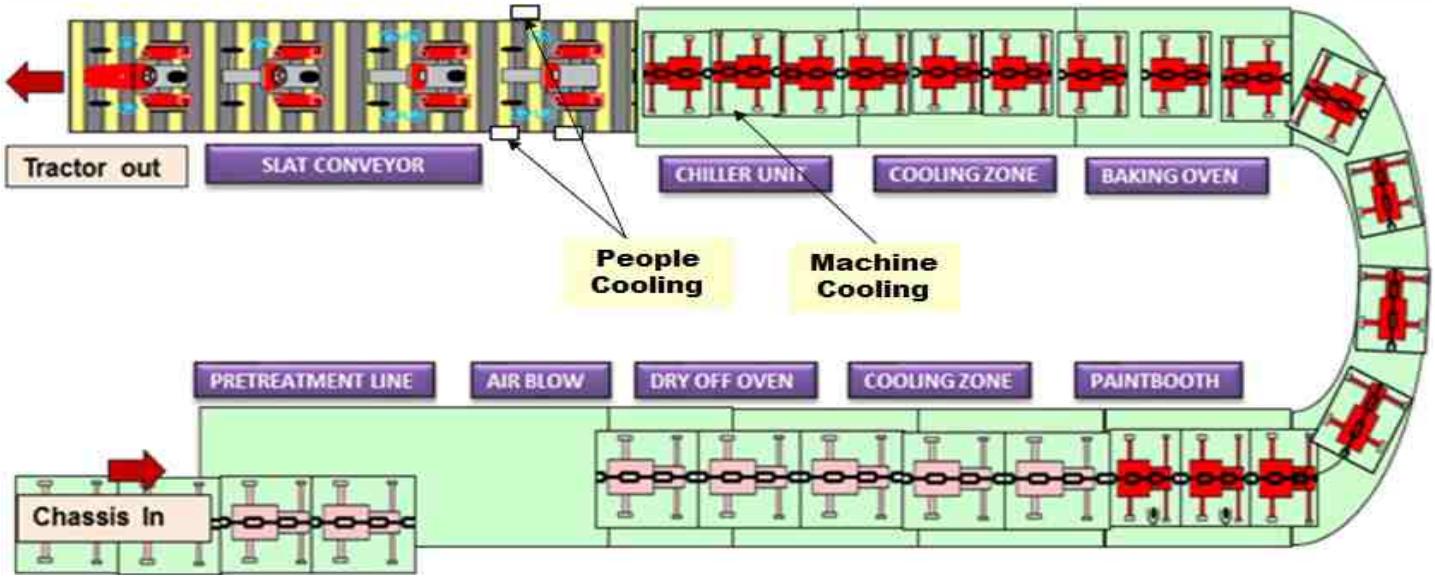
Background

Mahindra & Mahindra (M&M) is the largest tractor manufacturer in the world (by volume). M&M has already sold over 2.1 million tractors. The manufacturing plant on Hingana Road, Nagpur, rolls out 90,000 tractors per year and is one of the largest tractor manufacturing units in India.

Challenges

M&M has more than one tractor assembly shop floor at its manufacturing plant in Nagpur. The factory management was using a 40 TR chilled water system for machine cooling and an air handling system (without cooling coil) for worker comfort at one of their tractor assembly areas. Though the chilled water system proved to be adequate for cooling the machines, it failed to provide comfort to the workers. This problem was further aggravated by the extreme summer conditions in Nagpur where temperatures soar upto 47 °C.

This led to frequent worker discomfort that resulted in loss of production.



HMX-IDEC

Solution

When approached by M&M for a solution, the head of the R&D department of HMX visited the site. Upon investigation it was found out that in addition to inadequate chiller capacity, an improper layout of ducting and the resulting excessive losses in static pressure also contributed to the failure of the existing cooling system. It was decided to modify the existing ducting layout and install a HMX-IDEC (blowthrough type) of 32,000 CFM capacity. Out of this, 16,000 CFM was going to be used for machine cooling and the remaining 16,000 CFM for people comfort.

Why HMX?

The management was facing a recurring problem of rusting of the blowers and motors on air washers in other parts of the factory. Most importantly comfortable temperatures were also not being maintained on the shop floors due to the limitation of the single stage evaporative cooling. Hence M&M was searching for something better.

Team HMX provided M&M with a solution wherein it could use the existing ducting system with a slight change in its layout. Our team was also able to convince M&M that only a two stage evaporative cooling system could bring down the ambient temperature from 45-47 °C to 26-27 °C. Further with the use of the blowthrough HMX-IDEC, the possibility of rusting of the blower and motor could be completely eliminated.

Result

The 32,000 CFM blowthrough HMX-IDEC was commissioned in February, 2014. Since its commissioning, HMX-IDEC has successfully provided comfort to the workers and cooling to the machines on the assembly shop floor. The below table shows temperature readings observed on 24 March at different times during the day.

Temperatures between 25 - 27 °C are being maintained consistently on the assembly shop floor even during the hottest part of summer. Both the management and the workers are extremely happy with the solution provided.

Table : Temperature readings of HMX-IDEC

Sr. No.	Date	Time	Ambient temperature (°C) DBT	Room temperature (°C) DBT
1	24/3/14	1.00 PM	38	25
2	24/3/14	2.30 PM	40	26
3	24/3/14	4.00 PM	39	27

Result

- Rusting of moving parts is eliminated
- Reduction in temperature at the outlet of the IDEC by 0.6 to 1 °C due to elimination of motor heat entering into the room
- Filtered secondary air ensures more robust operations
- Eliminated use of present AHU and chilled water system. Green solution with two stage evaporative cooling
- Reduces carbon footprint while delivering superior performance

Conclusion

After experiencing the cooling provided by the HMX-IDEC, the management decided to stop the use of the chilled water system completely, along with the AHU. These systems are now being kept on standby. This has resulted in power consumption of only 27 kW per hour compared to a previous consumption of 58 kW per hour (by the chilled water system). This means a saving of 31 kW per hour along with excellent cooling, which was beyond the expectations of M&M.

The management at M&M now enjoy the dual benefits of excellent cooling and power savings after the commissioning of HMX-IDEC. They are already in talk with us for replacing 2 x 200 TR chiller units at two different locations in the same factory and also using the IDECs' to cool another tractor assembly shop floor.

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