

# Design Of Experiments (DOE) Checklist

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## 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

## Standard Operating Procedure (SOP) Verified?

☐ Yes☐ No

## Describe Equipment Setup and Configuration

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

### 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