Industrial Engineering For Apparel Industry

I have been a Lean Management Consultant for the past decade and have been asked interesting questions by my prospects/clients. I'd have to say, the most made statement has been "Lean only works in the Automotive Industry and is not applicable to our industry…". This misconception is what triggered me to write a book on Lean for the various industries that I consult in, i.e. one book for every industry. This book on the application of LEAN in Apparel Manufacturing, is my first foray into authoring a book. This book is an attempt to educate its readers on how to implement the practical aspects of LEAN, on the shopfloor. It begins with the dissemination of the interrelated elements of the Toyota Production System, the objective of TPS and its importance in Production Management. The concepts of LEAN and waste elimination are then explained with an overview of the Seven Types of Manufacturing Wastes. Value Stream Mapping, a frequently used tool to map the waste, has been elaborated in four chapters. These chapters explain concepts like Product Family Matrix, KPI definitions, guiding principles to design a Lean process and the construction of the 'AS IS' and the 'TO BE' Value Stream Maps. Individual chapters are devoted to the elements of TPS like 5S, Visual Management, Skill Management, Process Standardization and Single Minute Exchange of Dies. These chapters explain the concepts and their application in detail, equipping you with the required tools and techniques. The chapter on Balanced Score Card and Hoshin Kanri explains the mechanism of aligning the vision of the factory to the individual objectives. The chapters on A3 Problem Solving and Quality Management initiate the readers to a scientific methodology of problem solving. We follow up with chapters on Kanban Systems and WIP

Management in order to get a sense of Pull systems. The chapter on Total Productive Maintenance lays emphasis on measurement of OEE% and the problem-solving cascade. We end this book with chapters on Shopfloor Control, sustaining a Lean culture and providing a Lean Implementation Model for Apparel Manufacturing. I would like to extend my gratitude to Deepak Mohindra, Chairman, Apparel Resources for his continued support and guidance. My wife Manali, my daughters Aishwarya & Arya and my mother Padma, have also been my constant motivators. I would also like to thank my past and current clients for implementing my advice. This book would be incomplete without mentioning Ashish Grover, who was a great support during preliminary Lean pilots on the garmenting shopfloor. This book is my tribute to him. I hope that this book creates more value for you and your organization. Wish you all the best in your LEAN journey!

While there is pressure (from buyers), inclination (within self to do better) and a heightened aspiration among apparel manufacturers to use Industrial Engineering (IE) like other more industrialized sectors, there is no specific book as such dealing with IE in relation to apparel manufacturing. The existing books that are already written on IE possess academic rigour and generic functions applicable across industries, thus making it difficult for the practitioners to refer and clear discrete doubts related to apparel manufacturing. Undoubtedly, work study is the centrepiece of Industrial Engineering; however apart from work study, industrial engineers in apparel industry are also supposed to perform various other functions like preparing operation breakdown and operation flow chart, selecting machine type and attachment and workaids, planning machine layout for maximizing unidirectional material movement, optimising inventory and storage space and maintaining workplace health and safety. These are some of

the areas that often lack significant attention. This practitioner's handbook is an amalgamation of theory and practices, including steps of implementation and common mistakes. A balanced approached is taken to make it equally meaningful and useful for the academics as well as the industry. A unique section titled "industry practices" is incorporated at the end of each chapter which shares the typical practices, constraints and benefits accrued by the industry, which will give meaningful insight to the readers and help them relate theory with actual practice.

The never-ending global search for a country with a low labour wage is almost bottoming out. The so-called labor-oriented apparel manufacturing industry is poised to change. Due to fierce global pressure on reducing price and lead time, the textiles and apparel producers will have to banish all waste from their supply chain. Lean manufacturing which removes waste and smoothens the process flow is gaining popularity among textiles and apparel producers and will be a key element for the survival of the industry in the years ahead. An overview of various lean tools with a balanced mix of conceptual knowledge and practical applications in the context of apparel manufacturing Valuable industry information which managers and engineers can follow themselves without the need to hire outside consultants Case studies and examples from apparel manufacturing demonstrating how lean tools are being used successfully by leading organizations; an academician's delight Possible use cases of several lean tools having potential use in the apparel manufacturing scenario

Productivity improvement means doing the same thing in a better and smarter way and continuing to work on improving the techniques for an individual or a team on the shopfloor. And this continuous improvement is the only way to achieve high profitability. Garment manufacturing involves number of operations carried out by different operators and all the

activities starting from cutting, sewing till finishing are different from each other in terms of the way they are performed and the technology being used for them. So, it is always advisable to look at the working of four aspects and that are material, machine, men and method. However there are ways to build higher productive efficiencies which result in reduction in cost and bring in higher profit margin.. The book discusses different case studies from the shopfloor showing productivity improvements.

