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**NATIONAL STANDARD OF THE
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GB/T 17989.4-2020

Control charts - Part 4: Cumulative sum charts

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3.1 Terms and definitions

Foreword

The plan of GB/T 17989 "Control Chart" is divided into the following 9 parts.

- Part 1. General guidelines;
- Part 2. Conventional control chart;
- Part 3. Acceptance control chart;
- Part 4. Cumulative and control charts;
- Part 5. Special control charts;
- Part 6. Exponentially weighted moving average control chart;
- Part 7. Multiple control charts;
- Part 8. Short cycle and small batch control methods;
- Part 9. Autocorrelation process control chart.

This part is Part 4 of GB/T 17989.

This section is drafted in accordance with the rules given in GB/T 1.1-2009.

This section replaces GB /Z 4887-2006 "Guidelines for the use of cumulative sum techniques for quality control and data analysis of cumulative sum charts." versus

Compared with GB /Z 4887-2006, the main technical changes are as follows.

--- Adjust GB /Z 4887-2006 0.1 "Basic of Cumulative Sum Graph" to Chapter 4 "Overview of Cumulative Sum Graph" (see Section 4

Chapter, Chapter 0 of GB /Z 4887-2006);

--- Adjust GB /Z 4887-2006 0.2 "Simple Example of Cumulative Sum Graph" to Chapter 6 "Example of Cumulative Sum Graph",

And enriched and improved the relevant content (see 6.5 ~ 6.7, Chapter 0 of GB /Z 4887-2006);

--- Added terms and definitions (see 3.1);

--- Added acronyms (see 3.2);

--- Added symbols (see 3.3);

--- Removed GB /Z 4887-2006 Chapter 2 "Cumulative Sum Graph Preparation";

--- Removed GB /Z 4887-2006 Chapter 3 "Representation of Figures";

--- GB /Z 4887-2006 Chapter 4 "Judgment Rules for Graphs" has been adjusted to Chapters 7 and 8 of this part, of which Chapter 7 "Base

"Determining cumulative sums" clarifies the basic criteria for cumulative sums. Chapter 8 "Cumulative sum graph scheme types" provides a variety of specific

Accumulation and determination methods (see Chapters 7 and 8, Chapter 4 of GB /Z 4887-2006);

--- Added semi-parabolic V-shaped template (see 8.4);

--- Deleted Chapter 5 "Judgment Rules for Retrospective Analysis" in GB /Z 4887-2006;

--- Removed Chapter 7 "Application Examples" of GB /Z 4887-2006;

--- Added an example of a motor production process (see Chapter 6);

--- Increased handling measures based on the nature of the process (see 7.1);

--- Elaborate the cumulative sum graph design scheme for wave monitoring (see 9.4);

--- Explains the cumulative sum graph design scheme of discrete data (see 9.5);

--- Increased the introduction of the Von Neumann method (see Appendix A), tabular accumulation and graph examples (see Appendix B) and the change points of step changes

Estimate (see Appendix C).

This part uses the redrafting method to modify and adopt ISO 7870-4..2011 "Control Chart Part 4. Accumulation and Control Chart".

The technical differences between this part and ISO 7870-4..2011 and their causes are as follows.

--- Regarding the normative references, this section has made adjustments with technical differences to adapt to China's technical conditions and the situation of adjustment.

The situation is reflected in Chapter 2 "Regulatory Reference Documents", and the specific adjustments are as follows.

- * Replace ISO 3534-1 with GB/T 3358.1 equivalent to the international standard (see Chapter 3);
- * Replace ISO 3534-2 with GB/T 3358.2 equivalent to the international standard (see Chapter 3);
- * Added reference to GB/T 17989.1 (see Chapter 3).

The following editorial changes have also been made in this section.

- Modify the title of Chapter 6 to "Example of cumulative sum graph";
- Added step 1 missing from the 9.6.1.3 example;
- Added step 1 missing from 9.6.2.2 example;
- Added steps 1 and 3 missing in 9.6.2.3;
- Rewrite step 6 of 9.6.1.3 and 9.6.2.2 as "according to the H and K values, from Table 24 [Count (Poisson) data in different H and

K combination of the cumulative sum of the average chain length features under the scheme] in the form of "retrieval and query the performance of its appropriate scheme", which is easy to guide reading

Operation and use.

This part was proposed and managed by the National Technical Committee for Standardization of Statistical Methods (SAC/TC21).

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China Institute of Atomic Energy, Beijing Institute of Aerospace Control Instruments, Haifeng General Aviation Technology Co., Ltd.

Introduction

This section introduces a simple and effective method of graphical data display, showing its flexibility and practicality, the method is suitable for any

Meaningful data sequence. This data covers a wide range, and can be macro business data (e.g. turnover, profit or management expenses), or

This is micro-operational data (for example, downtime and absenteeism controlled for individual process parameters and product characteristics). Data can be represented

A series of individual values, which can be expressed on a continuous scale (for example, 24, 60, 31, 21, 18, 97)

The format of "good/bad" and "success/failure" is expressed; of course, the data can also be expressed as comprehensive indicators (for example, mean, range, number of events).

The method has an interesting name "cumulative sum", referred to as "cumulative sum (CUSUM)". The name and data processing process are

Off, each observation minus a predetermined value (for example, target value, priority value or reference value) to get a deviation

(Add) These deviations, the cumulative deviation sequence diagram is called cumulative sum graph. Such a simple arithmetic process has a visual interpretation of the data.

Significant effect.

Golfers around the world have unknowingly used accumulation and methods. By scoring "plus 4" or "minus 2", golf

The player uses the cumulative sum method in a numerical sense. They subtract "pars" from their actual scores, and then accumulate the income bias.

difference. This is the practical application of the cumulative sum method. However, in the areas of commerce, industry, finance, and public services, accumulation and methods are still large.

The extent is unknown and the usage rate is extremely low. This may be due to the fact that cumulative sum methods are often expressed in statistical language rather than actually working

Language.

This section aims to help users understand the cumulative sum map and promote the wide application and promotion of the method. Cumulative and control charts are conventional controls

A useful supplement to the graph, for small offsets, the cumulative sum graph is easier to detect and use. In golf, when the par changes,

And the chart is not affected, the conventional control chart requires adjustment of the control line.

In addition to conventional control charts, you can also use exponentially weighted moving average control charts (EWMA). Summary of each point in the EWMA chart

The information of all subgroups or observations is given. For more "distant" process data, a smaller weight is assigned according to the exponential decay trend. And accumulation

Similar to the graph, the EWMA graph can also sensitively detect small offsets in the process. EWMA diagrams will be presented in another part of this series of standards

discuss.