
Book Reviews

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- 1 Chevrolet Volt, Development Story of the Pioneering Electrified Vehicle
by: L. Brooke
Published 2011
by SAE International
400 Commonwealth Drive, Warrendale,
PA 15096-0001, USA (<http://www.sae.org>), 219pp
ISBN: 978-0-7680-4765-3**

This compendium presents the most complete design and engineering story available anywhere about this groundbreaking new vehicle. It also introduces you to the engineering team and how they made the world's first production extended range electric vehicle a reality.

Combining articles from SAE International's Vehicle Electrification and Automotive Engineering International magazines, new SAE technical papers, and all-new content, this full-colour book is the only one of its kind that lifts the veil on how the GM team and key supplied partners met the difficult engineering challenges faced in developing the Volt.

Topics include the Volt's systems, components, and model-based design; a behind-the-wheel look at a volt prototype; and how the Volt's engineering team used on star to collect test drive data from preproduction Volt vehicles.

The book presents GM outstanding achievements such as:

- the electrification of the automobile from conventional hybrid, to plug in hybrids, to extended range electric vehicles
- BM's battery requirements creating a new state of the art in vehicle energy storage
- engineering approach put this innovative vehicle into production at moon-shot speed
- a unique electrified transaxle
- codifying the car
- sweating the body details
- a chassis that cruses
- a new role for the ICE
- charging and connectivity.

The book is intended to help the reader to study and select, if necessary, suitable approaches to discover this field of technique. It could be a valuable tool for such selection.

2 Silicone Elastomers, 4th International Conference, 30–31 March 2011, Cologne, Germany, Conference Proceedings

Organised by: iSmithers

Published 2011

by Smithers Rapra Technology Ltd.

Shawbury, Shrewsbury, Shropshire,

SY4 4NR, UK, (<http://www.polymerconferences.com>), 208pp

ISBN: 978-1-84735-627-7

Innovation is one of the most distinct features of human nature. In the long history of innovations, mankind has shaped his environment and developed new substances that had tremendous impact on history and the way we live today.

Seventy years ago a breakthrough synthesis was developed that opened up the door to a completely new class of materials, silicone products, which we know, and use today in countless applications. Eugene Rochow and Richard Müller independently developed this synthesis in 1940.

The direct synthesis or Müller-Rochow process, which converts inert silicon metal into versatile reactive silicone compounds in a single-step reaction, is the key for designing building blocks thus enabling tailor made products for a variety of applications.

Key to all developments in this area is a profound understanding of silicone and related chemistries, which momentive has embraced in its motto 'The science behind the solutions', which developments were launched in the past decades starting from the direct process to the use of silicones as construction sealants, specialty silanes as coupling-agents for energy efficient tires and recently ultraclear liquid silicone rubber for optical applications.

Conference proceedings discussed the following topics:

- market trends for silicone elastomers
- silicone elastomer materials
- applications for silicone elastomers
- testing silicone elastomers
- fillers for silicone elastomers
- processing silicone elastomers.

Visit website for more information: <http://www.polymerconferences.com>.

3 Ultra-fast Fibre Lasers, Principles and Applications with MATLAB[®] Models
by: L.N. Binh and N.Q. Ngo
Published 2011
by CRC Press, Taylor & Francis Group
Boca Raton, London, New York, 6000 Broken Sound Parkway,
NW, Suite 300, Boca Raton, FL 33487, USA, 419pp
ISBN: 978-1-4398-1128-3

Ultrashort pulses in mode-locked lasers are receiving focused attention from researchers looking to apply them in a variety of field, from optical clock technology to measurements of the fundamental constants of nature and ultrahigh-speed optical communications.

Ultra-fast fibre lasers: principles and applications with MATLAB[®] models is a self-contained reference for engineers and others in the fields of applied photonics and optical communications. Covering both fundamentals and advanced research, this book includes both theoretical and experimental results. MATLAB files are included to provide a basic grounding in the simulation of the generation of short pulses and the propagation or circulation around non-linear fibre rings.

