



Aerospace Standard AS9103

Variation Management of Key Characteristics

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Why AS9103?

- One of the objectives of the IAQG is to establish common aerospace industry quality standards and requirements.
- **AS9103 - Variation Management of Key Characteristics** will provide a common standard for expectations for KC's within the aerospace industry.
- This presentation covers the version that is Published in US in 10/2001

AS9103

This Aerospace Standard establishes variation management requirements for Key Characteristics.

Key Characteristic (AS9100): The features of a material or part whose variation has a significant influence on the fit, performance, service life, or manufacturability.

AS9103

AS9100, Section 4.9.1 General: The supplier shall identify and plan the production, installation and servicing processes which directly affect quality and shall ensure that these processes are carried out under controlled conditions.

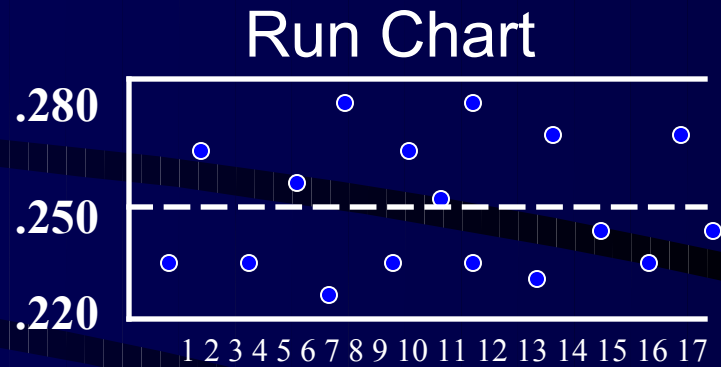
Controlled conditions shall include the following:

...

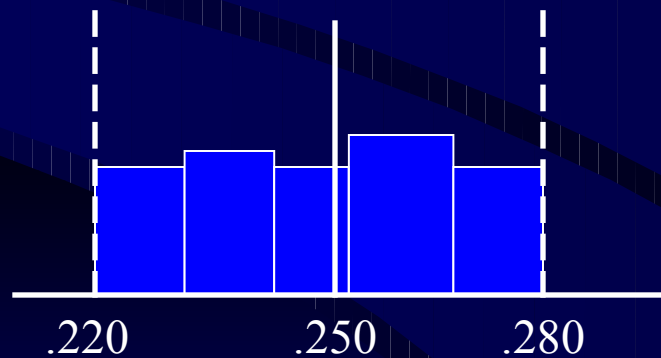
... ;monitoring and control of key characteristics where required by purchase order/contract;

...

Uncontrolled Process



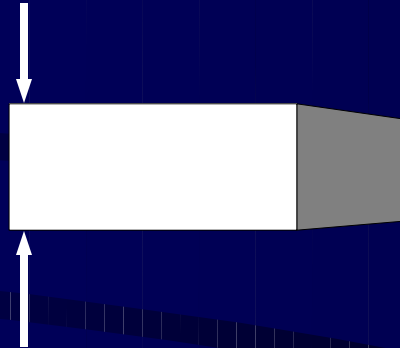
Histogram



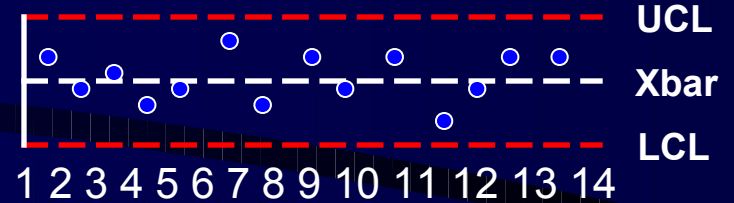
Controlled Process



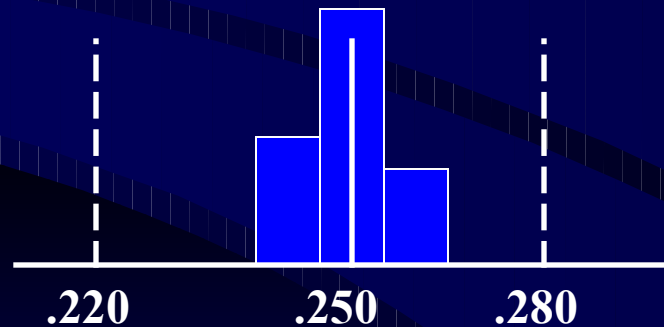
$.250 \pm .030$



Control Chart



Histogram



$Cpk = 2.3$

Characteristics that could be Key:

- Dimensional features - thickness, diameter, length, etc.
- Chemical concentrations
- Time
- Pressure, speed, rates, temperature, etc.

In general, any feature or process whose *variation* will have a significant effect on the performance of the characteristic for its intended use may be a key characteristic.

