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The Evolution of Automotive Technology: A Handbook

By Gijs Mom
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   The evolution of automotive technology : a handbook / by Gijs Mom.
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   Summary: “This book covers one and a quarter century of the automobile, conceived as a cultural history of its technology, aimed at engineering students and all those who wish to have a concise introduction into the basics of automotive technology and its long-term development. Its approach is systemic and includes the behavior of drivers, producers, nonusers, victims, and other “stakeholders” as well as the discourse around mobility. Nowadays, students of innovation prefer the term co-evolution, emphasizing the parallel and mutually dependent development of technology and society. This acknowledges the importance of contingency and of the impact of the past upon the present, the very reason why The Evolution of Automotive Technology: A Handbook looks at car technology from a long-term perspective. Often we will conclude that the innovation was in the (re)arrangement of existing technologies. Since its beginnings, car manufacturers have brought a total of 1 billion automobiles to the market. We are currently witnessing an explosion toward the second billion. Looking back, we can see this history evolve through five distinctive phases: Emergence (1880–1917), Persistence (1917–1940), Exuberance (1945–1973), Doom (1973–2000), Confusion (2001–present). The Evolution of Automotive Technology: A Handbook helps us understand how these phases impacted society and, in turn, shows us how car technology was influenced by car users themselves.” — Provided by publisher.
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to Maarten, and his great-grandfather
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Preface

The Evolution of Automotive Technology: A Handbook is a quarter century-old dream come true.

Back in the 1980s, a Dutch publisher asked me to become the editor of a three-volume technical handbook conceived in the 1920s, by George Frederik Steinbuch, one of the pioneers of Dutch automotive engineering. I had just graduated from HTS Autotechniek (HTS standing for Hogere Technische School, or Polytechnic, focusing on Automotive Technology), and had also finished a Master’s degree in literary history. Ambitiously, I proposed a ten-volume successor instead. Although this plan got stranded between the busyness of my subsequent career as a lecturer at the Polytechnic, and multiple reorganizations of the publishing house, five volumes were eventually finalized, with three of them translated into German. For every volume, I studied the history of the topic and wrote two introductory chapters myself (on history and basic theory), while editing the contributions of the experts in the remainder of each volume.

At the end of the 1990s, I received a PhD in history of technology, and transferred to Eindhoven University of Technology (TU/e) to take up a position in research and teaching, focusing on mobility research, traffic engineering, and the automotive culture.

Coincidentally, some years ago, the great-grandson of George Frederik Steinbuch, TU/e Mechanical Engineering professor Maarten Steinbuch, asked me if I would like to help set up a new Master’s program in automotive technology. In addition, the board of the university decided to attract a new, more socially oriented type of engineering students by offering a brand-new Bachelor of Automotive Technology program at the Electrical Engineering Department, prioritizing the study of control and systems engineering, the electric and hybrid propulsion as well as the smart car. My answer should not be difficult to guess.

Suddenly, car technology proper, a closed book to many students of the history of the automobile, came alive again for me. I started to dig into my own history, combining this with the new educational and theoretical insights I had gathered during the last decade or so. The result is the book before you, tested extensively during the first three years of the Bachelor’s program, and far more years at the Master’s level. My audience was a continuously changing international group of students, whom I would like to
thank here for helping me put the content to the test. Some of them produced reports that made it into the pages of this book.

Of these students, some have to be mentioned by name: student assistants Jorrit Bakker, Valerian Meijering and, especially, Wilco Pesselse and Texas van Leeuwenstein. They helped set up the courses, gather and scan illustrative material, develop the quiz questions, and go through numerous versions of texts, with their source references and requests for permission to use illustrations.

I thank Bart Smolders, Director of Education of the Electrical Engineering Department, who made the initial investment into the student assistant support; Johan Schot, Director of the Technology in Society group of the IE&IS Department for following up in the final phase, as well as Jos Hermus, Managing Director of the same department, for providing the basis for the continuation of this project beyond my retirement.

I was also able to make prolific use of the Netherlands Center for Automotive Documentation (NCAD), which I had co-founded at the end of the 1990s, and which keeps several thousands of printed material, including my own collection of old handbooks, as well as my complete set of all Steinbuch editions since 1922.

I would like to thank director Jan Wouters, the many NCAD volunteers who helped search for illustrations as well as its board of directors, chaired by Peter van der Koogh, for their cooperation during the past years.

I also would like to thank Jan Schukking, long-since retired from Kluwer Technische Boeken BV, who hired me in the 1980s as an editor of “the Steinbuch series”, and who never lost his confidence in me. I am very pleased that I can show him the results of his confidence in the form of this book. I am also grateful to the current copyright holder of the Steinbuch series, mybusinessmedia, and to intermediary Henk Heuvelman, for granting me permission to use many of the original illustrations. The same gratitude extends to the many copyright holders of the other illustrations necessary in a handbook like this: they are duly credited in the caption of the figures. Every effort has been made to identify and contact copyright holders of illustrations. The author requests notification of any corrections that should be incorporated in future editions.

The preparation of the printed book was crucially advanced by Georgine Clarsen (Wollongong University), Ann Johnson (University of South Carolina), and Lee Vinsel (Stevens Institute of Technology), who read earlier versions of the manuscript, and acted as reviewers. I also thank the anonymous reviewer, who reminded me of the differences in language and study style between engineering students and other types of students. I hope that his influence on the writing style of this text will convince other teachers and professors, who are giving courses in automotive engineering, to make use of this book in their classes. It is also my hope that engineers and others interested in the long-term development of the car will find this book educational and fun to read.
My thanks also go to the staff at SAE International for guiding me through the labyrinth of book production: Martha Swiss and Monica Nogueira.

Finally, I would like to acknowledge the breadth of vision of Maarten Steinbuch, who, supported by many colleagues at TU/e, made this project possible in the first place. In less than a decade, automotive technology and “smart mobility” have been made into one of the strategic areas of the university, quite a feat after a long period of automotive lull at this institution. I was very lucky to help shape this program during the last phase of my professional career.

I dedicate this book to Maarten, and his great-grandfather. They stand at the beginning and the end of my version of automotive technology history.

Gijs Mom
Shanghai, 18 August 2014