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20 Years Of Powertrain And Vehicle Virtual Development

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Drive Cycle Powertrain Efficiencies and Trends Derived from EPA Vehicle Dynamometer Results

FITZPATRICK BAUTISTA

Popular Mechanics National Academies Press
For the past 20 years engineering students at the Ohio State University Center for Automotive Research have being designing, building, and racing electric vehicles. Over the past 15 years the team has focused on the development of the Buckeye Bullet series of landspeed racing vehicles to chase new speed records for EV's. Throughout history, automotive technology has been born on the racetrack and the students of the Buckeye Bullet racing team have used this concept to push the performance limits of electric vehicle technology. In 2010 the team developed a partnership with EV manufacture Venturi Automobiles to form the Venturi Buckeye Bullet Racing Team. The team's current mission is to chase 400 MPH and set the ultimate landspeed record regardless of class utilizing an electric vehicle. For the first time in 100 years an electric vehicle will challenge the ultimate speed performance of the internal combustion engine. This document begins with a high level view of the development process for the VBB3 electric landspeed vehicle with a focus on the development of the 2 mega-watt electric powertrain and energy storage systems. Next a detailed look into the specification, design, construction, and integration of each of the key powertrain components is presented. A section on the development of specialized test benches for high speed, high torque motors is included. The document concludes with a review of the results to date and future work remaining to achieve the 400 MPH program goal.
Lemon-Aid New Cars and Trucks 2010 Springer Science & Business Media
The nation has compelling reasons to reduce its consumption of oil and emissions of carbon dioxide. Plug-in hybrid electric vehicles (PHEVs) promise to contribute to both goals by allowing some miles to be driven on electricity drawn from the grid, with an internal combustion engine that kicks in when the batteries are discharged. However, while battery technology has made great strides in recent years, batteries are still very expensive. Transitions to Alternative Transportation Technologies--Plug-in Hybrid Electric Vehicles builds on a 2008 National Research Council report on hydrogen fuel cell vehicles. The present volume

reviews the current and projected technology status of PHEVs; considers the factors that will affect how rapidly PHEVs could enter the marketplace, including the interface with the electric transmission and distribution system; determines a maximum practical penetration rate for PHEVs consistent with the time frame and factors considered in the 2008 Hydrogen report; and incorporates PHEVs into the models used in the hydrogen study to estimate the costs and impacts on petroleum consumption and carbon dioxide emissions.

A European Perspective MDPI

Sustainable Automotive Energy System in China aims at identifying and addressing the key issues of automotive energy in China in a systematic way, covering demography, economics, technology and policy, based on systematic and in-depth, multidisciplinary and comprehensive studies. Five scenarios of China's automotive energy development are created to analyze the possible contributions in the fields of automotive energy, vehicle fuel economy improvement, electric vehicles, fuel cell vehicles and the 2nd generation biofuel development. Thanks to this book, readers can gain a better understanding of the nature of China's automotive energy development and be informed about: 1) the current status of automotive energy consumption, vehicle technology development, automotive energy technology development and policy; 2) the future of automotive energy development, fuel consumption, propulsion technology penetration and automotive energy technology development, and 3) the pathways of sustainable automotive energy transformation in China, in particular, the technological and the policy-related options. This book is intended for researchers, engineers and graduates students in the low-carbon transportation and environmental protection field. China Automotive Energy Research Center (CAERC), Tsinghua University, established in 2008, is a university-wide interdisciplinary automotive energy research institution affiliated to Laboratory of Low Carbon Energy (LCE), Tsinghua University. More than 30 researchers are working at CAERC, including six full professors. CAERC's mission is to create and disseminate sustainable automotive energy knowledge, research and development of integrated automotive energy system assessment methodologies and models, and provide technological and policy options for sustainable automotive energy system transformation in China and the world.

