

AIAG & VDA SPC Manual

What's New? – Webinar Quick Reference Guide

Understanding the Major Changes from the Legacy AIAG SPC Manual



Why Was the SPC Manual Updated?

Modern manufacturing uses powerful statistical software, large datasets, more complex processes and stronger risk-based decision making. The AIAG & VDA SPC Manual updates SPC to better reflect today's manufacturing environment and improve capability evaluation.



The Biggest Change in Thinking

Traditional SPC asks 'Is the process stable and predictable?'

AIAG & VDA SPC asks 'Can we accurately predict the probability of producing nonconforming parts?'

Classical SPC focuses on predictability, while AIAG & VDA emphasizes probability. Both perspectives complement each other.

Major Changes at a Glance

- Use the best-fit distribution instead of assuming Normality.
- Introduce the Control Loop framework.
- Define explicit SPC implementation requirements.
- Clarify capability progression ($P_m/P_{mk} \rightarrow P_p/P_{pk} \rightarrow C_p/C_{pk}$).
- Address time-dependent process behaviour.
- Evaluate chart effectiveness using ARL and OC curves.

Key Change #1 – Distribution Matters

Fit the actual data distribution to improve defect prediction. Incorrect Normal assumptions can significantly underestimate customer risk.

For years, dealing with non-normal data (like geometric tolerances, flatness, or circularity) forced engineers to perform complex, distorted mathematical transformations. The new manual expands the control chart toolkit by adding Pearson Control Charts, allowing you to chart non-normal data directly. It also refines the use of high-sensitivity charts like CUSUM and EWMA for catching microscopic process shifts early

Key Change #2 – Control Loop Framework

Six Control Loops classify SPC activities based on control objectives rather than chart types. Ask 'What am I trying to control?' before selecting a chart.

Loop 1: Statistical Process Control (SPC) for Real-Time Process Monitoring

Loop 2: Quality Conformance Gates for Tolerance-Based Control Chart

Loop 3: Post-Process Improvement Cycle for Continual Improvement Analysis

Loop 4: Product audits

Loop 5: Process Audits

Loop 6: System Audits

Key Change #3 – SPC Becomes a Managed Process

Instead of plotting control charts, SPC is a Managed Process with explicit implementation requirements.

Requirements now include:

- defining process clear specification
- process characterization
- validated measurement systems
- defined and justified sampling plans
- OCAPs
- Clear SPC roles and competency
- software validation

Key Change #4 – Capability Progression

Machine Capability (Pm/Pmk) → Preliminary Process Performance (Pp/Ppk) → Stable Process Capability (Cp/Cpk).

Use Cp/Cpk only after process stability has been demonstrated.

Key Change #5 – Time-Dependent Process Models

Models A–D recognise processes that naturally drift, wear or cycle over time, enabling more appropriate chart selection.

Real-world processes do not always sit perfectly still in a textbook bell curve. The new manual formally adopts four distribution models to categorize how a process behaves over time:

- Model A (Ideal): Constant location (mean) and constant variation (spread).
- Model B: Constant location but changing variation.
- Model C (The Wear Model): Constant variation but a predictably drifting location (e.g., tool wear or chemical depletion).
- Model D (Chaotic): Unpredictable changes in both mean and variation. This requires immediate stop-and-fix action.

Key Change #6 – Better Control Chart Design

Use Average Run Length (ARL), Operating Characteristic (OC) curves, and Type I/II error analysis to evaluate chart effectiveness.

Other Notable Changes

- New Capability indices (Cw and Cwk): to evaluate within-process variation for internal improvement. Continue using Pm/Pmk, Pp/Ppk and Cp/Cpk for customer reporting.
- Additional charts for non-normal and time-dependent models: e.g. CUSUM, EWMA
- Normality test: Verification of normality before starting analysis

Practical Implications

For engineers: Review existing capability studies. Learn the new capability progression. Understand distribution fitting. Apply the correct Control Loop. Validate SPC software. Strengthen OCAPs and documentation.

For auditors: Instead of looking for charts plotted, look for a complete SPC system, from defining process spec to OCAPS, linking to processes and system.

For management: Understand that it is not just a documentation update. Allocate resources for training and software upgrades. Use capability results to support better business and customer risk decisions

Key Takeaways

- The new manual builds on classical SPC.
- Distribution fitting improves capability accuracy.
- Control Loops improve SPC application.
- Capability indices have clearer rules.
- SPC is now a complete process management methodology.

– End –

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