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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 17989.7-2022

Statistical method of quality control in production process - Control charts - Part 7: Multivariate control charts

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foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1.Structure and Drafting Rules of Standardization Documents" drafted.

This document is part 7 of GB/T 17989.GB/T 17989 has released the following parts.

--- Control Charts Part 1.General Guidelines;

--- Control Charts Part 2.General Control Charts;

--- Control Charts Part 3.Acceptance Control Charts;

--- Control Charts Part 4.Cumulative and Control Charts;

--- Statistical method control charts for quality control in production processes - Part 5.Special control charts;

--- Statistical method control chart for quality control of production process Part 6.Exponentially weighted moving average control chart;

--- Statistical method control chart for quality control in production process Part 7.Multivariate control chart;

--- Statistical method control chart for quality control in production process Part 8.Control method for short cycle and small batch;

--- Statistical methods for quality control of production process control charts Part 9.Stationary process control charts.

This document is modified using ISO 7870-7.2020 "Control Charts - Part 7.Multivariate Control Charts".

Compared with ISO 7870-7.2020, this document has the following structural adjustments.

--- Adjust the order of symbols and abbreviations in Chapter 4.symbols are first, abbreviations are after.

The technical differences between this document and ISO 7870-7.2020 and their reasons are as follows.

--- Delete the abbreviations "PCA" and "PLS", which appear less frequently and are replaced by common Chinese names;

--- Add "n > d" at the end of paragraph 1 of Appendix C.1 to clarify the value range;

---The quantile representation in the formula should be adjusted with reference to GB/T 3358.2.

The following editorial changes have been made to this document.

--- Change the standard name to "Production Process Quality Control Statistical Methods Control Chart Part 7.Multivariate Control Chart";

--- Modify "y1", "y2", "* y1", "* y2" to "x1", "x2", "* x1", "* x2", the original text is wrong;

--- Modify "offset from 0.5sigma to 2sigma" in 5.2 to "offset from 0.5 times standard deviation to 2 times standard deviation";

--- Modify "covariance vector" in Chapter 6 to "covariance matrix";

--- For the characteristics in Appendix B, according to the original source of the case data, the characteristics "speed" and "temperature" are restored to the real ones provided by the enterprise

Mass properties "Line speed" and "Flame temperature";

--- Legend of Figure B.1, Figure B.2, Figure B.3 in Appendix B, "j" is "Observation Number" instead of "Subgroup Number"; "Y2" is "Y2 Statistics"

quantity" rather than the explanatory "distance squared of MEWMA relative to the process mean of the controlled process".

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

Control charts are commonly used statistical tools in process control to monitor deviations in the process and keep the process stable. GB/T 17989 control

Figure series standards are divided into the following 9 parts.

--- Control Charts Part 1.General Guidelines. The purpose is to give the basic terms,

principles and classification of control charts, and to select control charts

guide.

--- Control charts Part 2.General control charts. The purpose is to establish guidelines for process control using conventional control charts.

--- Control charts Part 3.Acceptance control charts. The purpose is to establish guidelines for the use of acceptance control charts for process control, and to specify

General procedures for determining subgroup sample sizes, action limits, and decision criteria are described.

--- Control Charts Part 4.Cumulative and Control Charts. The purpose is to establish the application of cumulative and techniques for process monitoring, control and review

Statistical methods for sex analysis.

--- Statistical methods for quality control of production process control charts Part 5.Special control charts. The purpose is to establish the understanding and application of

A guide to statistical process control with special control charts.

--- Production process quality control statistical methods control charts Part 6.Exponentially weighted moving average control charts. The purpose is to establish

A guide to understanding and applying exponentially weighted moving average (EWMA) charts for statistical process control.

--- Statistical methods for quality control of production process control charts Part 7.Multivariate control charts. The purpose is to establish the construction and application of multiple

A guide to statistical process control with meta-control charts and establishes routine methods for using and understanding multi-variable control charts for measurement data.

--- Statistical methods of production process quality control control chart Part 8.Control methods for short cycle and small batches. The purpose is to establish

When the subgroup size is 1, the conventional metrology control chart is used to detect the method of short cycle and small batch production process.

--- Statistical methods for quality control of production process control charts Part 9.Stationary process control charts. The purpose is to establish the construction and application of

A guide to controlling stationary processes with control charts.

When several quality characteristics need to be controlled simultaneously, it is common practice to draw a separate (univariate) control chart for each characteristic.

Unfortunately, this approach can lead to misleading results when there is a strong correlation between features. When it comes to the need to monitor the existence of a correlation

Multivariate statistical process control (MSPC) needs to be applied when a process control problem of multiple variables is required. The most useful tool for multivariate statistical process control

The tool is a multivariate control chart. For the correlation between quality characteristics, multivariate control charts can be used for process evaluation and statistical process control.

Multivariate statistical process control is designed to issue an alarm when a process has an identifiable cause and the process is not in statistical control. by constantly

Efforts to systematically eliminate the identifiable causes of abnormal fluctuations in the process and bring the process back to a state of statistical control. Once the process is in statistics

Control state, whose performance is predictable, and the ability of the process to meet specification requirements can be assessed.

The main purpose of this document is to provide guidance on how to use multivariate control charts for statistical process control.

Whether the question evaluation process is under statistical control. GB/T 17989.6 provides a multivariate normal distribution or approximate multivariate normal distribution.

A method for calculating the process capability of a cloth process or product characteristic.

Multivariate control charts are used to monitor multivariate characteristics, one or more of which are often correlated with other characteristics.

Production process quality control statistical method control chart

Part 7.Multivariate Control Charts

1 Scope

This document describes guidelines for constructing and applying multivariate control charts for statistical process control, and establishes the use and understanding of measurement data

General approach to meta-control charts.

This document applies to statistical process control of quantitative multivariate characteristics.

The application of principal component analysis and partial least squares in multivariate