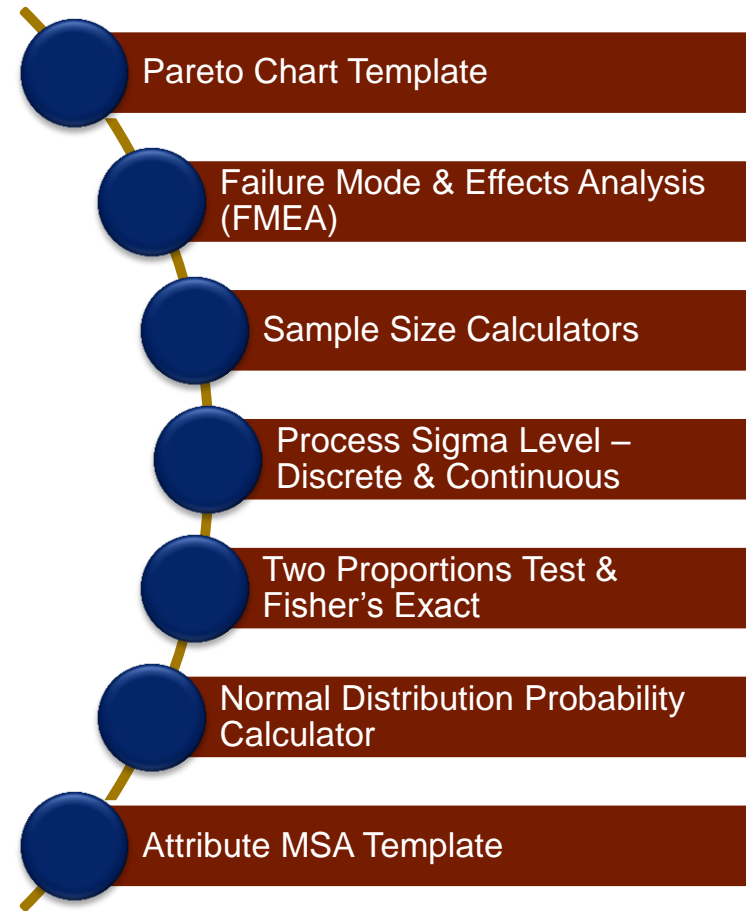
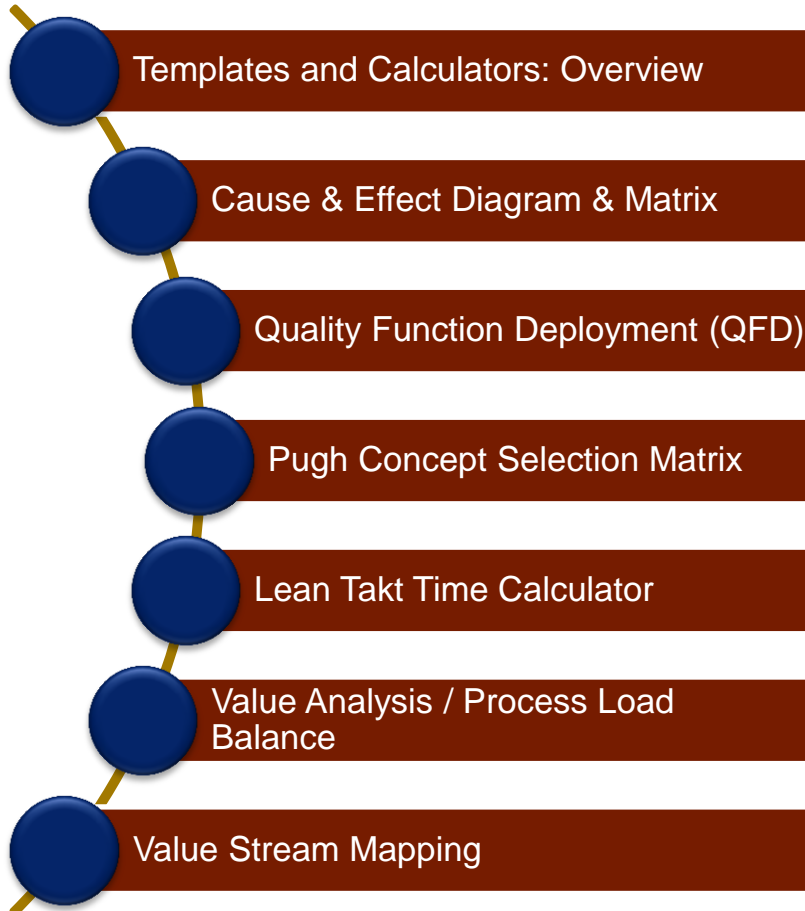


