



# SAE 2015 ENERGY SAVING & EMISSION REDUCTION FORUM

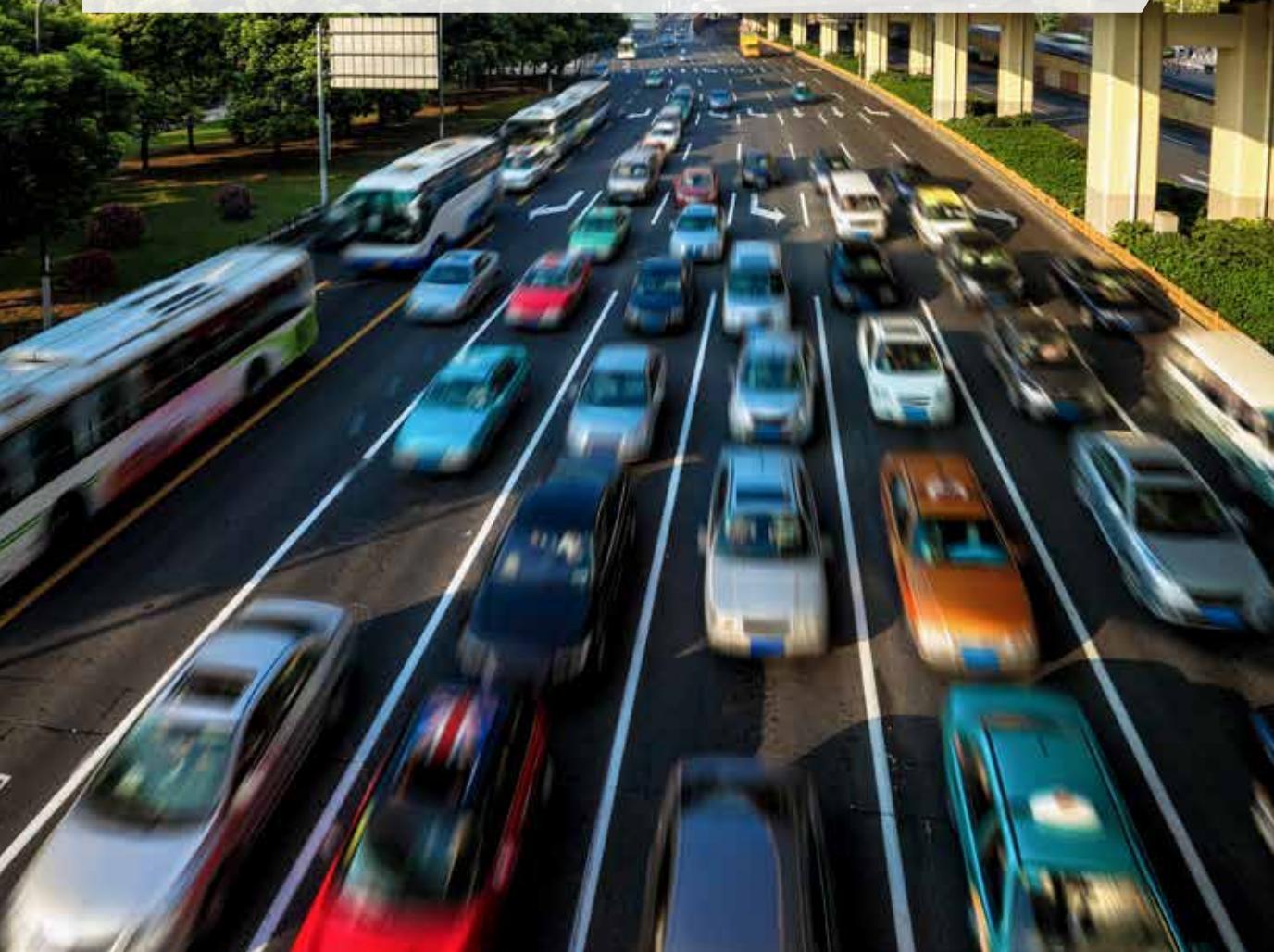
## 节能减排技术论坛

November 4-5, 2015

Shanghai, China

[www.saeeser.org](http://www.saeeser.org)

- *High Efficiency Combustion Systems*
- *Emissions Reduction*
- *Lightweighting*



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## Overview

SAE 2015 Energy Saving & Emission Reduction Forum will present and discuss the latest breakthroughs in both Heavy Duty and Light Duty regarding lightweight materials, cutting edge adaptive applications of energy efficiency and emission reduction from Regulatory Bodies, OEMs, Tier 1 suppliers, universities and research institutions, universities, and research institutions.

