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NEW

Tire Forensic Investigation Analyzing Tire Failure

By Thomas Giapponi

This book covers the many ways that a tire can fail, and shows how to identify that failure. Based on the author's 30 years of experience in the tire industry, the book looks at the methodical, physical, visual and tactile examination of the failed tire and identifies the various failure modes for passenger car and light truck tires.

Chapters cover:

- Belt Separation
- Non-Belt Separation Identification
- Balance Weight Mark Identification and Significance
- and more

ISBN: 978-0-7680-1955-1, 238 pp., Paperbound 2008.

\$63.96 (SAE Member)

\$79.95 (Nonmember)

Product Code: R-387

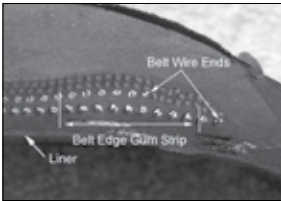
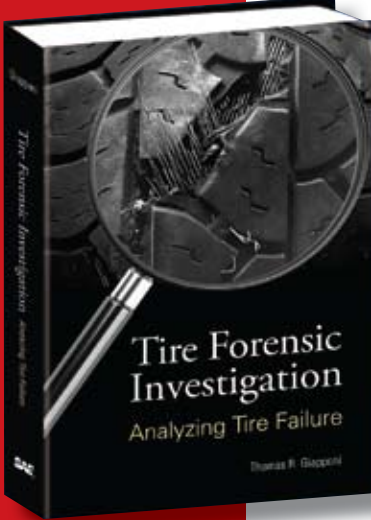


Fig. 1.2 Tire section view of the tread shoulder.

The cause(s) for the crack initiation and propagation can be all there are secondary or more contributors to the failure; later in this chapter.

1.2 Belt Separation—Crack Initiation and

A separation between the working belts begins with crack within the belt skirts stock (compound) or belt edge gum strip ends in the shoulder area of the tire. (These latter two are dependent on the cause(s) of the initiation of the crack, its at the time of the initiation, and environmental and vibration and growth can follow. The separation growth as progresses along the belt edge (usually encompassing the and then progresses inward toward the centerline. Crack the belt edge gum strip from the belt edge to the inward edge

¹⁴ Not all tires are designed with a belt edge gum strip.

¹⁷ The inward side of the belt edge gum strip is that side closest to the centerline.

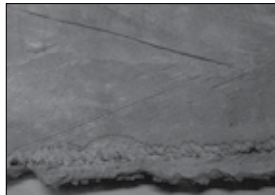


Fig. 1.3 Belt separation at the belt edge, as viewed from the bottom of the #2 belt in a detached tread and belt.

(Fig. 1.3) can vary from slow to rapid, depending on the parameters causing growth in the first place (e.g., the energy release rate). However, within the belt edge gum strip area (Fig. 1.2), the structural design of the tire and compound are such that crack propagation and growth can be inhibited. However, once crack growth has progressed to the inward edge of the belt edge gum strip, there is a much more rapid progression of the separation (Ref. 14, p. 18) toward and beyond the centerline of the tire. The now loose (i.e., separated) tread and #2 belt combination is not secured to the #1 belt, and as the separation grows, the centrifugal force alone will begin to tear one belt from another.¹⁸ As this parabola¹⁹ appearing separation grows to or beyond the centerline, the forces on the tire may create another parabola-like separation growing inward from the opposite side. This second parabolic growth, if it occurs, will be much smaller

¹⁸ Although centrifugal forces are always acting on the spinning tire and are trying to pull it apart, the exact tire can resist these forces. Note that excessive speed either above the speed ratings for the tire or a fully spinning tire that is not in contact with the ground can come apart, even with intact belts (Ref. 1.5, p. 8).

¹⁹ This parabola also is called crescent or thumbnail shaped.



Fig. 1.4 Large and small parabolic separations joined across the casing.

than the initial separation (Fig. 1.4) but eventually will join the initial parabola, such that the #2 belt and tread now are separated 100% across the tread. From this point onward, it will be only a matter of time and speed before there is a tread and belt detachment.

Somewhere in the preceding process, for a single separation, prior to the tread and #2 belt partial or complete detachment from the #1 belt, the separation will reach a point where there will be an input into the axle on a once-per-revolution cycle. This vibration can be followed by an increased noise level coming from the tire.¹¹⁰ The ability to hear or feel these vibrations and noises through the vehicle depends on the following:

¹¹⁰ At 100 kph (60 mph), a once-per-revolution "bump," depending on the size of the tire, will be approximately 12 "bumps" per second (12 Hz).

