Motion and Time Study for Lean Manufacturing (3rd Edition)

Fred E. Meyers, Jim R. Stewart
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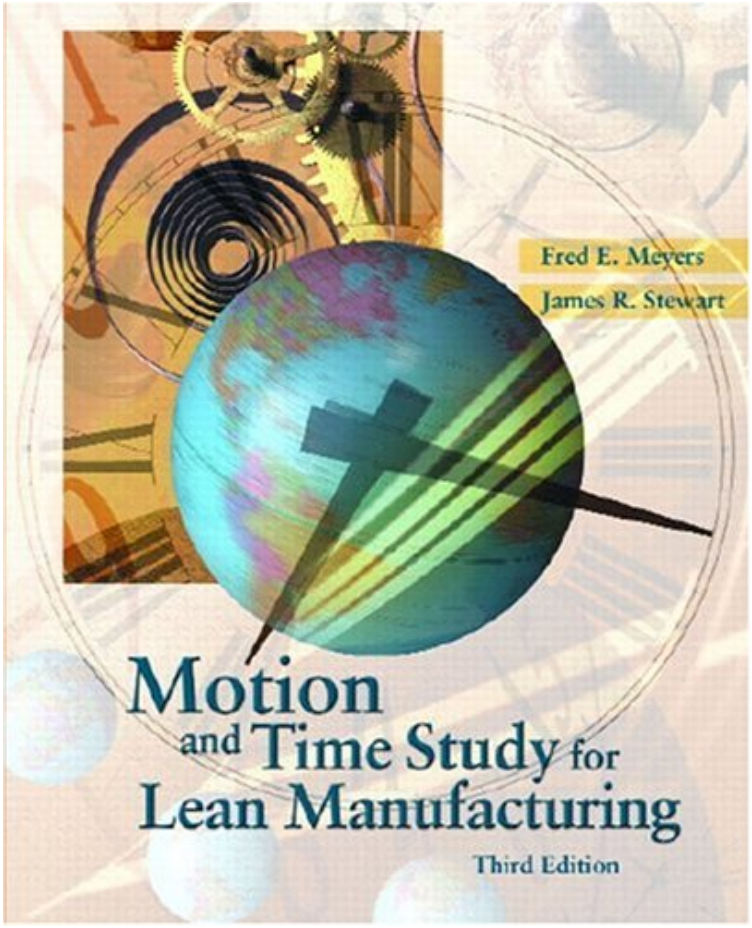

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Fred E. Meyers, Jim R. Stewart : Motion and Time Study for Lean Manufacturing (3rd Edition) before purchasing it in order to gage whether or not it would be worth my time, and all praised Motion and Time Study for Lean Manufacturing (3rd Edition):

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Motion and time study has finally found a home in the modern plant by helping employees to understand the nature and the true costs of work, assist management in reducing unnecessary costs, and balance work cells to make work flow smoother. This how-to motion and time study book provides readers with a resource that describes the techniques and procedures of motion and time study. Practical, detailed advice is given on all aspects of motion and time study including work station design, job analysis, and the techniques of setting time standards. A new chapter places motion

and time study in the context of lean manufacturing. This edition also includes a new section on ergonomics and the environmental aspects of the workplace, while continuing the hands-on approach of prior editions. For engineers and plant managers.

