

Process Capability Analysis Report

ENGLISH REPORT

1. Report Information

Product / Part / Process	Housing Width	Capability Requirement	1.330
Prepared By / Team	Quality Engineering Team	Report Date	7/1/2026
Sample Size	30	Report Scope	Current sample only

2. Process Data

Parameter	Value
Sample Size	30
Target	10.000
LSL	9.900
USL	10.100
Sample Mean	10.030
Within Standard Deviation	0.028
Overall Standard Deviation	0.028
Minimum	9.970
Maximum	10.080
Out-of-Spec Observations	0

These statistics summarize the current sample used for capability analysis. All parsed values used in the analysis were numeric.

3. Capability Indices

Index	Value	Capability Requirement	Status
Cp	1.194	1.330	Below Requirement
Cpk	0.836	1.330	Below Requirement
Pp	1.194	1.330	Below Requirement
Ppk	0.836	1.330	Below Requirement

4. Index Interpretation

Cp

Cp is below the selected capability requirement. Based on the current sample and the standard deviation method used in this version, the calculated Cp estimate does not meet the selected capability requirement.

Cpk

Cpk is below the selected capability requirement. Based on the current sample and the standard deviation method used in this version, the calculated Cpk estimate does not meet the selected capability requirement.

Pp

Pp is below the selected capability requirement. Based on the current sample, the calculated Pp estimate does not meet the selected capability requirement.

Ppk

Ppk is below the selected capability requirement. Based on the current sample, the calculated Ppk estimate does not meet the selected capability requirement.

Relationship Between Indices

- **Cp vs Cpk:** Cp is greater than Cpk. Process location / centering reduces the calculated Cpk estimate. Cp is also below the selected capability requirement, so based on the current sample and the standard deviation method used in this version, the calculated Cp estimate does not meet the selected capability requirement.
- **Pp vs Ppk:** Pp is greater than Ppk. Process location reduces the calculated Ppk estimate. Pp is also below the selected capability requirement, so based on the current sample, the calculated Pp estimate does not meet the selected capability requirement.
- **Cpk vs Ppk:** In this version, $Cp = Pp$ and $Cpk = Ppk$ because the same sample standard deviation is used for both calculations. This should not be interpreted as a true comparison between within-process variation and overall variation.

5. Observed Specification Performance

- No observations in the current sample are outside specification limits.
- The absence of out-of-spec observations alone does not demonstrate adequate process capability.

6. Statistical Notes / Assumptions

- Capability indices are sample-based estimates from the current data set only.
- The analysis assumes the sample is representative of the process.
- Normal capability analysis assumes the data are appropriate for a normal capability model.
- Capability indices should not be interpreted without considering process stability, measurement system adequacy, distribution assumptions, and applicable customer requirements.
- If subgroup or time-order data is not available, a complete Capability Sixpack-style assessment would also review process stability, normality, and time-series behavior.

7. Calculation Notes

- Within Standard Deviation = 0.028
- Overall Standard Deviation = 0.028
- Because subgroup information was not provided, the same sample standard deviation was used for both within and overall capability calculations. Therefore, $Cp = Pp$ and $Cpk = Ppk$ in this demonstration.
- Capability formulas used: $Cp = (USL - LSL) / (6 * \text{within standard deviation})$; $Cpk = \min((USL - \text{sample mean}), (\text{sample mean} - LSL)) / (3 * \text{within standard deviation})$; Pp and Ppk use the overall standard deviation.

8. Suggested Follow-up Review

- Review process centering.
- Review process stability using control charts.
- Review subgroup definition if subgroup data becomes available.
- Review distribution assumptions before drawing broader conclusions.
- Compare calculated indices with applicable customer, internal, or industry capability requirements.

9. Scope of This Report

This report provides a statistical interpretation of capability indices calculated from the current sample and selected capability requirement. It is not a PPAP approval tool, production release tool, MSA tool, SPC approval tool, or production disposition decision.

