

Update to the AIAG- SPC Reference Manual

Michael Down

General Motors Corporation/SPC Rewrite Chairman

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SPC Rewrite Committee

ABSTRACT

The SPC reference manual was one of the first manuals released by Ford, GM, and DaimlerChrysler (formally Chrysler) to communicate the methods and application of Statistical Process Control. It has been useful, but it was released in the early 80's and required updating in relation to style, changes in philosophy, and the introduction of new methods.

INTRODUCTION

SPC- Statistical Process Control has been around for many years, first created by Walter Shewhart in the 1920. It came to the forefront by Dr. W. Edwards Deming's teaching and application in Japan in the mid 40's after World War Two and into the early 80's when it became recognized in the US. It eventually became a requirement of all US automotive suppliers to have proof of the application of SPC and that the parts being delivered were from a stable process.

MAIN SECTION

The main purpose of this paper is to review the philosophy used in the development of the new SPC reference manual, the changes and additional methods reviewed and supported.

PHILOSOPHY OF THE SUBCOMMITTEE

Prior to starting the rewrite the committee established specific norms to follow while developing the manual. They were as follows:

- Update the format to match current manuals
- Evaluate order, improve logic
- Customer focused: Easier to use and understand
- Reduce focus on indices
- Up-front reinforce the need for a system of application and analysis
- Add additional methods that have been introduced since the manual was published
- Improve the glossary and index
- Review and update reference list

Introduction

The manual contains information from the basics of SPC, management support process, the common statistical methods, and additional methods that can be used in special situations. The introduction sets the stage by showing the importance of using SPC to define variation.

- Establish where the process is centered
- Whether the process is stable or unstable
- The amount of variation that exists.

Data, Results, and Measurement

Decisions and estimates are based on a perception of what the population is doing. The quality of this perception is based on a number of issues.

- Homogeneous population
- Distribution of the population
- Sampling plan
- Whether the process and population are stable
- Measurement variation
- Interdependent variables

The stability and uniformity of the population is critical to understand prior to collecting and analyzing data. The uniformity and stability of the population impact the way that collect the data and the way the data is analyzed. This is not just a "point of view", it always exist whether it taken into account or ignored. In most cases a normal distribution (bell curve) in relation to a continuous process.

Sampling can also impact the results of data collection and analysis. In some cases a randomized sample is required. This means by where, when and how the sample is taken from the population. Randomization helps to limit bias and also gives a better picture of what the variation in the population looks like. In other cases, the sample isn't random; parts are either specifically selected or made to specific requirements. This often occurs in engineering development or when problem solving issues. (Note: Distribution, Uniformity, and stability of the population are assumed/ Measurement variation is small)

Aiag Manual For Spc

John Lawson



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Statistical Process Control , **Statistical Process Control (SPC)** ,1995 **Measurement of Geometric Tolerances in Manufacturing** James D. Meadows,1998-05-28 This insightful reference demonstrates a system of measurement inspection gaging geometric tolerancing and fixturing of products in full compliance with the American National Standards Institute ANSI the American Society of Mechanical Engineers ASME and the International Organization for Standardization ISO approved standards **Understanding ISO 9001 : 2015 Quality Management System, 2nd Edition, Revised and Expanded** Virendra Kumar Gupta,2017-06-15 The 2015 version of ISO 9001 brings many enriching changes to promote quality excellence by organizations The most significant change is the reinforcement of the fact that ISO 9001 is not just a quality issue It is relevant as an overarching management topic The book explains the requirements of the revised 2015 version of ISO 9001 in simple and practical manner The objective has been to enhance understanding of the subject matter by managers and quality professionals A conceptual understanding shall enable managers and professionals to design better systems and processes uniquely suited to their respective organizations In view of this the first five chapters of the book explain concepts on QUALITY PROCESS PROCESS APPROACH MANAGEMENT and PDCA These are relevant for all management system standards being developed by International Organization for Standardization with the High Level Structure Part II of the book goes into details of each clause focusing on processes and process interactions We expect that the readers will appreciate that ISO 9001 now focuses more on expected outcomes through processes than mandating too many requirements **The ASQ Certified Six Sigma Green Belt Handbook** Roderick A. Munro,Govindarajan Ramu,Daniel J. Zrymiak,2022-06-30 This handbook is designed to help candidates preparing for the ASQ Six Sigma Green Belt certification exam Meant for those who already understand the basic concepts of reducing variation and improving processes it also serves as a helpful reference to the appropriate materials needed to conduct successful Green Belt projects The layout of the handbook is mapped to the 2022 version of ASQ s Body of Knowledge BoK This revised edition includes new information about SMART goals key process indicators Takt time just in time processes and spaghetti diagrams The Kano model risk management business continuity planning SWOT analysis and RACI charts Data collection plans and quality checks Gap analysis 5 Whys analysis and fault tree analysis Maintaining quality improvements Document control audits training plans the PDCA cycle Andon and Jidoka system **The Certified Quality Engineer Handbook** Rachel Silvestrini,Sarah E. Burke,2017-01-25 A comprehensive reference manual to the Certified Quality Engineer Body of Knowledge and study guide for the CQE exam *The Certified Six Sigma Green Belt Handbook, Second Edition* Roderick A. Munro,Govindarajan Ramu,Daniel J. Zrymiak,2015-05-13 This reference manual is designed to help those interested in passing the ASQ s certification exam for Six Sigma Green Belts and others who want a handy reference to the appropriate materials needed to conduct successful Green Belt projects It is a reference handbook on running projects for those who are