From the Back Cover Motion and Time Study for Lean Manufacturing, Third Edition, offers step-by-step procedures, forms, and practical advice on uses of time standards, motion-study techniques, and time-study questions. It covers other topics such as workstation design, successful attitudes, and goals for motion- and time-study people. Some of the features of this text are: Illustrations and tables that support the concepts presented End-of-chapter review questions that help users of the text review and master the material presented in each chapter. An appendix of useful forms that help users apply the concepts of motion and time study New to this edition of the text are: A chapter dedicated to the concepts of lean manufacturing Additional charts, procedures, and forms that reflect the current theory and practices of the industry This textbook also serves as a perennial reference on the application of motion- and time-study techniques. About the Author Fred E. Meyers is president of Fred Meyers and Associates, an industrial engineering management consulting company. He designs and implements production improvement and motivation systems. Mr. Meyers is a registered professional industrial engineer and a senior member of the Institute of Industrial Engineers. He has 35 years of industrial engineering experience. He has worked for Caterpillar Tractor Co., Boeing's aerospace division, Mattelloy Co., Times Mirror Corp., Ingersoll-Rand's proto tool division, Spaulding's golf club division, and Southern Illinois University-Carbondale, College of Engineering, where he taught for 20 years while starting and operating his consulting business. He was director of applied research and an associate professor. Mr. Meyers has worked for over 100 companies as a consultant responsible for installing incentive systems, performance control systems, plant layouts, new product startup, and cost estimating systems. He has worked in heavy equipment manufacturing, aerospace, consumer products, appliance manufacturing, lumber, plywood, paper, oil blending and packaging, furniture, tooling, fiberglass, and many other areas. The variety of his assignments has given him the ability to see the wide-ranging uses of motion and time study. Fred E. Meyers has taught motion and time study to over 130 classes and 5,000 people, including professional engineers and managers, union stewards, and college students. He has presented seminars to the National Association of Industrial Technology, industrial plants, the U.S. Air Force and Navy, and labor unions. James R. Stewart is Associate Professor of Technology at Northern Illinois University. For the past decade, he has taught plant layout, engineering economy, manufacturing philosophy, production and inventory systems, industrial quality control, ergonomics, and work measurement and improvement. He is a Fellow in the World Academy of Productivity Science. He is a senior member of the Institute of Industrial Engineers and is a founding member and is on the board of directors of the Society for Work Science. He is also on the board of The International MODAPTS Association. He is an active member of a number of other societies, including NAIT, ASQ, and Human Factors and Ergonomics Society. He has 30 years of experience in work measurement in education, government, and industry. Dr. Stewart has served on the faculty of several universities; worked in city, county and state productivity programs; and has managed engineering programs in electronics assembly, electronics component fabrication, pulp and paper fabrication, fiberglass processing, industrial tape manufacturing, and engineering consulting. He has published many articles about unique applications of work measurement. James R. Stewart has taught motion and time study in credit and noncredit courses for over 25 years. He has been certified and taught a number of predetermined time systems, including MOST, Work Factor, MTM-1, and MODAPTS. Excerpt. Reprinted by permission. All rights reserved. With the publication of the third edition, a new author, James R. Stewart, has been added to the team. Certainly this does not represent any change in the unique, down-to-earth teaching method of senior author and scholar Fred Meyers. Having been a user and supporter of this book since it was noted at a NAIT seminar a decade ago, the junior author intends to keep it has a text for the teaching of basic courses in using the tools of motion study and time study. Although the book has undergone a number of changes, it provides a practical education in the basic principles of motion and time study. Over the past decade, lean manufacturing has become the philosophy for manufacturers who want to use the tools for improving operations. We see the concept as so important that a new Chapter 2 has been devoted to it. We describe it as a lean manufacturing environment. As an environment, it nurtures and supports many types of improvement systems and methods. And, it is open to the concepts of various cultures and methodologies. Because it sets the tone for all that follows, the chapter has been placed after the overview chapter and before the history chapter. A number of persons important to work measurement have been added to the history chapter, Chapter 3. These include pioneers Henry Gantt and Harrington Emerson, early text authors, consultants, and educators Ralph Barnes and Marven Mundel, as well as Shigeo Shingo, the early Toyota pioneer of what is becoming the lean manufacturing environment. Although we considered many others, the lessons of the lives of these pioneers provide the guidance to install the lean manufacturing environment and to continue the innovation and improvement of our manufacturing system. Chapter 4 has pulled together the introductory material scattered over several chapters. It now provides a concise but complete summary of what is to follow. Chapter 5 is directed toward teaching process charting and process improvement. Chapter 6 adds the SIMO chart to the other tools of operations analysis. Chapter 7 includes a new section on ergonomics and on the environmental aspects of the workplace.

