Case: Bottle Cap
Grading Rubric Rev 2_17

For each of the case report sections, the point value is shown. The expected characteristics of the response are then listed. Deductions will be made for any of the characteristics not met.

A. Understanding the Case.

A.1. Create a flow chart and paste it here.

5- Response is characterized by the following

- Includes all pertinent operator interactions with the machine.
- Includes the basic operations within a cycle.
- Correctly utilizes flowchart symbols and contains at least one decision point.
- Accurately depicts the process flow with all arrows following logical paths
- Is detailed enough to use as a tool for reference when analyzing the process for sources of variation.

B. Control Charts - Overall

B.1. Explain why you would want to monitor the process with control charts and how you will analyze charts once they are run. What conditions will you be looking for and what can you conclude from analyzing charts? (This is general discussion. Do not include your evaluation of the charts here.)

5- Response is characterized by the following

- Includes an objective to running the charts relative to the case.
- Accurately describes how to analyze the chart and conditions to look for.
- Describes the conclusions that can be made upon review of the chart.
- Extraneous/irrelevant information not included in response.

B.2. Paste the overall control chart here.

B.3. Analyze the overall control chart, describing your findings and conclusions.

5- Response is characterized by the following

- Control chart was run correctly. Title of chart is appropriate.
- Explanation of conclusions includes all pertinent aspects of review of the chart.
- Conclusions are appropriate for the chart
- Appropriate next steps are identified.
- Extraneous/irrelevant information not included in response.

B.3. Explain the purpose of a capability analysis. Include assumptions required for use and explanations of Cp, Cpl, Cpu, and Cpk.

5- Response is characterized by the following

- Includes an objective to running the analysis relative to the case.
- Assumptions required to perform the analysis are correct.
- Explanations of Cp, Cpl, Cpu, and Cpk are technically correct
- The practical implications of the indices are explained.
- Extraneous/irrelevant information not included in response.

B.4. Paste the overall capability analysis here.

B.5. Based on the results of the overall capability analysis, what is the capability of the current process to hold the diameter? (discuss Cp, Cpu, Cpl and Cpk and describe what each tells about the process). Indicate the % out of specification and describe how this percentage relates to the indices.

6 – Response is characterized by all of the following

- Capability analysis is run correctly. Title of chart is appropriate.
- Verification of assumptions is made.
- Review of relevant information is valid
  - If assumptions validated, discussion demonstrates correct understanding of the indices (not just repeating the numbers).
  - If assumptions not valid, discussion describes what information can be useful from running the analysis and why it could be useful.
- Determination of % out of spec is correct and correctly related to the information on the capability analysis.
- Conclusions based are conceptually sound.

C. Control charts – individual shifts.

C.1. Paste the three shifts' Sixpack reports here.

C.2. Analyze and compare the three shifts' control charts. Describe your findings and conclusions.

5- Response is characterized by the following

- Six packs are run correctly with appropriately titled charts.
- Conclusions for each chart are appropriate.
- Comparison of charts identify significant differences (from practical viewpoint, not just comparing limits)
- Appropriate next steps are identified.
- Extraneous/irrelevant information not included in response.

C.3. Analyze and compare the three shifts' capability analysis. Describe your findings and conclusions.

5- Response is characterized by the following

- Assumptions verified and conclusions for each shift are appropriate.
  - If assumptions validated, discussion demonstrates correct understanding of the indices (not just repeating the numbers).
  - If assumptions not valid, discussion describes what information can be useful from running the analysis and why it could be useful.
- Comparison made of identify pertinent differences (from practical viewpoint, not just number comparison).
- Conclusions based are conceptually sound and include how this information can be used in determining the areas for process improvement.

D Temperature versus Diameter

D. 1 Paste the scatter diagram of temperature versus diameter here.

D.2. Describe your conclusions in analyzing the scatter diagram. Discuss how can you use this information?

6- Response is characterized by the following

- Scatter diagram is run correctly.
- Discussion indicates understanding of the diagram.
- Plans for use of information is relevant to the case.

E Gage R&R

E.1. Paste the session window and the "Report for Measurement" output from the Gage R&R here.
E.2. Explain what the repeatability and reproducibility data from the study indicate. Explain any significant observations in the Report for Measurement charts.

6- Response is characterized by the following

- Gage R&R is run correctly with session window and report for measurement provided.
- Discussion indicates understanding of repeatability and reproducibility (beyond stating what the numbers are, and beyond the definitions from the lecture).
- Pertinent observation made from review of Report for Measurement.

E.3. Is the %GRR measurement system acceptable per the MSA Guidelines? Explain.
E.4. What does the % study variance to tolerance tell you?