There is surely a bridge between the management goal and the performance of employees working to achieve that goal, be it any industry and the apparel sector is not an exception. Designing a workplace that can bridge this gap to deliver the maximum output is an important area of concern. Though, there are many technologies available in the market today that can help the organizations to overcome the challenges and compete with their competitors. One of the major challenges is the cost associated with technologies which makes it difficult to be opted by small manufacturers and secondly, the lack of technical know-how as well as understanding of the technology. One of the proven solutions is: changing the workplace into an engineered workplace that can help the manufacturers in achieving the desired goals and targets with maximum efficiency and effectiveness. This series will take the garment manufacturers through a number of articles that will help them identify new ways and methodologies that will result in improved productivity and the key of all the articles remains the same: re-engineering the current workplace into a workstation.

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Industrial Engineering in Apparel ManufacturingApparel Resources Pvt. Ltd.

This book is written for you, if you want to learn the industrial engineering basics, about the necessary tools for engineers and activities done by industrial engineers. If you want to work as an industrial engineer in a garment factory.By learning industrial engineers subject, you can bring changes and bring improvement in the factory where you work. An engineering degree is not necessary to improve factories' productivity and reducing manufacturing costs. What is required is the right attitude. If you allow yourself to learn industrial engineering tools, you can learn most of them in one month. Then you can practice these IE tools and IE activities in the next 3 months. After that, you are ready for serving the factory. You can make things better.

This book addresses current research trends and practice in industrial design. Going beyond the traditional design focus, it explores a range of recent and emerging aspects concerning service design, human–computer interaction and user experience design, sustainable design, virtual & augmented reality, as well as inclusive/universal design, and design for all. A further focus is on apparel and fashion design: here, innovations, developments and challenges in the textile industry, including applications of material engineering, are taken into consideration. Papers on pleasurable and affective design, including studies on emotional user experience, emotional interaction design and topics related to

social networks make up a major portion of the contributions included in this book, which is based on five AHFE 2020 international conferences (the AHFE 2020 Virtual Conference on Design for Inclusion, the AHFE 2020 Virtual Conference on Interdisciplinary Practice in Industrial Design, the AHFE 2020 Virtual Conference on Affective and Pleasurable Design, the AHFE 2020 Virtual Conference on Kansei Engineering, and the AHFE 2020 Virtual Conference on Human Factors for Apparel and Textile Engineering) held on July 16–20, 2020. Thanks to its multidisciplinary approach, it provides graduate students, researchers and professionals in engineering, architecture, computer and materials science with extensive information on research trends, innovative methods and best practices, and a unique bridge fostering collaborations between experts from different disciplines and sectors.

Industrial engineering affects all levels of society, with innovations in manufacturing and other forms of engineering oftentimes spawning cultural or educational shifts along with new technologies. Industrial Engineering: Concepts, Methodologies, Tools, and Applications serves as a vital compendium of research, detailing the latest research, theories, and case studies on industrial engineering. Bringing together contributions from authors around the world, this three-volume collection represents the most sophisticated research and

developments from the field of industrial engineering and will prove a valuable resource for researchers, academics, and practitioners alike.

Sourcing practices in the global apparel industry are changing because of the removal of quotas, new trade agreements, and a drive by apparel importers to lower costs. This study addresses the implications of these changes for garment manufacturers in Commonwealth developing countries. The principal research activities behind the book consisted of face-to-face interviews in North America with top sourcing executives of apparel importing companies and senior executives of apparel manufacturing companies and other stakeholders in six Commonwealth developing countries. The findings indicate that almost without exception apparel manufacturers are struggling to lower costs and to increase productivity so as to remain competitive. Government and industry are thus faced with critical decisions on how best to support the apparel industry in their respective countries. The principal outputs of the study are enterprise level guidelines to remain competitive in the face of evolving sourcing policies, technology, and practices, complemented by related frameworks at government and institutional levels.

