



ASSOCIATION OF
CONSULTING ENGINEERS
SINGAPORE

ACES-TROX Training: 'Systems and Equipment'

TROX[®] ACADEMY

9 x Wednesdays; Duration: 1.5 hours per Lesson
Online Training – 8.00 pm to 9.30 pm

| Lesson 1 | Lesson 2 | Lesson 3 | Lesson 4 | Lesson 5 | Lesson 6 | Lesson 7 | Lesson 8 | Lesson 9 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 20 Oct | 27 Oct | 3 Nov | 10 Nov | 17 Nov | 24 Nov | 1 Dec | 8 Dec | 15 Dec |

Mode of Delivery: Online via Zoom Meeting
Limit to 40 pax per run
Registration link and QR Code <https://forms.gle/cdyismPSinsQ6KUCA>

CPD: PDU to be confirmed
Fee: \$120 nett per pax (ACES Member)
\$180 nett per pax (Non-Member)



COURSE OBJECTIVES

1. To provide training programs (on-line) for graduates and practicing engineers in the ACMV industry who need to either extend or update their knowledge on a particular subject(s) in accordance with current developments in the industry.
2. The training programs are designed to cater for the needs of young graduates, practicing technicians and engineers to provide a better understanding of certain fundamentals as listed in this series of courses.
3. To provide joint training programs with recognised engineering and/or training institutions in the Asia Pacific region.
4. The course is designed as a series of nine lessons on 'Systems and Equipment'.
5. The contents for each lesson is given below as a guide to show what can be expected in the training under each subject.
6. The course will be conducted sequentially in the order as shown below on a weekly basis. In short, since there are a total of nine lessons under this module to be conducted over a period of nine weeks.
7. The presentation for each lesson is expected to take 1 hour and 30 minutes including group discussion at the end of each lesson. Participants are encouraged to participate in discussion questions presented during and at the end of each presentation.

COURSE CONTENTS

The contents for each of the following courses are detailed below:

1. Introduction to ACMV Systems
2. Chilled Beam Systems
3. Thermal Displacement Ventilation (and UFAD) Systems
4. VAV Systems
5. Challenges of ACMV System in times of Covid-19
6. Noise Attenuation in ACMV Systems and Weather Louvers
7. Ventilation Dampers
8. Fire and Smoke Dampers
9. VAV Terminal Units and Accessories

i. Lesson 1 – Introduction to ACMV Systems

Content:

- Types of ACMV Systems
- Mixed Flow Systems
 - Constant Air Volume (CAV) Systems
 - Variable Air Volume (VAV) Systems
 - Fan Coil Unit Systems
 - Induction Unit Systems
- Task Conditioning Systems
- Types of Air Terminal Devices (ADT)
- Thermal Displacement Flow Systems
- Air-Water (or Chilled Beam) Systems

ii. Lesson 2 – Chilled Beam Systems

Content:

- What are Chilled Beams?
- How do they Work?
- Types of Chilled Beams
- Product Types and Features
- Induction Principle
- Benefits and Limitations of Chilled Beam Systems
- Installation Guidelines
- Are they suitable for Tropical Climate?

iii. Lesson 3 – Thermal Displacement Ventilation (TDV) and UFAD Systems

Content:

- Types of Air Diffusion Methods.
- Mixed Flow Systems.
- Task Conditioning Systems.
- Thermal Displacement Ventilation (TDV) Systems.
- Advantages and Limitations of TDV Systems.
- Under-floor Air Distribution (UFAD) Systems.
- Advantages and Limitations of UFAD Systems.
- Design Considerations
- Installation Examples

iv. Lesson 4 – VAV Systems

Content:

- Introduction on VAV Systems
- Benefits of VAV Systems
- Fan Laws
- Terminologies
- How does VAV System work?
- Types of VAV Terminal Units
- VAV Diffusers
- Types of Air Terminal Device suitable for VAV system
- Constant Flow Regulators

v. Lesson 5 – Challenges of ACMV System in times of COVID-19

Content:

- Virus Transmission
- Airborne Contaminants
- Mixed Flow vs Thermal Displacement Flow Systems
- Ventilation Rate
- Air Filtration
- Ultra-Violet Germicidal Irradiation (UVGI)
- Assessment of Ventilation Requirement to EN 16798-1

vi. Lesson 6 – Noise Attenuation

Content:

- Types of Attenuators
- In-line Duct Attenuators
- Cross-talk Attenuators
- Acoustic Louvres
- Specifications and Selection Guidelines for Attenuators
- External Weather Louvres
- Specifications and Selection Guidelines for Weather Louvres
- Installation Guideline and Examples

vii. Lesson 7 – Ventilation Dampers

Content:

- Types of Ventilation Damper
- Damper Characteristic Curves
- Damper Performance Ratings
- Damper Operation
- Damper Features and Specifications
- Damper Selection Guidelines
- Actuator Selection and Accessories

viii. Lesson 8 - Fire & Smoke Dampers

Content:

- What is a Fire Damper?
- What is a Smoke Damper?
- Types of Fire Damper; Smoke Damper and Combination Fire & Smoke Damper
- Selection and Application of Fire Dampers and Smoke Dampers
- Installation Guidelines for Fire and Smoke Dampers
- Standards relating to Fire dampers and Smoke Dampers

ix. Lesson 9 – VAV Terminal Units and Accessories

Content:

- Types of VAV Terminal Units
 - Single Duct VAV Terminal Units
 - Dual Duct VAV Terminal Units
 - Series Fan VAV Terminal Units
 - Parallel Fan VAV Terminal Units
 - Induction Type VAV Terminal Units
- Accessories
 - Air Re-heaters
 - Thermal Cut-out Switch
 - Pressure Differential Sensor or Flow Switch
 - Temperature Sensors
 - VAV Controllers

CERTIFICATION

- **E-Certificate of Attendance** will be issued to participant with at least 75% attendance.
- **E-Certificate of Competency** will be issued to participant upon meeting the requirements of the course and passing the examination.

TRAINER



Kenneth Gong

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Academic Qualifications:

BSc Degree in Building Services Engineering (Northumbria University, UK), 1987.
Diploma in Acoustic and Noise Control (Institute of Acoustics, UK), 1989.
Certificate in Quality Management (Institute of Quality Assurance, UK), 1989.
Master of Business Administration (Maastricht School of Management, Netherlands), 2009.

Kenneth is a qualified Chartered Building Services Engineer with more than 30 years working experience in the building services industry. After completion of his first degree, he started his career in the UK as a M & E Design Consultant for a period of 10 years before he returned to Malaysia in 1997.

Upon his return, he joined TROX Malaysia Sdn. Bhd., a multi-national manufacturer of air-conditioning components and systems. He is responsible for product research and development, product testing and certification and technical support and training.