

Race Car Engineering

[#race car engineering](#) [#motorsport design principles](#) [#automotive performance optimization](#) [#racing vehicle aerodynamics](#) [#chassis design motorsport](#)

Race car engineering is the specialized field dedicated to designing, developing, and optimizing high-performance vehicles for competitive motorsport. It encompasses cutting-edge automotive performance optimization, focusing on crucial elements like aerodynamics, chassis design, engine technology, and driver ergonomics to achieve unparalleled speed, reliability, and safety on the track.

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Race Car Engineering and Mechanics

A comprehensive guide on how to tune, test, and win in any form of racing. Includes technical information on all areas of race car engineering, including suspension and chassis, springs, brakes, aerodynamics, engine systems, safety, driving, testing, computers in racing, and a special section on race cars of the future.

An Introduction to Race Car Engineering

Hands-On Race Car Engineer looks at every part of the process required to make a car better than its competitors. Drivers will gain a better understanding of the dynamics of the vehicle. Race engineers will better understand the practical implications of set-up. Design engineers will gain insight into practical applications of their designs. Mechanics will better understand why engineers design things a certain way. In short, 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.

Hands-On Race Car Engineer

Based on the principles of engineering science, physics and mathematics, but assuming only an elementary understanding of these, this textbook masterfully explains the theory and practice of the subject. Bringing together key topics, including the chassis frame, suspension, steering, tyres, brakes, transmission, lubrication and fuel systems, this is the first text to cover all the essential elements of race car design in one student-friendly textbook. It avoids the pitfalls of being either too theoretical and mathematical, or else resorting to approximations without explanation of the underlying theory. Where relevant, emphasis is placed on the important role that computer tools play in the modern design

process. This book is intended for motorsport engineering students and is the best possible resource for those involved in Formula Student/FSAE. It is also a valuable guide for practising car designers and constructors, and enthusiasts.

Race Car Design

This guide and textbook on motorsport engineering is written from a practical point of view. It offers a wide-ranging insight into the nuts and bolts technology of practical car racing from saloons and sports cars to open wheelers. It gives the aspiring race engineer the tools to do the job by explaining all aspects of race car technology and offering crucial insight into the essentials of the motorsport engineering industry. For motorsport engineering students at all levels, this book particularly covers the examination syllabuses for IMI (the Institute of the Motor Industry), EAL and BTEC, and meets the CPD requirements of most engineering institutions. Each aspect of the race car is covered in a separate chapter with test questions and suggestions for further study at the end. Combining the key points from his previous publications Basic Motorsport Engineering and Advanced Motorsport Engineering, the author draws on a career in teaching and industry to create the must-have, all-in-one reference. It is an ideal companion for the practising owner, driver or race engineer (whether amateur or professional), a suitable introductory text for HND and degree students and a great point of reference for any other keen fans with an interest in motorsport.

Practical Motorsport Engineering

In the full design of a Race Car, there are many important aspects to study and analyze. There is no book in the World that analyzes the design process of a Race Car, step by step, from conception to circuit testing. This book offers this knowledge: to be able to design a competition vehicle, knowing and analyzing all its phases. Ideal for Students in FSAE, Formula Student, Vehicle Companies, Universities Engineering Students, Engineering Professors, Racing Engineering Formation, etc....In the full design of a Race Car, there are many important aspects to study and analyze. There is no book in the World that analyzes the design process of a Race Car, step by step, from conception to circuit testing: Suspension, Tires, Mass transfer, Max speed, Power Train, Post Rig and Aero Post Rig Analysis, Lap Time, Acceleration, Braking, Aerodynamic design, Refrigeration, Dynamic and Static behaviour, Optimization, etc....This book offers this knowledge: to be able to design a competition vehicle, knowing and analyzing all its phases

