

Package Contents

- Three CDs
- Course Handbook
- Online Pre-test (self-test, immediate results)
- Online Post-test (submit to SAE)
- Application for CEUs/Certificate of Completion

Equipment Requirements

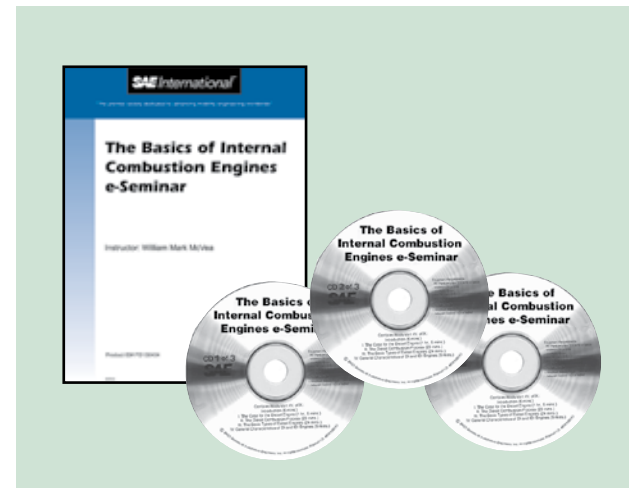
- PC Pentium class 200 MHz or better
- Windows 98 or later
- CD-ROM Drive
- Sound Card and Speakers/Headphones
- 800 X 600 screen resolution or greater (1024 X 768 Recommended)
- 32 MB of RAM or better
- Windows Media Player 7 or above
- Internet Explorer 4.0 or higher

Order No: PD130404

List Price: **\$995**; SAE Members: **\$895**

Single-user price

CEUs: 1.3*



To order or for quantity or site license pricing:

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* SAE e-Seminars receive the IACET CEU.
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Related Resources from SAE International

Classroom Version

The Basics of Internal Combustion Engines Seminar

Get up to speed on the most relevant internal combustion engine topics with this seminar. Attendees will gain a practical, hands-on approach to the basics of combustion and the gaseous cycles, the major components, and the design theories of the three most common internal combustion engines. (I.D.# C0103)

NEW

Internal Combustion Engine Handbook — Basics, Components, Systems, and Perspectives

By Richard Van Basshuysen and Fred Schaefer
This essential resource illustrates the latest level of knowledge in engine development, presenting theory and practice in a balanced ratio. Chapter topics include: a historical review, thermodynamic fundamentals, engine components, lubrication, friction, supercharging of internal combustion engines, combustion and combustion systems, the powertrain, and sensors. (R-345)

Introduction to Internal Combustion Engines

By Richard Stone

The most comprehensive, truly introductory text on internal combustion engines. A valuable reference for students studying the internal combustion engine and for engineers needing a practical overview of the subject, this third edition includes new material covering fuel chemistry, additive performance and variable geometry turbocharging. (R-278)

NEW

100 Years of Engine Developments

Edited by Daniel J. Holt

This comprehensive collection of 100 papers looks back at the technological advancements and accomplishments that played a key factor in the internal combustion engine's evolution over the past 100 years. Each chapter looks at the research, testing, and design changes that have taken place in a specific component of the engine. (PT-115)

Visit store.sae.org for complete schedules, product information, and pricing on these related SAE resources.

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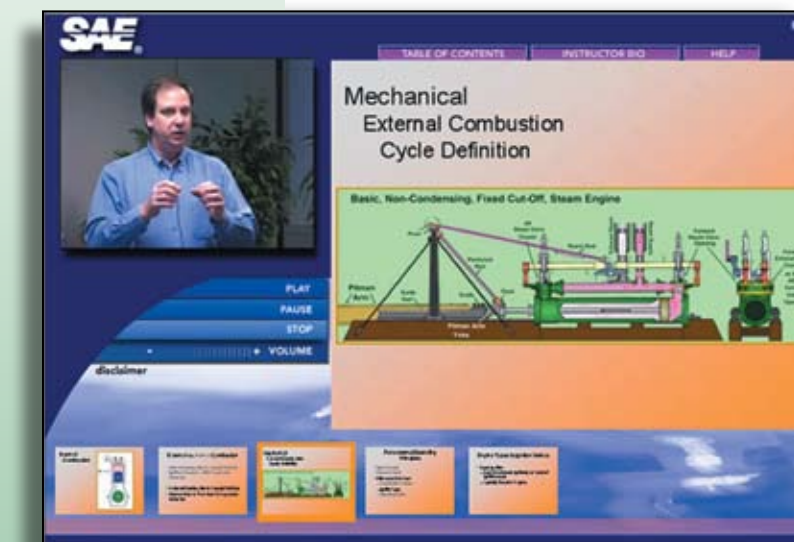
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NEW