## Focused Industry

- High Efficiency Combustion Systems
- Emissions Reduction
- Lightweighting

## Who Should Attend

- **Industries:**  
Climate, thermal management: engine, cabin, battery; thermal efficiencies, heavy duty trucks and buses, off-highway, light and medium duty vehicles
- **Companies:**  
OEMS, engine manufacturers, chemical companies, academia, catalyst companies, materials companies, Research & Development, government, Tier 1, 2 and 3 Suppliers, Component manufacturers, Fuel Suppliers
- **Job Functions/ Title:**  
Engineering (electrical, mechanical, chemical, R&D, production and design), marketing/sales, academia, program and/or project management
- **Areas of Interest:**  
Environment, Fuel Consumption, Maintenance, Power Systems, Propulsion, Safety, Systems Engineering, diesel engines, Emissions Control, aftertreatment systems, legislation

# **WHO ATTENDED SAE 2014 ENERGY SAVING & EMISSION REDUCTION FORUM?**

Attendees consisted of:

- Engineers
- Engineers Management
- Industry Executives
- Academics
- Government Officials
- Consultants

## **PART OF ATTENDED COMPANY (2013 & 2014)**

### **1. OEM**

Beijing Hyundai Motor Company  
Beiqi Foton Motor  
Brilliance auto group holdings co., LTD.Automotive engineering research institute  
Changan  
Changan Ford Automobile  
Chery Automobile  
Chery Jaguar Land Rover  
Automotive Company  
Commercial Vehicle Technical Center, DFCV  
DFM  
Ford Motor  
Geely Automobile Research Institute  
General Motors China Science Lab  
Great Wall Motor Co.Ltd Engine R&D Center  
Higer Bus Company  
Hua-chuang Automobile  
Navistar (Shanghai) Trading  
Nissan (China) Investment  
PATAC  
Qoros  
SAIC Motor  
SAIC Motor Passenger Vehicle Company  
Toyota Motor Engineering & Manufacturing (China)  
Volkswagen Research Lab China  
Zhejiang Geely Powertrain Research Institute

### **2. Material**

ALCOA  
Baosteel academia sinica  
BASF (China)  
Corning  
Dow Corning China Holding  
Dow Chemistry  
Eastman Chemical  
Henkel  
Institute of Iron and Steel Research Ansteel Group Corporation  
ITW  
LANXESS Chemical (China)  
LORD Corporation  
Sapa Profiles (Shanghai)  
ShangHai Broadway Packaging & Insulation Material

### **3. Component**

AVL Shanghai Tech Center  
Alcoa Wheel Products  
Avic commercial aircraft engine  
China Engine Company  
Cummins (China) Investment  
Denso (China) Investment  
DICASTAL  
Faurecia Emissions Control Technologies  
Faw Jiefang Automotive  
Wuxi Diesel Engine Works  
Faw Wuxi Fuel Injection  
Equipment Research Institution  
Huayu Automotive System  
Sensata Technologies

Management China  
Shanghai Huizhong Automotive Manufacturing  
South Korea Delphi  
Weichai Power Shanghai R&D Center  
YAPP Automotive Parts

### **4. Research Institute**

CAE  
CAERI  
China Automotive Technology Research Center  
Federal State Unitary Enterprise Central Scientific Research Automobile and Automotive Institute "NAMI"  
MCE-5 Development SA  
Oak Ridge National Laboratory  
Vehicle Emission Control Centers of MEP

## High Efficiency Combustion Systems Session

With the increased demands for fuel efficiency and fuel economy, the internal combustion engine (ICE) continues to be examined for design enhancements to improve these measures. Overall, the program will examine several technological advances required to maximize efficiency, for both light- and heavy-duty applications including:

- Advanced, low-temperature combustion techniques
- Improved understanding and modeling of heat loss mechanisms
- Electrification and intelligent control of accessory loads
- Possible redesign of mechanical systems (e.g., variable stroke for fully expanded cycles)
- High-efficiency turbo-machinery to extract exhaust energy and provide boost