NEW

An Introduction to Engine Testing and Development

By Richard D. Atkins

This book presents the basic principles required for the testing and development of internal combustion engine powertrain systems, providing the new automotive engineer with the basic tools required to effectively carry out meaningful tests. This book explains the test process - from setting up a dynamometer test facility to testing for performance and durability.

Topics covered include:

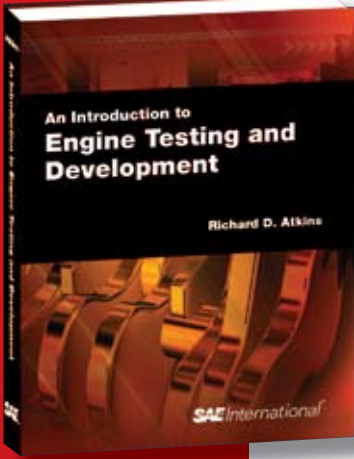
- The test facility and the methods of measuring engine power
- Instrumentation, temperature, pressure flow and calibration
- Combustion analysis and emissions
- Fitting operations within the test cell best practices
- Quality standards for engine testing

ISBN: 978-0-7680-2099-1, 308 pp., Hardbound 2009.

\$63.96 (SAE Member)

\$79.95 (Nonmember)

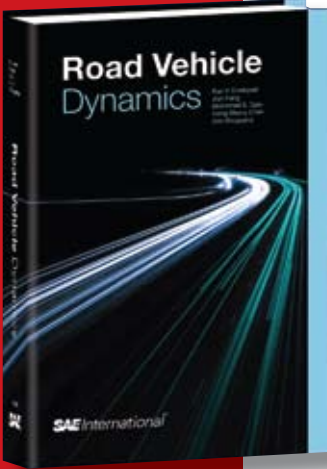
Product Code: R-344



NEW

Road Vehicle Dynamics

By Rao V. Dukkipati, Jian Pang,
Mohamad S. Qatu, Gang Sheng Chen,
Zuo Shuguang



This book provides a detailed and well-rounded overview of the dynamics of road vehicle systems, with an emphasis on safety considerations. Readers will come to understand how physical laws, human factor considerations, and design choices come together to affect a vehicle's ride, handling, braking, and acceleration.

Topics include:

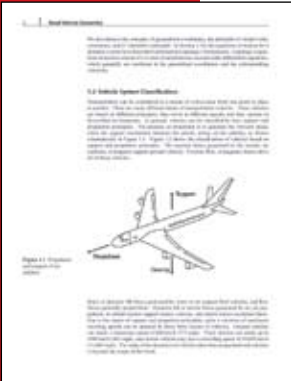
- Analysis of dynamic systems
- Tire and ride dynamics
- Vehicle rollover analysis
- Total vehicle dynamics
- and more

ISBN: 978-0-7680-1643-7, 874 pp., Hardbound 2008.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

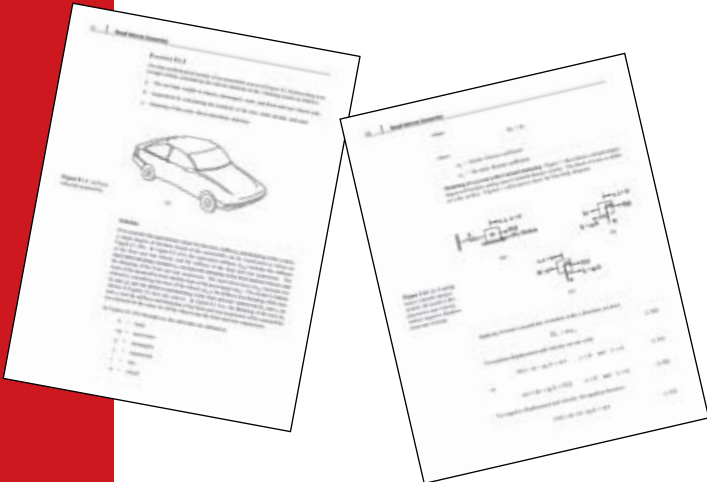
Product Code: R-366



Available in 2009

Road Vehicle Dynamics Problems & Solutions

Product Code: R-386



Analysis Techniques for Racecar Data Acquisition

By Jorge Segers

Data acquisition has become an invaluable tool for establishing racecar - and car/driver - performance. This book provides a thorough overview of the varied methods for analyzing racecar data acquisition system outputs, with a focus on vehicle dynamics.