Volume is indexed by Thomson Reuters CPCI-S (WoS). Collection of selected, peer reviewed papers from the 4th International Conference on Textile

Engineering and Materials (ICTEM 2014), August 23-24, 2014, Shenzhen, China. The 121 papers are grouped as follows: Chapter 1: Textile Materials, Processing and Application, Chapter 2: Textile Industry Development, Management and Innovation, Chapter 3: Apparel Design, Manufacturing and Research, Chapter 4: Aesthetics and Textile Science, Chapter 5: Advanced Materials Science and Processing Technologies, Chapter 6: Industrial Engineering and Information Technology.

'Ergonomics' in simple term means 'the study of the efficiency of persons in their working environment'. Both in Europe and the United States, the use of principles to improve efficiency in the workplace began around the turn of the twentieth century, but it was only in 1949 when the term 'ergonomics' was first adopted. 'Ergonomics' is the science behind posture and risk analysis of workers, understanding the reasons for repetitive strain injuries and workplace re-engineering for a healthy and thus a productive organisation.

Developed by the author and now being employed by a number of businesses, Quick Response Manufacturing (QRM) is an expansion of time-based competition, aimed at a single target with the goal of reducing lead times. The key difference between QRM and other time-based programs is that QRM covers an entire organization, from the shop floor to the office, to sales and beyond.

Providing guidelines for establishing a QRM enterprise, this volume builds upon kaizen, TQM, TPM, and other practice to help organizations streamline all functions of their operation. It shows how to quickly introduce products, along with ways to rethink materials and production management.

Cutting-Sewing-Finishing is the common terminology used for the overall process that takes place in any organisation manufacturing garments via the industrial way. The cutting room or cutting department is the place where all the pre-sewing activities like spreading, cutting, bundling, ticketing, fusing, and embroidery are conducted before the cut components are sent to the sewing department. In a garment factory, cutting department is pivotal from the point of view of controlling the material utilisation, considering the fact that material constitutes 60% of the manufacturing cost. Although the labour cost component in spreading and cutting is very less in comparison to sewing, the process involves material conversion which is irreversible, and hence, it is profoundly significant. Like any other department, the technology used and the processes being followed are the two most important parameters of cutting room. This multi-author book is an honest attempt on our part to cover all the cutting room processes in detail to unravel the relevance of material utilisation for garment manufacturing and thus provide an essential guide for cutting room managers and executives. These processes act

as the tipping point for a garment factory where even a minor wastage or saving done in the fabric being used can have a major impact on the order margins. Besides, they lay the foundation for the garments' quality and hence become all the more important.

This book provides an overview of intelligent decision-making techniques and discusses their application in production and retail operations. Manufacturing and retail enterprises have stringent standards for using advanced and reliable techniques to improve decision-making processes, since these processes have significant effects on the performance of relevant operations and the entire supply chain. In recent years, researchers have been increasingly focusing attention on using intelligent techniques to solve various decision-making problems. The opening chapters provide an introduction to several commonly used intelligent techniques, such as genetic algorithm, harmony search, neural network and extreme learning machine. The book then explores the use of these techniques for handling various production and retail decision-making problems, such as production planning and scheduling, assembly line balancing, and sales forecasting.

This comprehensive text on apparel product development reflects the current importance of manufacturers' and retailers' private brands and exclusive designer

collections.

Getting higher productivity doesn't mean working for more time with the available resources. It is all about how smartly we work. On a sewing floor, it refers to how efficient we are at doing a piece of work, i.e. opting the best method with the combination of most recent technology available. This not only increases the productivity but also saves money, improves quality by reducing defects. Following the above concept, a series of articles review the different levels of technology solutions available for an operation, the make and models of machinery and equipment available in the market. At the outset, it must be borne in mind that many of the operations are complex, time consuming and require a skilled operator. The process can be greatly simplified by using automatic machines available for the purpose, which, promisingly enough, also give a fair ROI. This is calculated for each of the operations to gauge the overall advantage an automatic machine holds over a basic manually operated one.

This book presents the conference proceedings of the 25th edition of the International Joint Conference on Industrial Engineering and Operations Management. The conference is organized by 6 institutions (from different countries and continents) that gather a large number of members in the field of operational management, industrial engineering and engineering management. This edition of the conference had the title:

THE NEXT GENERATION OF PRODUCTION AND SERVICE SYSTEMS in order to emphasis unpredictable and very changeable future. This conference is aimed to enhance connection between academia and industry and to gather researchers and practitioners specializing in operation management, industrial engineering, engineering management and other related disciplines from around the world.