Transitions to Alternative Transportation Technologies Springer Nature

The transport sector continues to shift towards alternative powertrains, particularly with the UK Government's announcement to end the sale of petrol and diesel passenger cars by 2030 and increasing support for alternatives. Despite this announcement, the internal combustion continues to play a significant role both in the passenger car market through the use of hybrids and sustainable low carbon fuels, as well as a key role in other sectors such as heavy-duty vehicles and off-highway applications across the globe. Building on the industry-leading IC Engines conference, the 2021 Powertrain Systems for Net-Zero Transport conference (7-8 December 2021, London, UK) focussed on the internal combustion engine's role in Net-Zero transport as well as covered developments in the wide range of propulsion systems available (electric, fuel cell, sustainable fuels etc) and their associated powertrains. To achieve the net-zero transport

across the globe, the life-cycle analysis of future powertrain and energy was also discussed. Powertrain Systems for Net-Zero Transport provided a forum for engine, fuels, e-machine, fuel cell and powertrain experts to look closely at developments in powertrain technology required, to meet the demands of the net-zero future and global competition in all sectors of the road transportation, off-highway and stationary power industries.

Advanced Microsystems for Automotive Applications 2012

John Wiley & Sons
The announcement of a hydrogen fuel initiative in the Presidentâ€™s 2003 State of the Union speech substantially increased interest in the potential for hydrogen to play a major role in the nationâ€™s long-term energy future. Prior to that event, DOE asked the National Research Council to examine key technical issues about the hydrogen economy to assist in the development of its hydrogen R&D program. Included in the assessment were the current state of technology; future cost estimates; CO2 emissions; distribution, storage, and end use considerations; and the DOE RD&D program. The report provides an assessment of hydrogen as a fuel in the nationâ€™s future energy economy and describes a number of important challenges that must be overcome if it is to make a major energy contribution. Topics covered include the hydrogen end-use technologies, transportation, hydrogen production technologies, and transition issues for hydrogen in vehicles.

Tribology and Dynamics of Engine and Powertrain

Dundurn
An invaluable overview of the latest powertrain technology Integrated Powertrains and Their Control provides an overview of the latest in powertrain technology from an expert in the field. Based on current and ongoing research, this book updates the field's body of knowledge by highlighting new advances in design, modeling, and simulation as well as implementation considerations dictated by new and evolving legal requirements. Relevant to mechanical engineers in both research and industry, this book provides valuable insight and directions for future investigations.

Integrated Powertrains and Their Control

John Wiley & Sons Incorporated
The book covers a wide range of applied research compactly presented in one volume, and shows innovative engineering solutions for automotive, marine and aviation industries, as well as power generation. While targeting primarily the audience of professional scientists and engineers, the book can also be useful for graduate students, and also for all those who are relatively new to the area and are looking for a single source with a good overview of the state-of-the-art as well as an up-to-date information on theories, numerical methods, and their application in design, simulation, testing, and manufacturing. The readers will find here a rich mixture of approaches, software tools and case studies used to investigate and optimize diverse powertrains, their functional units and separate machine parts

based on different physical phenomena, their mathematical representation, solution algorithms, and experimental validation.
Energy and Water Development Appropriations for 2004 Springer Science & Business Media
The most trustworthy source of information available today on savings and investments, taxes, money management, home ownership and many other personal finance topics.
The Hydrogen Economy National Academies Press
America's economy and lifestyles have been shaped by the low prices and availability of energy. In the last decade, however, the prices of oil, natural gas, and coal have increased dramatically, leaving consumers and the industrial and service sectors looking for ways to reduce energy use. To achieve greater energy efficiency, we need technology, more informed consumers and producers, and investments in more energy-efficient industrial processes, businesses, residences, and transportation. As part of the America's Energy Future project, Real Prospects for Energy Efficiency in the United States examines the potential for reducing energy demand through improving efficiency by using existing technologies, technologies developed but not yet utilized widely, and prospective technologies. The book evaluates technologies based on their estimated times to initial commercial deployment, and provides an analysis of costs, barriers, and research needs. This quantitative characterization of technologies will guide policy makers toward planning the future of energy use in America. This book will also have much to offer to industry leaders, investors, environmentalists, and others looking for a practical diagnosis of energy efficiency possibilities.
Fundamentals, Applications and Future Trends National Academies Press
Electric PowertrainEnergy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell VehiclesJohn Wiley & Sons

Volume 1: Advanced Internal Combustion Engines (I)