already knowledgeable about process improvement and variation reduction The primary layout of the handbook follows the ASQ Body of Knowledge BoK for the Certified Six Sigma Green Belt CSSGB updated in 2015 The authors were involved with the first edition handbook and have utilized first edition user comments numerous Six Sigma practitioners and their own personal knowledge gained through helping others prepare for exams to bring together a handbook that they hope will be very beneficial to anyone seeking to pass the ASQ or other Green Belt exams In addition to the primary text the authors have added a number of new appendixes an expanded acronym list new practice exam questions and other additional materials

Coloring of Plastics Robert A. Charvat, 2005-02-25 Expert coverage of the state of the art in plastics coloring This latest edition of Coloring of Plastics Fundamentals offers an updated introduction to color as a science while also providing the foundation for many additional technological subjects The basic families of colorants are described along with their properties The material examines how statistical analysis can improve the consistency of colored polymer production runs as well as the colorants used to match the color Other important topics covered in Coloring of Plastics Fundamentals Second Edition include Environmental issues and the reuse of discarded material Potential problems with the interaction between colorants and other additives Measurement information and matching visually and instrumentally Techniques for incorporating colorants into polymers as compounds or concentrates Special effect colorants Polymer and colorant manufacturers plastics compounders and coating and synthetic fiber industries will acquire an enhanced appreciation of the complex technological issues a colorist must consider if a plastics coloring project is to succeed

Short-Run SPC for Manufacturing and Quality Professionals William A. Levinson, 2022-09-07 On the manufacturing shop floor the principle of value comes from the production of parts rather than charts crucially applies when using practical statistical process control SPC The production worker should need to enter only a sample's measurements to get immediately actionable information as to whether corrective action e.g. as defined by a control plan's reaction plan is necessary for an out of control situation and should not have to perform any calculations draw control charts or use sophisticated statistical software This book's key benefit for readers consists of spreadsheet deployable solutions with all the mathematical precision of a vernier along with the simplicity of a stone ax Traditional SPC relies on the assumption that sufficient data are available with which to estimate the process parameters and set suitable control limits Many practical applications involve however short production runs for which no process history is available There are nonetheless tested and practical control methods such as PRE Control and short run SPC that use the product specifications to set appropriate limits PRE Control relies solely on the specification limits while short run SPC starts with the assumption that the process is capable that is at least a 4 sigma process and works from there to set control limits Cumulative Sum CUSUM and exponentially weighted moving average EWMA charts also can be used for this purpose Specialized charts can also track multiple part characteristics and parts with different specifications simultaneously This is often useful for example where the same tool is engaged in mixed model

production Readers will be able to deploy practical and simple control charts for production runs for which no prior history is available and control the processes until enough data accumulate to enable the traditional methods assuming it ever does. They will be able to track multiple product features with different specifications and also control mixed model applications in which a tool generates very short runs of parts with different specifications. The methods will not require software beyond readily available spreadsheets nor will they require specialized tables that are not widely available. Process owners and quality engineers will be able to perform all supporting calculations in Microsoft Excel and without the need for advanced software.