The book contain following chapters:

- introduction
- principles and analysis of mode-locked fibre lasers
- active mode-locked fibre ring lasers: implementation
- NLSE numerical simulation of active mode-locked lasers: time domain analysis
- dispersion and non-linearity effects in active mode-locked fibre lasers
- actively mode-locked fibre lasers with birefringent cavity
- ultrafast fibre ring lasers by temporal imaging
- terahertz repetition rate fibre ring laser
- non-linear fibre ring lasers
- bound solutions by active phase modulation mode-locked fibre ring lasers
- actively mode-locked multiwavelength erbium-doped fibre lasers.

The most practical short pulse sources are always found in the form of guided wave photonic structures. This minimises problems with alignment and eases coupling into fibre transmission systems. In meeting these requirements, fibre ring lasers operating in active mode serve well as suitable ultrashort pulse sources. It is only a matter of time before scientists building on this research develop the practical and easy-to-use applications that will make ultrahigh-speed optical systems universally available.

4 Magneto Luminous Chemical Vapour deposition**by: H. Yasuda****Published 2011****by CRC Press, Taylor & Francis Group****Boca Raton, London, New York, 6000 Broken Sound Parkway,****NW, Suite 300, Boca Raton, FL 33487, USA, 253pp****ISBN: 978-1-4398-3877-8**

The magneto luminous chemical vapour deposition (MLCVD) method is the perfect example of the 'front-end green process'. It employs an entirely new process that expends the minimum amount of materials in gas phase, yields virtually no effluent, and therefore requires no environmental remediation. Unlike the 'back-end green process', which calls for add-on processes to deal with effluent problems, the newer MLCVD approach is a completely different phenomenon that has never been adequately described until now.

Dispelling previous misconceptions and revealing new areas for investigation, MLCVD describes the key process of dielectric break-down of gas molecules under the influence of a magnetic field. It emphasises behavioural distinctions between molecular gases that cause plasma polymerisation (such as methane and trimethylsilane) and monoatomic gases (e.g., helium and argon) when dealing with the dielectric breakdown of the gas phase under low pressure. The author also reveals his minimum perturbation theory of biocompatibility. This is based on the realisation that nanofilms prepared using MLCVD have unique, stable interfacial characteristics necessary to achieve a surface that can be tolerated in various biological environments.

The book contains the following chapters:

- *Introduction*
- *Context of terms used and concepts*: plasma, electric discharge of gas, gas phase, polymerisation and material formation, surface and interface, biocompatibility
- *Green deposition coating of nanofilms*: Front-end approach and rear-end approach in green processing, System approach interface engineering with green processes, Plasma phase and luminous gas phase, Dielectric breakdown of gas phase, Source of electrons for electron avalanche to cause gas phase breakdown, Interfacial electron transfer, Experimental examination of gas phase breakdown, Factors that control transformation of gas phase, Electronegativity of atom and efficiency of electron-impact reactions
- *Influence of magnetic field on luminous gas phase*: Influence of magnetic field on roles of electrons, Shaping of negative glow near the magnetron anode, Influence of magnetic field on dielectric breakdown of gas phase, Electrons in electric field and in magnetic field, Implications of magnetron gas phase breakdown, Magnetic field initiation of luminous gas phase
- *Polymer formation mechanism in luminous gas*: Free-radical polymerisation and free-radical polymer formation in luminous gas phase, Repeating step growth polymerisation (RSGP) mechanism, Competitive ablation and polymerisation (CAP) principle, Influence of unaccounted factors, Dissociation of monomer molecules, Dependence of polymer formation on operation parameters