## Emissions Reduction Session

With a greater than 10 percent growth expected in the domestic passenger vehicle market, China now has the world's largest auto market; and emissions from transportation are growing rapidly as well. However, China is determined to reduce carbon dioxide emissions and boost fuel efficiency with manufacturing technologies without compromising safety, performance, reliability and cost. Session topics include:

- Intelligent Combustion
- Engine Downsizing and Pressure Boosting
- Variable Valve Trains
- Thermal Efficiencies, Including Waste Heat Recovery
- Light, Medium and Heavy Duty Vehicle Content

## Lightweighting Session

Regulations and resulting standards for reducing emissions and increasing fuel efficiencies are creating a need for OEMs to develop lighter vehicles to achieve these requirements. This Forum has been designed to provide automobile manufacturers and suppliers with the latest advances in manufacturing strategies, design and materials selection strategies to promote lighter weight, fuel efficient vehicles without sacrificing safety or performance.

	<b>Day One</b>	<b>Day Two</b>
	<b>High Efficiency Combustion Systems and Emissions Reduction Session</b>	<b>Lightweighting Session</b>
9:00	<b>China Government Policy</b>	<b>KEYNOTE: Teardown and Analysis of BMW's I3</b>  <b>Sandy Munro</b> , Chief Executive Officer, Munro & Associates, Inc.
9:30	<b>KEYNOTE: Near- and Long-term Role of Internal Combustion Engines in Advanced Vehicles</b>	
10:15	<b>Dr. J. Gary Smyth</b> Executive Director, Global R&D Laboratories, GM Global Research and Development	<b>Tsinghua University</b>
11:15	<b>High Efficiency Combustion System Topic</b>	<b>Fei XIONG</b> Chief Engineer Geely Automobile Research Institute
11:45	<b>Bengt Johansson</b> , Lund University	<b>Lightweighting Session Topic</b>
13:30	<b>Wensi Jin</b> , Mathworks	<b>Lightweighting Session Topic</b>
14:00	<b>Gert Jan Vogelaar</b> , Punch Power	<b>Hans Mikota</b> Head of Research and Development Georg Fischer Automotive Business Unit China
14:30	<b>Meeting the Challenge of Organic Rankine Cycle Based Waste Heat Recovery Simulation</b>  <b>Steve Streater</b> Senior Product Manager, Mentor Graphics	<b>Lightweighting Session Topic</b>
15:30	<b>Fuel-ethers and Their Key Contribution to Enable Higher Vehicles Efficiency and Improved Air Quality</b>  <b>Clarence Woo</b> Director Asian Clean Fuels Association	<b>Lightweighting Session Topic</b>
16:00	<b>Charles E. Roberts Jr.</b> , Director, Diesel Engines and Emissions R&D, Southwest Research Institute	<b>Lightweighting Session Topic</b>
16:30	<b>High Efficiency Combustion Systems and Emissions Reduction Panel Discussion</b>	<b>Lightweighting Panel Discussion</b>



### Gary Smyth

Executive Director  
Global R&D Laboratories  
GM Global Research and Development

Dr. J. Gary Smyth is Executive Director, Global R&D Laboratories, GM Global Research and Development.

Smyth began his career with GM in 1989 as a senior project engineer with GM Advanced Product Engineering in Warren, Michigan. He has held numerous positions in the Advanced Powertrain organization and was named Engineering Director, Advanced Propulsion System Controls in 1999, with responsibilities including advanced diesel and advanced emission development. In September 2004, he transferred to GM R&D as Director, Powertrain Systems Research Lab, where his responsibilities included directing all research and development globally for conventional and hybridized propulsion systems. In June 2010, Gary was promoted to Executive Director, North American Science Labs, GM Global R&D. A native of Northern Ireland, Smyth attended The Queen's University of Belfast (QUB). He studied Mechanical Engineering and received a B.Sc. in 1985 and a PhD in 1991. He is an active member of SAE International, including a founding member of the Executive Leadership Team for the SAE North American International Powertrain Conference (NAIPC).



### Clarence Woo

Executive Director  
Asian Clean Fuels Association

Mr Clarence Woo has been involved in the oil, gas and petrochemical industry for the past 20 years. He started his career with Mobil Oil Singapore and has experienced numerous responsibilities within Mobil Oil. They included Technical Services, which provided technical expertise and training in the field of lubricants, fuels, and LPG.

Mr Woo worked in Ethyl Corporation as Senior Area Manager managing petroleum additive sales to various countries in Asia Pacific. Mr Woo had also served as a Product Manager, Fuel Additives, where he had helped managed fuel additive sales and fuel additive developments in Asia.