The ASQ Certified Quality Engineer Handbook Scott A. Laman, 2022-12-01. The ASQ Certified Quality Engineer Handbook Fifth Edition covers a wide range of topics in the quality engineering field and is organized to align with the 2022 ASQ Certified Quality Engineer CQE Body of Knowledge BoK. This handbook is essential for candidates preparing for the ASQ CQE examination. For working engineers it is a convenient and thorough guide to the profession. In addition to providing detailed explanations of each section of the 2022 CQE BoK, this current edition includes an explanation of cost benefit analysis CBA and the RACI matrix critical to quality as a design input, hazard analysis and FMEA, overall equipment effectiveness OEE, 5 Whys analysis, data automation and database integration, and assessing risk in audit planning and implementation. New chapter on risk management, Appendices and a Glossary of Terms for reference purposes. Content in this fifth edition has been restructured to provide tools and concepts that match the 2022 CQE BoK as well as improved textbook and journal article references throughout the entire book. This handbook also provides case studies that give readers a broader context for real life scenarios and applications.

Implementing Six Sigma Forrest W. Breyfogle, III, 2003-11-10. Das bewährte Handbuch zum Statistiktool Six Sigma jetzt in neuer aktualisierter Auflage besprochen werden. Es gibt neue Verfahren und deren Implementation, erweiterte Behandlung und das Benchmarking mit vielen praxisnahen Beispielen. Enthält viele Checklisten und übersichten häufig auftretender Fehler.

The Certified Six Sigma Master Black Belt Handbook T.M. Kubiak, 2012-11-19. Organizations are continuously trying to improve by reducing cost, increasing customer satisfaction and creating an environment of empowered employees who continuously strive for excellence in each process and product. In much the same way, governments are continuously required to do more with less, enhance budget and organizational performance, and identify innovative ways to increase their impact. There are challenges to applying the Lean Six Sigma LSS tools in the public sector. Examples of these challenges include hierarchical environments, a lack of common goals, and the complexity of working in the public sector. The information included as part of this book provides over 30 spotlights highlighting project examples, lessons learned, and tips and tricks for using LSS in the public sector. These spotlights are based on interviews facilitated with a robust sampling of senior operations strategy practitioners. The LSS methodology focuses on eliminating waste, lean, and then reducing variation. Six Sigma is a process or product that contains no waste. The information covered in this book will allow someone to have an immediate impact in any public sector organization. It

describes some of the most powerful continuous process improvement tools that can be used with limited training required This is further enhanced by showing direct correlations to the LSS tools and the challenges that will be faced Because the public sector spans such a diverse range of organizational charters such as transportation education and defense this book does not focus solely on either manufacturing or services Rather it provides a balanced approach to utilizing LSS in all environments

Advanced Product Quality Planning D. H. Stamatis, 2018-11-12 This book defines develops and examines the foundations of the APQP Advanced Product Quality Planning methodology It explains in detail the five phases and it relates its significance to national international and customer specific standards It also includes additional information on the PPAP Production Part Approval Process Risk Warranty GD T Geometric Dimensioning and Tolerancing and the role of leadership as they apply to the continual improvement process of any organization Features Defines and explains the five stages of APQP in detail Identifies and zeroes in on the critical steps of the APQP methodology Covers the issue of risk as it is defined in the ISO 9001 IATF 16949 the pending VDA and the OEM requirements Presents the role of leadership and management in the APQP methodology Summarizes all of the change requirements of the IATF standard

ESD Technology, 1992 *Leading High-Reliability Organizations in Healthcare* Richard Morrow, 2016-03-15 This book details the attributes and practices that help high reliability organizations HROs excel in the service they provide to their customers Explaining what it takes to achieve high reliability in healthcare settings it presents proven tools and concepts that leading healthcare organizations are using to improve safety and quality The book identifies the necessary infrastructure methods and analytics required to achieve and sustain higher reliability It also includes case studies that illustrate success stories and failures so readers can avoid making the same mistakes

