Converting Design to Reality at HICC

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Times have changed. Customers now are more demanding than ever. They want quick results and short completion periods. Consultants are equally demanding. They want you to implement their new designs and concepts and ensure that these work to their satisfaction. Our contract for air conditioning the Hyderabad International Convention Centre was no exception to such demands with a completion period of only eight months. This centre, the first of its kind in India, was designed with several innovative features that would help to reduce installed capacity and conserve energy. How we measured up to this challenge is the subject of this article.

There was a time when IBM used to have a sign strategically placed all over its offices that merely said THINK, to remind their engineers to think before they act, and that's exactly what the project team did a lot of to start with. Preliminary planning indicated that preparation of shop drawings for duct layout, submittals for approval of major imported equipment involving long delivery and shipping time and selection of dependable, quality - conscious sub contractors for ductwork, piping, insulation and electrical were extremely important and had to be completed on a war footing.

A project completion schedule was prepared in MS Project showing actual start and actual finish against baseline start, baseline finish and used to update the work progress on a weekly basis.

Some of the project's design features and how we coped with them are explained below.

High DT Cooling Coils

This was a very important requirement called for by the consultant in his design and specifications. Normal chilled water cooling coils selected and commonly used in India have a DT of 5°C which is the difference between the entering and leaving water temperature to the coils. High DT coils call for a 10°C split in order to take advantage of substantially lower water / brine flow rates, smaller pumps and smaller pipe sizes. The packaged water / brine chillers must also have a matching temperature drop capability to ensure balanced operation of the cooling system.

While the major chiller manufacturers could readily confirm their ability to design and supply such chillers, we faced difficulties in having Indian cooling coil manufacturers guarantee this high DT drop. It was obvious to us that they were not confident of their design and nor could they give us a list of installations where such coils had been supplied earlier and per-

About the Author

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forming with such high temperature drops.

Hence we decided to import these coils from a reputed American manufacturer without any premium on price. Subsequent trials after commissioning the cooling system have confirmed satisfactory performance of the coils.

Ductwork

Very often in the past when hand fabricated ductwork was the norm, this item of work was responsible for delays especially on large projects such as the HICC, where

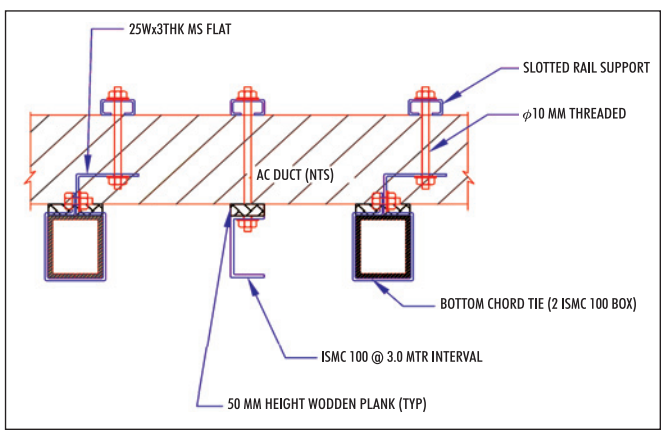

Figure 1 : Sketch of steel supports for ductwork

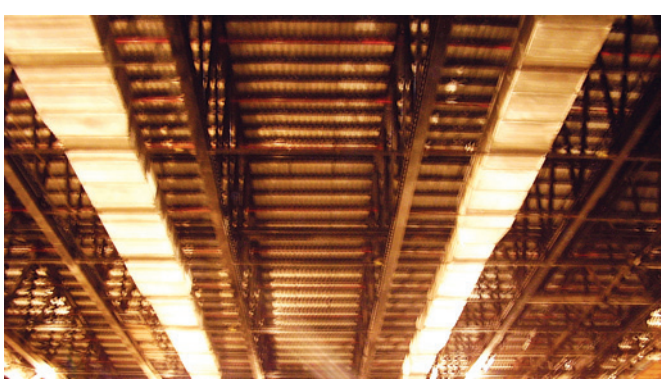

Photo 1 : A view of the ductwork in the Convention Hall

approximately 17,000 m^2 of ductwork was required, a major part of it in the gigantic convention hall (107 m long 67 m wide). We selected a ductwork sub contractor with facilities for mechanised fabrication and adequate experience to handle our project on time.

Installing the ductwork in the convention hall at a height of 12.5 meters from floor level involved designing and providing steel supports in between the trusses and laying the ducts on these supports. Considering the vast area of the hall and the height, providing scaffolding for duct erection worked out to be a very expensive and time consuming proposition.