Templates & Calculators- SigmaXL[®] Version 6.1



Templates & Calculators

- **DMAIC & DFSS Templates:**
 - Team/Project Charter
 - SIPOC Diagram
 - Flowchart Toolbar
 - Data Measurement Plan
 - Cause & Effect (Fishbone) Diagram and Quick Template
 - Cause & Effect (XY) Matrix
 - Failure Mode & Effects Analysis (FMEA)
 - Quality Function Deployment (QFD)
 - Pugh Concept Selection Matrix
 - Control Plan

Templates & Calculators

- **Lean Templates:**
 - Takt Time Calculator
 - Value Analysis/Process Load Balance
 - Value Stream Mapping
- **Basic Graphical Templates:**
 - Pareto Chart
 - Histogram
 - Run Chart

Templates & Calculators

- **Basic Statistical Templates:**
 - Sample Size – Discrete and Continuous
 - 1 Sample t Confidence Interval for Mean
 - 2 Sample t-Test (Assume Equal and Unequal Variances)
 - 1 Sample Confidence Interval for Standard Deviation
 - 2 Sample F-Test (Compare 2 StDevs)
 - 1 Proportion Confidence Interval (Normal and Exact)
 - 2 Proportions Test & Fisher's Exact
- **Probability Distribution Calculators:**
 - Normal, Lognormal, Exponential, Weibull
 - Binomial, Poisson, Hypergeometric



