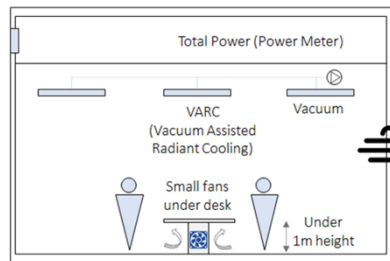
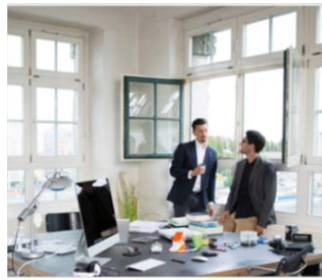


Hybrid cooling system with higher indoor temperature by Vacuum Assistant Radiant Cooling (VARC)



VARC system diagram



Hybrid cooling with an open window

Cooling energy reduction is one of the key factors to achieving Singapore's national climate target, net zero emissions by 2050. The building sector is responsible for more than 20% of Singapore's carbon emission and the majority of the electricity consumption in a building is attributed to cooling. In this context, a hybrid cooling system with higher indoor temperatures can bring cooling energy reduction by replacing the commonly used air-conditioning systems. In addition to the importance of cooling energy reduction, the way to improve indoor air quality has been widely discussed while going through the COVID pandemic. Natural ventilation is beneficial to maintain good air quality by bringing enough outdoor air into the room. In this regard, a hybrid cooling system with natural ventilation can bring significant positive impacts in cooling energy reduction and air quality improvement.

With the support from Building and Construction Authority (BCA), Building System and Diagnostics Pte Ltd has developed and commercialised a hybrid cooling system, VARC, that aims to provide thermal comfort for occupants under higher temperature conditions to reduce cooling demands and energy consumption. VARC is a patented technology that will provide radiant cooling. Instead of the typical supply & return chilled water circulation from a central cooling plant in the entire ceiling or floor, VARC utilizes lower temperature of water under lower pressure conditions in a vacuum cavity in modular panels. The vacuum pump maintains lower pressure in a cavity of panel to avoid the condensation issue on the surface of cooling panel. This will be the first radiant cooling system in tropical countries, which can provide thermal comfort in higher temperature space condition without any condensation issue. VARC is 50% more energy efficient than the typical air-conditioning system while enjoying satisfied thermal comfort based on actual site test & thermal comfort survey. More than 80% of survey participants felt neutral or cool.

Project Principal Investigator: Tan Phay Ping / Building System and Diagnostics Pte Ltd
Project supported by GBIC Product Prototyping

Applications:

- Hybrid cooling system with higher indoor temperature by Vacuum Assistant Radiant Cooling (VARC) for outdoor and open window space

Capabilities:

- Hybrid cooling system
- Cooling for outdoor and open window space
- Radiant cooling system in tropical countries

Benefits:

- Provide cooling for open space and open window space.
- Reduce building energy consumption.
- Improve indoor air quality and occupant's comfort.

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