John Wiley & Sons
The light-duty vehicle fleet is expected to undergo substantial technological changes over the next several decades. New powertrain designs, alternative fuels, advanced materials and significant changes to the vehicle body are being driven by increasingly stringent fuel economy and greenhouse gas emission standards. By the end of the next decade, cars and light-duty trucks will be more fuel efficient, weigh less, emit less air pollutants, have more safety features, and will be more expensive to purchase relative to current vehicles. Though the gasoline-powered spark ignition engine will continue to be the dominant powertrain configuration even through 2030, such vehicles will be equipped with advanced technologies, materials, electronics and controls, and aerodynamics. And by 2030, the deployment of alternative methods to propel and fuel vehicles and alternative modes of transportation, including autonomous vehicles, will be well underway. What are these new technologies - how will they work, and will some technologies be more effective than others? Written to inform The United States Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and Environmental Protection Agency (EPA) Corporate Average Fuel Economy (CAFE) and greenhouse gas (GHG) emission standards, this new report from the National

Research Council is a technical evaluation of costs, benefits, and implementation issues of fuel reduction technologies for next-generation light-duty vehicles. Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles estimates the cost, potential efficiency improvements, and barriers to commercial deployment of technologies that might be employed from 2020 to 2030. This report describes these promising technologies and makes recommendations for their inclusion on the list of technologies applicable for the 2017-2025 CAFE standards.

Handbook of Automotive Powertrain and Chassis Design

Transportation Research Board

The automotive industry is still one of the world's largest manufacturing sectors, but it suffers from being very technology-focused as well as being relatively short-term focused. There is little emphasis within the industry and its consultancy and analyst supply network on the broader social and economic impacts of automobility and of the sector that provides it. The Global Automotive Industry addresses this need and is a first port of call for any academic, official or consultant wanting an overview of the state of the industry. An international team of specialist researchers, both from academia and business, review and analyse the key issues that make vehicle manufacturing still the world’s premier manufacturing sector, closely tied in with the fortunes of both established and newly emerging economies. In doing so, it covers issues related to manufacturing, both established practices as well as new developments; issues relating to distribution, marketing and retail, vehicle technologies and regulatory trends; and, crucially, labour practices and the people who build cars. In all this it explains both how the current situation arose and also likely future trajectories both in terms of social and regulatory trends, as the technological, marketing and labour practice responses to those, leading in many cases to the development of new business models. Key features Provides a global overview of the automotive industry, covering its current state and considering future challenges Contains contributions from international specialists in the automotive sector Presents current research and sets this in an historical and broader industry context Covers threats to the industry, including globalization, economic and environmental sustainability The Global Automotive Industry is a must-have reference for researchers and practitioners in the automotive industry and is an excellent source of information for business schools, governments, and graduate and undergraduate students in automotive engineering.

Routledge

Hydrogen fuel cell vehicles (HFCVs) could alleviate the nation's dependence on oil and reduce U.S. emissions of carbon dioxide, the major greenhouse gas. Industry-and government-sponsored research programs have made very impressive technical progress over the past several years, and several companies are currently introducing pre-commercial vehicles and hydrogen fueling stations in limited markets. However, to achieve wide hydrogen vehicle penetration, further technological advances are required for commercial viability, and vehicle manufacturer and hydrogen supplier activities must be coordinated. In particular, costs must be reduced, new automotive manufacturing technologies commercialized, and adequate supplies of hydrogen

produced and made available to motorists. These efforts will require considerable resources, especially federal and private sector funding. This book estimates the resources that will be needed to bring HFCVs to the point of competitive self-sustainability in the marketplace. It also estimates the impact on oil consumption and carbon dioxide emissions as HFCVs become a large fraction of the light-duty vehicle fleet.

Mustang - The Original Pony Car National Academies Press

Popular Mechanics inspires, instructs and influences readers to help them master the modern world. Whether it's practical DIY home-improvement tips, gadgets and digital technology, information on the newest cars or the latest breakthroughs in science -- PM is the ultimate guide to our high-tech lifestyle.

The Car-dependent Society Penguin

This book introduces readers to hydrogen as an essential energy carrier for use with renewable sources of primary energy. It provides an overview of the state of the art, while also highlighting the developmental and market potential of hydrogen in the context of energy technologies; mobile, stationary and portable applications; uninterruptible power supplies and in the chemical industry. Written by experienced practitioners, the book addresses the needs of engineers, chemists and business managers, as well as graduate students and researchers.