AS9103 Document Structure

1. Introduction

2. References

3. Definitions

4. Applicability

5. General Requirements

6. Process Requirements and Outputs

- Figure 1: Process Flow Chart
- Appendix A: Guidelines To Meeting Requirements
- Appendix B: Example Process Control Plan

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1. Introduction - This Aerospace Standard establishes variation management requirements for Key Characteristics.

1.1 Scope - The Standard shall be applicable to all production processes that influence the variation of Key Characteristics.

1.2 Purpose - This Aerospace Standard is intended to drive the improvement of the manufacturing processes through adequate planning and effective management of KC variation.

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3. Definitions (*selected*)

3.2 Producer - An organization that performs any process affecting the manufacture of the part.

3.3 Customer - The organization which provides Part or System Key Characteristics via engineering drawings, specifications or purchase order/contract.

3.6 Process Control Document (PCD) - A written description of manufacturing plan developed to control variation in Key Characteristics.

Establish proper level of supplier control: AS9103 Approach

Outcomes
Based
Requirements



Supplier designs process
to achieve objective
within certain constraints.
Flexibility as to process.

OR

Activity Based
Requirements



Supplier to achieve
objective through specified
process. Limited flexibility
as to process.

Establish proper level of supplier control: AS9103 Approach

AS9103 approach is to provide for both methods
of supplier control:

Outcomes

Based



Section 5 - General
Requirements

Requirements

Activity Based
Requirements



Section 6 - Process
Requirements

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Section 5: General Requirements for Variation Management of Key Characteristics

Outcome based requirements with suitable constraints



Section 5: General Requirements

Section 5 consists of general requirements that must be met regardless of the variation management methodology applied.

- Variation management activities performed on KC's
- Identify lower level KC's where necessary
- Create and maintain appropriate documentation

Section 5: General Requirements *(cont)*

- Process capability established when KC in-control
- Requirements for combined KC's - Process Control
- Requirements for reduced inspection
- Flow down to subcontractor as appropriate
- Exceptions documented and agreed to by customer

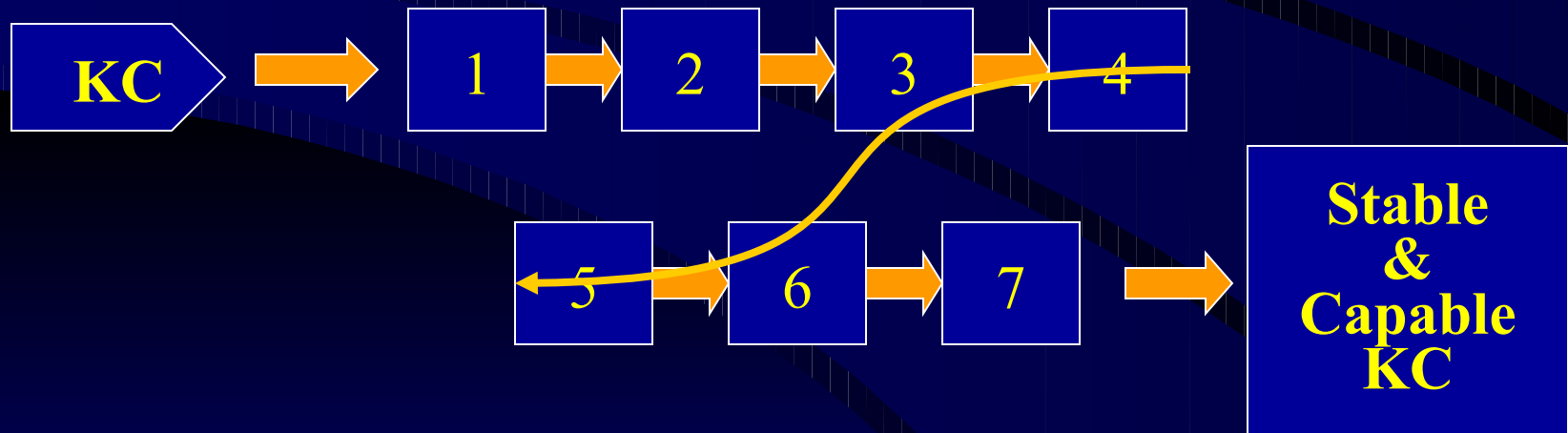
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Section 6: Process Requirements and Outputs