Topics include:

- Data analysis software requirements
- Straight-line acceleration
- Braking, gearing, and cornering
- Quantifying roll stiffness distribution
- and much more

ISBN: 978-0-7680-1655-0, 198 pp., Hardbound 2008.

\$63.96 (SAE Member)

\$79.95 (Nonmember)

Product Code: R-367



Bestseller

Bosch Automotive Handbook 7th Edition

This best-selling, industry favorite has been updated and features a wealth of reliable technical data, as well as insight into state-of-the-art automotive technology, comprehensive coverage of hundreds of automotive subjects, and over 1,000 illustrations, diagrams, tables, and sectional drawings.

Contents and central themes include:

- Basic principles: physics, materials science, machine parts
- Sensors: measurement principles, designs
- Internal-combustion engines: gasoline engine, diesel engine
- Engine peripherals: cooling, supercharging, exhaust-gas system
- Emission-control and diagnosis legislation
- and more

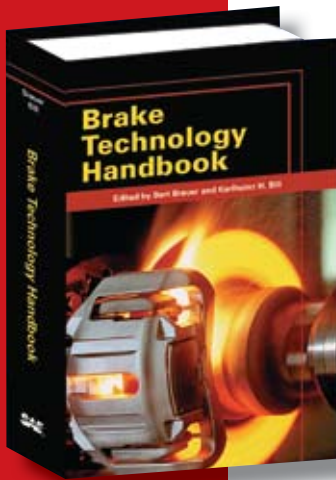
ISBN: 978-0-7680-1953-7, 1200 pp., Paperbound 2007.

\$39.96 (SAE Member)

\$49.95 (Nonmember)

Product Code: BOSCH7





Brake Technology Handbook

By Bert J. Breuer, Karlheinz Bill

In a single source, this book provides comprehensive coverage of the current state-of-the-art, as well as the future, of brakes and braking systems. Translated and completely updated from the landmark German-language work *Bremsenhandbuch*, it covers brake system fundamentals, requirements, design, construction, components, and subsystem functions for vehicles of all types (including passenger cars, commercial vehicles, off-road vehicles, motorcycles, racing vehicles and even aircraft).

Subjects covered include:

- Mechatronics
- Materials
- Processes
- and more

ISBN: 978-0-7680-1787-8, 576 pp., Hardbound 2008.

\$95.96 (SAE Member)

\$119.95 (Nonmember)

Product Code: R-375



Modern Engine Technology from A to Z

By Richard Van Basshuysen, Fred Schaefer

Part dictionary, part encyclopedia, this book will serve as a comprehensive reference guide for personnel in the automotive, engine, petroleum and supporting industries. It is derived from the successful German publication *Shell-Lexikon Verbrennungsmotor* (Shell Lexicon of the Combustion Engine) which originally appeared in supplements to the *Journal of Automotive Engineering* and *Journal of Engine Engineering*.

What to expect:

- In-depth contributions from nearly 100 experts
- Theory and Practice on state-of-the-art engine development
- Keywords, cross-references, illustrations, and more

ISBN: 978-0-7680-1705-2, 1072 pp., Hardbound 2007.

\$103.96 (SAE Member)

\$129.95 (Nonmember)

Product Code: R-373



Books by Carroll Smith



Drive to Win

Existing books on how to drive a racing car are written from the driver's point of view. In *Drive to Win*, author Carroll Smith looks at what the driver does (or should do) from the point of view of the engineer, the team manager, the car owner, and the sponsor. The book is insightful, concise, and entertaining.

ISBN: 978-0-9651600-0-1, 208 pp., Paperbound 1996.

\$19.96 (SAE Member)
\$24.95 (Nonmember)
Product Code: B-701

Prepare To Win

Prepare To Win deals exclusively with the nuts and bolts of race car preparation. It contains no theory, only down-to-earth specific instructions on how to set up a race car in a professional manner. The whole spectrum of race car preparation is covered.

ISBN: 978-0-9651600-3-2, 174 pp., Paperbound 1975.

\$15.96 (SAE Member)
\$19.95 (Nonmember)
Product Code: B-705

Engineer To Win

It's no secret that lost races and crashes are caused by what is usually referred to as mechanical failure. But author Carroll Smith rightly contends that all failures are human in origin. Poor designs, incorrect manufacture and assembly, unreasonable demands, and negligent maintenance all lead to the dreaded "mechanical failure."

ISBN: 978-0-87938-186-8, 280 pp., Paperbound 1984.