Sustainable Automotive Energy System in China National Academies Press

Vehicle manufacturers among others are putting great emphasis on improving fuel economy (FE) of light-duty vehicles in the U.S. market, with significant FE gains being realized in recent years. The U.S. Environmental Protection Agency (EPA) data indicates that the aggregate FE of vehicles produced for the U.S. market has improved by over 20% from model year (MY) 2005 to 2013. This steep climb in FE includes changes in vehicle choice, improvements in engine and transmission technology, and reducing aerodynamic drag, rolling resistance, and parasitic losses. The powertrain related improvements focus on optimizing in-use efficiency of the transmission and engine as a system, and may make use of what is termed downsizing and/or downspeeding. This study explores quantifying recent improvements in powertrain efficiency, viewed separately from other vehicle alterations and attributes (noting that most vehicle changes are not completely independent). A methodology is outlined to estimate powertrain efficiency for the U.S city and highway cycle tests using data from the EPA vehicle database. Comparisons of common conventional gasoline powertrains for similar MY 2005 and 2013 vehicles are presented, along with results for late-model hybrid electric vehicles, the Nissan Leaf, Chevy Volt and other selected vehicles.

Opportunities, Costs, Barriers, and R&D Needs

CRC Press

As U.S. and Canadian automakers and dealers face bankruptcy and Toyota battles unprecedented quality-control problems, Lemon-Aid guides steer the confused and anxious buyer through the economic meltdown unlike any other car-and-truck books on the market. Phil Edmonston, Canada's automotive "Dr. Phil" for more than 40 years, pulls no punches. In this all-new guide he says: Chrysler's days are numbered with the dubious help of Fiat. Electric cars and ethanol power are PR gimmicks. Diesel and

natural gas are the future. Be wary of "zombie" vehicles: Jaguar, Land Rover, Saab, and Volvo. Mercedes-Benz – rich cars, poor quality. There’s only one Saturn you should buy. Toyota – enough apologies: "when you mess up, ’fess up."

Drive Cycle Powertrain Efficiencies and Trends Derived from EPA Vehicle Dynamometer Results Dundurn

'Proceedings of the FISITA 2012 World Automotive Congress' are selected from nearly 2,000 papers submitted to the 34th FISITA World Automotive Congress, which is held by Society of Automotive Engineers of China (SAE-China) and the International Federation of Automotive Engineering Societies (FISITA). This proceedings focus on solutions for sustainable mobility in all areas of passenger car, truck and bus transportation. Volume 1: Advanced Internal Combustion Engines (I) focuses on: •New Gasoline Direct Injection(GDI), Spark Ignition(SI)&Compression Ignition(CI) Engines and Components •Fuel Injection and Sprays •Fuel and Lubricants •After-Treatment and Emission Control Above all researchers, professional engineers and graduates in fields of automotive engineering, mechanical engineering and electronic engineering will benefit from this book. SAE-China is a national academic organization composed of enterprises and professionals who focus on research, design and education in the fields of automotive and related industries. FISITA is the umbrella organization for the national automotive societies in 37 countries around the world. It was founded in Paris in 1948 with the purpose of bringing engineers from around the world together in a spirit of cooperation to share ideas and advance the technological development of the automobile.

Electric and Hybrid Vehicles Program. Annual Report to Congress. Eleventh. Fiscal Year 1987 Springer Science & Business Media

TCRP Report 132: Assessment of Hybrid-Electric Transit Bus Technology provides decision making guidelines coupled with a comprehensive life cycle cost model (LCCM) to assist transit managers in evaluating, selecting, and implementing hybrid-electric technology options for transit buses. The guidelines and the accompanying LCC model resulted from the gathering of site data coupled with a comprehensive review of both capital requirements and operating costs of hybrid-electric buses in comparison with those powered by traditional diesel engines. Information grew out of a sound, engineering-based, independent technical evaluation of the costs, performance, and reliability of hybrid-electric transit bus technology in actual service. The LCC model, contained on the accompanying CD-ROM (CRP-CD-71), allows the user to compare the total life cycle costs across several cost categories for up to 6 different "purchase scenarios." These scenarios let the user decide when the purchases will be made, the types of buses to be compared, the work load of the buses, and many other cost inputs in determining benefits and costs associated with alternative purchasing strategies.

The Global Automotive Industry Electric PowertrainEnergy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles

John Fenton provides an in-depth study for specialists concerned with chassis and powertrain systems. This text also includes reviews and up-to-date applications, offering a comprehensive reference source.

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