Mr Woo is currently the Executive Director of Asian Clean Fuels Association that supports governments and encourages industries to pursue the use of cleaner fuels for a cleaner environment through the attributes of sound science, cost effectiveness and sustainability.

### Significant achievements

In China, he was successfully involved in a China Phase 3 (Euro 3 equivalent) Gasoline Research Programme in collaboration with the China State Environment Protection Agency and Tsinghua University. Mr Woo also assisted the government in looking into post implementation programmes and Phase 4 and 5 (Euro equivalent) specifications.

Partnered through the Association with the United Nations Environment Programme (UNEP) to encourage the Council of Arab Ministers Responsible for the Environment within the Arab League to issue a resolution to totally phase out lead by 2008 and work towards reducing sulfur in fuels in the region.



## Sandy Munro

Chief Executive Officer  
Munro & Associates, Inc.

A frequent speaker and advisor to some of the world's top manufacturing executives on implementing cultural change and integrated product development strategies, Sandy Munro offers clients a wealth of perspective and a penchant for technology transfer. Although he began his career in the automotive industry and has worked extensively with global automakers and Tier 1 suppliers, his expertise cuts across virtually every segment of the manufacturing sector.

With more than 40 years of experience in designing, building and processing components, Sandy brings clients an unmatched breadth of experience gained in the manufacturing and engineering environments. After beginning his career as a toolmaker, he worked his way up the ranks to designer and eventually became engineering manager at Valiant Machine Tool Co., a leading Detroit-area specialty tool company.

In 1978, Sandy joined Ford Motor Co. and shifted roles from machine tool and automation designer to manufacturing engineer. After several projects where he helped increase productivity on engine assembly lines, he was promoted to senior automation specialist. There he supervised the installation and development of new, more productive engine manufacturing lines.

In 1982, Sandy met Dr. E. Deming and his career dramatically changed. Dr. Deming's phrase of "As variation is reduced, quality will increase" resonated with Sandy and he became a zealot in reducing variation not only on the manufacturing floor, but also in the design phase where, according to Sandy, all variation stems from.

At Ford, Sandy was named corporate coordinator - design for automation (DFA) and, in this new position, he helped the company utilize DFA to save billions of dollars, improve quality and reduce development cycles during the early 1980's by improving manufacturability at very early stages. For his efforts, Sandy was twice nominated for the Henry Ford Award.

In 1988, he was convinced by Dr. Deming to leave Ford and start his own company, which became Munro & Associates, Inc. The company has grown to become a world class engineering consulting firm that specializes in upfront, predictive methods to increase profitability by improving quality, reliability and value, while reducing total lifecycle costs. The Deming spirit and philosophy is evident in all of Munro's products and services.

Evangelical in spreading the gospel of paradigms shifts, concurrent engineering and innovation, Sandy has chaired and spoken at numerous engineering conferences and symposia around the world.

He has also lectured at the University of Michigan, Stanford, Purdue, the University of Rhode Island and other universities. Sandy is the NASA (National Aeronautics and Space Administration) Chairman of the Michigan Small Aircraft Transportation System (MI SATS), a board member for NCAM (National Council for Air Mobility), a member of the Society of Automotive Engineers, Society of Manufacturing Engineers and the Engineering Society of Detroit.



### Steve Streater

Senior Product Manager  
Mentor Graphics

Steve Streater is a Senior Product Manager for Mentor Graphics' Flowmaster 1D thermo-fluid, system simulation tool. He has more than 25 years of experience in the automotive industry, working primarily in powertrain consultancy for industry experts such as Ricardo and MAHLE Powertrain. He specialized in automotive cooling system design and development, before moving to R&D program management in 2000, and subsequently to software product management in 2009. Steve studied Mechanical and Production Engineering at The University of Brighton and was elected a Fellow of the Institute of Mechanical Engineers in 2000.



### Hans Mikota

Head of Research and Development  
Georg Fischer Automotive Business Unit

"Hans Mikota is Head of Research and Development Asia of Georg Fischer Automotive Business Unit China, Suzhou. He is responsible for product development, process development as well as materials engineering for Georg Fischer Automotive in Asia.

