

# Thermal, Combustion and Air Pollution Control Systems: Design, Specification, Operation and Maintenance

4th - 5th September, 2013  
Concorde Hotel, Kuala Lumpur, Malaysia

## COURSE DIRECTOR



Thomas F. McGowan, P.E.  
President  
TMTS Associates, Inc. USA

## Key Benefits of Attending this Workshop:

- ◆ **UNDERSTAND** the fundamentals of thermal combustion processes, flowrates and temperatures
- ◆ **LEARN** the importance of the 3Ts – Time, Temperature and Turbulence, in maintaining good combustion and minimizing pollution
- ◆ **OBTAIN** comprehensive technical charts, graphs, data and equations to allow easy calculations for better thermal system design and operation
- ◆ **ACQUIRE** skill and knowledge in handling NO<sub>x</sub> control and stack testing
- ◆ **KNOW** how heat and mass balances are compiled and run
- ◆ **GAIN** insight on thermal and air pollution control system monitoring, troubleshooting and maintenance
- ◆ **LEARN** how to evaluation and handle samples of materials and equipment for thermal and combustion

## What Makes Long Trends Corporate Training Courses Special?

- ◆ Interactive training sessions, proactive discussions and opportunities for experiences and skills sharing
- ◆ Small groups to ensure an effective learning environment
- ◆ Real-life case studies which enable the participants to apply what they have learned during the courses and enhance their understanding of the subject-matter
- ◆ Comprehensive course material including extensive documentation containing additional informative material, printout of presentation, case studies complete with proposed solutions and tools kits

- Over 40 years of experience in specification, design, manufacture, startup, testing, permitting and troubleshooting of thermal system from feed to stack.
- Having conducted training courses for American Institute of Chemical Engineers, American Society of Mechanical Engineers and Air and Waste Management Association
- Holder of US patent No.4,601,730
- Editor of Biomass and Alternative Fuel System : An Engineering & Economic Guide
- Co-author of The Industrial Wood Energy Handbook
- Recipient of 1984 US DOE National Energy Award
- Recipient of the Distinguished Services Award at the 2010 International Thermal Treatment Technology Conference

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All participants will receive a course certificate issued by Thomas F. McGowan, P.E.

## WORKSHOP OVERVIEW:

This is a two-day intensive technical training course designed for those who involve in thermal, combustion and pollution control systems design and operation.

With group discussion and real-life case studies, the course will cover the comprehensive concepts and practices of thermal combustion engineering and its application in a range of industrial process engineering practice including oil and gas processing, petrochemicals and others.

Upon finishing this course, participants can expect to secure comprehensive knowledge on combustion and air pollution control used throughout a wide range of industries. Participants can also expect to obtain data and up-to-date technique methods which allow them to handle a wide variety of thermal process assignments to reduce fuel use, control pollution and consequently enhance productivity and profitability of their organizations.

## WHO SHOULD ATTEND THIS WORKSHOP?

This course is a must-attend for all those working in the chemical, petrochemical, stone clay and glass, oil & gas and other industries where combustion processes are used and who need to understand combustion, thermal systems and air pollution controls. Interested personal include:

- ✓ Process Development Engineers/Managers
- ✓ Manufacturing and Industrial Engineers/Managers
- ✓ Chemical and Mechanical Engineers
- ✓ Process Engineers
- ✓ Utilities Engineers/Manager
- ✓ Plastics, Alloys and Refractory Engineers
- ✓ Civil Engineers
- ✓ Production Engineers
- ✓ Maintenance Engineers
- ✓ Environmental Engineers/Technicians
- ✓ Maintenance Supervisors
- ✓ Laboratory Technicians
- ✓ Chemical Plant Operators
- ✓ Procurement Engineers/Sales Engineers
- ✓ Project Managers and Engineers

### PRE-COURSE QUESTIONNAIRE:

To ensure that you gain maximum value from this course, a detailed questionnaire will be forwarded to you upon registration to establish your exact training needs and issues of concerns. Your completed questionnaire will be analyzed by the course trainer prior to the event and addressed during the event. You will receive a comprehensive set of course documentation to enable you to digest the subject matter in your own time.