\$19.96 (SAE Member)
\$24.95 (Nonmember)
Product Code: B-703

Tune To Win

Tune To Win covers the development and tuning of the race car. This book clearly explains the basic principles of vehicle dynamics, relating these to the various systems of the racing car and to the inputs and control functions of the racing driver. Carroll Smith explores the subject step-by-step and explains how and why each system is supposed to work.

ISBN: 978-0-87938-071-7, 174 pp., Paperbound 1978.

\$15.96 (SAE Member)
\$19.95 (Nonmember)
Product Code: B-704

Carroll Smith's Nuts, Bolts, Fasteners, and Plumbing Handbook

After months of preparation, practice and planning, the season's race championship can rely on just one fastener doing its job. If that fastener shears or loosens, the whole race can be lost - not to mention valuable machinery and even lives. This informative publication is a guide to hardware for race and street cars. Famed race team manager Carroll Smith tells you what each nut, bolt, fastener, and plumbing piece is, how it works, how to torque it, where to use it, and where not to use it.

ISBN: 978-0-87938-406-7, 224 pp., Paperbound 1990.

\$17.56 (SAE Member)
\$21.95 (Nonmember)
Product Code: B-702

The Carroll Smith Race Car Set

Order all five volumes and save!

\$79.20 (SAE Member)/ \$99.00 (Nonmember)
Product Code: B-706.SET

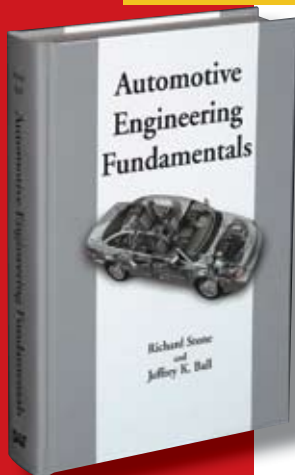
Carroll Smith's Engineer in Your Pocket

ISBN: 978-0-9651600-1-8, 32 pp., Paperbound 1998.

\$12.76 (SAE Member)/ \$15.95 (Nonmember)
Product Code: B-789



Bestseller



Automotive Engineering Fundamentals

By Richard Stone, Jeffrey K. Ball

Gain a basic understanding of the principles involved with designing a vehicle. From engines and transmissions to vehicle aerodynamics and computer modeling, the intelligent and interesting presentation of core concepts in this book is sure to make it an indispensable resource for engineering students and professionals alike.

Sections include:

- Introduction and Overview
- Spark Ignition Engines
- Steering Systems and Steering Dynamics
- Vehicle Aerodynamics
- and more

ISBN: 978-0-7680-0987-3, 612 pp., Hardbound 2004.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: R-199

Bestseller



Handbook of Automotive Engineering

By Ulrich W. Seiffert, Hans Hermann Braess

This latest edition and successor to the well-known German language handbook last published by Professors Heinrich Buschmann and Paul Koessler is widely considered to be one of the most comprehensive encyclopedias of vehicle systems and design. Featuring more extensive coverage than other comparable publications, it contains:

- Information on automotive design and applications
- Over 40 subject matter experts focusing on specific automotive topics
- Information on powertrains, electronics, vehicle safety and future materials
- Extensive figures, drawings, illustrations and formulas

ISBN: 978-0-7680-0783-1, 638 pp., Hardbound 2005.

\$111.96 (SAE Member)

\$139.95 (Nonmember)

Product Code: R-312

Bestseller

Fundamentals of Vehicle Dynamics

By Thomas D. Gillespie

Providing comprehensive coverage of vehicle dynamics in a single volume, this book introduces the basic mechanics governing vehicle performance and familiarizes the reader with analytical methods and terminology.

Major topics include:

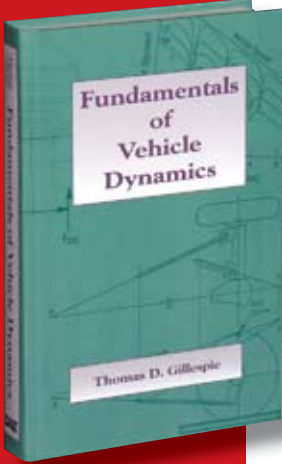
- Acceleration and Braking Performance
- Aerodynamics and Rolling Resistance
- Ride, Tires and Steady-State Cornering
- Suspensions
- Steering Systems
- and more

ISBN: 978-1-56091-199-9, 519 pp., 10 Chapters, Hardbound 1992.

\$63.96 (SAE Member)

\$79.95 (Nonmember)

Product Code: R-114



Bestseller

Engine Testing: Theory & Practice, Third Edition

By Michael James Plint, Tony Martyr

This book brings together the large and scattered body of information on the theory and practice of engine testing, to which any engineer responsible for work of this kind must have access. The eclectic nature of engine, powertrain, chassis and whole vehicle testing makes this comprehensive book a true must-have reference for those in the automotive industry, as well as more advanced students of automotive engineering.

