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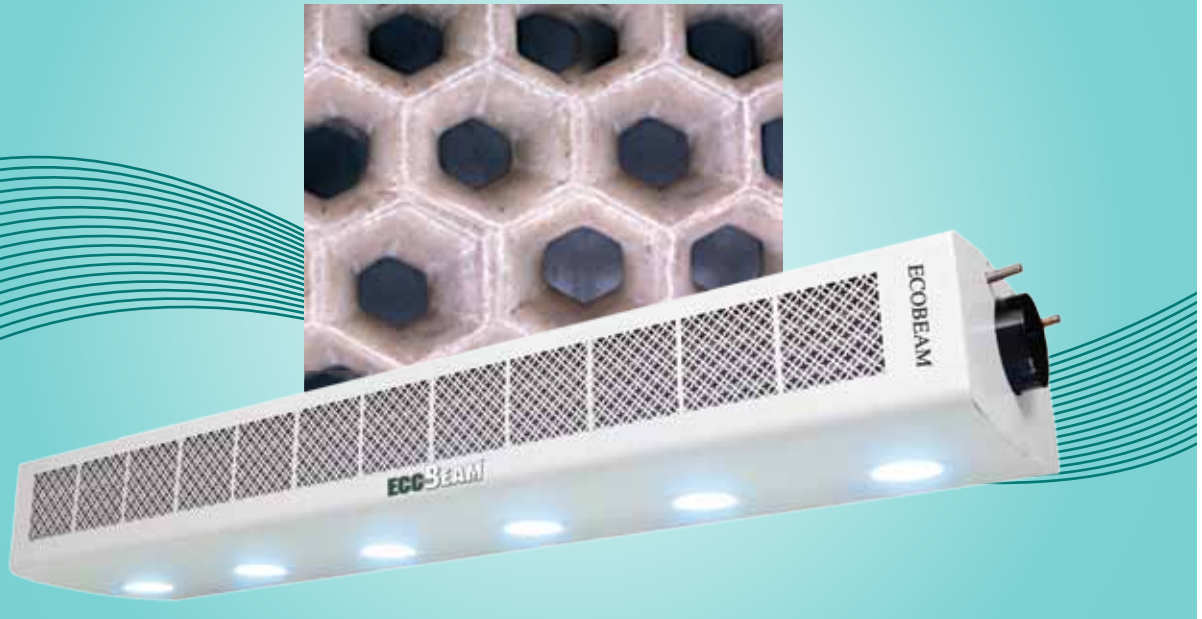
Inspired by the ancient art of Cooling



DRI™ ECOBEAM™

Chilled Beams

Developed in Asia, for Asia and the humid regions around the globe

DRI™

Innovative Air Solutions

What is a Chilled Beam?

Chilled Beams are room air recirculation devices, which are used to cool and ventilate spaces wherein user comfort and good indoor air quality is desired and valued; typically in commercial office spaces, hospital patient rooms, hotel rooms, classrooms and laboratories. Chilled beams also supplement the flexible use of available space, and are used where the primary air is dehumidified.

DRI's range of *EcoBeam* have a higher induction ratio and, therefore, the primary air volume is reduced and the supply air needs to be dehumidified to become dry enough to carry out all internal moisture loads. When paired with the DOAS, the chilled beam system ensures reliable and energy efficient system operation.

Benefits of Chilled Beams

- Eliminates the fan for room air circulation, thereby reducing the fan power requirements.
- Chilled Beams use water as energy carrier, making it efficient in terms of system energy use and space requirement of building services in a building.
- Indoor air quality improves since the outdoor air is required to cater to the internal latent load.
- Chilled Beam system has limited maintenance requirements.

Benefits of *EcoBeam*

- Have higher induction ratio, so less primary air is needed to induce the room air. This results in better energy efficiency.
- Chilled Beams used in conjunction with DOAS ensures integrated energy recovery and moisture removal.
- One source responsibility lowers the risk, and saves time and money.

Applications

Chilled beams can be used in buildings where outdoor air is treated (dehumidified) before supplying it into spaces and infiltration of outdoor air is in control. Also the internal moisture (latent) loads need to be moderate and primary air volume sufficient to avoid condensation. Therefore, the typical applications are:

Commercial Office Buildings

In an office building, chilled beam systems provide several benefits. The lower supply air volume provides significant energy savings without influencing the comfort of users. In addition, the smaller infrastructure required to move lower air flow allows for small plenum spaces, translating into shorter floor-to-floor construction or higher ceilings. In case dedicated outdoor air system with good filtration is used, the indoor air quality is also improved.

Hotel rooms

Hotel rooms can also benefit from chilled beam systems. Fan power savings come from elimination of fan coil units, as a central air handling unit can have a lower total specific fan power. Also, less maintenance is needed inside the hotel room due to removal of the condensation pipes and filter.

Schools

Schools can benefit from chilled beam systems as the primary air is only used for providing good air quality for people and extra heat is removed with water. Therefore, the benefits of a lower supply air volume are reduced fan power, lower plenum height, reduced reheat requirements and noise levels.