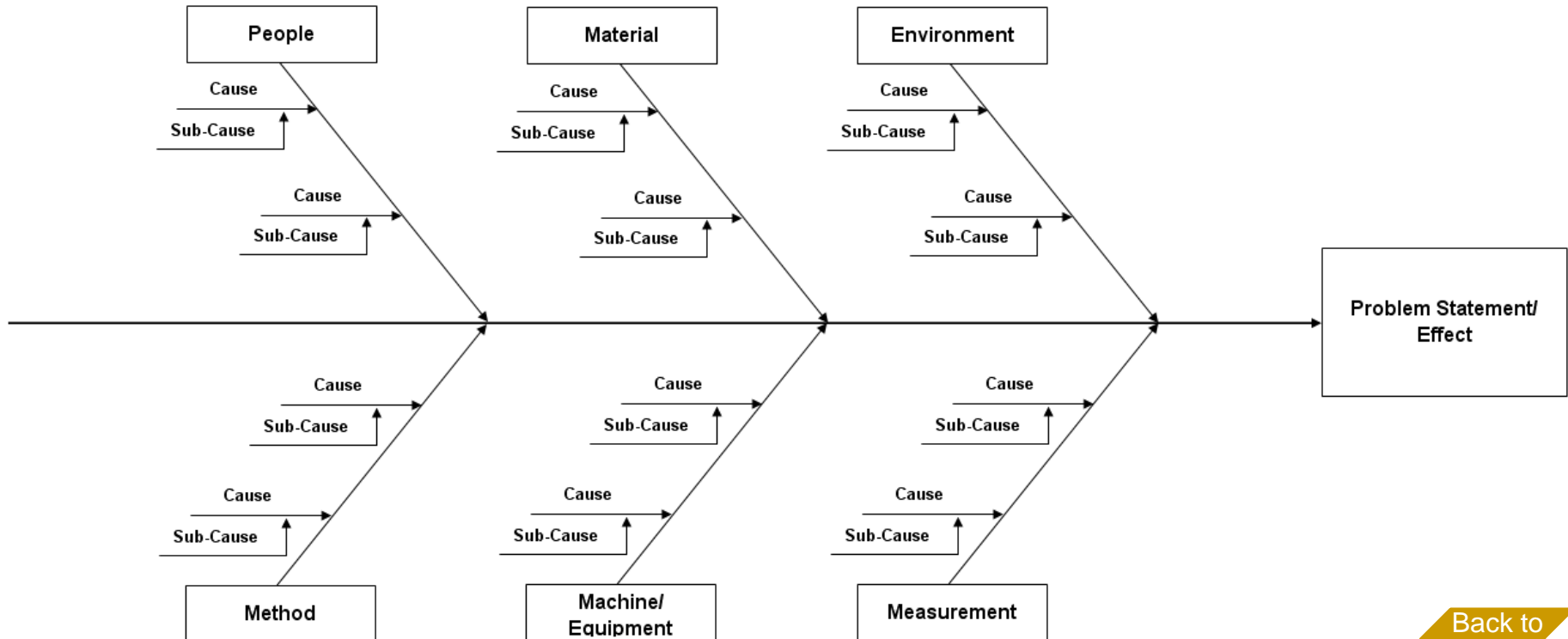
Templates & Calculators

- **Basic MSA Templates:**
 - Gage R&R Study – with Multi-Vari Analysis
 - Attribute Gage R&R (Attribute Agreement Analysis)
- **Basic Process Capability Templates:**
 - Process Sigma Level – Discrete and Continuous
 - Process Capability & Confidence Intervals
- **Basic DOE Templates:**
 - 2 to 5 Factors
 - 2-Level Full and Fractional-Factorial designs
 - Main Effects & Interaction Plots
- **Basic Control Chart Templates:**
 - Individuals
 - C-Chart

Templates & Calculators: Cause & Effect Diagram

CAUSE & EFFECT (FISHBONE) DIAGRAM

Process/Project Name:	<input type="text"/>
Date:	<input type="text"/>
Prepared By:	<input type="text"/>
Notes:	<input type="text"/>





Templates & Calculators: Cause & Effect (XY) Matrix

CAUSE & EFFECT (XY) MATRIX

Process/Project Name:	Call Center Example
Date:	
Performed By:	
Notes:	

Output Variables (Y's):	Call Abandon Rate	Customer Satisfaction	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Importance Score (1-10):	8	10								

Pareto Chart

Input/Process Variables (X's)	Table of Association Scores (X's to Y's)										Weighted Score
Answer Speed	9	9									162
Employee Experience	1	3									38
First Time Resolution	0	9									90
Y1											0



Templates & Calculators: Quality Function Deployment (QFD)

		Desired Direction of Improvement:																
		↑	○	↑	↑													
		Functional Requirements (How):										Satisfaction Ratings:						
Customer Requirements (What):		Customer Importance Rating	Functional Requirement 1	Functional Requirement 2	Functional Requirement 3	Functional Requirement 4	Functional Requirement 5	Functional Requirement 6	Functional Requirement 7	Functional Requirement 8	Functional Requirement 9	Functional Requirement 10	Our Customer Satisfaction (CS) Rating	Competitor 1 Rating	Competitor 2 Rating	Competitor 3 Rating	Competitor 4 Rating	CS - Max(Competitor Rating)
	Customer Requirement 1	4	9	3		9							3	2				1
	Customer Requirement 2	5	9	9	9	9							4	4				0
	Customer Requirement 3	2	3	3	1	9							4	3				1
	Customer Requirement 4	3	9	1	1	9							1	3				-2
	Customer Requirement 5																	0
	Customer Requirement 6																	0
	Customer Requirement 7																	0
	Customer Requirement 8																	0
	Customer Requirement 9																	0
	Customer Requirement 10																	0
Raw Score:		114	66	50	126	0	0	0	0	0	0	0						
Rank:		2	3	4	1	5	5	5	5	5	5	5						

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Templates & Calculators: Pugh Concept Selection Matrix

Key Criteria	Weight	Concept A	Concept B	Concept C	Concept D	Concept E	Concept F	Concept G	Concept H	Concept I	Concept J	Current Baseline Datum
Criterion 1	4	+	S	-								S
Criterion 2	5	+	S	S								S
Criterion 3	3	S	+	-								S
Criterion 4	2	+	S	S								S
Criterion 5	5	+	+	S								S
Criterion 6												S
Criterion 7												S
Criterion 8												S
Criterion 9												S
Criterion 10												S
Criterion 11												S
Criterion 12												S
Criterion 13												S
Criterion 14												S
Criterion 15												S
Criterion 16												S
Criterion 17												S
Criterion 18												S
Criterion 19												S
Criterion 20												S

Sum of Positives (+):	4	2	0	0	0	0	0	0	0	0	0
Sum of Negatives(-):	0	0	2	0	0	0	0	0	0	0	0
Sum of Sames (S):	1	3	3	0	0	0	0	0	0	0	0
Positives - Negatives:	4	2	-2	0	0	0	0	0	0	0	0

