KULI Simulations and Correlation with Laboratory Test Data

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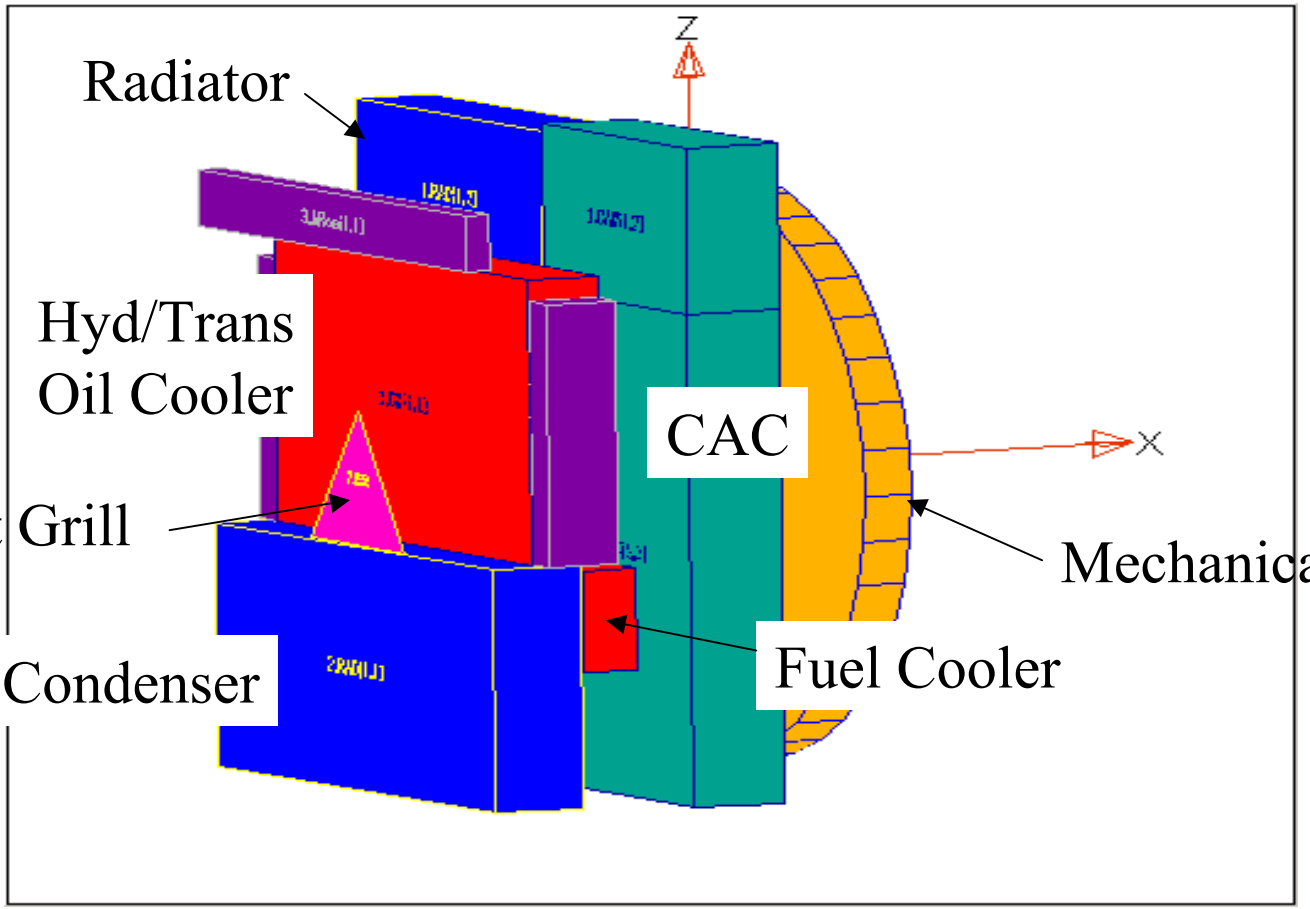