Hospital Patient Rooms

In the hospital patient rooms, the room air temperature can be controlled to desired level without need to increase the air volumes. When fully cleanable models are used, the high hygiene requirements of hospitals can be met.

Laboratories

In sensible load driven laboratories where the supply air rate is driven by the internal gains (such as refrigerators, testing equipment, etc.) as opposed to the exhaust requirements, chilled beam systems can offer significant energy savings.

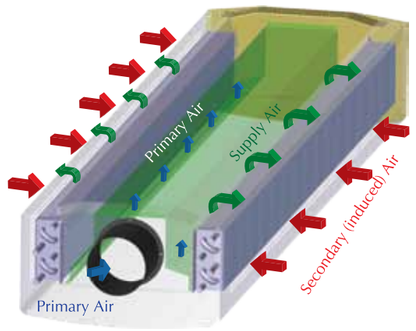
Tell Me More!

Chilled Beams

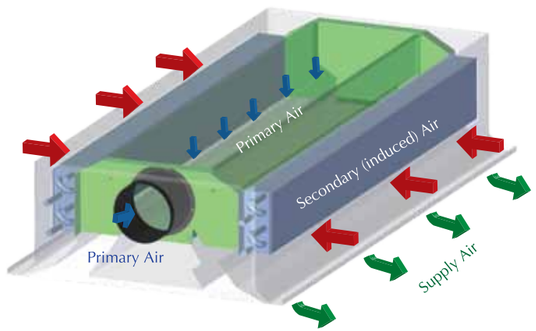
Active chilled beams are connected to both the ventilation supply air ductwork, and the chilled water system. The main dedicated outdoor air-handling unit supplies primary air into the rooms through the chilled beam. Primary air supply induces secondary air (room air) to be recirculated through the heat exchanger of the chilled beam. In order to cool the room cooled (15^{o} -18^{o} C) water is cycled through the heat exchanger. Cooling output of active chilled beam is depending on the amount of secondary air induced via heat exchanger and the difference between room air temperature and average water temperature. Room temperature is controlled by regulating the water fl ow rate of through the heat exchanger. When desired, hot water (30^{o} -45^{o} C) can be used in this system for heating.

The *EcoBeam* solution we developed is based on the innovative and patened nozzle arrangement together with venturi. Both the ecoNozzle and ecoVenturi design have been inspired by old Indian architectural element “jali”, which has been used over the centuries to increase air movement in buildings. A nozzle is the “engine” of active chilled beam to create room air circulation, while the venturi is a funnel, where velocity of the air increase as the cross sectional area decreases.

EcoBeam - ECB-E-451



EcoBeam - ECB-C-601



Case Study: One building – four different HVAC Systems

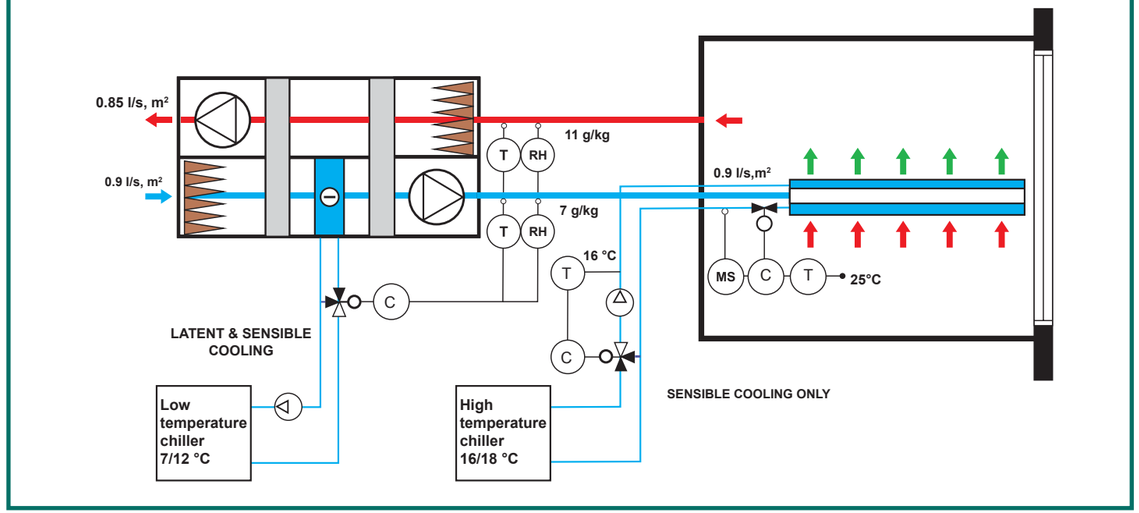
Energy efficiency of four different HVAC systems were simulated in three different cities of India. Chilled Beams system provides the most energy efficient solution viz; 20-25% less energy is used than in traditional system. In case, EcoBeam is integrated with DOAS system, further energy can be saved.

Pairing EcoBeam with DOAS

In a typical chilled beam application, the primary air volume is increased by about 50% of ASHRAE 62.1 + 30% (LEED requirement) to enable high enough secondary air circulation via heat exchanger. This means increased fan energy and bigger space requirement of ducts, as higher air volumes are distributed in the building and also reduced air quality as a. 30-50% of air is recirculated.