Quality Improvement Through Statistical Methods Bovas Abraham, 2012-12-06 This book is based on the papers presented at the International Conference Quality Improvement through Statistical Methods in Cochin India during December 28 31 1996 The Conference was hosted by the Cochin University of Science and Technology Cochin India and sponsored by the Institute for Improvement in Quality and Productivity IIQP at the University of Waterloo Canada the Statistics in Industry Committee of the International Statistical Institute ISI and by the Indian Statistical Institute There has been an increased interest in Quality Improvement QI activities in many organizations during the last several years since the airing of the NBC television program If Japan can why can't we Implementation of QI methods requires statistical thinking and the utilization of statistical tools thus there has been a renewed interest in statistical methods applicable to industry and technology This revitalized enthusiasm has created worldwide discussions on Industrial Statistics Research and QI ideas at several international conferences in recent years The purpose of this conference was to provide a forum for presenting and exchanging ideas in Statistical Methods and for enhancing the transference of such technologies to quality improvement efforts in various sectors It also provided an opportunity for interaction between industrial practitioners and academia It was intended that the exchange of experiences

and ideas would foster new international collaborations in research and other technology transfers

An Introduction to Acceptance Sampling and SPC with R John Lawson, 2021-02-25 An Introduction to Acceptance Sampling and SPC with R is an introduction to statistical methods used in monitoring controlling and improving quality Topics covered include acceptance sampling Shewhart control charts for Phase I studies graphical and statistical tools for discovering and eliminating the cause of out of control conditions Cusum and EWMA control charts for Phase II process monitoring and the design and analysis of experiments for process troubleshooting and discovering ways to improve process output Origins of statistical quality control and the technical topics presented in the remainder of the book are those recommended in the ANSI ASQ ISO guidelines and standards for industry The final chapter ties everything together by discussing modern management philosophies that encourage the use of the technical methods presented earlier In the modern world sampling plans and the statistical calculations used in statistical quality control are done with the help of computers As an open source high level programming language with flexible graphical output options R runs on Windows Mac and Linux operating systems and has add on packages that equal or exceed the capability of commercial software for statistical methods used in quality control In this book we will focus on several R packages In addition to demonstrating how to use R for acceptance sampling and control charts this book will concentrate on how the use of these specific tools can lead to quality improvements both within a company and within their supplier companies This would be a suitable book for a one semester undergraduate course emphasizing statistical quality control for engineering majors such as manufacturing engineering or industrial engineering or a supplemental text for a graduate engineering course that included quality control topics

The ASQ CSSGB Study Guide Roderick A. Munro, Daniel J. Zrymiak, Elizabeth J. Rice-Munro, 2017-03-20 A team of ASQ Fellows has created this study guide with over 300 new questions predominantly based on the best selling second edition of The Certified Six Sigma Green Belt Handbook The primary audience for this work is the individual who plans to sit for the ASQ Certified Six Sigma Green Belt CSSGB examination The intended purpose of this study guide is to help you determine your readiness for the exam using the questions as a self assessment tool The answers to each chapter s questions appear at the end of the chapter The correct answer is given by letter along with the location of the topic and page number and paragraph or other locator in the second edition of The Certified Six Sigma Green Belt Handbook

Six Sigma for Business Excellence: Approach, Tools and Applications Hemant Urdhwaresh, 2011 Six Sigma for Business Excellence Approach Tools and Applications based on the author s first hand experience in quality engineering provides a comprehensive coverage of the Six Sigma methodology This book provides the complete study material for students taking the certified Six Sigma Black Belt and Green Belt examinations conducted internationally by the American Society for Quality ASQ At the same time it adequately fills the need of management professionals with numerous application examples and case studies providing an insight into the practical aspect of implementing Six Sigma tools The book begins with providing an overview of the evolution of Six Sigma explains

the basic concepts and then takes the readers step by step through the process The focus is more on enabling the implementation of the Six Sigma tools by providing illustrations tables application examples and templates as well as Minitab and Excel data files for project work and exercises in the soft form on a CD accompanying the book The templates carried in the book include the Sigma calculator Six Sigma project review checklist process mapping confidence intervals hypothesis tests project charter and measurement systems analysis Gauge R R Study The CD also contains a 30 day trial version of the Minitab and SigmaXL software programs

Quality Management for Organizations Using Lean Six Sigma

Techniques Erick Jones, 2014-02-25 The next step in the evolution of the organizational quality field Lean Six Sigma LSS has come of age However many challenges to using LSS in lieu of in conjunction with or integrated with other quality initiatives remain An update on the current focus of quality management Quality Management for Organizations Using Lean Six Sigma Techniqu

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