ChecklistGuro

Design of Experiments (DOE) Checklist

Problem Definition & Objective Setting

Focuses on clearly defining the manufacturing problem and establishing measurable objectives for the DOE.

Describe the Manufacturing Problem

Write something...

What are the initial observations and symptoms of the problem?

Write something...

What is the current process capability (e.g., Cp, Cpk)?

Enter a number...

What is the primary objective of the DOE? (Choose One)

- [ ] Reduce Variation
- [ ] Improve Mean
- [ ] Reduce Cost
- [ ] Improve Quality
- [ ] Other (Specify)

Define specific, measurable, achievable, relevant, and time-bound (SMART) objectives for the DOE.

Write something...

Target improvement percentage (e.g., reduce defect rate by 10%)

Enter a number...

What are the key constraints limiting the improvement?

- [ ] Cost
- [ ] Time
- [ ] Equipment
- [ ] Material
- [ ] Other (Specify)

Describe the current process control measures (if any).

Write something...

Factor & Response Selection

Deals with identifying potential factors influencing the response and selecting the key responses to be optimized.

Describe the manufacturing process being studied.

Write something...

What is the desired output metric (e.g., throughput, yield, defect rate)?

Enter a number...

Select the units of measurement for the response variable (e.g., pieces/hour, %, parts per million).

- [ ] Pieces/Hour
- [ ] Percentage (%)
- [ ] Parts Per Million (PPM)
- [ ] Millimeters (mm)
- [ ] Seconds
- [ ] Other (Specify in LONG_TEXT)

List potential factors that could influence the response.

Write something...

For each potential factor, briefly describe how it impacts the response (positive or negative).

Write something...

Estimate the current average value of the response variable.

Enter a number...

Which factors are considered the most critical to investigate (based on prior knowledge or experience)?

Describe any constraints on the factor ranges (e.g., equipment limitations, safety regulations).

Write something...

Experimental Design Selection

Covers the process of choosing the appropriate experimental design (e.g., Full Factorial, Fractional Factorial, Response Surface Methodology) based on the problem and resource constraints.

Primary Design Type

- [ ] Full Factorial
- [ ] Fractional Factorial
- [ ] Response Surface Methodology (RSM)
- [ ] Mixture Design
- [ ] Taguchi Design

Number of Factors to be Studied

Enter a number...

Number of Levels per Factor

Enter a number...

Central Composite Design (If using RSM)

- [ ] Face-Centered
- [ ] Circle
- [ ] Incomplete Block

Justification for Chosen Design

Write something...

Randomization Method

- [ ] Latin Square
- [ ] Random Order
- [ ] Cyclical

Number of Replicates

Enter a number...

Considerations for Interactions (if applicable)

Write something...

Experimental Setup & Validation

Focuses on the physical setup, ensuring accurate data collection, and validating the experimental conditions.

Equipment Calibration Date

Enter a number...

Standard Operating Procedure (SOP) Verified?

- [ ] Yes
- [ ] No

Describe Equipment Setup and Configuration

Write something...

Measurement System Analysis (MSA) Score (e.g., % agreement)

Enter a number...

Environmental Conditions Controlled?

- [ ] Yes
- [ ] No

Document any deviations from planned setup

Write something...

Attach Photos/Videos of Setup (Optional)

Upload File

Date of Setup Verification

Enter date...

Data Collection & Analysis

Addresses the procedures for collecting data and using statistical analysis tools to interpret results.

Number of Replicates per Run

Enter a number...

Measurement Resolution (e.g., decimal places)

Enter a number...

Calibration and Measurement System Analysis (MSA) Documentation Review

Write something...

Statistical Software Used (e.g., Minitab, R, JMP)

- [ ] Minitab
- [ ] R
- [ ] JMP
- [ ] Other

Sample Size for Each Factor Level

Enter a number...

Description of Data Validation Procedures

Write something...

Analysis Method Used (e.g., ANOVA, Regression)

- [ ] ANOVA
- [ ] Regression
- [ ] Other

Raw Data File (CSV, Excel)

Upload File

Results Interpretation & Conclusion

Focuses on drawing meaningful conclusions from the experiment, identifying significant factors, and recommending actions.

Summarize the key findings of the DOE.

Write something...

What is the R-squared value for the model? (Indicates model fit)

Enter a number...

Which factors were found to be statistically significant ($p < 0.05$)?

- [ ] Factor A
- [ ] Factor B
- [ ] Factor C
- [ ] No significant factors found

Describe the interaction effects observed (if any).

Write something...

What is the predicted optimal setting for the factors?

Enter a number...

Does the model adequately explain the variability in the response? (Based on R-squared & Residual Analysis)

- [ ] Yes, the model is a good fit.
- [ ] The model needs improvement.
- [ ] The model is not appropriate.

What conclusions can be drawn from the DOE results regarding the original manufacturing problem?

Write something...

Which of the following recommendations are made based on the DOE?

- [ ] Adjust factor settings
- [ ] Modify process parameters
- [ ] Investigate further
- [ ] No action required

Implementation & Verification

Covers the steps involved in implementing the changes based on DOE results and verifying their impact.

Describe the proposed changes to the manufacturing process based on DOE findings.

Write something...

Target improvement percentage for the response variable (e.g., yield, defect rate).

Enter a number...

Planned start date for implementing the changes.

Enter date...

Planned completion date for implementation.

Enter date...

Number of production runs to monitor after implementation.

Enter a number...

Method for initial verification (e.g., pilot run, gradual rollout).

- [ ] Pilot Run
- [ ] Gradual Rollout
- [ ] Full Production Implementation

Describe the verification plan, including data collection methods and acceptance criteria.

Write something...

Which key performance indicators (KPIs) will be monitored during verification?

- [ ] Yield
- [ ] Defect Rate
- [ ] Cycle Time
- [ ] Material Waste
- [ ] Cost per Unit

Verification Result: Pass/Fail

- [ ] Pass
- [ ] Fail
- [ ] Needs Further Investigation

Documentation & Reporting

Ensures proper documentation of the entire DOE process for future reference and auditing purposes.

Project Objective Summary

Write something...

Detailed Experimental Procedure

Write something...

Raw Data Files (CSV, Excel)

Upload File

Statistical Analysis Output (e.g., Minitab, JMP)

Upload File

Number of Replicates Run

Enter a number...

List of Assumptions Made During Analysis

Write something...

Potential Limitations of the Study

Write something...

Report Distribution List

- [ ] Engineering Team
- [ ] Quality Control
- [ ] Management
- [ ] Other

Report Completion Date

Enter date...

Engineer Signature