Report Example: Type 1 Gage Study

Description of Output

Date: 12/31/2017
Gage: My Gage
Characteristic: Diameter
Operator: Fred
Analyzed by: Bill

USL: 12.335
LSL: 12.285
P = % Tolerance for Cg: 20
k = Standard Deviation Multiplier: 6
Measurement Increment: 0.0001
Reference Value: 12.306

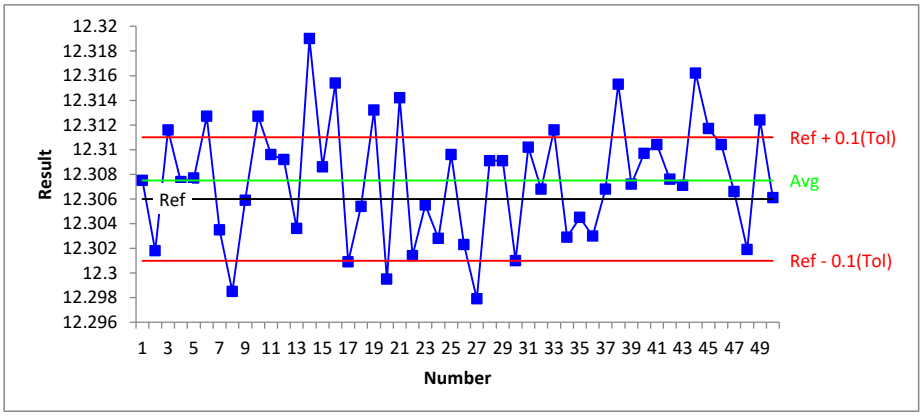
Print out of information entered by the user

Statistics

Average:	12.31
Standard Deviation (s):	0.00485
Study Variation (SV = ks):	0.0291
Tolerance:	0.05
MI as % of Tolerance:	0.20% (Should be less than 5%)

The average and standard deviation are calculated. The study variation is k (default is 6) times the standard deviation. MI as a % of tolerance is given.

Run Chart: Measurement Variation vs. Tolerance Range



This a run chart of the results over time with the tolerance "range" , reference and average plotted. The tolerance lines are based on 0.5*(% tolerance for Cg).

The software counts the number of points beyond the tolerance "range". The more points beyond this range, the more likely the measurement system can't produce results with that range.

This chart shows the variation in measurement results.
The average and reference lines are plotted.
The tolerance lines are based on 0.5(% tolerance for Cg)
There are 16 points outside the tolerance band.
The measurement system is not capable of producing results within the tolerance band.

Bias: Is the Difference Between the Average and Reference Values Significant?

Bias:	0.00150
t Statistic:	2.185
p Value:	0.03

Since p ≤ 0.05, the bias is statistically significant.

The calculated bias is the average minus the reference value. The t statistic is calculated and the value of p determined. p is the key variable here. If p <=0.05, then the bias is statistically significant. If it is greater than 0.05, the bias may not be statistically significant.

Capability Assessment

Cg is the ratio of the tolerance band chosen(P) to the study variation.
Larger values of Cg are desired.
If Cg = 1.33, about 75% of the study variation fits into the tolerance band (P).
Cg=(P*Tolerance/100)/SV
% Var (Repeatability) is the ratio of the study variation to the tolerance.
15% or less is usually desired.
%Var (Repeatability) =100*SV/TOL

Cg	% Var (Repeatability)
0.343	58.25%

Since Cg < 1.33, the measurement system capability is not acceptable.
Since the variation > 15%, the measurement variation is too large.

This portion is the capability analysis. The terms are explained to the left.

Cgk adds bias into the Cg calculation.
Cgk=(((P/200)*Tolerance)-|Bias|)/(SV/2)
%Var (Repeatability + Bias) = [(P*SV/2)/((P*Tolerance/200)-|Bias|)]

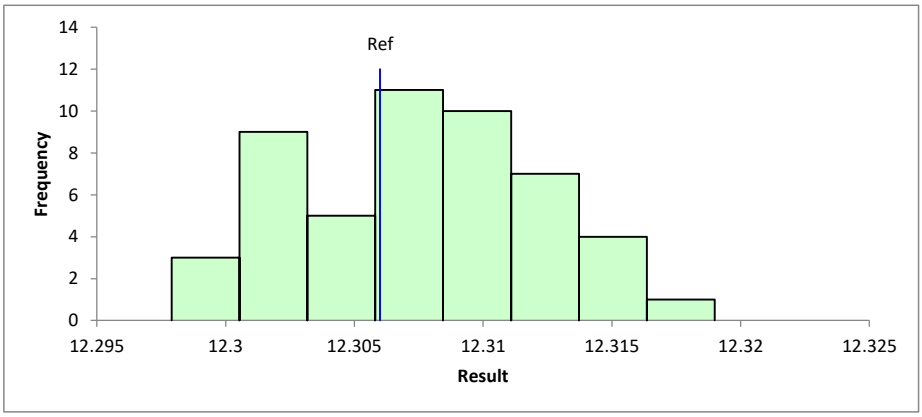
Cgk	%Var (Repeatability + Bias)
0.240	83.22%

Since Cgk < 1.33, the measurement system capability is not acceptable.

Since the variation > 15%, the measurement variation is too large.

Histogram of Measurement Results

The histogram of measurement results should be approximately normally distributed.



This is a histogram of the measurement results. It should be fairly normal.

Data

Optional Data Table

Sample Number	Result	Comments
1	12.3075	
2	12.3018	
3	12.3116	
4	12.3074	
5	12.3077	
6	12.3127	
7	12.3035	
8	12.2985	
9	12.3059	
10	12.3127	
11	12.3096	
12	12.3092	
13	12.3036	
14	12.319	
15	12.3086	
16	12.3154	
17	12.3009	
18	12.3054	
19	12.3132	
20	12.2995	
21	12.3142	
22	12.3014	
23	12.3055	
24	12.3028	
25	12.3096	
26	12.3023	
27	12.2979	
28	12.3091	
29	12.3091	
30	12.301	
31	12.3102	
32	12.3068	
33	12.3116	
34	12.3029	
35	12.3045	
36	12.303	
37	12.3068	
38	12.3153	
39	12.3072	
40	12.3097	
41	12.3104	
42	12.3076	
43	12.3071	
44	12.3162	
45	12.3117	
46	12.3104	
47	12.3066	
48	12.3019	

49	12.3124
50	12.3061