

Engineering Management

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FRAIDON MAZDA



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Engineering Management

Foreword

The engineering profession can be justifiably proud of its achievements. Engineering skills alone, however, are not sufficient to guarantee success; industry requires competent managers to ensure that products are developed and brought to the market-place to meet the ever increasing needs of sophisticated consumers.

It has been said that successful companies are run by accountants. This is a fallacy; in the modern technological era, where information can span the globe in a fraction of a second, travelling as pulses of light or as radio waves, engineering companies need to be led by managers who understand the technology they are controlling. Engineers are therefore finding that the paths to executive positions are now open to them and it is essential that they take advantage of these opportunities.

This does not mean that the requirement for good engineers has diminished. On the contrary; the pace of development has meant that, in parallel with the demand for good engineering managers, the need for good engineers has also increased. No longer should engineers feel that the only way to promotion is by moving into management. Most organizations now operate a dual career ladder so that engineers can stay and progress within their discipline, and only those who have a genuine desire to move into management can do so.

Management is not easy, however, and too many engineers make the move without first considering what is involved and without any preparation for the new role. There are many differences between engineering and management; the two that the new engineering manager is most likely to encounter are the need to manage people, and to interface with a wide variety of different functions. People management extends to those who report directly to the new manager, as well as his or her peers within the company, and also to its customers and suppliers. The engineering manager must acquire a range of new people-related skills such as team building, communications and motivation. The new manager must also learn that time is now the most difficult commodity to manage as greater and greater demands are made on this scarce resource.

In addition to managing people, engineering managers find themselves interfacing to a greater extent with the many different functions within an organization—such as finance, manufacturing and marketing—and in order to communicate effectively they must understand the basic principles of these functions. Budgets and project plans need to be prepared and managed, and managers who do not understand these concepts will not be successful in their positions.

I am very pleased to note that *Engineering Management* meets all the basic needs of the new engineer moving into management. Theory has been combined with good practical case studies, to which I am certain engineers within industry will be able to relate. It covers the basic people skills which engineering managers must learn and also provides a very comprehensive introduction to topics such as business strategy, decision making, financial management, project management, manufacturing operations, marketing and sales. I am confident that this breadth of coverage will ensure that *Engineering Management* becomes a reference manual for students and for new and practising engineering managers within industry.

Peter Schuddeboom
Assistant Vice President
Product Development
International Broadband Networks
Nortel Ltd
August 1997

Preface

Congratulations on buying this book; a wise choice! I wonder, however, what your objectives are in obtaining the book? If you believe that by reading it you will automatically become a 'manager', then you may be disappointed. Perhaps it would be better to donate the book to your local charity shop and see if you can pick up a second-hand copy of Gray's *Anatomy*. You probably have a greater chance of becoming a surgeon by reading that book, and I am reliably informed the pay is better!

I have written *Engineering Management* with two types of reader in mind: (i) the student who is about to enter the field of management and wants to acquire a basic understanding of its theory and practice; and (ii) the practising manager who drifted into management, without any formal training, and now wishes to acquire this essential knowledge. If you fall into either of these categories, then read on. This book is for you!

There are many aspects of management which need to be studied and learned, and *Engineering Management* provides information on all of these. However, to become a 'good' manager also requires hands-on practical experience in management. Not only is theory important but managers must also learn how to apply this theory in practice and of equal importance – how to fit the theory to their own characteristics and style.

Engineering Management relates theory to practice by presenting a large number of case studies throughout the book. These case studies are based on a single company, the FloRoll Manufacturing Company. This is a fictitious company, but one that represents a typical medium-sized industrial organization. The situations presented are those which arise in real companies and are based on the author's own experience of working in four different organizations over a 25 year period. Case study exercises are also included at the end of each chapter for use in classroom exercises and discussions.

Management covers a wide range of disciplines and skills and this book presents an insight into all the functions within an organization which the Engineering Manager is likely to come into contact with. It is divided into seven parts. Each part is largely self-contained and may be studied, or taught, in any order, to suit individual needs or course requirements.

Part 1 introduces the FloRoll Manufacturing Company and the basic principles of management: the levels of management found within a company; the types of tasks undertaken by managers; and the different management styles adopted in different situations.

Part 2 describes the business environment within an organization. It discusses the

dynamics of organizations and looks at the following areas: organization structures; formal and informal organizations; global organizations; the importance of total quality management within all disciplines; and the management of change, which must occur continually if the organization is to survive and grow.

Part 3 covers the concepts of corporate strategy and the processes used in arriving at decisions. It describes the elements of a strategic plan, including strategic alliances and acquisitions, and how it can be developed and implemented. Because strategic plans require the collection of relevant data to aid decision making, the techniques for data collection and analysis are also covered in detail.

Part 4 deals with financial management within an organization. It describes the basic financial environment, including the following areas: the concepts of accounting; budgets and controls; profitability; obtaining finance; valuating a company; and the importance of and techniques used for costing and cost control. This section concludes with a chapter on the important topic of investment decisions; that is, how to spread limited financial resources so as to obtain maximum benefit.

Part 5 describes the techniques used for planning and control of large projects, and the aims and techniques of Operations Management, including a description of the use of information technology in different parts of an organization.

Part 6 covers the critically important subjects of marketing and sales management. It describes the role of marketing within an organization, introducing concepts such as: the marketing mix; marketing intelligence; market segmentation; consumer and industrial markets; product introduction and management; the management of customers; and the sales and distribution functions.

Part 7 provides an insight into the skills needed by a competent manager in the following areas: leadership and motivation of staff; the importance of and techniques for building effective teams; and different methods of effective communication that can be used in various circumstances, including meetings and presentations. The book concludes with a short chapter on the importance of that very scarce commodity, time, and how it can be used effectively.

I have been asked why I called this book *Engineering Management*, and whether or not the book is applicable to management within any other discipline, such as in a service or non-engineering environment. I have worked within the engineering profession for over 25 years—in many different junior, middle and senior management positions—managing teams from 10 to over 100 engineers, responsible on some occasions for multi-million pound projects. I have been fortunate to do this in several different disciplines, as an Engineering Manager, a Sales Support Manager, a Product Marketing Manager, and as a Project Manager. However, in spite of this wide range of management experience, it has all been for engineering organizations, and the case studies within the book are closely related to an engineering company. Consequently, I do not feel qualified to claim that the book meets the requirements of industries other than engineering, although I do believe that it does.

Fraidoon Mazda
Bishop's Stortford
August 1997

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The FloRoll Manufacturing Company

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Introduction

This chapter introduces the FloRoll Manufacturing Company, part of a multinational organization operating in most of the major markets of the world. This company is used for case studies throughout the book.

1.1 The past

The floroll started its life in similar fashion to many high-technology products; in a garage belonging to David Swinton. Both David and his brother Edward were responsible for its early development, but it was not until some years later, when the product was shown to have military applications, that the floroll began to take its present form.

David and Edward founded the FloRoll Manufacturing Company and obtained a contract from the Royal Air Force to carry out the early experimental work. They moved from their garage workshop to secure premises and soon built the team up to 25 skilled engineers and technicians. It was some years later that the product came off the classified list and the company was free to look for non-military applications. The company then went public, although David and Edward still maintained a significant amount of the equity.