We therefore devised moveable steel frames which were fabricated and installed between the trusses to allow workmen to stand over the catwalks and safely erect the

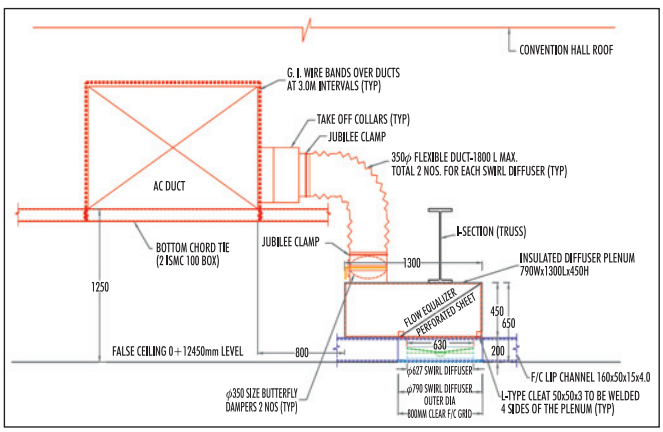

Figure 2 : Sketch of a Swirl diffuser installation

ducts. No ladders or scaffolding were therefore required.

Swirl Diffusers

This type of diffuser, not commonly used in India, was specified by the consultant to achieve a throw of 10 metres, a high induction rate, a low noise level and draftless air distribution in the convention hall.

Since such diffusers are not manufactured in India they were sourced from the UK and installed in specially

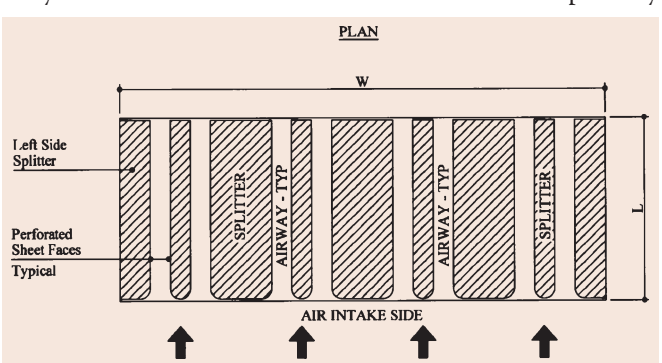

Figure 3 : Sectional plan view of a typical silencer

designed acoustic plenums to achieve the low noise level specified. The plenum design was provided by the diffuser manufacturer and modified by us to suit the site requirements.

Noise Level Silencers

To achieve the specified noise level of less than NC 30 in the convention hall we appointed Prime Technologies, Dubai, acoustic designers and suppliers, who, after studying the air handling units and the blowers incorporated in these units, as well as the ductwork layout, arrived at a suitable design of sound attenuators to be installed in the supply and return duct sections of each air handling unit.

These attenuators or silencers were fabricated in Hyderabad using the consultants fabrication drawings with fibreglass acoustic insulation material of required thickness and density.

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Figure 4 : Transporting a tank to the site

After commissioning the system, actual sound level readings taken by the consultant, confirmed that the acoustic design of the silencers was, in fact, more than adequate to achieve the NC 30 requirements.

Thermal Storage System

For the first time in Hyderabad, a thermal storage system was part of the design specifications of the consultant, and this feature helped to optimise the chiller size and reduce the connected power requirement of the air conditioning system. Adequate storage capacity also helped to meet peak cooling loads of short duration and to meet the cooling need during complete power interuptions.

The storage requirement was met by providing three massive steel tanks of 70m^3 capacity each, with dimensions of 3m diameter × 10.2m length, an empty weight of 10 tons and an operating weight of 80 tons. Very fortunately we were able to locate a steel shop with adequate fabrication facilities only 45 km away from the HICC site. The tanks were transported to site on open trucks after obtaining all necessary road permits and installed on RCC foundations with the help of special heavy-duty mobile cranes.

Two layers of 50mm EPS of TF quality was applied as external insulation and covered with a protective 26G aluminium clading.

Imported Equipment used for the Project

• Chillers	Carrier from China
• Cooling towers	Marley from Malaysia
• Pumps	ITT from USA
• Cooling coils	From USA
• VAV boxes	Johnson from Singapore
• Aerofoil Blowers	Kruger from Singapore
• VFDs	ABB from Singapore
• Actuators	Belimo from Switzerland

Fumigation System

This system was part of the consultant's design to help flush out and ventilate any part of convention hall with the help of manually operated dampers in the supply and return duct system connections to the air handling units. ❖