He is a member of Georg Fischer Business Unit China management team and heads the development teams for both iron sand casting as well as aluminum and magnesium high pressure die casting. Hans Mikota received a master degree in process engineering from Mining and Metallurgy University of Leoben, Austria in 1998. Prior to working for Georg Fischer in China since 2012 he has held various positions in management and engineering for Georg Fischer Automotive in Europe, both in casting technology research as well as engineering and development of lightweight chassis components. He is a married father of 2 children and lives with his family in Suzhou.

# REGISTRATION AND VENUE INFORMATION

## Registration:

CATEGORY	FEES
Two Days	¥ 2,500
Day One Only	¥ 1,500
Day Two Only	¥ 1,500
Student (Two Days)	¥ 1,500

### TO REGISTER:

SAE Shanghai Office  
**Contact:** Miss Echo Wen  
**Phone:** +86-21-6140-8922  
**Email:** Echo.Wen@sae.org  
**Register Online:** [www.saeeser.org](http://www.saeeser.org)

\* If you are a foreign student (non-Chinese student), please fill in the registration form, attach your student ID card, and send to SAE Shanghai Office.

\*\* If you can read & write Chinese, please register on the event website directly.

\*\*\*All registration amenities include access to technical sessions, exhibit, tea break, lunch, reception, networking opportunities. Digital Presentations will be provided after the forum, which has been permitted by speakers.

### Sponsorship:

**Mr. Jay Jiang**  
Phone: +86-21-6140-8921  
Email: Jay.Jiang@sae.org

### Strategic Cooperation:

**Miss. Maggie Mao**  
Phone: +86-21-6140-8909  
Email: Maggie.Mao@sae.org

### Business Cooperation:

**Mr. Alan AO**  
Phone: +86-21-6140-8920  
Email: Alan.Ao@sae.org

### Cancellations:

If you are unable to attend, you can send a colleague in your place by contacting Shanghai Office with the details. If you have to cancel, we will refund your payment less an administration charge. Cancellations can only be accepted by email email. A RMB 300/USD 50 processing fee will be assessed for each canceled registration that results in a refund before Oct 14, no refunds after Oct 14.

## VENUE INFORMATION:

### Crowne Plaza Century Park Shanghai

Address: 1433 Minsheng Road, Corner of Yingchun Road, Pudong, Shanghai, China  
Phone: +86-21-5190-8886  
Fax: +86-21-5190-9208

TRANSPORTATION	DISTANCE	TAXI FEE
Shanghai Pudong Int'l Airport (PVG): Shanghai Hongqiao Int'l Airport (SHA): Shanghai Hongqiao Railway Station	Around 34 km Around 28 km	Around CNY 120 Around CNY 100
To Shanghai Railway Station	Around 14 km	Around CNY 50

## GASOLINE DIRECT INJECTION (GDI) ENGINES

**ID#:** C1009

**Date:** October 28-30, 2015 (3 days)

**Instructor:** Bruce Chehroudi

**Language:** English

**Shanghai CEU:** 4.0

**CEU (US) :** 2.0

**Classroom:**

**Address:** Shanghai

**Fees:** CNY 4,900;

**Early Bird:**CNY 4,200 (Register Before August 7)

The quest for more efficient, smarter, and environmentally cleaner liquid-fueled spark ignition (SI) reciprocating engines is more alive and intense now than ever before. GDI SI engines have overcome many of the original limitations and are now becoming commonplace. This seminar will provide a comprehensive overview of GDI engines. Mixture preparation and the combustion process, with an emphasis on strategies for both homogenous and stratified charge operation and control, including issues related to the direct injection of gasoline into the combustion chamber, and fuel injection system requirements for optimal spray characteristics will be explored. Emission of pollutants, fuel economy and effects of some key design and operating parameters will also be covered. The seminar concludes with an overview of a select list of production and prototype GDI engines.

### Learning Objectives

By attending this training program you will be able to:

- Describe the rationale behind the GDI engine operation
- Analyze the important processes in GDI engines
- Explain liquid atomization, sprays, and injector requirements for successful GDI operation
- Utilize the technology and the logic behind gasoline direct injection
- Estimate and predict effects of key engine design and operating conditions on performance, combustion, and emission in GDI engines
- Communicate effectively with engineers working on fuel injection, combustion and

emission aspects of the GDI engine in your firm or with customers

- Effectively contribute to the design of critical components such as combustion chambers, injectors, and emission reduction strategies
- Explain and utilize trade-offs between increasing engine performance and maintaining low emission characteristics

### Who Should Attend

This seminar will be especially valuable for engineers, technical and project managers, researchers, and academicians. Engineers working on the design of components for high efficiency and performance of GDI engines as well as those directly and indirectly involved in mixture preparation and emission reduction of harmful pollutants from these engines will highly benefit from this course. Environmental engineers desiring to expand their understanding of fuel spray formation, combustion and emissions from GDI engines will benefit, as well as, engineers active in the development and application of software for the modeling and design of combustion chambers, fuel spray dynamics, combustion and emission issues.