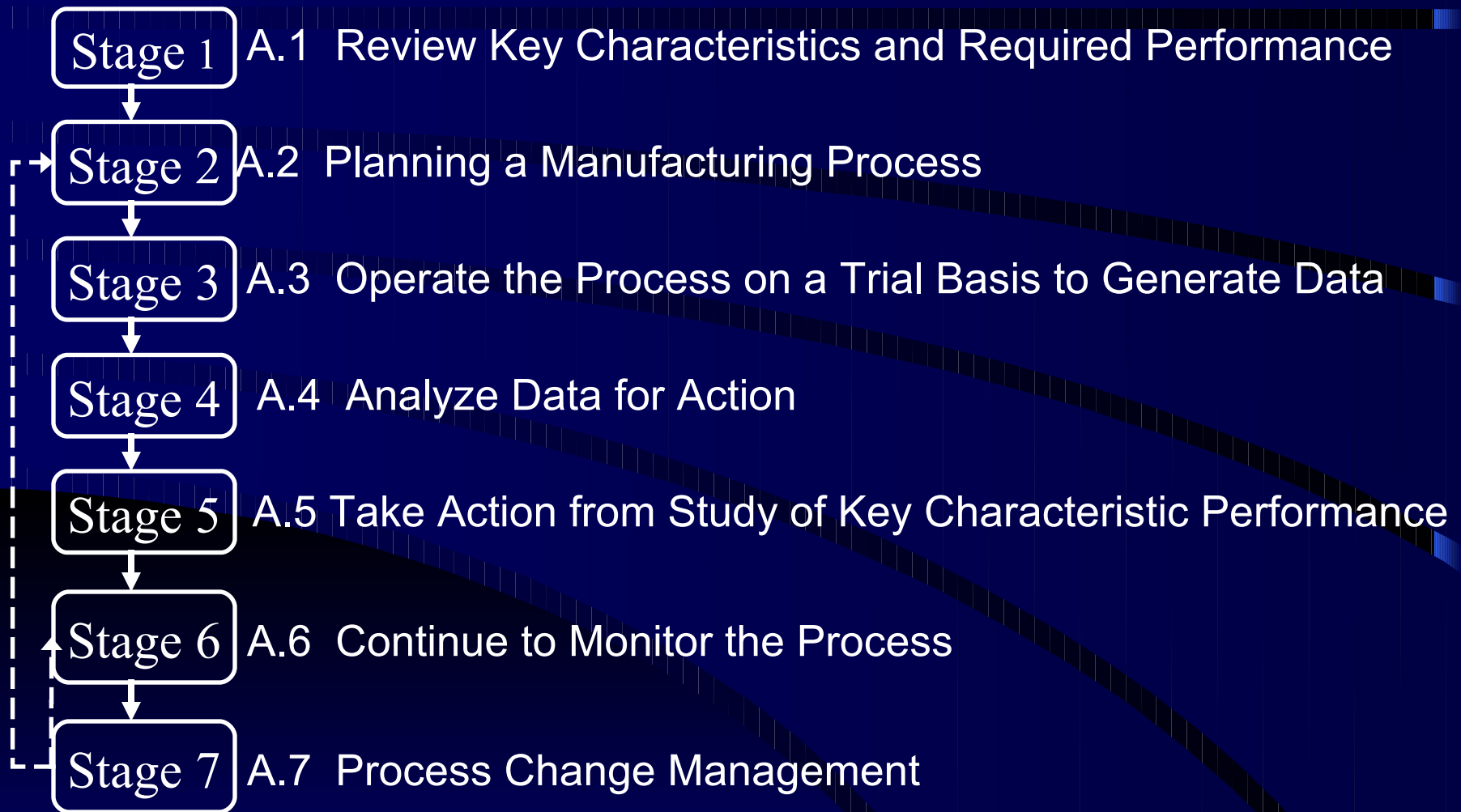
7 Stages to KC Variation Management



Section 6: Process Requirements (*selected*)

- Describes a process that may be used in fulfilling the requirements of this standard.
- Requirements for compliance to this process are included Appendix A.
- Other compliance methods may be used if they can be shown to meet General Requirements of Section 5.

Figure 1: Variation Management of KC's



Section 6: Process Requirements and Outcomes

Each Stage is further broken down into more detailed process requirement steps.

For Example:

Stage 5

A.5 Take Action from Study

Process Requirement Expanded (*Example*)

Stage 5

A.5 Take Action from Study of Key Characteristic Performance

- A.5.1 When a process is not stable, and the special cause is known, corrective action shall be taken to remove permanently or minimize the cause. Effectiveness of corrective action shall be verified.
- A.5.2 When a process is not capable or the special cause continues to be evident, the producer shall investigate gage variation. If a Measurement Systems Analysis (MSA) has already been performed, the producer shall verify the results.
- A.5.3 If a process is stable but not capable, the producer shall investigate centering the process.

Process Requirement Expanded (*Example-cont*)

A.5.4 If a process continues to be stable but not capable, the producer shall take appropriate actions on sources of variation that influence the

A.5.5 process performance.

A.5.6 ...

A.5.7 ...

A.5.8 The Process Control Document shall be finalized as soon as the process is stable and capable.

A.5.9 Stage 5 Outputs:

- Corrective action documentation for out of control points
- Measurement Systems Analysis
- Corrective action documentation for sources of variation
- Product/process protection plan
- Updated PCD or equivalent

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