How to Design a Race Car, Step by Step

This series of books gives you the knowledge to become a successful Race Engineer. There are many good engineering books, but none have been written specifically for someone engineering a Race Car. Whether you are fresh out of university or a club racer wanting to know more; this series is for you. This collection of books has come about for many reasons. My fascination with the technical side of motorsport, the desire to go faster, the desire to learn, and a most importantly to help aspiring Race Engineers. The desire to learn how make machines go faster started as a 10 year old with my first Moto X bike. I kept wondering why the works bikes looked so different to mine in the magazines. Trouble was there were no books to show me how to turn my bike into a works replica. So, I just pulled the forks and dampers apart and tried different oil, valving and springs. Eventually some of the modifications proved successful, but I always thought it would have been so much easier if I had a guide book. I was in the same boat when I started racing my first formula ford. Having to prepare the car myself as well as drive it and engineer it on race day. None of my fellow competitors were going to tell me how to set up the car. And I just couldn't find information that was race engineering specific. I also spent a lot of money with suspension and race prep "experts" who I found out later really did not know what they were doing. When I started working as a Data Engineer in professional motorsport and had to troll through two, floor to ceiling book shelves full of books to find answers to problems. Why can't there be just one book with what a race engineer needs to know I used to think. And finally, the thing that got me writing was working with new Data / Race Engineers. Most were intelligent, hardworking and eager to learn. However, they often came into the team without knowing or understanding what they needed to do as a Race Engineer. I decided to write the first volume on shock absorbers for several reasons. Shock absorbers are the least understood of all components in a race car. I see this nearly every day as part of my business is tuning shock absorbers for customers with many different types of race cars. The most important thing you can take from this book is that shock absorbers are not a black art. Like any mechanical component or any machine in its dynamic state it all comes back to engineering from first

principles. Yes, experience does play its part to get the most out of your shocks and give the feel driver wants. But, if you start off following the basic principles laid out in this book, you will soon have your dampers in the ball park.

Race Car Engineering and Mechanics

The first book to summarize the secrets of the rapidly developing field of high-speed vehicle design. From F1 to Indy Car, Drag and Sedan racing, this book provides clear explanations for engineers who want to improve their design skills and enthusiasts who simply want to understand how their favorite race cars go fast. Explains how aerodynamics win races, why downforce is more important than streamlining and drag reduction, designing wings and venturis, plus wind tunnel designs and more.

How to Be a Race Engineer

The focus of the book is on the driving dynamics of racing vehicles. The interaction of the tyre, the aerodynamics, of the chassis and the limited slip differential specific to racing vehicles is dealt with. A chapter on the basics of vehicle dynamics makes it possible to get started with this topic even without prior automotive engineering training. A historical review and a consideration of the essential safety aspects create an understanding of higher-level requirements, which are specified, for example, by the technical regulations.

Race Car Aerodynamics

EJ 'Ted' Cutting was not only Aston Martin's most successful Chief Race Car Design Engineer, but was also an innovator with influential force on the worldwide automotive industry. Originating from a limited edition hardback version, this eBook was produced in celebration of the 60th anniversary of Aston Martin winning the World Sports Car Championship for Britain with the all-conquering DBR1 designed, engineered and created by Ted himself. Rather than a traditional biography of his life, Ted wanted his book to be rather less scripted and informal; it was therefore initially adapted from a number of recorded conversations between himself and Aston Martin Heritage Trust members Stuart Bailey and Brian Joscelyne - the title being an obvious choice considering this! In addition to the in-depth telling of a legendary period in British motorsport by a man at the centre of it all, the book also sees Ted clarify a number of details which have in the past been incorrectly reported. Unusually it also contains all his published documents and access to a 90 minute video of his unique lecture on 'Racing Astons' to further endorse his story. Although the original hardback edition of this book was produced only in a limited run, Ted's wish was to make the complete book available to a much wider audience, now possible through the internet; as an engineer always working at the cutting edge of technology, he would appreciate the benefits of information sharing in the digital age. As well as being of interest to fans of Aston Martin and of motorsports in general, the book is a compelling read for any student of automotive design and engineering; after all, progress is about standing on the shoulders of giants - and in the field of race car design, few individuals ever reach the colossal heights achieved by Ted Cutting.