The garment manufacturing industry faces many global challenges due to various factors including competition, increased production costs, less productivity/efficiency and labor attribution. So, there is a need to focus and concentrate on identifying the real issues, taking corrective actions suited to the specific industrial centre of the unit, empowering the technical and managerial staff by enhancing their knowledge and ability, analysing orders efficiently and deciding whether actions are viable for the company. Industrial engineering in apparel production reviews the techniques for internal correction and openness for a knowledge/technology approach that needs to be built into the mind of the faculties to be upgraded as system run, rather than people run. The author emphasizes that the industrial engineering concept needs to be imparted to the facilities to increase productivity. With its highly distinguished author, Industrial engineering in apparel production is a valuable reference for students, researchers, industrialists, academics and professionals in the clothing and textile industry.

Retaining customers in any industry is one of the biggest challenges today, and more

so in the fashion industry, where competition is very high and customer loyalty very fickle, which has to be earned not just by the look of the garment but also through quality. Therefore, it is imperative that apparel brands world over follow strict quality guidelines right from product designing to quality of inputs to sewing and packaging the product. This critical journey even involves managing the quality of the machines on which the product is made to the way the after-sales services are carried out. Effectively managing quality of all the above materials and processes is a major challenge, mainly for the reason that the complete cycle requires human intervention and humans make mistakes. This book is an honest endeavour to comprehensively cover implementation of all the possible tools, techniques and methodologies which encompass the concept of ‘quality’ for the apparel industry such as quality control, quality assurance and total quality management system. All the concepts have been fortified by case studies on the implementation process with detailed discussion and final outcome. These would not only enable the industry to move forth on the path of consistent improvement but would also support it to remain in sync with the rapidly evolving technological world of today.

The International Conference on Industrial Engineering and Engineering Management is sponsored by the Chinese Industrial Engineering Institution, CMES, which is the only national-level academic society for Industrial Engineering. The conference is held annually as the major event in this arena. Being the largest and the most authoritative

international academic conference held in China, it provides an academic platform for experts and entrepreneurs in the areas of international industrial engineering and management to exchange their research findings. Many experts in various fields from China and around the world gather together at the conference to review, exchange, summarize and promote their achievements in the fields of industrial engineering and engineering management. For example, some experts pay special attention to the current state of the application of related techniques in China as well as their future prospects, such as green product design, quality control and management, supply chain and logistics management to address the need for, amongst other things low-carbon, energy-saving and emission-reduction. They also offer opinions on the outlook for the development of related techniques. The proceedings offers impressive methods and concrete applications for experts from colleges and universities, research institutions and enterprises who are engaged in theoretical research into industrial engineering and engineering management and its applications. As all the papers are of great value from both an academic and a practical point of view, they also provide research data for international scholars who are investigating Chinese style enterprises and engineering management.

Apparel manufacturing globally remains the same over the last fifty years; only migrated from one country to another in search of cheap labour. Notwithstanding, the changing economics of production and distribution, shifts in consumer demand, the emergence of

“fast fashion” and the political agenda of reshoring and sustainable manufacturing are pushing apparel manufacturers to explore radically new ways of creating and capturing value. The fourth industrial revolution more commonly known as Industry 4.0 has already brought a plethora of technologies for adoption in manufacturing. The increased processing power of computing and miniaturization of chip size is making things earlier thought impossible, possible. The reduction in cost of data processing, storing and transferring has made AI and ML affordable for commercial use. The mighty robots changed themselves to safe co-bots to work alongside human workers. A wind of change is visible, and the apparel manufacturing industry is also embracing newer technologies and manufacturing concepts to herald in the new era of future manufacturing. This book details how different technologies are going to shape apparel manufacturing factories of the future.

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This book will serve as one best reference to the Apparel Engineers in the garment industry, as well as learners and professions. Apparel Engineering is a term to explain the industrial engineering activities to be used in Apparel Production process, this will include methods to reduce Man, Machine and Material wastage in the Apparel Production process, it includes selection of right tools and machines, training to the operators for quality and fast production, material management, ergonomics to use in apparel industry, methods development and advanced production planning and

development of method study and Workstudy applications in production process, Line balancing to product handling. The whole booklet is capsuled to easy knowledge by reducing long theories. Maximum real time data from industry are used to generate and explain the calculations so that the methods can easily be adapted to industries by their industrial Engineers. In this book, author has tried to explain the ideas of, Wastage, Facility Layout and Material Planning, Material Flow system, Plant Layouts, Factory layout, Economics of Material Handling, Production Systems, Capacity planning, Marker Planning & cutting, Processing of fabric faults, Marker utilisation, Cut order planning, Workstudy Procedures, Micromotion studies, Production studies, Work Measurement Techniques, Performance rating, Allowances, Industrial Ergonomics, Principles of Motion Economy, Production Planning Process, Line Planning, Capacity Planning, Line Balancing, WIP, Scheduling Orders, Manufacturing Lead Time, Load Levelling, Scheduling Bottlenecks, Operation Scheduling, Production Reporting, Job evaluation & Compensation, Designing wage structure, Incentive plan etc Second edition has many more ad-ones and data tables for professional reference.