Covers all key aspects of engine testing, including:

- Test Facility Specification
- Test-Cell Design
- Data Management
- Dynamometer Selection and Use
- and more

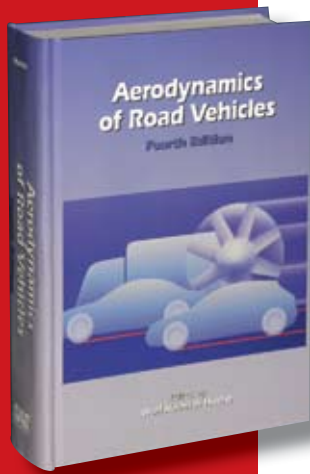
ISBN: 978-0-7680-1850-9, 468 pp., Hardbound 2007.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: R-382





Aerodynamics of Road Vehicles

This comprehensive book discusses the aerodynamics of passenger cars, commercial vehicles, sports and race cars, and motorcycles, along with related fields that are influenced by aerodynamics. Among these are aerodynamics-effect on fuel economy, directional stability, engine cooling, and passenger comfort.

Chapters cover:

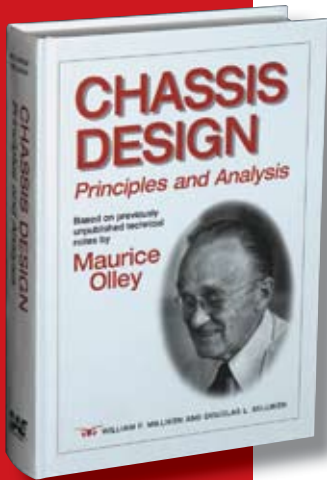
- Introduction to Automobile Aerodynamics
- Some Fundamentals of Fluid Mechanics
- Aerodynamic Drag of Passenger Cars
- Directional Stability
- Wind Noise
- and more

ISBN: 978-0-7680-0029-0, 938 pp., 15 Sections, Hardbound 1998.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: R-177



Chassis Design Principles and Analysis

By William F. Milliken, Douglas L. Milliken

Based on previously unpublished technical notes by Maurice Olley, this book is the first complete presentation of his life and work. It provides insight into the development of chassis technology and its practical application by a master. Many examples are worked out in the text and the analytical developments are grounded by Olley's years of design experience.

Chapters cover:

- Maurice Olley - His Life and Times
- Tires and Steady-State Cornering
- Transient Cornering
- Ride
- Suspension Linkages
- and more

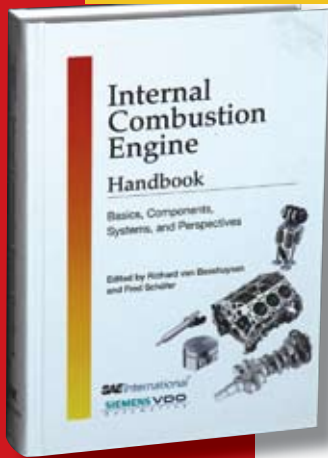
ISBN: 978-0-7680-0826-5, 676 pp., Hardbound 2002.

\$63.96 (SAE Member)

\$79.95 (Nonmember)

Product Code: R-206

Bestseller



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

By Richard Van Basshuysen, Fred Schaefer

Thorough in its presentation, this resource illustrates knowledge in engine development, paying particular attention to the presentation of theory and practice in a balanced ratio, and includes an insightful look into the internal combustion engine's future viability.

Chapter topics include:

- Historical Review
- Thermodynamic Fundamentals
- Engine Components
- Powertrain
- and more

ISBN: 978-0-7680-1139-5, 868 pp., Hardbound 2004.

\$119.96 (SAE Member)

\$149.95 (Nonmember)

Product Code: R-345

Bestseller



Hands-On Race Car Engineer

By John H. Glimmerveen

This book will help racing professionals and enthusiasts learn to recognize why they won or lost a race - key information to continually improving and reaching the winner's circle. It looks at every part of the process required to make a car better than its competitors.

Chapters include:

- Assembling the Car
- Geometrical Set-up
- Testing, Practice and Qualifying
- Racing
- Essential Spares and Equipment
- and more

ISBN: 978-0-7680-0898-2, 264 pp., Paperbound 2004.

