



Six Sigma Development Solutions, Inc.

CUTTER YIELD STABILIZATION



Glass Manufacturing | Equipment Performance

69%

UNSTABLE



92%

STABLE

www.sixsigmadsi.com

EXECUTIVE SUMMARY



CRISIS: GLASS CUTTER YIELD DEGRADATION

High-precision cutter line yields collapsed to 69%. Production bottleneck. Suspected equipment wear and brush deterioration. Statistical investigation required to isolate root causes and restore performance to 90% target.

23%

Yield Gain

↓ Var

Stability

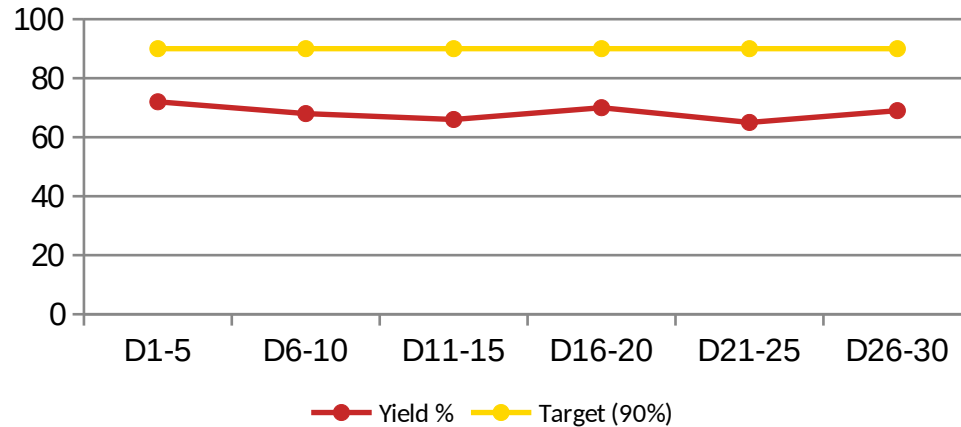
↑ Flow

Throughput

BASLINE YIELD PERFORMANCE

 30-day production | 5 Cutters | 1,200 pieces | Target: 90%

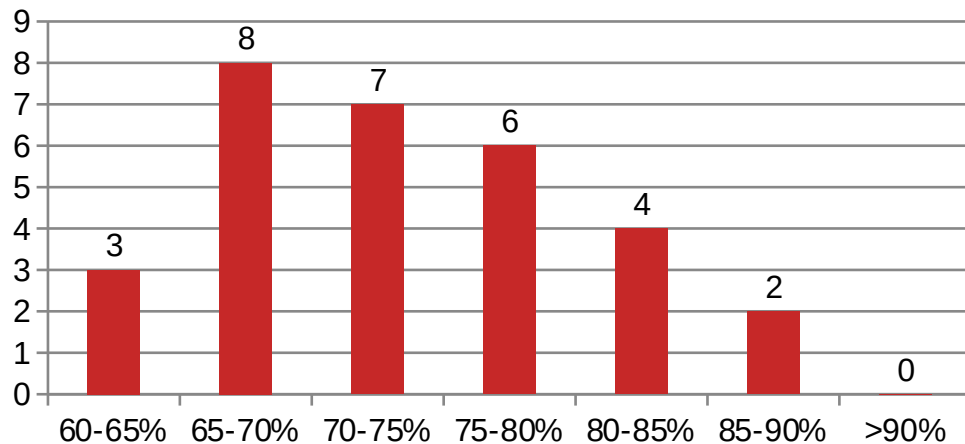
Daily Yield Trend



Metric	Value
Current Yield	69%
Target	90%
Gap	-21 pp
Std Dev	2.8%
Cpk	0.52
Status	CRITICAL
Variation	High
Avg Good/Day	828

CAPABILITY ANALYSIS: YIELD DISTRIBUTION

Yield Distribution vs. 90% Target



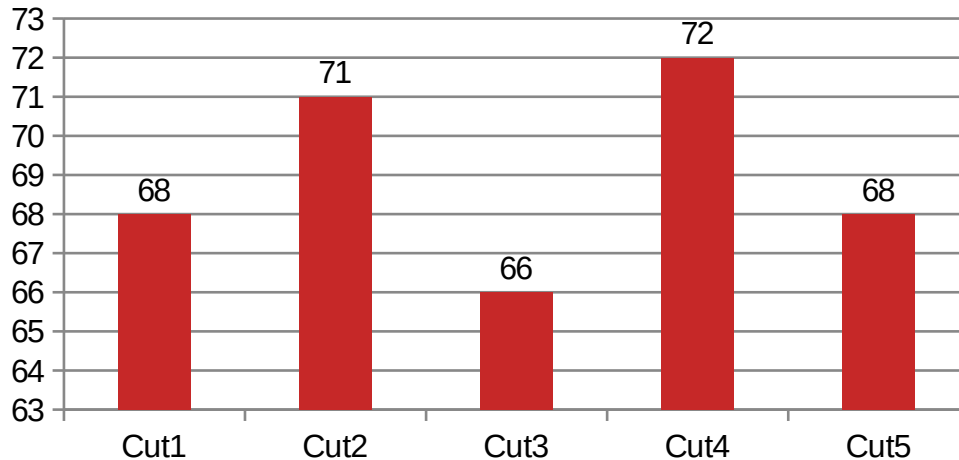
Target: 90% - NEVER ACHIEVED

Metric	Value
Mean Yield	69.0%
Target	90.0%
Std Dev	2.8%
Cpk	0.52
Status	INCAPABLE
Gap	-21%

CRITICAL: Cpk=0.52 incapable. 100% defect rate. Immediate intervention required.