As EcoBeam have higher induction ratio, less primary air is needed to induce the room air and therefore building can be designed based on fresh air requirement only. This also allows using DOAS (Dedicated Outdoor Air System) units for air handling with integrated energy recovery and moisture removal. As the primary air volume is reduced, the supply air needs to be dehumidified to become dry enough to carry out all internal moisture loads. This can be ensured with **DRI Ultima**, where double-wheel with cooling coil is able to remove enough moisture from primary air.

Operation Schematic of DOAS with Active Chilled Beam System



EcoBeam Range

EcoBeam ECB-C-601 Concealed chilled beam
- ❄ High cooling capacity with low primary air volume
- ❄ 2-way discharge
- ❄ Installation with suspended ceiling
- ❄ End connection of air duct and pipes
- ❄ Condensation collection trays
- ❄ Integrated LED panel light as option

EcoBeam ECB-C-602 Concealed chilled beam
- ❄ 2-way discharge via ceiling grille
- ❄ Air intake directly from the room
- ❄ Installation with suspended ceiling
- ❄ End connection of pipes, side connection of air duct
- ❄ Condensation collection trays

EcoBeam ECB-C-603 Concealed chilled beam
- ❄ Low unit height
- ❄ 2-way discharge
- ❄ Installation with suspended ceiling
- ❄ End connection of pipes, side connection of ducts

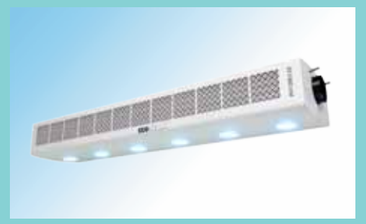
EcoBeam ECB-C-604 Concelead chilled beam
- ❄ 600x600
- ❄ 4 way discharge
- ❄ Installation with suspended ceiling
- ❄ Condensation collection trays

EcoBeam ECB-C-605 Concelead chilled beam
- ❄ 1200x600
- ❄ 4- way discharge 1200x600
- ❄ Installation with suspended ceiling
- ❄ Condensation collection trays

EcoBeam ECB-C-151 Concealed chilled beam
- ❄ 1-way discharge via ceiling grille
- ❄ Installation with suspended ceiling typically near the window
- ❄ End connection of pipes, side connection of air duct
- ❄ Condensation collection tray

EcoBeam ECB-E-301 Exposed chilled beam
- ❄ Installation to the corner of wall and ceiling
- ❄ 1-way discharge from side
- ❄ Exposed installation
- ❄ End connection of air duct and pipes
- ❄ Various perforation options available

EcoBeam ECB-E-451 Exposed chilled beam
- ❄ High cooling capacity with low primary air volume
- ❄ 2-way discharge towards the surface above the unit
- ❄ Exposed installation, min.100 mm free space required above the unit
- ❄ End connection of air duct and pipes
- ❄ Condensation collection trays
- ❄ Various perforation options available

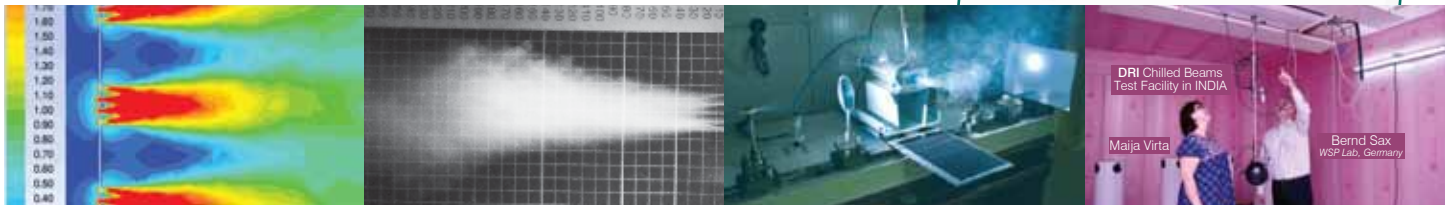


EcoBeam ECB-M-451 Exposed multi-service chilled beam
- ❄ Multi-service unit with various options available (LED lights, daylight sensor, occupancy sensor, PA-speaker, etc.)
- ❄ High cooling capacity with low primary air volume
- ❄ 2-way discharge towards the surface above the unit
- ❄ Exposed installation, min. 100 mm free space required above the unit
- ❄ End connection of air duct and pipes
- ❄ Condensation collection trays
- ❄ Various perforation options available

EcoBeam ECB-E-452 Exposed chilled beam
- ❄ Low unit height
- ❄ 2-way discharge from sides
- ❄ Exposed installation directly to the ceiling surface
- ❄ End connection of air duct and pipes
- ❄ Various perforation options available

Product Development and Testing

EcoBeam range have been developed in India for Asia and high humid areas around the world. The product performance is an outcome of thorough research and numerous studies using technologies like Computational Fluid Dynamics (CFD) and shadow graph. A state-of-the-art test facility has been built for testing chilled beam performance based on both Eurovent and AHRI testing procedure. It can also be used for application testing.



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ECB/2016/101/R2

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