\$55.96 (SAE Member)

\$69.95 (Nonmember)

Product Code: R-323

Bestseller

Race Car Vehicle Dynamics

By William F. Milliken, Douglas L. Milliken

Truly comprehensive in its coverage of the fundamental concepts of vehicle dynamics and their application in a racing environment, this book has become the definitive reference on this topic. Although the primary focus is on the race car, the engineering fundamentals detailed are also applicable to passenger car design and engineering.

Chapters cover:

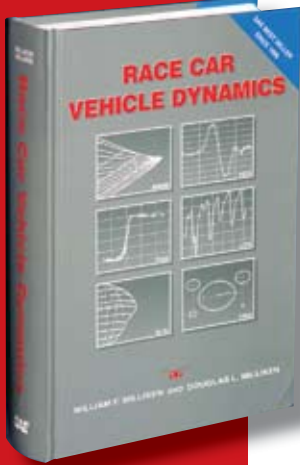
- The Problem Imposed by Racing
- Tire Behavior
- Aerodynamic Fundamentals
- Vehicle Axis Systems
- and more

ISBN: 978-1-56091-526-3, 918 pp., 2 Sections, 23 Chapters, Hardbound 1995.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: R-146



Race Car Vehicle Dynamics book and Problems, Answers and Solutions set

ISBN: 978-0-7680-0121-8, Shrinkwrapped 1997.

\$119.96 (SAE Member)

\$149.95 (Nonmember)

Product Code: R-146.SET

Bestseller

Race Car Vehicle Dynamics Problems, Answers and Experiments

By Douglas L. Milliken, Edward M. Kasprzak, L. Daniel Metz, William F. Milliken

Written for the engineer as well as the race car enthusiast and students, this is a supplement to the original classic book, *Race Car Vehicle Dynamics*, and includes:

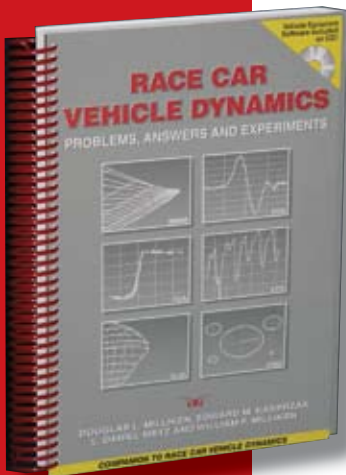
- Detailed worked solutions to all of the problems
- Problems for every chapter in *Race Car Vehicle Dynamics*, including many new problems
- The Race Car Vehicle Dynamics Program Suite (for Windows) with accompanying exercises
- Experiments to try with your own vehicle
- Educational appendix with additional references and course outlines
- 90+ figures and graphs

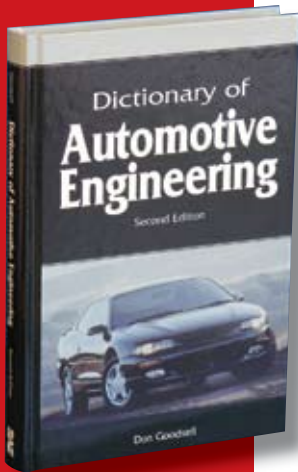
ISBN: 978-0-7680-1127-2, 294 pp., Spiral Bound 2003.

\$55.96 (SAE Member)

\$69.95 (Nonmember)

Product Code: R-280





Dictionary of Automotive Engineering Second Edition

By *Don Goodsell*

The second edition provides complete coverage of over 3,000 terms and over 100 detailed drawings currently used in automotive engineering worldwide. This thorough technical reference defines the terminology of the professional engineer, and also includes the more informal vocabulary common in industry use.

Includes expanded coverage of the following areas:

- Fuels and Lubricants
- Materials (Including Plastics and Elastomers)
- Tires, Testing, Electronics
- Off-highway and Construction Vehicles

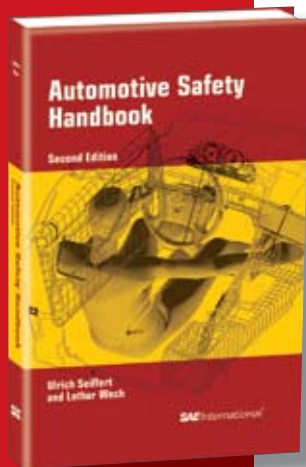
Co-published by SAE and Butterworth-Heinemann.

ISBN: 978-1-56091-683-3, 280 pp., Hardbound 1995.