# Day One

## Session 1 Combustion Basics and Fuel Efficiency

- ◆ Fuel to air ratios
- ◆ Heat of combustion -- gross and net
- ◆ Theoretical flame temperatures
- ◆ Rich and lean flames
- ◆ The concept of available heat
- ◆ Combustion charts and data tables
- ◆ Types of burners and flames
- ◆ Gas and oil trains
- ◆ Safety systems and flame management systems

## Session 2 NOx Control

- ◆ Combustion based/front end control via low NOx burners,
- ◆ Combustion based flue gas recirculation,
- ◆ Low O2 firing, reburning, water injection
- ◆ End of pipe techniques SCR, SNCR and wet scrubbers

## Session 3 Regulatory Review

- ◆ General review on (with US based limits) on particulate matter, NOx, SO2, HCl, SO3, dioxins and metals

## Session 4 Burning Gases

- ◆ Direct fired organic vapor oxidizers,
- ◆ RTOs (regenerative thermal oxidizers)
- ◆ Recuperative thermal oxidizers, flares
- ◆ Flashback prevention, flame arrestors

## Session 5 Burning Liquids

- ◆ Fuel oil, waste fuels, atomizers, aqueous wastes, high ash and slagging wastes

## Program Schedule

### (Day 1 - Day 2)

08:30	Registration
09:00	Session 1
10:40	Refreshments & Networking Break
11:00	Session 2
12:45	Lunch
14:00	Session 3
15:30	Refreshments and Networking Break
15:50	Session 4
17:00	Course Ends

## Day Two

### Session 6 Burning, Drying and Desorbing Solids

- ◆ Burning coal, biomass, bagasse, agricultural waste, wood pellets, DMC Fuel™, garbage/trash, grate fired
- ◆ Suspension/pulverized fuel burners
- ◆ Solids handling, slag control
- ◆ Thermal treatment of petroleum contaminated soils & other media
- ◆ Thermal treatment of oil based drilling mud

### Session 7 Boilers, Heat Recuperation and Fuel Efficiency

- ◆ Raising steam
- ◆ Saturated and superheated steam
- ◆ Fire tube and water tube boilers
- ◆ Radiant and convective sections
- ◆ Slag issues and fire side additives

### Session 8 Air Pollution Control Systems

- ◆ Venturi scrubbers
- ◆ Acid gas absorbers
- ◆ Coalescing mist eliminators
- ◆ Wet and dry electrostatic precipitators
- ◆ Baghouses, ceramic filters
- ◆ Combination/sequential APC systems
- ◆ Dioxin removal, mercury removal

### Session 9 Controls, Monitors and Testing, and Materials of Construction

- ◆ Functional specifications
- ◆ PLC control systems
- ◆ Temperature and flow monitors
- ◆ Automatic vs. Manual control
- ◆ Corrosion, alloys, refractories and insulation

### Session 10 Solving Plant Problems and Troubleshooting

Review of basic engineering test equipment, case studies of solving problems, and general approach to troubleshooting

#### In-house Training Solutions

Make use of Long Trends' expertise in the training industry and have this course customized to your company/organization at a time/venue of your choice and at a cost attractive to you! For more information, please email: [enquiry@long-trends.com](mailto:enquiry@long-trends.com)

### ABOUT THE COURSE DIRECTOR



**Thomas F. McGowan, P.E.**  
President  
**TMTS Associates, Inc. USA**

Mr. McGowan is the president and founder of TMTS Associates, Inc., an engineering consulting firm specializing in thermal systems, air pollution control, bulks solids handling, and industrial ventilation.

He has over 40 years of experience in specification, design, manufacture, startup, testing, permitting, and troubleshooting of thermal systems from feed to stack. Work includes industrial pilot scale prototypes through to full scale equipment. Much of his work has been on developing new processes for emerging markets.

Tom is an internationally recognized lecturer and trainer. He has conducted training courses and webinars for AIChE (American Institute of Chemical Engineers), ASME (American Society of Mechanical Engineers), AWMA (Air and Waste Management), and in house courses for industrial firms.

He is a licensed professional chemical engineering in Georgia and other states,

Tom holds a BA and MS in Chemical Engineering from Manhattan College in New York City, and a Masters in Industrial Management from Georgia Tech in Atlanta, Georgia.

He has authored numerous publications in hazardous waste, combustion, incineration, air pollution control, solids handling and energy. He is the editor of Biomass and Alternate Fuel Systems: An Engineering and Economic Guide; co-author of The Industrial Wood Energy Handbook, and contributor to Perry's Chemical Engineer's Handbook. He has made numerous presentations, including those on combustion, incineration, biomass energy, air pollution control and NOx control. Recipient of a 1984 US DOE National Energy Award; recipient of the Distinguished Service Award at the 2010 International Thermal Treatment Technology Conference; and recipient of the Chemical Engineering Magazine 2010 Award for Personal Achievement in Chemical Engineering for a Distinguished Career Solving Process Challenges and Enhancing the Field.

A sampling of Tom's clients include OEMs (original equipment manufacturers), operating companies in the stone/clay/brick industry, coke and needle coke, precious metal reclaiming, fertilizer, electrical utility, oil recycling and re-refiners, pharmaceuticals and specialty chemicals, rendering, glass and glass fiber optic production, remediation of contaminated soils, aerospace, well bore proppant production, forest products, hazardous waste treatment firms, and mixed waste (radioactive plus hazardous waste) treatment firms.