- *Operation parameters and deposition kinetics*. Operation parameters and plasma polymerisation process, Deposition kinetics, Properties of plasma polymers and domains of plasma polymerisation, Partition of deposition on electrode and deposition on surface in gas phase
- *Magneto-luminous chemical vapour deposition*: Domain of MLCVD, Toroidal glow surface without deposition, Confined luminous gas phase in low pressure, Polymer formation and deposition in low pressure
- *Applications of magneto-luminous chemical vapour deposition*: Implantation of imperturbable surface e state on substrate, MLCVD nanofilm for biocompatibility, Interface engineering for adhesion of coating

The author presents alternating views based on NASA's recent discovery that a magnetic field burst from the earth triggers the inception of the aurora borealis. Detailing similarities between this phenomenon and the inception of the magneto luminous gas phase described in this book, the author proposes that proof of the one occurrence could shed light on the other. Expanding on the author's previous works, this book introduces new discoveries, highlights the newly found errors of previous assumptions, and juxtaposes many cutting-edge alternative views and thought-provoking anomalies associated with the field.

5 Stress Corrosion Cracking: Theory and Practice

by: V.S. Raja and T. Shoji

Published 2011

by Woodhead Publishing Limited

Oxford, Cambridge, Philadelphia, New Delhi, 80 High Street,

Sawston, Cambridge CB22 3HJ, UK, 792pp

ISBN: 978-1-84569-673-3 (print), ISBN: 978-0-85709-376-9 (online)

Stress corrosion cracking (SCC) is the dominating mechanical property in the reliability of most commercial equipment and applications. While the nominal mechanical properties seem to dominate design of equipment, in fact, in the longer term it is the interactions among the materials, their environments and their stresses that control the lifetime.

SCC occurs broadly in high strength materials and in tough materials. It occurs in both ductile and brittle materials. SCC occurs in metals and ceramics. SCC occurs often at applied stresses as low as 10% of the annealed yield strength as in copper alloys. As a general matter it should be appreciated that the stresses that produce failure by SCC are almost always residual stresses and not the applied stresses as calculated by designers.

SCC initiates on surfaces which are absolutely smooth and requires no previous defects such as pits. SCC starts usually more readily at pre-existing defects such as pits, intergranular penetrations, and mechanical defects. When materials are cold worked as well as having high strength, the initiation and propagation of SCC is more rapid.

The subject of SCC may be old, but it remains academically and industrially a very important topic. There is an ever growing need to operate plants with least failures, as these failures have adverse affect on, among other things, safety, environment, and global resources, which are of great concern to humanity. Among all the forms of failures

affecting the integrity of plants, exposed to chemical environments, SCC is important in the sense that stressed components predominantly suffer by this failure. This is because of the fact that synergy exists between stress and environment to cause cracking of materials (components) well below their yield strength.

Further, the present publication is different from the previous publications in the sense that it attempts to cover all aspects of SCC-mechanisms, test methods, materials and industrial problems. Chapters have been written by academicians, researchers and engineers so as to give a holistic picture regarding SCC research and SCC problems. The book has 19 chapters, divided into four sections to deal with mechanisms, testing, materials and industrial problems written by 32 experts.

With its distinguished editors and international team of contributors, SCC will be an essential reference for engineers and designers working with metals, alloys and polymers, and will be an invaluable tool for any industries in which metallic components are exposed to tension, corrosive environments at ambient and high temperatures.

This book contains four parts:

Part I Fundamental aspects of SCC and hydrogen embrittlement

Part II Test methods for determining SCC susceptibilities

Part III SCC in specific materials

Part IV Environmentally assisted cracking problems in various industries.

6 Minimisation of Welding Distortion and Buckling, Modelling and Implementation

by: P. Michaleris

Published 2011

by Woodhead Publishing Limited

Oxford, Cambridge, Philadelphia, New Delhi, 80 High Street,

Sawston, Cambridge CB22 3HJ, UK, 298pp

ISBN: 978-1-84569-662-7 (print), ISBN: 978-0-85709-290-8 (online)

Welding is a cost-effective and flexible method of fabricating large structures, but drawbacks such as residual stress, distortion and buckling must be overcome in order to optimise structural performance. Minimisation of welding distortion and buckling provides a systematic overview of the methods of minimising distortion and buckling in welded structures.

