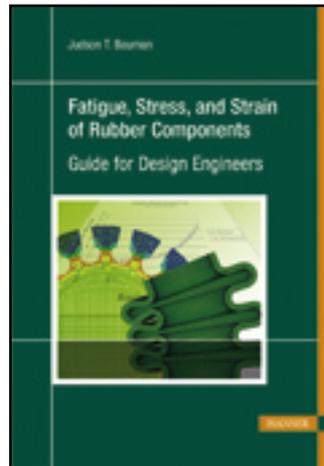


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Preface

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Fatigue, Stress, and Strain of Rubber Components

Guide for Design Engineers

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Preface

When I first went to work as a design engineer at Murdock Machine and Engineering, Irving, Texas in March 1982, I had a good background in design and engineering analysis of metal components. But Murdock was a manufacturer of elastomeric flexible joints. At that time all I knew about rubber was that it was black and stretchy. I had a lot to learn. Fortunately, there were several experienced company engineers who had good practical knowledge in designing the flexible joints the company made and I also had a good tutor in one Robert Finney, a consultant. The only literature available providing rubber component design formulas was a 45-page booklet called “Engineering Design with Natural Rubber” by P.B. Lindley. With Lindley’s book and the aid of fellow engineers I gradually became quite capable of engineering the elastomer components. The book presented here is the handbook I wish I had had back in March 1982. I hope it will aid you in your design, testing and analysis of elastomer components.

In writing this book I owe many debts of gratitude to professionals in the field of elastomer engineering. Earliest was the coaching in the FEA of elastomers I received from Robert Finney. Subsequently, while attending the University of Texas at Arlington, I was guided by my advisor, Professor Roger Goolsby. At the same time, I was supported by Oil States Industries, who gave me free use of their lab for the fatigue crack growth testing of rubber that I did for my dissertation. My research for this book was aided by Joan Long, then the librarian for the University of Akron. I particularly enjoyed the support of Michel Gerspacher, then of Sid Richardson Carbon Co., who gave me unrestricted access to their sizeable technical library. I was inspired and supported by many colleagues of the Rubber Division of the American Chemical Society (ACS). One such inspiration was Dr. Oon Hock Yeoh. Together he and I created the “Engineering of Rubber Components” sessions at regular Rubber Division meetings. Then I must credit Will Mars of Cooper Tire and Rubber, who salvaged a chapter of this book by discovering the mathematical error in a derivation which was baffling me. Finally I must mention Rob Miller of Abaqus South who performed the FEA for Chapter 7. There were of course many others whose influence was important in the creation of this book, but the list would be too long for this preface.

January 2009
Judson Bauman