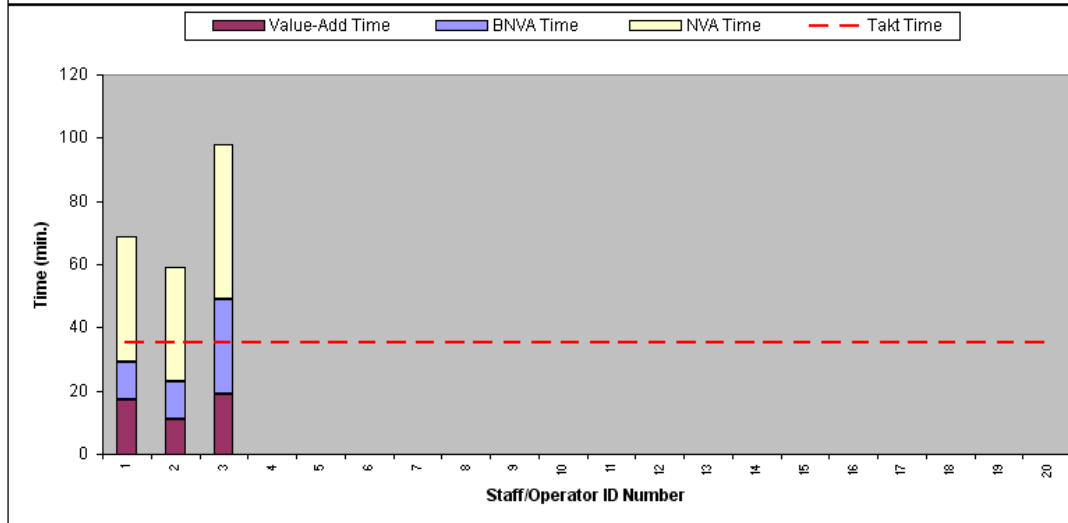
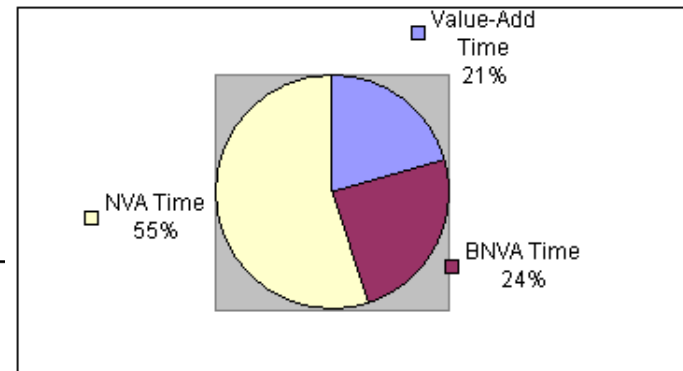
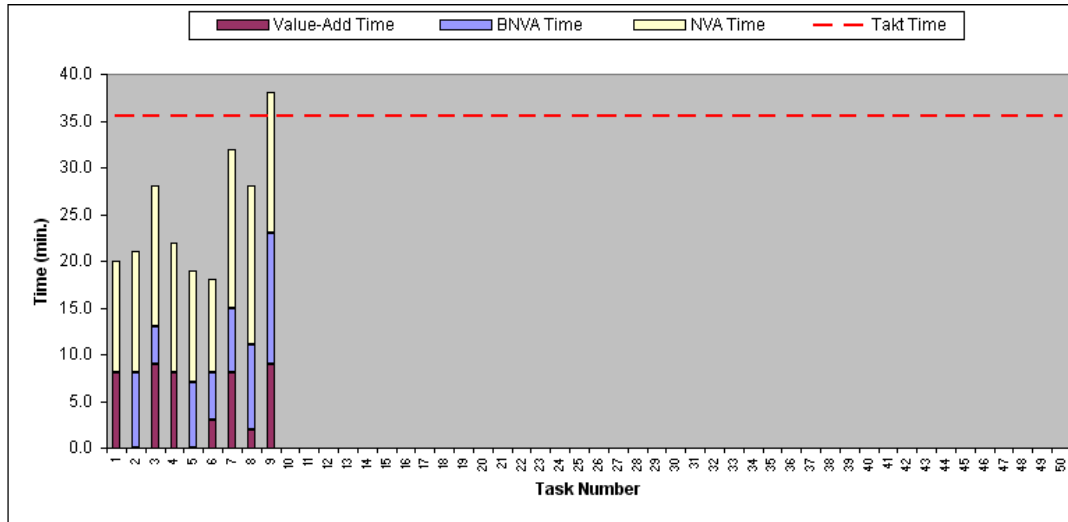
Weighted Sum of Positives (+):	16	8	0	0	0	0	0	0	0	0	0
Weighted Sum of Negatives (-):	0	0	7	0	0	0	0	0	0	0	0
Weighted Sum of Sames (S):	3	11	12	0	0	0	0	0	0	0	0
Weighted Positives - Weighted Negatives:	16	8	-7	0	0	0	0	0	0	0	0