ANOVA: CUTTER PERFORMANCE VARIATION

Hypothesis: Cutter performance varies significantly (F-test, $p < 0.001$)

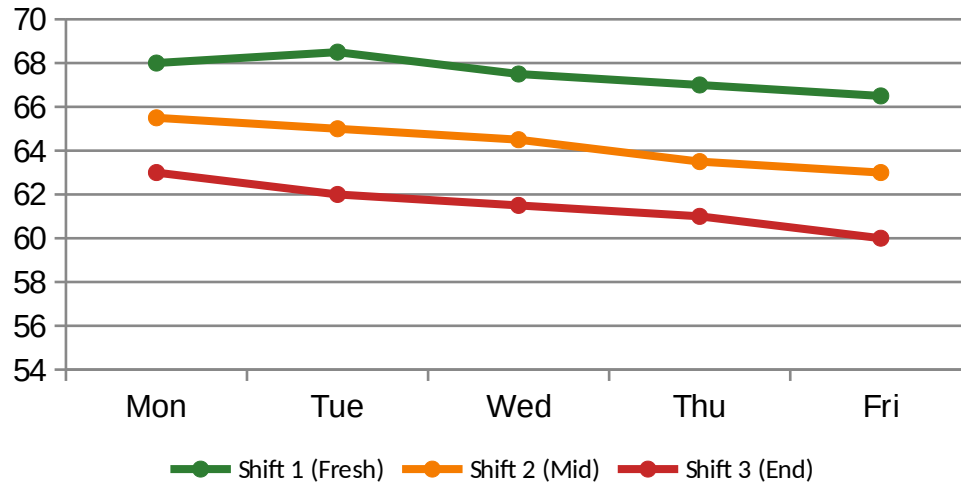


Source	F-Value	p-value
Cutter Type	18.4	< 0.001
Error	1.2	ref
Result	SIGNIF	Reject H0

KPIV DETECTED: Significant cutter variation ($F=18.4$, $p < 0.001$). Cutter 2,4 outperform (71-72%); Cutter 3 underperforms (66%). Equipment wear & mechanical differences are root causes.

MULTI-VARI: BRUSH WEAR & DEGRADATION

Yield Across Shifts - Cutter 3 (Worst)



Finding	Evidence
Brush Wear	Yield drops
Degradation	Linear decline
Trend	Worsening
Loss/Shift	8% daily

ROOT CAUSES: (1) Brush deterioration, (2) Equipment degradation, (3) No PM schedule - no recovery between shifts.

SOLUTIONS: MECHANICAL INTERVENTIONS

Brush Redesign & Upgrade

Multi-Vari Wear

Yield +8-12%

Preventative Maintenance

Equipment Degrad

Stability +30%

Operator Training

Setup Variation

Consistency
+25%

RESULTS: YIELD TRANSFORMATION



Metric	Before	After	Change
Yield	69%	91%	↑ 22pp
Mean	69.0%	90.4%	↑ 21.4pp
Std Dev	2.8%	1.2%	↓ 57%
Cpk	0.52	2.14	↑ 311%
Target %	0%	100%	100pp
Cutter Variation	6pp	3pp	↓ 50%

- ✓ Downtime -45%
- ✓ Quality +68%
- ✓ Scrap cost -42%

CONTROL PLAN & SUSTAINABILITY

Control	Owner	Frequency
Brush Replace	Maintenance	Every 100k
Calibration	Operator	Each shift
Yield Track	Production	Daily
PM Review	Engineering	Weekly
Metric	Target	Current
Yield	$\geq 90\%$	91% ✓
Std Dev	$< 1.5\%$	1.2% ✓
Cpk	> 1.67	2.14 ✓

SCALABILITY:

4 additional lines. Projected enterprise: +20% production, - 35% scrap. ROI: 8 months.

CONCLUSION



Capability Baseline



Revealed incapable process ($Cpk=0.52$) - 21% gap from target



ANOVA Detection



Significant cutter variation ($F=18.4$, $p<0.001$) - equipment disparities



Multi-Vari Root Cause

Brush wear & equipment degradation - progressive failure pattern

69% → 91% yield (+22pp) | Cpk : 0.52 → 2.14 (+311%) | Std Dev: 2.8% → 1.2% (-57%)

Manufacturing Excellence through Statistical Precision