### Prerequisites

Attendees should have general knowledge of engine operation especially in-cylinder combustion processes. However, a very concise review of the subject is presented.

### Topical Outline

#### DAY ONE

- Combustion Systems
  - Relative position of spark plug and fuel injector
  - How to achieve homogeneous and stratified charge -- spray-, wall-, and air-guided combustion systems
- Fuel Injection System
  - Fuel injection system requirements
  - Fuel injector requirements and classification
- Fuel Spray Characteristics

- Spray atomization requirements
- Sac spray consideration
- After-injection
- Fuel spray penetration and cone angle
- Split injection
- Sprays characteristics of injectors
- Effects of ambient pressure (density) on spray
- Spray characterization (GDI)

## DAY TWO

- Mixture Formation
  - In-cylinder flow characteristics and GDI combustion
  - Fuel-air mixing process
  - Spray-wall interactions
  - Cold start and wall wetting issues
- Combustion Process and Control Strategies
- Engine Operating Modes and Fuel Injection Strategies
  - Early-injection, late-injection, stoichiometric operation
  - Operating mode transition
- Split Injection Strategy
  - Two-stage, split, and post injection
- Combustion characteristics
  - Homogeneous-charge and stratified-charge combustion
- Effects of Engine Operating and Design Parameters on GDI Combustion
  - Injection and ignition timings
  - Spray cone angle
  - EGR
  - Knock resistance characteristics
  - Air-assisted versus single-fluid GDI fuel system
- Injector, Combustion Chamber, and Intake Valve Deposits

## DAY THREE

- Emissions of Pollutants - Reduction Approaches
  - Hydrocarbon, NOx, particulate and noise emissions
- Fuel Economy
  - Factors affecting improved fuel economy
  - Fuel economy versus emissions compromise
- Select Gasoline Direct-Injection Engines

- Early DISC engine
- Mitsubishi reverse-tumble-based wall-guided
- Concise review of Toyota, Nissan swirl-based (wall-guided), Audi wall-guided, AVL, FEV air-guided, Ford, Honda spray-guided, Isuzu, Mazda swirl-based, wall-guided, Mercedes-Benz spray-guided, Ricardo tumble-based, wall-guided, Volkswagen tumble-based, wall-guided FSI

- GDI Fuel Rail Technology
- Benefits of Turbocharging a GDI engine

### **Instructor(s): Bruce Chehroudi**

Dr. Chehroudi is Chief Scientist and Group Leader at Advanced Technology Consultants. His previous positions include: Principal Scientist at Air Force Research Laboratory (AFRL/ERC), Chief Scientist at Raytheon STX (formerly Hughes Aircraft STX), Professor of Mechanical Engineering, and Research Staff Member at Princeton University. He specializes in fluid mechanics and heat transfer, laser optical diagnostics, internal combustion engine, gas turbine and rocket engines, structure of sprays, gas turbine engines, combustion, fuel injection issues and emission of pollutants. Dr. Chehroudi is an AIAA Associate Fellow, a member of Tau Beta Pi and the recipient of several SAE awards including the Arch T. Colwell Merit Award, the Ralph R. Teetor Award, the SAE Recognition Award and the SAE Forest R. McFarland Award in recognition of his efforts and leadership in contributions to the Continuing Professional Development Seminars. He has taught courses in the areas of internal combustion engines, thermodynamics, thermophysics of gas flows, combustion, and measurement system, and has more than 150 publications and over 200 presentations in conferences, national and international journals. Dr. Chehroudi has a Ph.D from Princeton University.

