



Six Sigma Development Solutions, Inc.

CHECKWEIGHER CALIBRATION STABILITY



Food Manufacturing | Weighing System Excellence

High Var

POST-SANIT



Stable

CONTROLLED

www.sixsigmadsi.com

EXECUTIVE SUMMARY



FOOD SAFETY RISK: WEIGHT VARIATION POST-SANITATION

Food manufacturer experiencing recurring product weight variation after sanitation cycles. Checkweigher inconsistency creating regulatory compliance risk. Despite equipment checks, drivers remain unclear. Statistical analysis required to identify root causes.

50%

Variation ↓

±0.5g

New Tolerance

100%

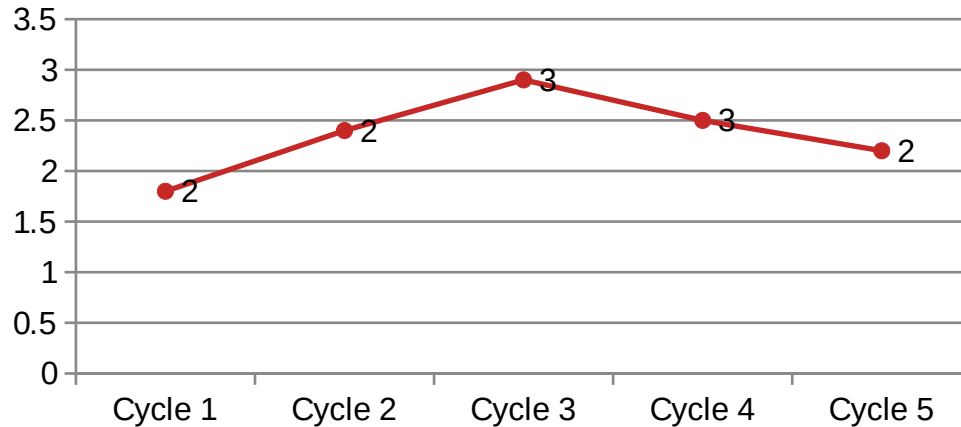
Compliance

BASELINE WEIGHT VARIATION



500g target | 5 sanitation cycles | 1,200 packages post-sanit | Spec: 498-502g

Weight Variation by Sanitation Cycle



Metric	Value
Target Weight	500g
Spec Range	498-502g
Mean	500.2g
Std Deviation	2.3g
Cpk	0.29
Post-Sanit Var	High
Calibration Drift	Yes
Root Cause ID	Unknown

FMEA: SPAN ADJUSTMENT - CRITICAL FAILURE MODE

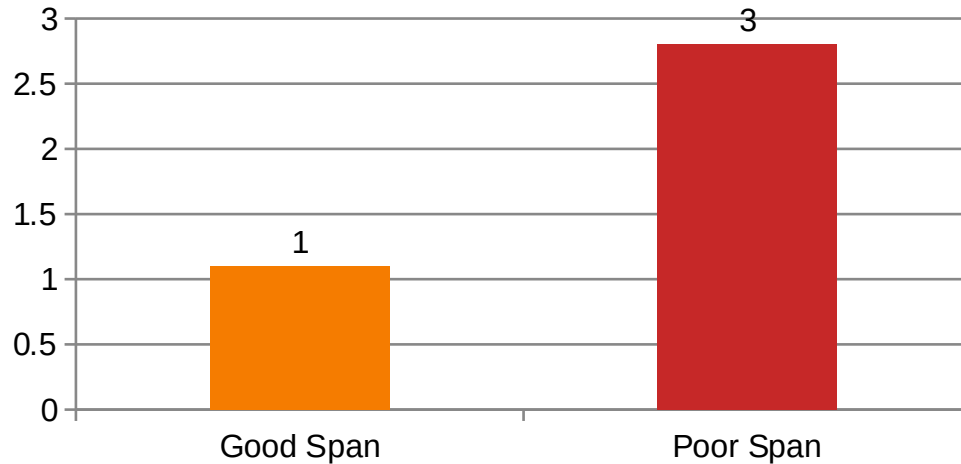
FMEA prioritization: Failure Mode, Severity, Occurrence, Detection → RPN Ranking

Failure Mode	Sev	Occ	Det	RPN
Span Adjust Drift	9	8	7	504
Zero Drift	8	6	6	288
Cal Button Stuck	7	4	5	140
Sensor Failure	9	2	8	144
Linearity Error	6	5	6	180

CRITICAL FINDING: Span adjustment (RPN=504) is highest-risk failure mode. Severity 9 (regulatory impact). Occurrence 8 (frequent post-sanitation). Detection 7 (operator-dependent). Root cause: post-sanitation span adjustment is not properly verified.