Templates & Calculators: Lean Takt Time Calculator

SigmaXL Lean Templates: Takt Time Calculator

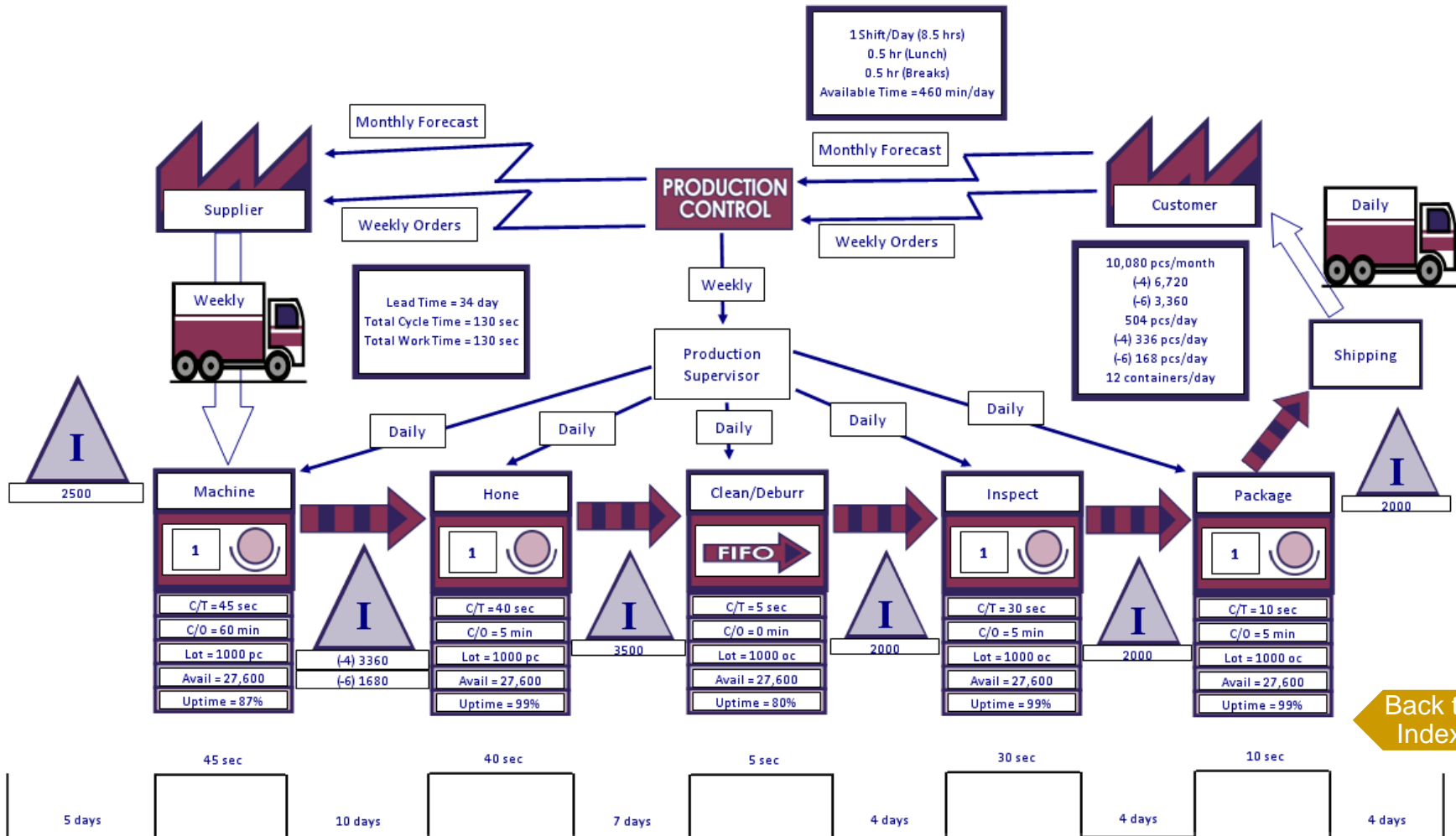
Daily Customer Demand:	units per day	<input type="text" value="22"/>
Scheduled Work:	hours per shift	<input type="text" value="8"/>
Shifts per Day:		<input type="text" value="2"/>
Lunch:	minutes per shift	<input type="text" value="30"/>
Breaks:	minutes per shift	<input type="text" value="30"/>
Planned Downtime:	minutes per shift	<input type="text" value="30"/>
Staff/Operator Cycle Time:	minutes per unit	<input type="text" value="226"/>
Available Time:	minutes per day	<input type="text" value="780.0"/>
Takt Time:	minutes per unit	<input type="text" value="35.5"/>
Required Number of Staff/Operators:		<input type="text" value="6.4"/>