6- Response is characterized by the following

- Discussion indicates understanding of %GRR (beyond stating what the number is and beyond giving definitions from the lecture).
- Acceptability of %GRR per MSA Guidelines is clearly explained and related as appropriate to other parts of the case.
- Discussion indicates understanding of %tolerance (beyond stating what the number is).
- Acceptability of %tolerance per MSA Guidelines is clearly explained.

F. Causes of variation

F.1. Paste your causes of variation diagram here.
F.2. Based on the analysis so far, what are the primary causes of variation in the process? Explain.

6 – Response is characterized by all of the following

- Appropriate tool selected and use is conceptually correct
- Evidence of thorough analysis with use of the tool such that actionable root causes are identified.
- Explanation is clear, rational and consistent with the figure.

G. Short term process recommendations

G. Based on the analysis thus far (all parts), what recommendations do you have for the process? Make at least three specific recommendations. State the recommendation, and then give the reason for the recommendation citing the data from the analysis. (Each recommendation in its own paragraph.)

6 – Response is characterized by all of the following

- At least three specific recommendations are made to reduce common cause variation.
- Significant results of the analysis are considered in making recommendations.
- Clear rationale for each recommendation is provided based on data/analysis in the case.
- Evidence provided is not contradictory to the improvement area identified.
- All areas for improvement opportunities are specifically relevant to the case.
- General improvement opportunities, without a clear relationship to the case are not included.
- Each recommendation is in its own paragraph.

H. Capability after improvements

H.1. Paste "after" control charts here.

H.2. Analyze the control charts and describe your findings and conclusions.

4- Response is characterized by the following

- Control charts were run correctly. Chart is appropriately titles
- Explanation of conclusions includes all pertinent aspects of review of the chart.
- Conclusions are appropriate for the chart
- Extraneous/irrelevant information not included in response.

H.3. Paste "after" capability analysis here.

H.4. Analyze the Capability Analysis and describe your findings and conclusions.

4 – Response is characterized by all of the following

- Capability analysis is run correctly. Chart is appropriately titled.
- Verification of assumptions is made.
- Review of relevant information is valid
  - If assumptions validated, discussion demonstrates correct understanding of the indices (not just repeating the numbers).
  - If assumptions not valid, discussion describes what information can be useful from running the analysis and why it could be useful.
- Conclusions based are conceptually sound.

I. Statistical Significance of Changes

I.1. At a 95% level of confidence, can you conclude there has been a reduction in the variance before (all operators) and after (improved data). Comment on the strength of the conclusion. Paste in Minitab output and discuss.

8 – Response is characterized by all of the following

- The Minitab approach/solution is correct.
- Understanding of the null and alternative hypothesis is evident.
- Statistical conclusion is correct and supported with appropriate and clear explanation.
- Comment as to strength of conclusion is statistically valid.
- Practical conclusion is correct and clearly explained.

I.2. At a 95% level of confidence, what conclusion can you draw about the process mean before (all operators) and after (improved data). Paste in Minitab output and discuss.

8 – Response is characterized by all of the following

- The Minitab approach/solution is correct.
- Understanding of the null and alternative hypothesis is evident.
- Statistical conclusion is correct and supported with appropriate and clear explanation.
- Practical conclusion is correct and clearly explained.

J. Long Term Recommendations

J.1. Provide a specific recommendation relative to further reducing variation in the process. State the recommendation and refer to previous aspects of the case/analysis in giving reasons for the recommendation.)

2 – Response is characterized by all of the following

- Clear rationale for the recommendation is provided based on data/analysis in the case.
- Evidence provided is not contradictory to the improvement area identified.
- Repeat of short term recommendations is not made unless new data is referenced.
- Area for improvement opportunity is specifically relevant to the case.
- General improvement opportunities, without a clear relationship to the case is not included.

J.2. Provide a specific recommendation for continued monitoring of the injection molding process. Describe the steps needed to implement the recommendation.

3 – Response is characterized by all of the following

- Clear rationale for the recommendation is provided based on data/analysis in the case.
- Steps described indicate understanding of SPC concepts..

Writing

5 – In the entire paper

- There are no more than 3 spelling or grammar mistakes. Grammar mistakes here include but are not limited to run-on sentences, sentence fragments, improper use of apostrophes, verb tense errors, subject verb agreement errors and double negatives.
- There are no long paragraphs with multiple topics.
- Writing/logic is easy to follow
- As indicated on the information sheet, cover sheet and table of contents not included.

Total possible points above is 100. This is the base team score which will be adjusted by an individual's evaluation score. See instructions with the evaluation form for explanation.