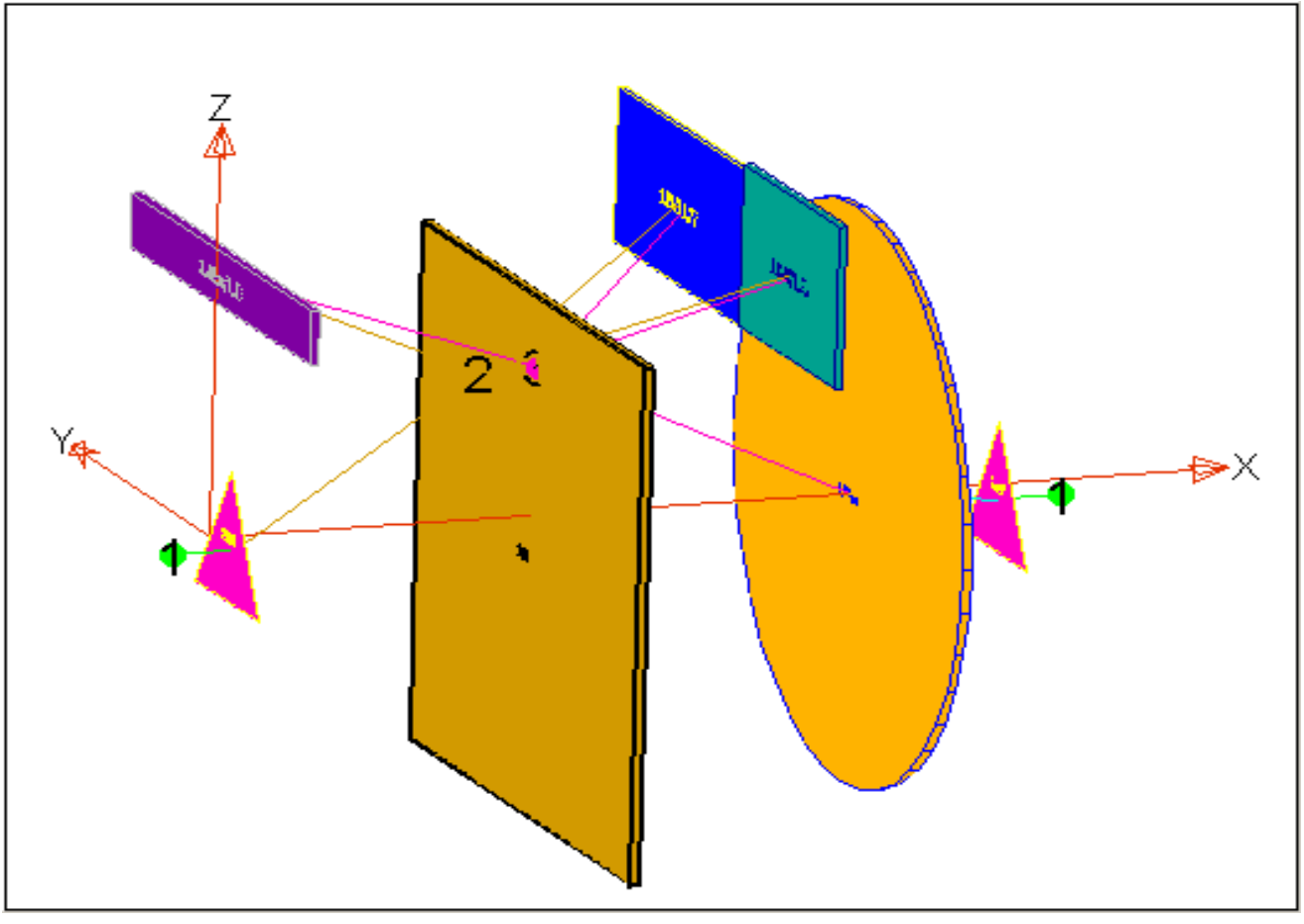
Presentation Format

- Kuli Model
- Airflow Path and Inner Circuit
- Wind Tunnel Testing and Data Correlations
- System Resistance Curve
- Correlation with Kuli