Following an introductory chapter, Part I focuses on understanding welding stress and distortion, with chapters on such topics as computational welding mechanics, modelling the effect of phase transformations on welding stress and distortion, and using computationally efficient reduced-solution methods to understanding welding distortion. Part II covers different methods of minimising welding distortion. Chapters discuss methods for minimising distortion (such as differential heating and reverse-side heating) and techniques for minimising buckling (for example, dynamic thermal tensioning, weld cooling and hybrid laser-arc welding).

Part I Understanding welding residual stress and distortion:

- introduction to welding residual stress and distortion

- understanding welding stress and distortion using computational welding mechanics
- modelling the effects of phase transformations on welding stress and distortion
- modelling welding stress and distortion in large structures
- using computationally efficient, reduced-solution methods to understand welding distortion

Part II Minimising welding distortion

- minimisation of bowing distortion in welded stiffeners using differential heating
- minimising buckling distortion in welding by thermal tensioning methods
- minimising buckling distortion in welding by weld cooling
- minimising buckling distortion in welding by hybrid laser-arc welding
- minimising angular distortion in welding by reverse-side heating.

With its distinguished editor and international team of contributors, minimisation of welding distortion and buckling will be an essential reference work for all welders and engineers involved in fabrication of metal end-products, as well as those in industry and academia with a research interest in the area.

7 Structural Failure Analysis and Prediction Methods for Aerospace Vehicles and Structures

by: S.Y. Ho

Published 2010

by Bentham Science Publishers Ltd.

Bentham E-books, 180pp

ISBN: 978-1-60805-024-6

This book deals with structural failure – induced by mechanical, aerodynamic, acoustic and aero-thermal loads – of modern aerospace vehicles, in particular high-speed aircraft, solid propellant rocket systems and hypersonic flight vehicles. Structural integrity and failure prediction of modern aerospace structures and flight vehicles have significant challenges due to the increasingly more demanding mission requirements and the use of non-traditional materials, such as non-metallic composites, in their construction. The growing pressure for high reliability and longer operational service life adds to the problem.

Prediction of the complex loading environment (such as aerodynamic heating seen in high-speed flights, thermal and acoustic operational and/or storage loads), and constitutive/fracture models can adequately describe the non-linear behaviour exhibited by advanced alloys and composite materials. These are some critical areas in predicting the non-linear structural response and failure analysis of modern aerospace flight vehicles. It is also important to use appropriate prediction methodologies for a given type of vehicle. For example, the methods for predicting the structural integrity and failure of solid propellant rocket systems are different to the methods used for aircraft, largely due

to the non-linear visco-elastic behaviour of solid propellants and the different operational/environmental loading conditions. Another example is acoustic fatigue, a major damage phenomenon that has to be considered in modern fighter aircraft but not for expendable solid rocket boosters.

This book has seven chapters, describing different key issues/challenges, emerging technologies, experimental methods and analytical techniques for predicting/assessing structural integrity and failure for the three selected types of modern aerospace vehicles: high-speed aircraft, solid propellant rocket systems and hypersonic flight vehicles.

This book represents what is believed to be a current need of the aerospace vehicle design engineer/scientist and structural analyst, arising from the necessity for more accurate and appropriate methods of:

- 1 structural and failure analysis
- 2 predicting the complex operational/environmental loading conditions for different types of modern aerospace vehicles and structures.

8 A Handbook of Transport Economics

by: A. de Palma, R. Lindsey, E. Quinet and R. Vickerman

Published 2011

by Edward Elgar Publishing Limited

The Lypiatts, 15 Lansdown Road, Cheltenham,

Glos GL50 2JA, UK, 904pp

ISBN: 978-1-84720-203-1

These handbooks tend to provide a synthesis of the subject from the different viewpoints of a range of disciplines including operational research, political science, engineering and management as well as economics. There are also handbooks which focus on particular branches of economics such as public economics, development economics and regional and urban economics. But no previous handbook has focussed so deliberately on the transport sector, through the lens of one discipline, economics.