Templates & Calculators: Value Analysis/ Process Load Balance Chart



Templates & Calculators: Value Stream Mapping

Example Present State Value Stream Map



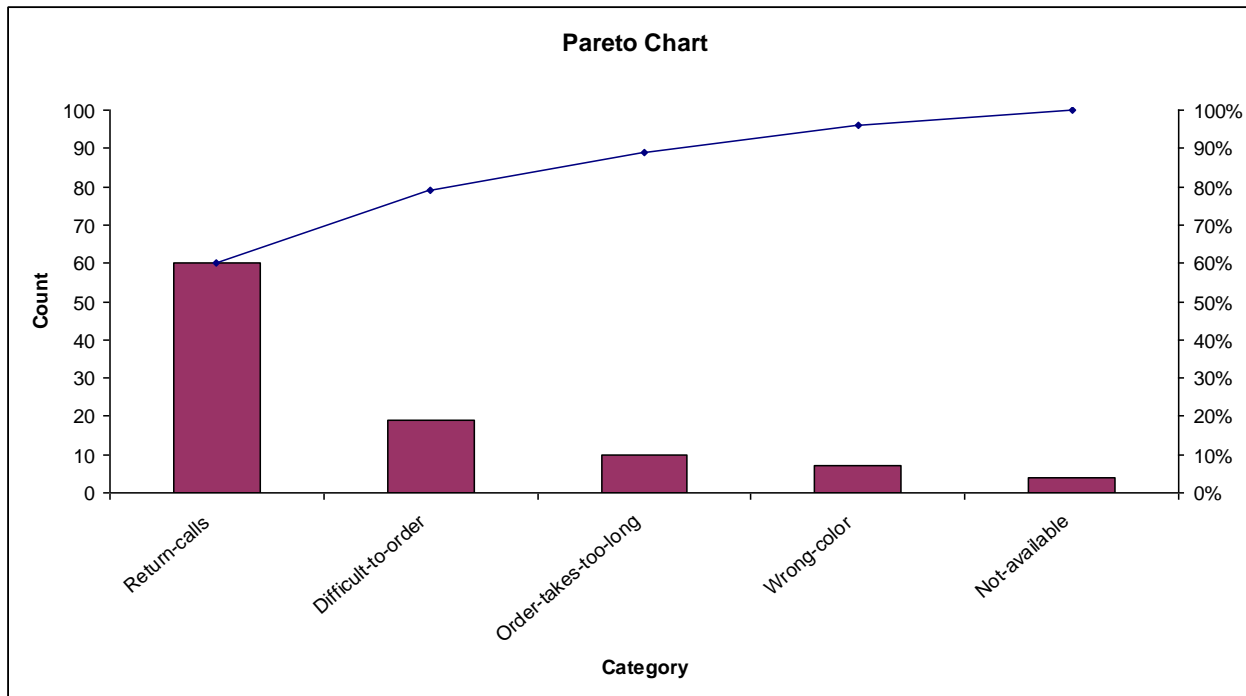
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Templates & Calculators: Pareto Chart Quick Template