\$23.99 (SAE Member)

\$29.99 (Nonmember)

Product Code: R-159



Automotive Safety Handbook Second Edition

By *Ulrich W. Seiffert, Lothar Wech*

Examining the state-of-the-art in passenger car vehicle safety, the book features thorough discussion of the interrelationships among the occupant, the vehicle, and the restraint system (in frontal, lateral, and rear impacts and rollover). Reflecting the latest changes in technology and legislation, the second edition provides updated information on many topics, including:

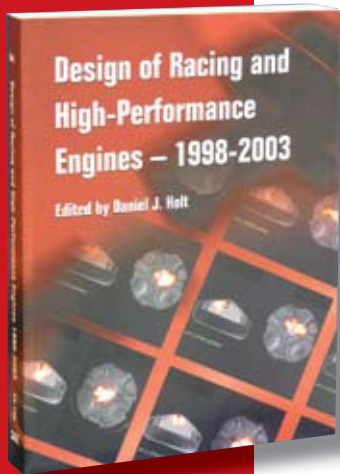
- Accident Avoidance
- Pedestrian Protection
- Compatibility

ISBN: 978-0-7680-1798-4, 306 pp., Hardbound 2007.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: R-377



Design of Racing and High-Performance Engines 1998-2003

By Daniel J. Holt

The 52 technical papers in this book show the improvements and design techniques that researchers have applied to performance and racing engines. They provide an insight into the top improvements needed to advance engine technology.

Content Includes:

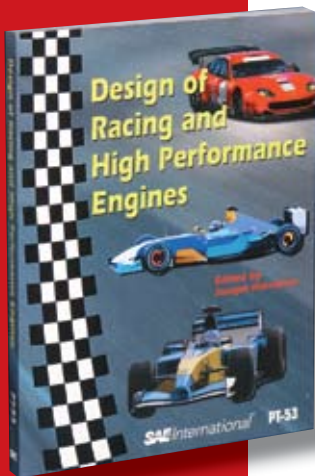
- Direct Injection
- Valve Spring Advancements
- Turbocharging
- Variable Valve Control
- Combustion Evaluation
- and more

ISBN: 978-0-7680-1298-9, 300 pp., 52 Papers, Paperbound 2003.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: PT-100



Design of Racing and High Performance Engines

By Joseph Harralson

This is an excellent primer for the novice and a great resource for the expert. In a clear and easy-to-understand manner, the book presents 17 technical papers covering the basic principles involved in the design of high performance engines.

Topics covered include:

- Engine friction and output
- Design of high performance cylinder heads
- Multi-cylinder motorcycle racing engines
- Valve timing and how it affects performance
- and more

ISBN: 978-1-56091-601-7, 272 pp., 17 Papers, Paperbound 1995.

\$39.99 (SAE Member)

\$49.99 (Nonmember)

Product Code: PT-53

Racing Chassis and Suspension Design

By Carroll Smith

The 28 SAE Technical Papers in this book, written between 1971 and 2003, offer what Smith believed to be the best and most practical nuggets of racing chassis and suspension design information.

Contents include:

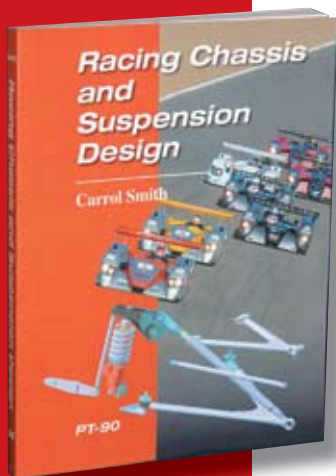
- Racing Tires
- Suspension Design
- Aerodynamics
- Use of FEA
- and more

ISBN: 978-0-7680-1120-3, 348 pp., 28 Papers, Paperbound 2004.

\$79.96 (SAE Member)

\$99.95 (Nonmember)

Product Code: PT-90



Bestseller

Car Suspension and Handling Fourth Edition

By Geoffrey Howard, John Peter Whitehead,
Donald Bastow

This 4th Edition focuses on the suspension and handling of cars, or automobiles, as opposed to those characteristics of other types of road vehicles, while always recognizing that there are differences in suspension requirements for different classes of vehicles, and in various markets of the world for a given vehicle.