Predetermined Time Standards (PTS) Systems, Chapter 8, includes new descriptions of two commercial systems to the usable system that Fred Meyers designed. Time study has been left as developed in prior editions. Chapter 10 still includes the description of standard data but also has the calculation of line balancing and the concepts of lean manufacturing environment plant balancing. All of the material previously spread through three chapters is consolidated here. In Chapter 11, the principles of work sampling have been augmented by a new auditing procedure and, form. A process for scheduling and measuring work performance supplements the indirect labor types described in Chapter 12. The last four chapters have been kept as written, as have the appendices. References, sample problems, worked examples, tests, and other supplemental materials are published separately in the teacher's supplement. We hope students and teachers will find that the many changes in this edition add to their ability to learn and use the tools of motion and time study in the lean environment. Acknowledgments For the third edition, we wish to thank Rodha Balamuralikrishna for his figures. We also thank reviewers Kenneth Currie of Tennessee Technological University and Donna C. S. Summers, Ph. D., of the University of Dayton. Fred E. Meyers James R. Stewart Preface to the Second Edition The purpose of this how-to motion and time study book is to provide students and practitioners with a resource that describes the techniques and procedures of motion and time study. This book has appropriately been called a "cookbook." Practical, detailed advice is given on all aspects of motion and time study, including work station design, job analysis, aid the techniques of setting time standards. The mathematics requirement of this textbook is high school algebra. A few simple formulas are included in the standard data chapter. These formulas require the insertion of a variable to calculate the time requirement. Two more complicated formulas are used to show how tables are developed. The practitioner can use the tables to save time. Motion study is accomplished before time standards are set. When a company decides to introduce a new product, a technician is asked to provide a plan to produce, for example, 1,500 units per day. The technician must design work stations for every fabrication, assembly, and packout operation. From the work station drawing, a left-hand/right-hand analysis of the work content is made. A predetermined time standard has been set for every body motion, so the times for every motion required to do the job are added together. This will be the time standard, and it was set before the company had the first part, machine, or operator. Modern management requires constant vigilance of its industrial engineers and technicians to reduce costs, reduce effort, and improve the working environment. Lean manufacturing (the Toyota production system) has a word, muda, which means waste. More specifically, any activity that uses resources but does not add value is muda. Lean thinking is one solution to muda. Lean thinking promotes using less effort by Eliminating useless motions, Combining motions, Changing the sequence of motions to make flow smoother, and Simplifying motions. Lean thinking results in the elimination of reduction of waste. Motion and time study has finally found a home in the modern plant by helping employees to Understand the nature and true costs of work, Assist management in reducing unnecessary costs, and Balance work cells to make work flow more smoothly. Motion and time study has also contributed the concept of time standards, so that important management decisions can be made intelligently. Motion and time study can Reduce and control costs, Improve working conditions and environment, and Motivate employees. Manufacturing plant management needs time standards. Many major decisions would be only a guess without time standards. How would we determine how many machines to buy, how many people to hire, how much to sell the product for; how would we schedule the plant, how would we justify new methods or equipment, how would we ensure a balanced work load on assembly lines, and how would we evaluate employees or pay for increased effort? Chapter 4 answers these questions and inspires an appreciation of the importance of motion and time study. This book will equip engineers and managers with the purposes, attitudes, methods, and techniques of motion and time study to make their plants leaner. Chapters 5 through 8 discuss methods analysis techniques. Stopwatch time study can be accomplished only after the machines have been installed and the operators fully trained. In a proposed new plant, no machines or employees are available to time study, but an operating plant can use stopwatch time study very effectively. The stopwatch technique is the oldest technique of setting time standards and it is entrenched in many companies. Chapter 9 examines this technique. Standard data is another technique of setting time standards before production begins, but it is developed from in-plant experience. Standard data is very personal to a specific company, and companies cannot normally use another's standard data. This is the most accurate, least costly method of setting time standards, and every motion and time study department should be developing its own. Chapter 10 examines this technique. Work sampling is based on the laws of probability and it is a scientific technique of setting quality time standards. Office work, engineering departments, maintenance craft, and even equipment can be work sampled. Everyone who has worked with others has work sampled. Chapter 11 discusses this common practice in a scientific light. Consultants often use work sampling first to establish the beginning efficiency of the operation. Potential savings forecasts will be based on current efficiency. Labor is a significant portion of manufacturing cost and must be controlled. Performance control systems based on time standards give management the control they need. History and research have shown that operations working without a performance control system average 60% of normal. When a performance control system is established, 85% performance results. Industrial plants on incentive average 120% performance. The size of these cost reductions is spectacular, and no industrial engineer, technologist, or manager will go unnoticed when such improvements are made. Chapter 13 discusses performance control systems. Chapter 12 discusses uses of time standards that could be an

important part of a technologist's career. Wage payment (Chapter 14) includes incentive systems, which is a fun area in which technologists can work. Assembly line balancing (Chapter 10) includes instructions on setting up assembly lines. This is a big area in many plants. Most of the textbook deals with direct factory labor, but every area of business can be positively influenced by motion and time study. Chapter 12 discusses 10 of the largest indirect labor categories. Chapter 15, the time management techniques chapter, is aimed at making the motion and time study technologist more productive. Human relationships are an important part of motion and time study. The successful attitudes and goals of motion and time study technologists are discussed in Chapter 16. A step-by-step procedure, real-life examples, , sample problems, and blank forms are included for every technique. This book will remain a good reference years after a course or seminar on motion and time study. Your feedback will be valued and considered for future editions. You may write to me in care of Prentice Hall, One Lake Street, Upper Saddle River, New Jersey 07458. Our objective is to provide a practical, usable, how-to text for motion and time study. Acknowledgments I am a student of Ralph Barnes, Peter August, and Mitchell Fein. All three have influenced me greatly, and their attitudes are part of me. I must thank Dr. Matthew P Stevens, of Purdue University, for his statistical expertise and help, and Dr. Richard Edwards, of the University of Kentucky, for his continuing support and encouragement. I also thank the reviewers of the second edition for their helpful comments: S. Deivanayagam, Tennessee Technical University; Alfred R. Hamelin, Walters State Community College; Matthew R. Meyer, Asheville-Buncombe Technical College; and Ross Udey, Peru State College. Fred E. Meyers