中文报告

1. 报告信息

产品 / 部件 / 工序	Housing Width	能力要求	1.330
编制人 / 团队	Quality Engineering Team	报告日期	7/1/2026
样本量	30	报告范围	仅基于当前样本

2. 过程数据汇总

参数	数值
样本量	30
目标值	10.000
LSL（下规格限）	9.900
USL（上规格限）	10.100
样本均值	10.030
组内标准差	0.028
总体标准差	0.028
Minimum（最小值）	9.970
Maximum（最大值）	10.080
超出规格观测值	0

以上统计量用于概述本次过程能力分析所使用的当前样本。本次分析使用的解析值均为数值。

3. 过程能力指数

指数	数值	能力要求	状态
Cp	1.194	1.330	未达到能力要求
Cpk	0.836	1.330	未达到能力要求
Pp	1.194	1.330	未达到能力要求
Ppk	0.836	1.330	未达到能力要求

4. 指数解读

Cp

Cp 低于所选能力要求。基于当前样本以及本版本使用的标准差方法，计算得到的 Cp 估计值未达到所选能力要求。

Cpk

Cpk 低于所选能力要求。基于当前样本以及本版本使用的标准差方法，计算得到的 Cpk 估计值未达到所选能力要求。

Pp

Pp 低于所选能力要求。基于当前样本，计算得到的 Pp 估计值未达到所选能力要求。

Ppk

Ppk 低于所选能力要求。基于当前样本，计算得到的 Ppk 估计值未达到所选能力要求。

指数关系

- **Cp vs Cpk:** Cp 大于 Cpk，说明过程位置/居中性降低了能力指数。同时 Cp 也低于所选能力要求，因此仅从过程离散程度来看，计算得到的能力也未达到所选能力要求。
- **Pp vs Ppk:** Pp 大于 Ppk，说明过程位置降低了总体表现指数。同时 Pp 也低于所选能力要求，因此仅从总体离散程度来看，计算得到的表现也未达到所选能力要求。
- **Cpk vs Ppk:** 在本版本中，Cp = Pp 且 Cpk = Ppk，因为两类计算均使用同一个样本标准差。这不应被解释为已经完成真正的组内波动与总体波动比较。

5. 规格表现观察

- 当前样本中没有超出规格观测值。
- 没有超出规格观测值并不单独证明过程能力充分。

6. 统计说明 / 假设

- 本报告中的能力指数是基于当前数据集的样本估计值。
- 分析假设当前样本能够代表该过程。
- 正态能力分析假设数据适合使用正态能力模型。
- 解释能力指数时，应同时考虑过程稳定性、测量系统充分性、分布假设以及适用的客户要求。
- 如果没有子组数据或时间顺序数据，完整的 Capability Sixpack 风格评估还需要进一步评审过程稳定性、正态性和时间序列行为。

7. 计算说明

- 组内标准差 = 0.028
- 总体标准差 = 0.028
- 由于没有提供子组信息，本版本使用同一个样本标准差进行组内能力和总体表现计算。因此，在本版本中 Cp = Pp, Cpk = Ppk。
- 本工具使用的公式： $Cp = (USL - LSL) / (6 * \text{组内标准差})$ ； $Cpk = \min((USL - \text{样本均值}) / (3 * \text{组内标准差}), (\text{样本均值} - LSL) / (3 * \text{组内标准差}))$ ；Pp 与 Ppk 使用总体标准差。

8. 建议后续评审

- 评审过程居中性。
- 使用控制图评审过程稳定性。
- 如果后续有子组数据，评审子组定义。

- 在形成更广泛结论前，评审分布假设。
- 将计算得到的能力指数与适用的客户、内部或行业能力要求进行比较。

9. 本报告范围

本报告仅基于当前样本和所选能力要求，对计算得到的过程能力指数进行统计解读。本工具不是 PPAP 批准工具、量产放行工具、MSA 工具、SPC 批准工具，也不提供生产处置结论。