The Basics of Internal Combustion Engines e-Seminar

Expand your knowledge of internal combustion engines from your desktop.



- Discuss with confidence the fundamental operational principles of modern internal combustion engines
- Describe in detail the differing characteristics of gasoline versus diesel, and compression ignition versus spark ignition systems, their value, practical use, and applicability to stated performance parameters
- Theorize on the practical application of all major components, sub-systems and systems currently in use in the internal combustion engine marketplace
- Review and analytically determine the most appropriate system to satisfy a stated operational need
- Review proposed new technology and decide on proof of concept based on the technical merits and technological extensions employed or proposed

Introducing SAE e-Seminars

Convenient, portable, and with core content not reliant on live web connectivity, **SAE e-Seminars** offer a new way to receive the same instruction as live classroom learning *without* the expense of travel and time away from the workplace. e-Seminars deliver classroom seminar content on CD-ROMs, featuring full-motion video illustrated with synchronized presentation slides.

The seminar content is presented in eight modular topics, allowing you to progress through the course at your own pace. The program interface offers linear progression through the video as well as the flexibility to pause or review specific concepts and to jump to individual slides from the table of contents. Handout materials are included, making the e-Seminar a complete ready-reference package, available whenever and wherever a refresher is needed. A self-quiz is available before taking the course and an online post-test will gauge new knowledge. Upon completion, you will receive 1.3 CEUs and obtain an SAE certificate of completion.

The Basics of Internal Combustion Engines e-Seminar

In this e-Seminar, Dr. William Mark McVea covers the most relevant topics related to internal combustion engines – ranging from hydrocarbon fuel ignition to volumetric efficiency. Students will gain a practical, thorough approach to the basics of combustion and the gaseous cycles, the major components, and the design theories of the three most common internal combustion engines (2- and 4-stroke gasoline and 4-stroke direct-inject diesel). Based on the popular classroom seminar, the nine hour and 25 minute course is divided into eight modules on three CDs and accompanied by a handbook.

Is this e-Seminar for You?

If you are a powertrain engineer, component supplier, vehicle platform powertrain development specialist, or involved in the application, design and discussion of engines, this e-Seminar is for you. It is recommended that you have at least an undergraduate engineering degree.