The book contours the following parts:

- *Introduction*
- *Part I Transport and spatial economy*: General equilibrium models for transportation economics, Transport in spatial models of economic development, New economic geography: the role of transport costs, Transport costs and international trade, City formation and transport costs.
- *Part II The demand for transport*: Valuation of travel time savings, Advances in discrete choice: mixture models, Dynamic traffic modelling, Activity-based travel demand analysis, Economics of transport logistics.
- *Part II The cost of transport*: Cost functions for transport firms, Efficiency measurement theory and its application to airport benchmarking, Theory of external costs, External costs of transport in the United States, External costs of transport in Europe, The value of a statistical life, Transport and energy, The full marginal costs of highway travel: methods and empirical estimation North America.

- *Part IV Optimal public decisions*: Surplus theory, The direct and wider impacts of transport projects: a review, Price discrimination, Road congestion pricing, The economics of information in transport, Personal intelligent travel assistants, Equity dimensions of transport policies, Psychology and rationality in user behaviour: the case of scarcity.
- *Part V Competition and regulation*: Competition, regulation and public service obligations, The theory of incentives applied to the transport sector, Public-private partnerships in transport, Parking economics, The industrial organisation of competition in local bus services, Competition and regulation in rail transport, Airport governance and regulation: three decades of aviation system reform, Competition and regulation in air transport, Competition and regulation in seaports, Competition and regulation in maritime transport.

This handbook is designed both for use on postgraduate and advanced undergraduate courses and as a reference for anyone working in the field. It also complements the textbook *Principles of Transport Economics*.

9 Handbook on the Economic Complexity of Technological Change

by: C. Antonelli

Published 2011

by Edward Elgar Publishing Limited

The Lypiatts, 15 Lansdown Road, Cheltenham,

Glos GL50 2JA, UK, 566pp

ISBN: 978-1-84844-256-6

This comprehensive and innovative handbook applies the tools of the economics of complexity to analyse the causes and effects of technological and structural change. It grafts the intuitions of the economics of complexity into the tradition of analysis based upon the Schumpeterian and Marshallian legacies.

The handbook elaborates the notion of innovation as an emerging property of the organised complexity of an economics system, and provides the basic tools to understand the recursive dynamics between the emergence of innovation and the unfolding of organised complexity. In so doing, it highlights the role of organisational thinking in explaining the introduction of innovations and the dynamics of structural change.

The book contains the following parts:

- *Part I introduction*: The economic complexity of technological change: knowledge interaction and path dependence.
- *Part II The economic complexity of innovation*: Complexity and innovation dynamic, Complexity in the theory of the developing firm, The persistence of innovation and path dependence, The symbiotic theory of innovation: knowledge creation and the evolution of the capitalist system.
- *Part III The economic complexity of knowledge*: Knowledge, complexity and networks, the dynamics of technological knowledge: from linearity to recombination, Complexity and the coordination of technological knowledge: the case of innovation platforms, Causes, consequences and dynamics of complex distributions of

technological activities: the case of prolific inventors, The biomedical workforce in the US: an example of positive feedbacks, University-industry interactions: the unresolved puzzle.

- *Part IV The economic complexity of structural change and development:* Meso-economics: a unified approach to systems complexity and evolution, Notes on a complexity theory of economic development, Innovation networks: formation, performance and dynamics, The complex interaction between global production networks, digital information systems and international knowledge transfers, The complex dynamics of economic development.
- *Part V Lessons and implications for economic policy:* Co-evolution, emergence and economic development: some lessons from the Israeli and Mexican experience, Network models of innovation process and policy implications, Government as entrepreneur: examples from US technology policy.

With a new methodological approach to the economics of technological change, this wide-ranging volume will become the standard reference for postgraduates, academics and practitioners in the fields of evolutionary economics, complexity economics and the economics of innovation.