

VARIABLE AIR VOLUME STRATEGIES FOR DEMAND CONTROL VENTILATION SEMICONDUCTOR CLEANROOMS

Course #: SCDCV101

Cleanroom applications such as battery manufacturing facilities, pharmaceutical production, and semiconductor fabrication all have one thing in common: the facilities they are made in use excessive amounts of energy. Given the high value of the outputs of these facilities, there is often more emphasis placed on reducing risk over saving energy, and this is a valid concern for facilities owners. **However, what if we told you there is a way to achieve both high quality product, and improved energy management?**

This presentation will provide you with the basic approach on HVAC and pressure control design strategies with a focus on ISO Class Cleanrooms. Specifically, we will emphasize variable air volume control and demand-based ventilation for semiconductor fabrication plants.

LEARNING OBJECTIVES

- Develop basic knowledge of High Purity Manufacturing with an emphasis on the critical quality parameters related to HVAC in the semiconductor application, including an understanding where ventilation systems are used in semiconductor manufacturing cleanrooms, and the importance of airflow patterns and their effect on particle migration using Computational Fluid Dynamics (CFD) models.
- With respect to wafer production, you will learn what the critical environmental quality requirements are and key factors of HVAC design that directly impact quality, yields and operating costs of the facility if not controlled consistently.
- A new approach and philosophy, driven by ASHRAE global regulators and cleanroom facilitators, to provide best practices in HVAC design approaches to address the ISO Class standards while still maintaining a stable pressure and achieving flexibility in space use and operations. Emphasis will be on variable air volume (VAV) control and use of environmental monitoring to implement demand-based ventilation (DBV) while still maintaining ISO Class standards.
- Provide examples of how other facilities have introduced this concept of VAV control and DBV successfully within the major mechanical level and room level to reduce their Energy Use Intensity (EUI).

Cleanrooms
use up to

**25x
more
energy**

than non-classified
spaces – mostly
due to HVAC¹

Reduce energy
consumption up to

**60%-
80%**

by implementing
demand based
ventilation
strategies¹

1. <https://www.sciencedirect.com/science/article/pii/S0378778819308102#bbib0008>
2. <https://www.sciencedirect.com/science/article/abs/pii/S0360132321000044>