Basic Course in Race Car Technology

Smith's Fundamentals of Motorsport Engineering provides the ultimate guide to motorsport engineering and what to expect at the racetrack, with content to suit motorsport learners from Level 3 up to degree level.

Cutting Edge Conversations

Describes some popular race cars and discusses some of the races in which they compete.

Smith's Fundamentals of Motorsport Engineering

"Is titanium for you? Can better brakes reduce lap times significantly? How do you choose the rights nuts and bolts? Which is more important, cornering or straight-line speed? Why did it break again? Engineer to Win not only answers these and many other questions, it gives you the reasons why."--Back cover

Racing Cars

In 2006, a small unavailing university auto racing team began building a racecar that would challenge the best engineering schools in the world. With fewer people and resources than any of the top competitors, the only way they were going to win was to push the limit, go for broke, and hope for more than a little luck. By the time they got to the racetrack, they knew: In the fog of fierce competition, whether you win or lose, you learn the hardest lessons about engineering, teamwork, friendship, and yourself.

Engineer to Win

The Art of the Formula 1 Race Car 2022 presents thirteen of the most exciting F1 race cars from seventy-plus years of competition, captured in the studio portraits of master automotive photographer James Mann. The photographs in this sixteen-month calendar showcase greats from Ferrari, McLaren, Williams, Lotus, Brabham, and Mercedes, portraying not just the vehicles' engineering and technological brilliance but also their inherent beauty—the captivating result of Formula 1's mix of competition, creativity, and technical ingenuity that makes these racers works of mechanical art. With a convenient page that shows the months of September, October, November, and December 2021, followed by individual pages for the months of 2022, keep yourself on track throughout the year while enjoying Formula 1's most captivating and successful race cars from the 1950s to today.

Racecar

This set includes Race Car Vehicle Dynamics, and Race Car Vehicle Dynamics - Problems, Answers and Experiments. Written for the engineer as well as the race car enthusiast, Race Car Vehicle Dynamics includes much information that is not available in any other vehicle dynamics text. 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. Authors Bill and Doug Milliken have developed many of the original vehicle dynamics theories and principles covered in this book, including the Moment Method, "g-g" Diagram, pair analysis, lap time simulation, and tyre data normalization. The book also includes contributions from other experts in the field. Chapters cover: *The Problem Imposed by Racing *Tire Behavior *Aerodynamic Fundamentals *Vehicle Axis Systems and more. Written for the engineer as well as the race car enthusiast and students, the companion workbook to the original classic book, Race Car Vehicle Dynamics, 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 *Over 90 figures and graphs This workbook is widely used as a college textbook and has been an SAE International best seller since its introduction in 1995.

The Art of the Formula 1 Race Car 2022

Store all the answers in your hip pocket! This handy pocket guide written by racing professional Carroll Smith suggests realistic solutions to common race car handling problems. Formatted listing causes and possible effects, and problems and possible causes. Spiralbound, 3 1/2"x 7 3/4"

Race Car Vehicle Dynamics Set

In most forms of racing, cornering speed is the key to winning. On the street, precise and predictable handling is the key to high performance driving. However, the art and science of engineering a chassis can be difficult to comprehend, let alone apply. Chassis Engineering explains the complex principles of suspension geometry and chassis design in terms the novice can easily understand and apply to any project. Hundreds of photos and illustrations illustrate what it takes to design, build, and tune the ultimate chassis for maximum cornering power on and off the track.

Engineer in Your Pocket

Explores the engineering challenges behind building race cars, as well as the creative solutions found to overcome those challenges. Accessible text, vibrant photos, and an engineering activity for readers provide a well-rounded introduction to the engineering process.