A	B	C	D	E
Category	Count			
Difficult-to-order	19			
Not-available	4			
Order-takes-too-long	10			
Return-calls	60			
Wrong-color	7			




Pareto Chart





Templates & Calculators: Failure Mode & Effects Analysis (FMEA)

Potential Failure Mode & Effects Analysis

	Process/Product: _____
	FMEA Team: _____
	Responsibility: _____
	Prepared By: _____


Row Number	Process								
	Process Steps or Product Functions	Potential Failure Mode	Potential Effects of Failure	Severity (1-10)	Potential Cause(s) of Failure	Occurrence (1-10)	Current Controls	Detection (1-10)	Risk Priority Number (RPN)
Sort									Sort
1	Stock Inventory	Stock in wrong location	Unable to locate stock	5	Correc location is full	7	Stock checked twice a year	9	315
2									
3									
4									
5									
6									
7									
8									
9									
10									

Score	Severity Guidelines	
	AIAG	Six Sigma
10	Hazardous without warning	Injure a customer or employee
9	Hazardous with warning	Be illegal
8	Very High	Render product or service unfit for use
7	High	Cause extreme customer dissatisfaction
6	Moderate	Result in partial malfunction
5	Low	Cause a loss of performance which is likely to result in a complaint
4	Very Low	Cause minor performance loss
3	Minor	Cause a minor nuisance but can be overcome with no performance loss
2	Very Minor	Be unnoticed and have only minor effect on performance
1	None	Be unnoticed and not affect the performance




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Templates & Calculators: Sample Size Calculators


 Sample Size Calculator - Discrete Data		
Sample Data (user inputs):		
Estimate of Proportion	P	0.5
Desired margin of error	delta / half-interval	0.03
Population Size (optional)	N	
Confidence level (enter .95 for 95%)	100*(1-α)%	95.0%
Results:		
Minimum Sample Size	n	1068
	n (adjusted for small N)	
	np check (should be ≥ 5)	534

Templates & Calculators: Sample Size Calculators


 Sample Size Calculator - Continuous Data		
Sample Data (user inputs):		
Estimate of Standard Deviation	S	1
Desired margin of error	delta / half-interval	0.25
Population Size (optional)	N	
Confidence level (enter .95 for 95%)	100*(1-α)%	95.0%
Results:		
Minimum Sample Size	n	62
	n (adjusted for small N)	




Templates & Calculators: Process Sigma Level – Discrete

 Process Sigma Level Calculator - Discrete Data			
Sample Data (user inputs):			
Number of units	n		500
Total number of defects observed	d		5
Number of defect opportunities per unit	o		1
Sigma Shift (typically +1.5 for long term data)			1.5
Results:			
Defects per Unit	dpu		0.01
Defects per Million Opportunities	dpmo		10,000.0
Defects per Opportunity	dpo%		1.00%
Yield	yield%		99.00%
Process Sigma Level	sigma		3.826

Templates & Calculators: Process Sigma Level – Continuous


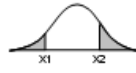




 Process Sigma Level Calculator - Continuous Data (Assumes that data are normally distributed)		
Sample Data (user inputs):		
Mean	x-bar	0
Standard Deviation	s	1
Upper Specification Limit	USL	3
Lower Specification Limit	LSL	-3
Sigma Shift (typically +1.5 for long term data)		1.5
Results:		
Expected dpm > USL		1349.9
Expected % > USL		0.13%
Expected dpm < LSL		1349.9
Expected % < LSL		0.13%
Expected dpm (overall)		2699.8
Expected yield (overall) %		99.73%
Process Sigma Level		4.282

Templates & Calculators: Two-Proportions Test & Fisher's Exact

 Hypothesis Test for the Equality of Two Proportions		
Sample Data (user inputs)		
Number of elements in sample #1 in category of interest:	x_1	70
Size of Sample #1:	n_1	100
Number of elements in sample #2 in category of interest:	x_2	80
Size of Sample #2:	n_2	100
Hypothesis Test Results:		
Proportion (sample #1)	$P_1 = x_1/n_1$	0.7000
Proportion (sample #2)	$P_2 = x_2/n_2$	0.8000
	Z_0 Statistic	1.633
Normal approximation p-value (2-sided, $H_a: P_1 \neq P_2$)		0.102
Normal approximation p-value (1-sided, $H_a: P_1 < P_2$)		0.051
Normal approximation p-value (1-sided, $H_a: P_1 > P_2$)		0.949
Fisher's exact p-value (2-sided, $H_a: P_1 \neq P_2$)		0.141
Fisher's exact p-value (1-sided, $H_a: P_1 < P_2$)		0.071
Fisher's exact p-value (1-sided, $H_a: P_1 > P_2$)		0.964

