**SUPPLEMENTARY DATA**

1. **ANOVA Tables**

**Thrust force (N)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **Adj SS** | **Adj MS** | **F-Value** | **P-Value** |
| Model | 14 | 98320 | 7022.9 | 181.69 | 0.000 |
|   Linear | 5 | 93528 | 18705.6 | 483.94 | 0.000 |
|     F | 1 | 92483 | 92483.3 | 2392.69 | 0.000 |
|     S | 1 | 24 | 23.5 | 0.61 | 0.437 |
|     HT | 3 | 1021 | 340.4 | 8.81 | 0.000 |
|   Square | 2 | 958 | 479.1 | 12.40 | 0.000 |
|     F2 | 1 | 928 | 928.1 | 24.01 | 0.000 |
|     S2 | 1 | 30 | 30.1 | 0.78 | 0.380 |
|   2-Way Interaction | 7 | 2176 | 310.8 | 8.04 | 0.000 |
|     F\*S | 1 | 9 | 8.6 | 0.22 | 0.638 |
|     F\*HT | 3 | 1652 | 550.7 | 14.25 | 0.000 |
|     S\*HT | 3 | 515 | 171.7 | 4.44 | 0.006 |
| Error | 93 | 3595 | 38.7 |  |  |
| Total | 107 | 101915 |  |  |  |

**Torque (N.cm)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **Adj SS** | **Adj MS** | **F-Value** | **P-Value** |
| Model | 14 | 698.682 | 49.906 | 55.41 | 0.000 |
|   Linear | 5 | 634.837 | 126.967 | 140.96 | 0.000 |
|     F | 1 | 625.342 | 625.342 | 694.26 | 0.000 |
|     S | 1 | 0.045 | 0.045 | 0.05 | 0.824 |
|     HT | 3 | 9.450 | 3.150 | 3.50 | 0.019 |
|   Square | 2 | 27.781 | 13.891 | 15.42 | 0.000 |
|     F2 | 1 | 27.749 | 27.749 | 30.81 | 0.000 |
|     S2 | 1 | 0.032 | 0.032 | 0.04 | 0.851 |
|   2-Way Interaction | 7 | 22.594 | 3.228 | 3.58 | 0.002 |
|     F\*S | 1 | 0.296 | 0.296 | 0.33 | 0.568 |
|     F\*HT | 3 | 11.520 | 3.840 | 4.26 | 0.007 |
|     S\*HT | 3 | 10.778 | 3.593 | 3.99 | 0.010 |
| Error | 93 | 83.768 | 0.901 |  |  |
| Total | 107 | 782.450 |  |  |  |

**Material temperature (°C)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **Adj SS** | **Adj MS** | **F-Value** | **P-Value** |
| Model | 14 | 466.926 | 33.352 | 167.10 | 0.000 |
|   Linear | 5 | 387.773 | 77.555 | 388.56 | 0.000 |
|     F | 1 | 197.278 | 197.278 | 988.38 | 0.000 |
|     S | 1 | 103.440 | 103.440 | 518.25 | 0.000 |
|     HT | 3 | 87.055 | 29.018 | 145.38 | 0.000 |
|   Square | 2 | 56.343 | 28.172 | 141.14 | 0.000 |
|     F2 | 1 | 49.020 | 49.020 | 245.60 | 0.000 |
|     S2 | 1 | 7.323 | 7.323 | 36.69 | 0.000 |
|   2-Way Interaction | 7 | 26.477 | 3.782 | 18.95 | 0.000 |
|     F\*S | 1 | 1.270 | 1.270 | 6.36 | 0.013 |
|     F\*HT | 3 | 17.504 | 5.835 | 29.23 | 0.000 |
|     S\*HT | 3 | 7.703 | 2.568 | 12.86 | 0.000 |
| Error | 93 | 18.563 | 0.200 |  |  |
| Total | 107 | 485.488 |  |  |  |

**Drill temperature (°C)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **Adj SS** | **Adj MS** | **F-Value** | **P-Value** |
| Model | 14 | 2439.92 | 174.28 | 91.26 | 0.000 |
|   Linear | 5 | 2344.66 | 468.93 | 245.55 | 0.000 |
|     F | 1 | 179.52 | 179.52 | 94.00 | 0.000 |
|     S | 1 | 1841.23 | 1841.23 | 964.15 | 0.000 |
|     HT | 3 | 323.90 | 107.97 | 56.54 | 0.000 |
|   Square | 2 | 52.09 | 26.05 | 13.64 | 0.000 |
|     F2 | 1 | 8.80 | 8.80 | 4.61 | 0.034 |
|     S2 | 1 | 43.29 | 43.29 | 22.67 | 0.000 |
|   2-Way Interaction | 7 | 102.08 | 14.58 | 7.64 | 0.000 |
|     F\*S | 1 | 1.98 | 1.98 | 1.04 | 0.311 |
|     F\*HT | 3 | 46.36 | 15.45 | 8.09 | 0.000 |
|     S\*HT | 3 | 53.75 | 17.92 | 9.38 | 0.000 |
| Error | 93 | 177.60 | 1.91 |  |  |
| Total | 107 | 2617.52 |  |  |  |