Chassis Engineering

Ross Bentley. Race teams have discovered great benefits can be derived from "tuning" their driver to perform at his/her full potential. Thus, this book is for everyone who works with a driver: engineers, crew chiefs, team owners, mechanics, and the driver's parents. This unique book instructs the driver's support team how to prepare and communicate with the driver so the driver delivers the best performance in races, practice sessions, and off-track team functions. Written by veteran racer and driving coach Ross Bentley, this book helps the driver's support team devise effective approaches to "tuning" their driver. It will help them identify techniques that do and don't work with their specific driver. The result should be better communication and a driver who is "tuned" for success.

Building Race Cars

Formula 1, the worlds most popular motor sport, from a totally new perspective ? Hidden in workshops around the world lie forgotten and abandoned machines ? unfulfilled. These purpose built cars have never started a race, never felt the excitement of a grand prix. Yet they define an era of Formula One, changing the landscape. Unraced tell the stories of nine grand prix cars that never started. An exciting and fresh look at F1 from the Author of Autodrome. The Unraced are largely forgotten or overlooked but the stories they have to tell reveal more about the sport than any championship winner, and for the first time these stories are told in a refreshing style, backed up with 150 photos, many never published before. The book covers Honda RC100/RC1.5x (1993-1995), Lola T95/30 (1995), DAMS GD-01 (1995), Honda RC2x (1995-1996), Dome F105 (1996), Lola T97/30 (1997), Honda RA099 (1999), Premier1 prototype (2001), McLaren MP4/18 (2003) and also includes a listing of all F1 projects (raced & unraced) from 1995 ? 2005. This book is completely incomparable and a must have for any motor sport enthusiast.

Speed Secrets 4

Aerodynamics is a science in itself, and is one of the most important factors in modern competition car design. This fully updated second edition covers all aspects of aerodynamics, including both downforce and drag. This complex subject is explained in down-to-earth terms, with the aid of numerous illustrations, including color CFD (Computational Fluid Dynamics) diagrams to demonstrate how aerodynamic devices work, as well as wind-tunnel studies.

Playing to Win

The performance of an F1 race car is greatly influenced by its aerodynamics. Race teams try to improve the vehicle performance by aiming for more levels of downforce. A huge amount of time is spent in wind tunnel and track testing. Typical wind tunnel testing is carried out in steady aerodynamic conditions and with car static configurations. However, the ride heights of a car are continuously changing in a race track because of many factors. These are, for example, the roughness and undulations of the track, braking, accelerations, direction changes, aerodynamic load variations due to varying air speed and others. These factors may induce movements on suspensions components (sprung and unsprung masses) at different frequencies and may cause aerodynamic fluctuations that vary tires grip. When the frequency of the movement of a race car is high enough the steady aerodynamic condition and the car static configurations are not fulfilled. Then, transient effects appear and the dynamics of the system changes: heave, pitch and roll transient movements of the sprung mass affect both downforce and center of pressure position. The suspension system have to cope with them, but in order for the suspension to be effective, unsteady aerodynamics must be considered. The main objective is to model the effects of unsteady aerodynamics and know really the car dynamic, with the aim of optimizing the suspension performance, improving tire grip and finally reducing lap times. This special books serie-collection, have a lot aspects: DEFINITIONS, PRINCIPLES AND CONSEQUENCES, FORCES AND MOMENTS, WINGS, GROUND AND DIFFUSER, REFRIGERATION, PRESSURE CENTER, AERO BALANCE, AERO MAP, NOZZLES, INTAKES, AIR BOX, TRUMPETS AND EXHAUSTS, WIND TUNNELS, SIMULATION CFD, EXAMPLES IMPLANTED IN RACE CARS, NOMENCLATURE, CONSIDERATIONS ABOUT GOOD SETUP, IDEAL DESIGN, POST RIG ANALYSIS, AERO POST RIG ANALYSIS, VEHICLE DYNAMIC, --OTHER'S TITLES..... -> In this BOOK - 10: ENGINEERING SAMPLES IN RACE CARS AND MORE.

Unraced...