Templates & Calculators: Normal Distribution Probability Calculator

Normal Distribution Probability Calculator			
Input the following information:			
Mean	μ		0
Standard Deviation	σ		1
Lower Bound (or LSL)	X1		1
Upper Bound (or USL)	X2		2

Select the Probability of Interest from the following probabilities:				
Areas:				
between X1 and X2		<table border="1"> <tr> <td>Prob(1 ≤ X ≤ 2)</td> <td>0.135905122</td> </tr> </table>	Prob(1 ≤ X ≤ 2)	0.135905122
Prob(1 ≤ X ≤ 2)	0.135905122			
outside X1 and X2		<table border="1"> <tr> <td>Prob(X ≤ 1 AND X ≥ 2)</td> <td>0.864094878</td> </tr> </table>	Prob(X ≤ 1 AND X ≥ 2)	0.864094878
Prob(X ≤ 1 AND X ≥ 2)	0.864094878			
below X1		<table border="1"> <tr> <td>Prob(X ≤ 1)</td> <td>0.841344746</td> </tr> </table>	Prob(X ≤ 1)	0.841344746
Prob(X ≤ 1)	0.841344746			
above X1		<table border="1"> <tr> <td>Prob(X ≥ 1)</td> <td>0.158655254</td> </tr> </table>	Prob(X ≥ 1)	0.158655254
Prob(X ≥ 1)	0.158655254			
below X2		<table border="1"> <tr> <td>Prob(X ≤ 2)</td> <td>0.977249868</td> </tr> </table>	Prob(X ≤ 2)	0.977249868
Prob(X ≤ 2)	0.977249868			
above X2		<table border="1"> <tr> <td>Prob(X ≥ 2)</td> <td>0.022750132</td> </tr> </table>	Prob(X ≥ 2)	0.022750132
Prob(X ≥ 2)	0.022750132			



Templates and Calculators: Attribute MSA Template

Product/Unit Name:	Example Attribute MSA
Date of Study:	
Performed By:	
Notes:	

Good Part or Unit: **G**
 Bad Part or Unit: **NG**

Part	True Standard
1	G
2	G
3	NG
4	G
5	NG

Appraiser A		Appraiser B		Appraiser C	
Trial # 1	Trial # 2	Trial # 1	Trial # 2	Trial # 1	Trial # 2
G	G	NG	G	G	G
NG	G	G	G	G	G
NG	NG	NG	NG	NG	NG
G	G	G	NG	G	G
NG	NG	NG	NG	NG	NG

Create Stacked Column format to Analyze with "Attribute MSA (Binary)" >>

Attribute MSA Analysis:

Within Appraiser Agreement:	# Inspected	# Matched	Percent	95% LC	95% UC	Cohen's Kappa
A	20	17	85.00%	62.11%	96.79%	0.8929
B	20	12	60.00%	36.09%	86.06%	0.2381
C	20	19	95.00%	75.13%	99.87%	0.9000

Type I - False Reject (Appraiser Rejected Good Part)

Type II - False Accept (Appraiser Accepted Bad Part)

Mixed - Assessments across trials are not identical

Each Appraiser vs. Standard Agreement:	# Inspected	# Matched	Percent	95% LC	95% UC	Type I Errors	Type I Error %	Type II Errors	Type II Error %	Mixed Error	Mixed Error %	Cohen's Kappa
A	20	17	85.00%	62.11%	96.79%	0	0.00%	0	0.00%	3	15.00%	0.8900
B	20	12	60.00%	36.09%	86.06%	0	0.00%	0	0.00%	8	40.00%	0.6000
C	20	19	95.00%	75.13%	99.87%	0	0.00%	0	0.00%	1	5.00%	0.9500

Between Appraiser Agreement:	# Inspected	# Matched	Percent	95% LC	95% UC
	20	10	50.00%	27.20%	72.80%

All Appraisers vs. Standard Agreement:	# Inspected	# Matched	Percent	95% LC	95% UC	Cohen's Kappa
	20	10	50.00%	27.20%	72.80%	0.8000