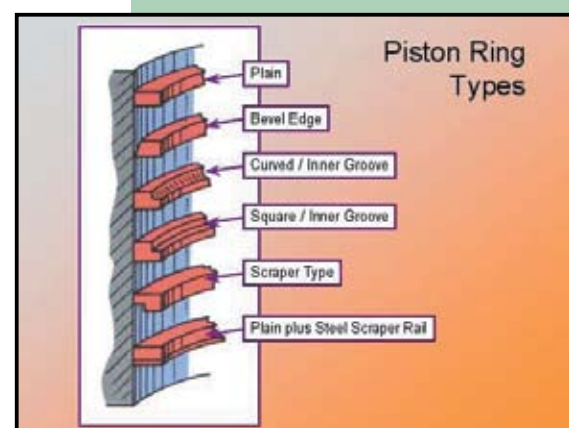
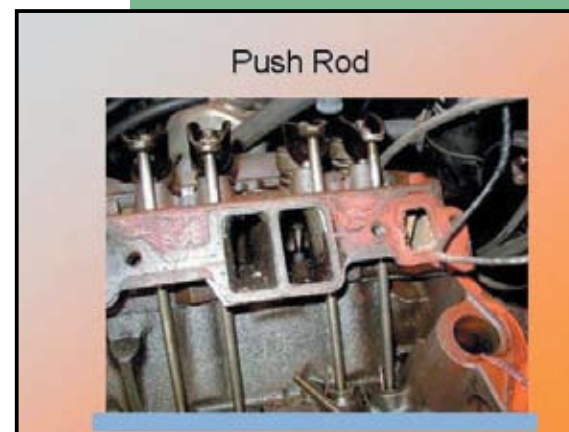
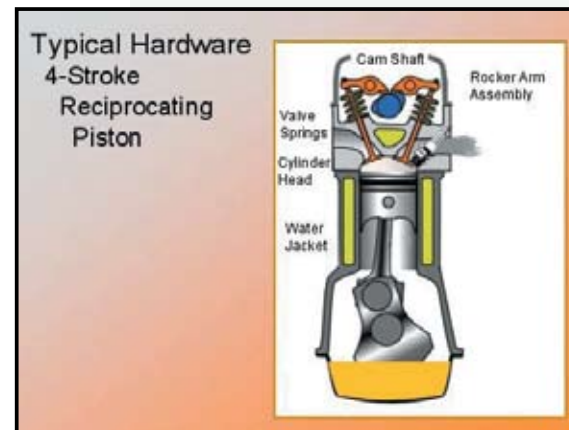


Instructor: William Mark McVea

Dr. William Mark McVea is founder and Chief Technical Officer of KBE+, Inc. KBE+ designs and develops complete powertrains for automotive and off-highway vehicles. KBE+ also develops and delivers professional development seminars for the automotive industry and its supplier base.

Dr. McVea was formerly a Professor of Information Technology in the B. Thomas Golisano College of Computing and Information Sciences at the Rochester Institute of Technology; a manager of the CAE group within a tier one, powertrain supplier to world automotive markets; a consulting engineer in vehicle dynamics with Gear Consultants, Inc.; a project manager of traction systems for off-highway vehicles with Clark-Hurth International; and research laboratory supervisor, developing geared traction devices with Gleason Power Systems, Inc. He has taught and lectured at Purdue, Michigan State and Syracuse Universities, and has published extensively on the topics of transmission systems, automated design assistant systems, knowledge systems and knowledge based engineering in general. Dr. McVea was awarded the SAE 2004 Forest R. McFarland award for outstanding contributions toward the work of planning, development, and dissemination of technical information through SAE technical meetings, conferences and professional development programs.

Dr. McVea holds a B.S. in Mechanical Engineering from the Rochester Institute of Technology, a Ph.D. in Design Engineering from Purdue University, and is a licensed Professional Engineer.



e-Seminar Content/Objectives

Module I: Engine Technology Development

[Total Run Time: 1 hour, 3 minutes]

- Discuss and adequately differentiate between the basic differences and similarities of the two most common combustion cycle circuits
- Correctly apply the various combustion/ignition technologies
- Fundamentally resolve the issues surrounding the interrelation of the “stroked piston” mechanism
- Describe the function, purpose and design issues regarding the hardware and components that support the energy conversion scheme from fast burn combustion, to linear motion, and finally to rotating power source

Module II: Basic Operation and Kinematics

[Total Run Time: 1 hour, 14 minutes]

- Apply the various operating cycles (i.e., 4-stroke, 2-stroke, or rotary eccentric) correctly through selection of an engine technology appropriate for the intended application
- Discuss the basic differences between spark ignition versus compression ignition technologies and correctly apply them to a given application
- Describe the limitation of each of the operating cycle technologies and/or the combustion/ignition systems
- Explain in terms of specifications and appropriateness the fundamental differences and benefits between the “stroked” engine technology and the rotary eccentric cycle

Module III: Air/Fuel Systems

[Total Run Time: 1 hour, 59 minutes]

- Apply the essence of combustion theory and the use of the stoichiometric ratio as it applies to internal combustion, hydrocarbon based engines
- Demonstrate a working knowledge of the fundamental principles of fluid dynamics as they apply to liquid/air flow regimes within a closed channel
- Discuss the principles, properties and value of fluid flow through a venturi and how it provides the motive force to pull liquids into a flow stream, and then to cause mixing within that flow stream
- Correctly identify components within a carbureted fuel/air management system, and define their function and/or contribution to fuel management functions
- Also provide the same knowledge discourse on fuel injection systems and components
- Realize the causes of emission production due to the effects of design, operation and components of an engine
- Link the functional causes of emission production to the legislation that addresses the concerns of emission release to the environment