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Competition Car Aerodynamics

A kinetic energy recover system (KERS) captures the kinetic energy that results when brakes are applied to a moving vehicle. The recovered energy can be stored in a flywheel or battery and used later, to help boost acceleration. KERS helps transfer what was formerly wasted energy into useful energy. In 2009, the Federation Internationale de l'Automobile (FIA) began allowing KERS to be used in Formula One (F1) competition. Still considered experimental, this technology is undergoing development in the racing world but has yet to become mainstream for production vehicles. The Introduction of this book details the theory behind the KERS concept. It describes how kinetic energy can be recovered, and the mechanical and electric systems for storing it. Flybrid systems are highlighted since they are the most popular KERS developed thus far. The KERS of two racing vehicles are profiled: the Dyson Lola LMP1 and Audi R18 e-tron Quattro. Four SAE technical papers follow the preface and focus on the use of KERS technology in F1 racing. The first paper examines the factors that influence hybrid performance and enable optimization for different racing circuits. The second paper describes a Flybrid KERS designed for the 2009 F1 season. The third paper considers the development of an electric KERS for the 2009 F1 season. The fourth paper presents the challenges and opportunities of the 2014 F1 engine and powertrain rules, particularly as they pertain to KERS. This book has been published for automotive engineers who are interested in hybrid systems, energy recovery, regenerative braking, and improving acceleration. It will also be useful for powertrain designers, researchers, academics, and motorsports professionals (race engineers, team managers, and technology practitioners who design and build racing powertrains).

Engineer to Win

'Adrian has a unique gift for understanding drivers and racing cars. He is ultra competitive but never forgets to have fun. An immensely likeable man.' Damon Hill

Engineering Samples in Race Cars and More - 10

A workbook for introductory courses on vehicle dynamics.

Front and Rear Wing in Race Car - 4

"Learn about the history of auto racing and find out what it takes to make it in this exciting career field"--

Kinetic Energy Recovery Systems for Racing Cars

The performance of an F1 race car is greatly influenced by its aerodynamics. Race teams try to improve the vehicle performance by aiming for more levels of downforce. A huge amount of time is spent in wind tunnel and track testing. Typical wind tunnel testing is carried out in steady aerodynamic conditions and with car static configurations. However, the ride heights of a car are continuously changing in a race track because of many factors. These are, for example, the roughness and undulations of the track, braking, accelerations, direction changes, aerodynamic load variations due to varying air speed and others. These factors may induce movements on suspensions components (sprung and unsprung masses) at different frequencies and may cause aerodynamic fluctuations that vary tires grip. When the frequency of the movement of a race car is high enough the steady aerodynamic condition and the car static configurations are not fulfilled. Then, transient effects appear and the dynamics of the system changes: heave, pitch and roll transient movements of the sprung mass affect both downforce and center of pressure position. The suspension system have to cope with them, but in order for the suspension to be effective, unsteady aerodynamics must be considered. The main objective is to model the effects of unsteady aerodynamics and know really the car dynamic, with the aim of optimizing the suspension performance, improving tire grip and finally reducing lap times. This special books serie-collection, have a lot aspects: DEFINITIONS, PRINCIPLES AND CONSEQUENCES, FORCES AND MOMENTS, WINGS, GROUND AND DIFFUSER, REFRIGERATION, PRESSURE CENTER, AERO BALANCE, AERO MAP, NOZZLES, INTAKES, AIR BOX, TRUMPETS AND EXHAUSTS, WIND TUNNELS, SIMULATION CFD, EXAMPLES IMPLANTED IN RACE CARS, NOMENCLATURE, CONSIDERATIONS ABOUT GOOD SETUP, IDEAL DESIGN, POST RIG ANALYSIS, AERO POST RIG ANALYSIS, VEHICLE DYNAMIC, --OTHER'S TITLES..... -> In this BOOK - 6: REFRIGERATION IN RACE CAR.