# IGNITION ISSUES AND THEIR IMPACT ON ENGINE PERFORMANCE, EFFICIENCY AND EMISSION

**ID#:** C0131

**Date:** November 2-3, 2015 (2 days)

**Instructor:** Bruce Chehroudi

**Language:** English

**Shanghai CEU:** 4.0

**CEU (US) :** 1.3

**Classroom:**

**Address:** Shanghai

**Fees:** CNY 3,600;

**Early Bird:**CNY 3,000 (Register Before August 7)

Improved understanding and control of ignition and thereby combustion are critical in dealing with the problems of pollutants formation, engine performance, and fuel economy. This seminar will provide you with basic knowledge and recent advances in combustion-initiation (ignition) issues to more intelligently evaluate and harness their potentials. Thermodynamic and fluid mechanical properties of the unburned charge near the spark plug and at the time of ignition strongly affect the quality of the combustion and therefore the emission of the pollutants from the engine. Furthermore, a weak ignition limits engine performance and drivability. The so-called cyclic variability, which affects and bounds the lean and knock limits of an engine design is to a great degree influenced by the ignition system. Equally important, the ignition system can and is being used to provide local in-cylinder information on air-fuel ratio, misfire, knock, and mass fraction burned in each individual cylinder. Hence, great potential exists for applications of this information for individual cylinder control strategy to attain a more fuel efficient and environmentally compatible engine.

## Learning Objectives

By attending this training program you will be able to:

- Describe the important processes in ignition and its relation to engine performance, efficiency, and emission
- Explain the combustion process in internal combustion engines
- Apply ignition strategies for reduction of engine pollutants
- Recognize the effects of ignition system

design and engine operating conditions on combustion and emission

- Describe the technology and the logic behind the current and future ignition-based engine diagnostics
- Assist in the design of critical components such as combustion chambers and exhaust systems
- Identify key design components of an ignition system for optimum combustion chamber design and low engine emission of pollutants

## Who Should Attend

This seminar will be especially valuable for engineers, technical and project managers, researchers, and academicians involved in ignition and combustion/emission aspects of the combustion engines. Currently, the design strategy of many components in these engines is affected by combustion and emission control measures to meet customer's, federal and local government's demands and regulations. Therefore, engineers working on the design of components for high efficiency and performance of combustion engines as well as those directly and indirectly involved in ignition and emission reduction strategies will highly benefit from this seminar.

## Topical Outline

### DAY ONE

- A Concise Background on Combustion in Spark Ignited (SI) Engines
  - Cylinder pressure traces
  - MBT and ignition timing
  - Flame propagation issues
  - Combustion characterization
  - Cyclic variability
- Ignition Fundamentals
- Spark Ignition
  - Function of ignition system
  - Commonly used ignition systems
  - What determines the amount of ignition energy
- Four Phases of Spark Ignition

- Pre-breakdown, breakdown, arc, and glow discharge

## DAY TWO

- Effects of Some Key Parameters on Combustion, Emission and Performance
  - Higher power and/or energy
  - Longer duration discharge
  - Multiple spark plugs
  - Different spark plug designs
- Alternative Ignition Methods
  - Corona ignition system
  - Plasma-jet ignition system
  - Flame-jet ignition system
  - Activated radical (AR) ignition
  - Others
- Diagnostic and Control Opportunities
  - Use of spark voltage for monitoring combustion
  - Spark spectroscopy
  - Ionization measurement for engine health monitoring & diagnostics
- Ignition Systems for Highly Diluted Mixtures
- Conclusions

## Instructor(s): Bruce Chehroudi

Dr. Chehroudi is Chief Scientist and Group Leader at Advanced Technology Consultants. His previous positions include: Principal Scientist at Air Force Research Laboratory (AFRL/ERC), Chief Scientist at Raytheon STX (formerly Hughes Aircraft STX), Professor of Mechanical Engineering, and Research Staff Member at Princeton University. He specializes in fluid mechanics and heat transfer, laser optical diagnostics, internal combustion engine, gas turbine and rocket engines, structure of sprays, gas turbine engines, combustion, fuel injection issues and emission of pollutants. Dr. Chehroudi is an AIAA Associate Fellow, a member of Tau Beta Pi and the recipient of several SAE awards including the Arch T. Colwell Merit Award, the Ralph R. Teetor Award, the SAE Recognition Award and the SAE Forest R. McFarland Award in recognition of his efforts and leadership in contributions to the Continuing Professional Development Seminars. He has taught courses in the areas of internal combustion engines, thermodynamics, thermophysics of gas flows, combustion, and measurement system, and has more than 150 publications and over 200 presentations in conferences, national and international journals. Dr. Chehroudi has a Ph.D from Princeton University.



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