DOE Analysis: Doe Analysis Reduced

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Reduced DOE Analysis Report Reduced Design of Experiments (DOE) Analysis Report Executive Summary Model Type: Full Factorial Design with Discrete Factors Reduction Method: Removed non-significant terms (p-value > 0.05) Terms Removed: 795 Original Parameters: 820 → Reduced Parameters: 451 Model Comparison: Full vs Reduced Metric Full Model Reduced Model Change R² 0.389692 0.385237 -0.004455 Adjusted R² 0.371752 0.370915 -0.000837 MSE 1.74369773 1.74601998 +0.00232225 Residual Std Error 1.320491 1.321370 +0.000879 Degrees of Freedom 7382 7426 +44 F-statistic 21.721383 26.898571 +5.177188 P-value (F) 0.000000e+00 0.000000e+00 - Parameters 820 451 -369 Reduced Model Specification Formula: ttemp ~ 1 + C(Transceiver_Manufacturer) + C(Rack_Unit) + C(Fan_Speed_Range) + C(Transceiver_Manufacturer):C(Rack_Unit) + C(Rack_Unit):C(Fan_Speed_Range) Reduced Model ANOVA (Type I - Sequential) df sum_sq mean_sq F PR(>F) C(Transceiver_Manufacturer) 9.0 3416.867951 379.651995 217.438517 0.000000e+00 C(Rack_Unit) 40.0 420.470350 10.511759 6.020411 6.566858e-30 C(Fan_Speed_Range) 1.0 1.650636 1.650636 0.945371 3.309322e-01 C(Transceiver_Manufacturer):C(Rack_Unit) 360.0 4773.002669 13.258341 7.593465 2.328162e-294 C(Rack_Unit):C(Fan_Speed_Range) 40.0 82.574157 2.064354 1.182320 2.001457e-01 Residual 7426.0 12965.944359 1.746020 NaN NaN Lack-of-Fit Test (Reduced Model) Source df sum_sq mean_sq F PR(>F) 0 Lack of Fit 44.0 96.198706 2.186334 1.254067 0.121251 1 Pure Error 7382.0 12869.745653 1.743396 NaN NaN 2 Total Error 7426.0 12965.944359 1.746020 NaN NaN Key Findings: Reduced model explains 38.52% of variance (R² = 0.385237) Residual standard error: 1.3214 Overall model F-statistic: 26.8986 (p < 0.001) Model remains highly significant after term removal Improved parsimony with 795 fewer parameters