How to Build a Car: The Autobiography of the World's Greatest Formula 1 Designer

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Race Car Vehicle Dynamics Workbook

Dialogue between one of the world's most experienced racing car designers and a technical author-graduate engineer on the theory and technique of racing car design and development. Contents include: The anatomy of a racing car designer; biography of Len Terry; description of nearly 30 Terry designs from clubman's sports car to Indianapolis winner; a blank sheet of paper; handling characteristics; the theoretical aspects; oversteer and understeer; practical implications; structural considerations; space-frames and monocoques; the cockpit area; the structural engine; progress and legislation; suspension; changing needs and layouts; the torsion bar; self-levelling systems; anti-dive and anti-squat; progressive-rate springing; stiffness/weight ratio; brakes, wheels and tires; influence of smaller wheels; twin-disc brake systems; attention to details; low-profile tire phenomena; aerodynamics; wings and things; intake ram effect; ground effect vehicles; the cooling system; radiator location; cooling

the oil; safety and comfort; primary and secondary safety; driver comfort; materials; components-ball joints, batteries, brakes, clutches, dampers, drive-shafts, electrics, flexible bearings, flexible fuel cells, gearshift linkages, instruments, non-return valves, non-spill fuel fillers, oil and fuel pipes, Perspex mouldings, radiators, springs and steering gear; design versus development; the competition-nine other racing car designers discussed; future developments.

Race Cars

The volume will include selected and reviewed papers from CONAT - International Congress of Automotive and Transport Engineering to be held in Brasov, Romania, in October 2016. Authors are experts from research, industry and universities coming from 14 countries worldwide. The papers are covering the latest developments in automotive vehicles and environment, advanced transport systems and road traffic, heavy and special vehicles, new materials, manufacturing technologies and logistics, accident research and analysis and innovative solutions for automotive vehicles. The conference will be organized by SIAR (Society of Automotive Engineers from Romania) in cooperation with FISITA.

Refrigeration in Race Car - 6

Colin Chapman was arguably the greatest race car designer ever. But his talent for design stretched far beyond Formula 1, encompassing sports car racing, road cars, aircraft, powerboats -- even furniture and coffins. The late Hugh Haskell, who worked as an engineer under Chapman, guides readers through the intricacies of engineering principles to make Chapman's restless innovations comprehensible. Also included are interviews with Chapman's contemporaries and rivals, illustrations from the Lotus archives, and a foreword by legendary racer Stirling Moss, who drove several of Chapman's designs.

Floor, Diffuser and Ground Effect in Race Car - 5

There is no available information at this time.

Racing Car Design and Development

Le Mans is one of the longest-running and most spectacular endurance races in the history of motorsport. Spanning from the first 24 Hours of Le Mans in 1923 to the present day, Art of the Le Mans Race Car takes the reader through a visual review of 90 years of significant, stunning racing machines. Featured cars include racers from Bentley, Talbot, Alfa Romeo, Cunningham, Jaguar, Ferrari, Porsche, McLaren, and Audi, to name but a few. Striking studio photography specifically commissioned for this book from James Mann, one of the world's leading car and motorcycle photographers, highlights the functional art of race car engineering, allowing readers to lose themselves in the myriad of mechanical details within. Each car includes a profile setting out its place in Le Mans history, accompanied by historical images and commentary from drivers, designers, and engineers. Written by renowned journalist and broadcaster Stuart Codling, Art of the Le Mans Race Car offers a fresh, visually breathtaking telling of the beautiful vehicles that have graced the world's most beloved endurance race.

CONAT 2016 International Congress of Automotive and Transport Engineering

A biography of motor racing mechanic Tony Robinson, who worked with some of the great names of the sport in the 1950s and '60s.

Colin Chapman

From historical background to state of the art techniques, and with chapters covering airdams, splitters, spoilers, wings, underbodies and myriad miscellaneous devices, Competition Car Aerodynamics 3rd Edition also features in-depth case studies from across the motorsport spectrum to help develop a comprehensive understanding of the subject.

Vehicle Dynamics and Damping

Art of the Le Mans Race Car