Module IV: Constituent Management Systems

[Total Run Time: 1 hour, 29 minutes]

- Provide a technical explanation of the two Electronic Control Units (ECUs) used to control the operation, fuel use rate and generated emission levels from any internal combustion engine
- Calculate the resultant value of the pulse width signal sent to the electronic control unit to affect fuel management, control functionality and mechanisms that implement the intended control information
- Describe all components associated with and adjacent to the valve systems within the modern internal combustion engine
- Detail all the relevant operational characteristics of the camshaft, which includes a technical description of its:
 - Function
 - Design
 - Benefits of various configurations
 - Use as an emission control device

Additional e-Seminars are available

The same instruction as live classroom learning without the travel expense.

- Catalytic Converters: Design and Durability e-Seminar
- Diesel Engine Technology e-Seminar
- Fundamentals of Modern Vehicle Transmissions e-Seminar
- Introduction to Brake Control Systems e-Seminar

For more information, visit <http://www.sae.org/e-seminars>

Module V: Fuels and Combustion

[Total Run Time: 37 minutes]

- Knowledgeably discuss the chemical composition of hydrocarbon based fuels, specifically the:
 - Chemical constituents, chemical formula, the formulation process, the heat value and the expected potential energy of gasoline and diesel
 - Meaning and method of derivation of the “Pump Number” rating for gasoline, and the difference between “Pump Number” and “Octane” as it is typically incorrectly applied
 - Value and use of “Research Octane Number” and “Motor Octane Number” as they apply to gasoline
 - Meaning and method of derivation of the “Cetane” rating for diesel, its use as a measure of fuel heating value, and its application when selecting fuel grades as a function of environmental conditions
 - Main by-products of combustion of gasoline and diesel with standard air
- Give a general description of the expected by-products of hydrocarbon based combustion
- Discuss the benefits of the use of laminar flow regime, the fluid dynamic properties, and compare and contrast these with those of the turbulent flow regime
- Provide a succinct narrative of the concept of flame propagation rates, and state these rates as a function of the fluid flow regime they occupy

Module VI: Combustion Chamber and Ignition Systems

[Total Run Time: 1 hour, 13 minutes]

- Functionally and beneficially define the concept of compression ratio and its effect on combustion efficiency and potential energy release from the fuel
- Discuss the relationship between compression ratio and typical combustion head configurations, design guidelines, and the interrelated effects of:
 - “Turbulence & Swirl”
 - “Equivalence Ratio”
 - “Compression Ignition” versus “Spark Ignition”
- Explain, in terms of combustion theory, the various combustion modes:
 - Normal
 - Pre-ignition
 - Pre-detonation

Module VII: Emissions and Controls

[Total Run Time: 55 minutes]

- Provide a brief narrative of the formation and levels of emissions produced within an internal combustion engine
- Explain the functional aspect of all components related to the control of the amount of emissions produced, specifically the control systems used:
 - Passive
 - Active
 - Prior to formation
 - After treatment
- Contribute to developmental examinations of:
 - Valve timing as an emission control system
 - Variable camshaft timing
 - Variable valve timing
- Appreciate the functional meaning of thermodynamics as a means to quantify efficiency measures

Module VIII: Detailed Study of the Bottom Half of the Motor

[Total Run Time: 53 minutes]

- Put into plain words the theories and practical criteria and reasons behind the selection of cylinder number and arrangement
- Discuss the value and historical evolution of cylinder liners, pistons, and piston rings, specifically the:
 - Function
 - Operation
 - Groove design
- Explain the flow paths, connectivity and requirements of the lubricant and the lubrication system, as it relates to:
 - Piston head design
 - Piston ring grooves
 - Connecting rods
 - Crankshaft
 - Lubrication pump
 - Lubrication passages within the engine block

* For classroom version, see back panel.