

DOE Design Summary

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Design Overview

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|-------------------|---|
| Design Type | Full Factorial Design |
| Number of Runs | 840 (10 × 42 × 2) |
| Response Variable | Interface Temperature (°C) |
| Experiment Type | Three-Factor Factorial with Main Effects, 2-way, and 3-way Interactions |

Factor Levels and Definitions

| Factor | Type | Levels | Description |
|--------------------------|----------------------|--------|--|
| Transceiver Manufacturer | Categorical | 10 | Accelight, CENTERA, Eoptolink, Finisar, Hisense, Intel Corp, Ligent Photonics, NON-JNPR, O |
| Rack Unit | Categorical Discrete | 42 | Integer values: 1, 2, 3, ..., 42 (representing physical rack positions) |
| Fan Speed Range | Categorical Binary | 2 | L = Low (< 9,999 rpm) H = High (≥ 10,000 rpm) |

Model Structure

Main Effects: 3 factors
Two-Factor Interactions: 3 interactions (Mfr×Rack, Mfr×Speed, Rack×Speed)
Three-Factor Interaction: 1 interaction (Mfr×Rack×Speed)
Total Model Terms: 820 parameters (full factorial expansion)
Significant Terms (Reduced Model): 25 parameters (after filtering $p \leq 0.05$)

Data Summary

Total Observations: 7,600
Unique Factor Combinations: 840 (representing all possible combinations of factors)
Replications: Approximately 9 replications per combination ($7,600 \div 840 \approx 9$)