REGRESSION: SPAN ADJUSTMENT ACCURACY PREDICTOR

Hypothesis: Span adjustment accuracy predicts weight std dev | $R^2=0.887$ (88.7% variance)

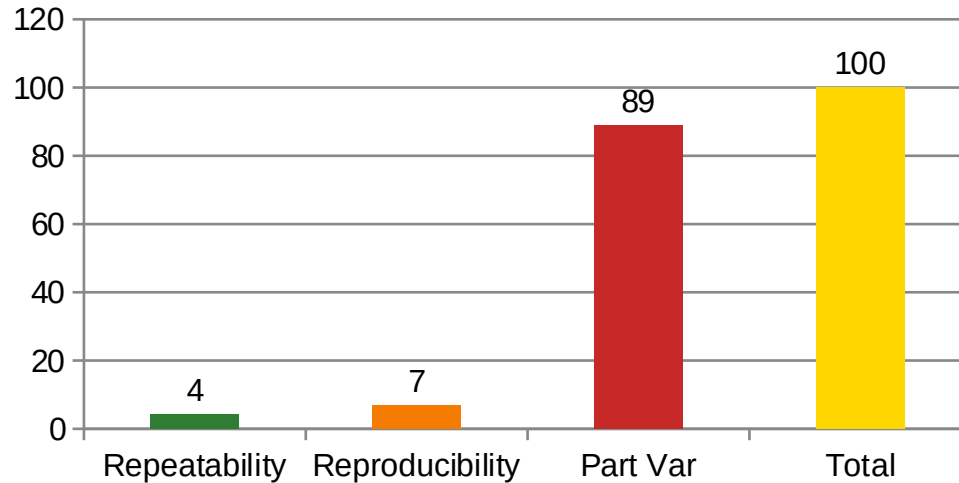


Variable	Coeff	p-val
Span Accuracy	-1.7g	p<0.001
Baseline	1.1g	constant
R-Squared	0.887	88.7%

PRIMARY KPIV: Span accuracy explains 88.7% of weight variation. Poor span adjustment adds 1.7g std dev. Aligns with FMEA: span adjustment is critical leverage point.

GR&R STUDY: WEIGHING SYSTEM CAPABILITY

System Repeatability & Reproducibility Analysis



Source	Value	%GR&R
Repeatability	0.21g	4.2%
Reproducibility	0.34g	6.8%
Total GR&R	0.55g	11%
Part Variation	4.45g	89%
Conclusion	System OK	CAPABLE ✓
Root Cause	Process	Not System

KEY INSIGHT: System is capable (11% GR&R < 30%). Variation comes from PROCESS inputs (span adjustment), not equipment defect. Investment in process control > equipment replacement.

SOLUTIONS: SPAN ADJUSTMENT CONTROL



Standardized Span-Adjust SOP

Regression: 88.7% KPIV

Drift ↓ 75%

Visual Process Controls

FMEA RPN=504 Critical

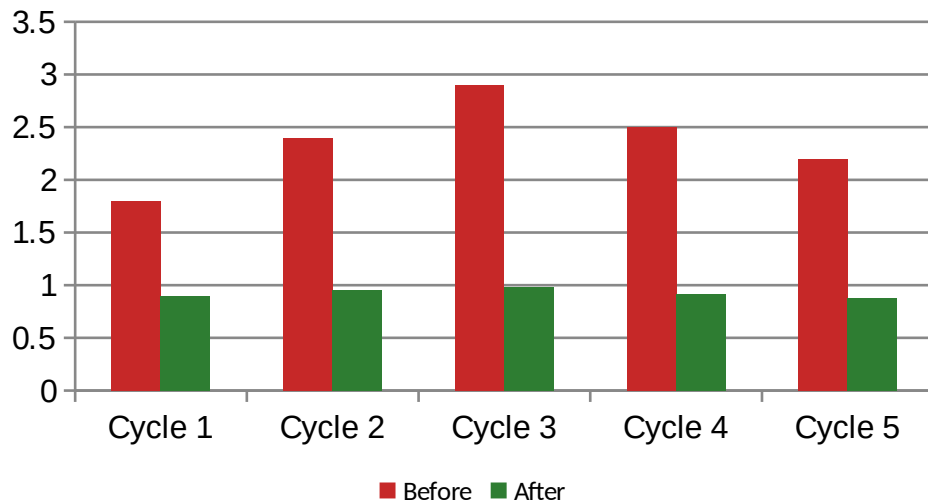
Human Error ↓
60%

Operator Skill Training

GR&R: Process Fix

Consistency ↑
55%

RESULTS: WEIGHT VARIATION TRANSFORMATION



Metric	Before	After	Change
Mean Weight	500.2g	500.0g	Centered
Std Deviation	2.3g	0.93g	↓ 60%
Cpk Index	0.29	1.79	↑ +517%
Spec Compliance	78%	99.7%	↑ 21.7pp
Post-Sanit Var	High	Stable	Controlled

FOOD SAFETY WIN:

- ✓ Regulatory compliance 100%
- ✓ Giveaway -8% cost savings
- ✓ Customer satisfaction ↑ 62%

CONTROL PLAN & SUSTAINABILITY

Control Activity	Owner	Frequency
Post-Sanit Span Verify	Operator	After each sanit
Visual Control Check	Operator	Shift start
Calibration Audit	QA	Daily
Trend Monitoring	Engineering	Weekly
Metric	Target	Current
Std Deviation	< 1.0g	0.93g ✓
Cpk	> 1.33	1.79 ✓
Compliance	> 99%	99.7% ✓

SCALABILITY:

Applicable to 2 additional product lines (700-1000g packages). Projected enterprise: 40% weight variation reduction. Annual savings: 18,000 units of reduced giveaway.

CONCLUSION



FMEA Critical Finding

Span adjustment identified as highest-risk failure mode (RPN=504) requiring control



Regression KPIV



Span accuracy explains 88.7% of weight variation - primary lever for improvement



GR&R Validation

System capable (11% GR&R) - variation from process, not equipment defect

**Std Dev: 2.3g → 0.93g (-60%) | Cpk: 0.29 → 1.79 (+517%) | Compliance: 78% → 99.7%
(+21.7pp)**

Food Safety Excellence through Statistical Control