DOE Design Summary

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Design Overview

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 ÷ 840 ≈ 9)