

## Case Study

**HMX's evaporative cooling solution helps maintain comfortable working condition at Relaxo Footwear****Background**

Relaxo Footwear made a humble beginning in the year 1976. The company has grown by leaps and bounds since then and today is the second largest manufacturer of footwear in India with an annual sales figure of more than Rs. 8,700 million. The company manufactures more than 300,000 pairs of footwear per day in its 9 manufacturing units in North India.

**Challenges**

The manufacturing of footwear involves two basic processes. The first stage involves shaping and stitching, which doesn't involve any heat generation. The second stage involves the injection moulding of the sole into the base of the upper part of the shoe. This is an endothermic process and involves the supply of a generous amount of heat to the mould. A lot of heat is also released around the moulding machines which causes significant discomfort to the workers in the area. On an average 20 people work on one such moulding machine at Relaxo.

The problem is further compounded by the notoriously hot summer temperatures in North India. The ambient temperature goes up to 45 - 46°C and makes working near the moulding machines extremely difficult.

When Relaxo Footwear was setting up a state of the art manufacturing unit in Bahadurgarh for its export markets, its newly appointed Director, Mr Rahul Dua, and his team, were clear on installing a cost-effective air cooling system to make this facility truly world class, that would not only improve the level of worker comfort and productivity, but also be true to its ideal of being a people-driven organization.

**Why HMX?**

A senior level team from Relaxo visited HMX-IDEDEC installations at Bosch at Jaipur and Volkswagen at Pune. The degree of cooling that they experienced at both these locations cleared all their doubts about the performance capabilities of the HMX-IDEDEC. The team unanimously agreed that only the HMX-IDEDEC would be able to deliver air temperatures as per their requirements.

Keeping in mind the clear benefits (shown in next page) provided by us and the visits made to Bosch and Volkswagen, Relaxo was fully convinced about the advantage of going in for the HMX-IDEDEC and placed with us its order for two HMX-IDEDEC units with individual capacities of 40,000 CFM.

**Solution**

This is the point where team HMX came into the picture. Since the customer was not using any form of air cooling, our sales team had to start from the basic principles. Relaxo was explained the basic concept of two stage evaporative cooling system and its advantages when compared to other technologies such as conventional air conditioning and other modes of air cooling. The option of conventional air conditioning was ruled out envisaging the high capital and operational expenditure.

Based on the calculations done by our team, it was concluded that a total of 120,000 CFM would be required to provide cooling to 120 people working on 6 moulding machines. The installation of 3 x 40,000 CFM units was proposed. This was to be a typical spot cooling solution where only the heat around the moulding machines had to be removed for providing relief to the people working on them.



HMX-IDEC at Relaxo Footwear , Bahadurgarh , India



Ducting layout inside the factory

**Clear benefits:**

|  | HMX-IDEC   | Air washer                             |
|--|--|--|
| 1. Temperature to be achieved at 4 moulding machines   |  | 24°C                                   |
| 2. Volume of cool air required to achieve 24°C temperature                                     | 80,000 CFM   | 133,000 CFM                            |
| 3. Additional percentage of cool air volume required by air washer as compared to the HMX-IDEC |  | 67% extra air required                 |
| 4. So, additional electricity consumption for air washer                                       |  | 25% extra cost for same cooling effect |
| 5. The volume of water added considering 12 hours of operation per day and 300 days in a year  | 3.00 million   | 3.6 million                            |
|  | Lesser amount of moisture addition for same cooling effect |  |

**Result**

**IDEC 1: Temperature readings**

| Sr. No. | Date     | Time    | Ambient temperature (°C) DBT | Room temperature (°C) DBT |
|---------|----------|---------|------------------------------|---------------------------|
| 1       | 20/04/14 | 1.30 pm | 34                           | 24.5                      |
| 2       | 20/04/14 | 2.35 pm | 34                           | 23.5                      |
| 3       | 20/04/14 | 3.10 pm | 33                           | 23.5                      |

**IDEC2: Temperature readings**

| Sr. No. | Date     | Time    | Ambient temperature (°C) DBT | Room temperature (°C) DBT |
|---------|----------|---------|------------------------------|---------------------------|
| 1       | 20/04/14 | 1.30 pm | 34                           | 25.0                      |
| 2       | 20/04/14 | 2.35 pm | 34                           | 22.5                      |
| 3       | 20/04/14 | 3.10 pm | 33                           | 23.0                      |

The above tables show the temperature readings taken at site of both the machines and at different times. They clearly show that the temperature achieved around the moulding machines is very close to the design temperature. This shows that our patented heat exchanger, DAMA, is performing exceptionally well.

The temperature around the 4 moulding machines has come down considerably, improving the worker comfort level which in turn has helped to increase productivity.

The management is looking at the possibility of installing the HMX-IDEC around other moulding machines in this factory and for their other factories as well.