Chapters include:

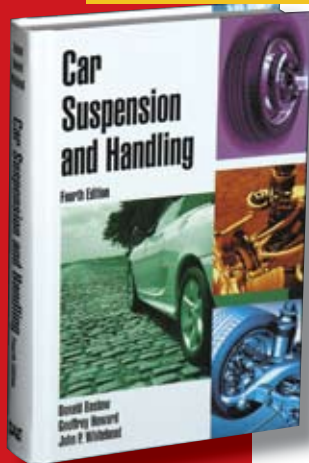
- Disturbances and Sensitivity
- The Wheel and Tire
- Steering
- Suspension Systems and their Effects
- and more

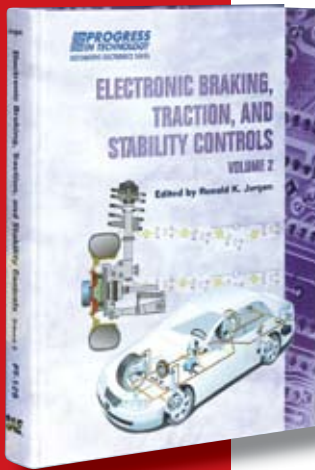
ISBN: 978-0-7680-0872-2, 474 pp., Hardbound 2004.

\$47.99 (SAE Member)

\$59.99 (Nonmember)

Product Code: R-318





Electronic Braking, Traction, and Stability Controls Volume 2

By Ronald K. Jurgen

This book contains 80 papers covering six years of research from 2000-2005 on advances in electronic braking systems including:

- Brake-by-wire and Antilock Braking Systems
- Traction Control Systems (TCS, ASR)
- Stability Control Systems (VDC)

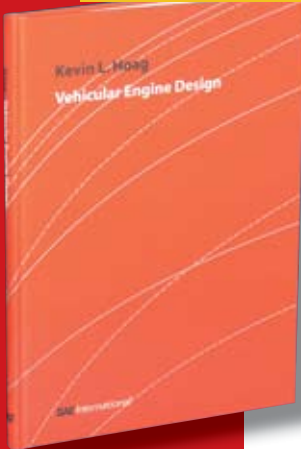
ISBN: 978-0-7680-1786-1, 656 pp., 80 Papers, Hardbound 2006.

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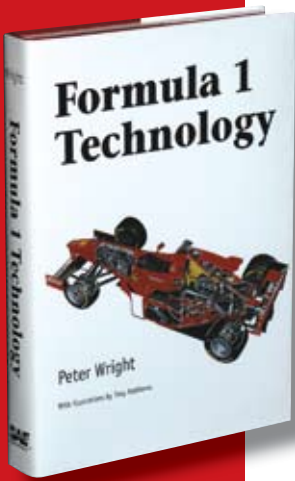
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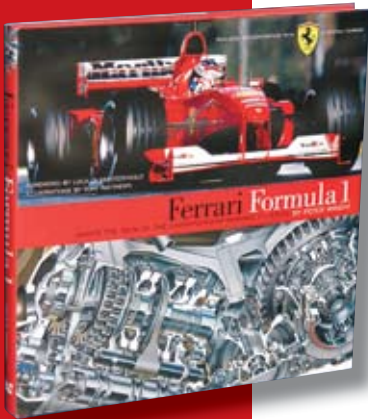
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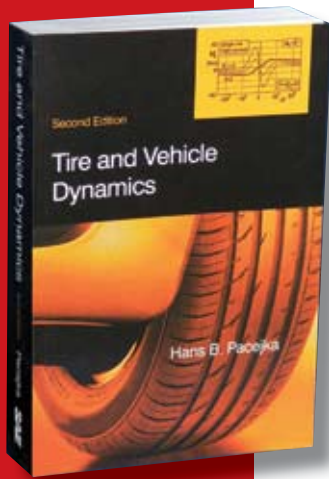
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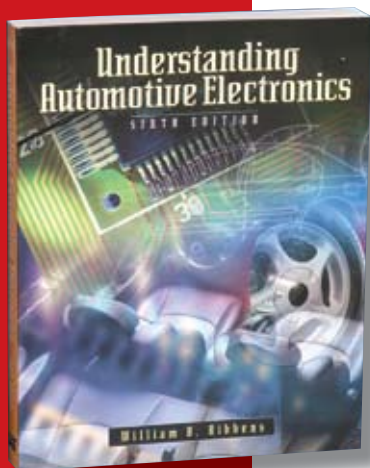
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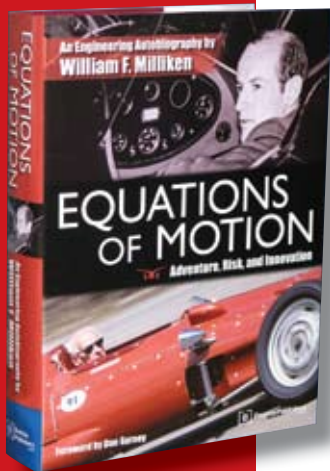
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