This book aims to provide a broad conceptual and theoretical perspective of apparel manufacturing process starting from raw material selection to packaging and dispatch of goods. Further, engineering practices followed in an apparel industry for production planning and control, line balancing, implementation of industrial engineering concepts in apparel manufacturing, merchandising activities and garment costing have been

included, and they will serve as a foundation for future apparel professionals. The book addresses the technical aspects in each section of garment manufacturing process with considered quality aspects. This book also covers the production planning process and production balancing activities. It addresses the technical aspects in each section of garment manufacturing process and quality aspects to be considered in each process. Garment engineering questions each process/operation of the total work content and can reduce the work content and increase profitability by using innovative methods of construction and technology. This book covers the production planning process, production balancing activities, and application of industrial engineering concepts in garment engineering. Further, the merchandising activities and garment costing procedures will deal with some practical examples. This book is primarily intended for textile technology and fashion technology students in universities and colleges, researchers, industrialists and academicians, as well as professionals in the apparel and textile industry.

Based on extensive primary research The Chinese and Hong Kong denim industry is the first title of its kind that contains a systematic description and analysis of the denim textile and clothing industry in mainland China and Hong Kong. The authors describe the industry systematically, from yarn, fabric and garment production to distribution channels with a detailed analysis of the industry's competitiveness. The impact of the World Trade Organisation on the industry is also covered along with a comparative

study of the textile clothing industries in the top ten exporting countries and regions in world trade. The Chinese and Hong Kong denim industry is invaluable to companies and individuals interested in the Chinese textile and clothing industry and markets. Universities and students specialising in textiles and clothing, marketing and management will also find this title of use, along with market development managers and market and industry analysts. Contains a systematic description and analysis of the denim textile and clothing industry in mainland China and Hong Kong Provides unparalleled detail on every aspect of denim production and apparel, including manufacturing, distribution, competitive analysis and industry strategy Discusses the impact of the World Trade Organisation on the industry and provides a comparative study of the textile clothing industries in the top ten exporting countries and regions Apparel Engineering is a term to explain the industrial engineering activities to be used in Apparel Production process, this will include methods to reduce Man, Machine and Material wastage in the Apparel Production process, it includes selection of right tools and machines, training to the operators for quality and fast production, material management, ergonomics to use in apparel industry, methods development and advanced production planning and development of method study and Workstudy applications in production process, Line balancing to product handling. The whole booklet is capsuled to easy knowledge by reducing long theories. Maximum real time data from industry are used to generate and explain the calculations so that the

methods can easily be adapted to industries by their industrial Engineers. I this book, author has tried to explain the ideas of, Wastages, Facility Layout and Material Planning, Material Flow system, Plant Layouts, Factory layout, Economics of Material Handling, Production Systems, Capacity planning, Marker Planning & cutting, Processing of fabric faults, Marker utilisation, Cut order planning, Workstudy Procedures, Micromotion studies, Production studies, Work Measurement Techniques, Performance rating, Allowances, Industrial Ergonomics, Principles of Motion Economy, Production Planning Process, Line Planning, Capacity Planning, Line Balancing, WIP, Scheduling Orders, Manufacturing Lead Time, Load Levelling, Scheduling Bottlenecks, Operation Scheduling, Production Reporting, Job evaluation & Compensation, Designing wage structure, Incentive plan etc This book will serve as one best reference to the Apparel Engineers in the garment industry, asl well as learners and professions.
This book presents selected peer reviewed papers from the International Conference on Advanced Production and Industrial Engineering (ICAPIE 2019). It covers a wide range of topics and latest research in mechanical systems engineering, materials engineering, micro-machining, renewable energy, industrial and production engineering, and additive manufacturing. Given the range of topics discussed, this book will be useful for students and researchers primarily working in mechanical and industrial engineering, and energy technologies.