- Conclusions and Comments

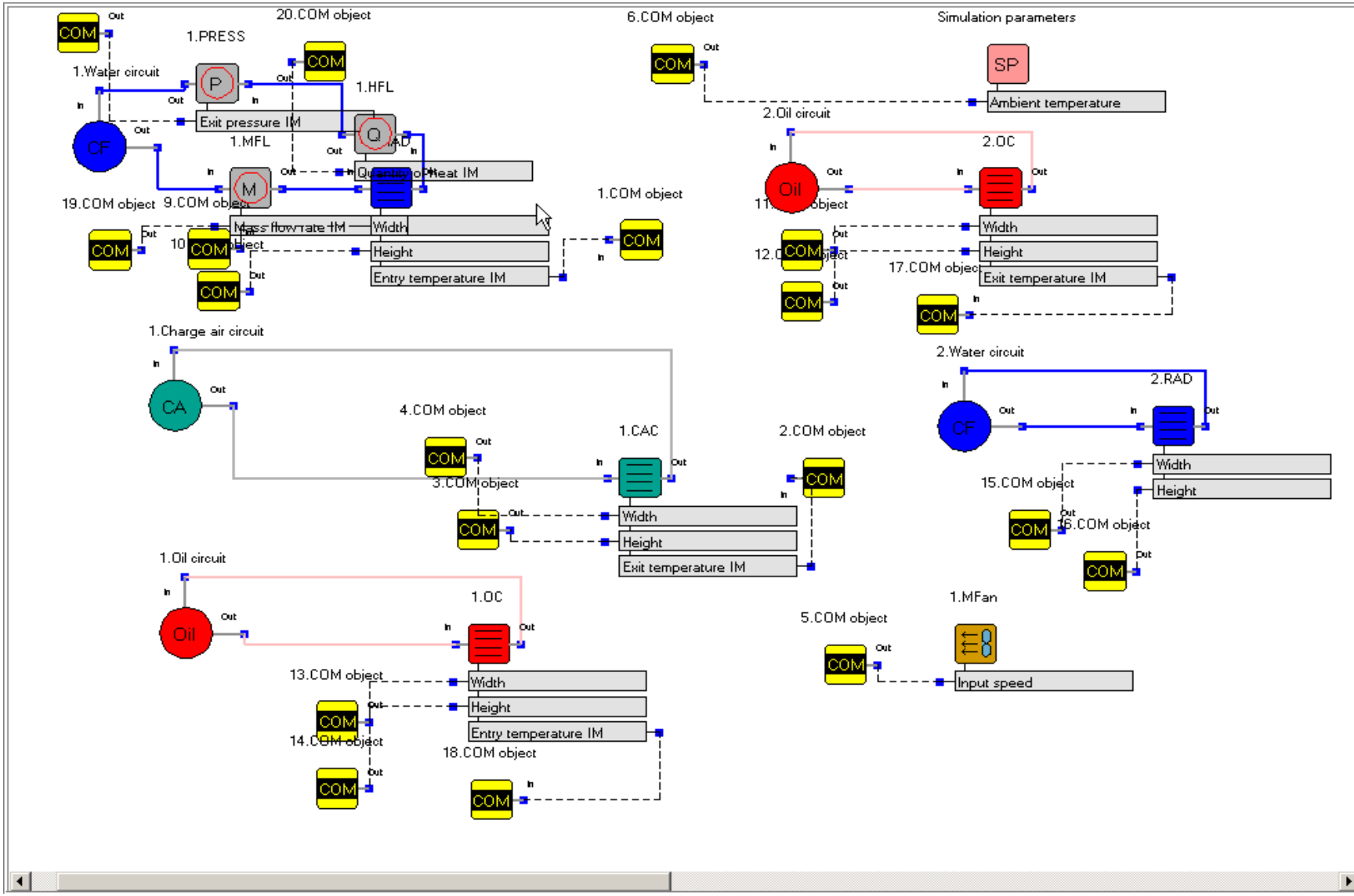
Cooling System Model for JD8000-20 Series Tractor



Air Flow Path for JD8000-20 Series Tractor

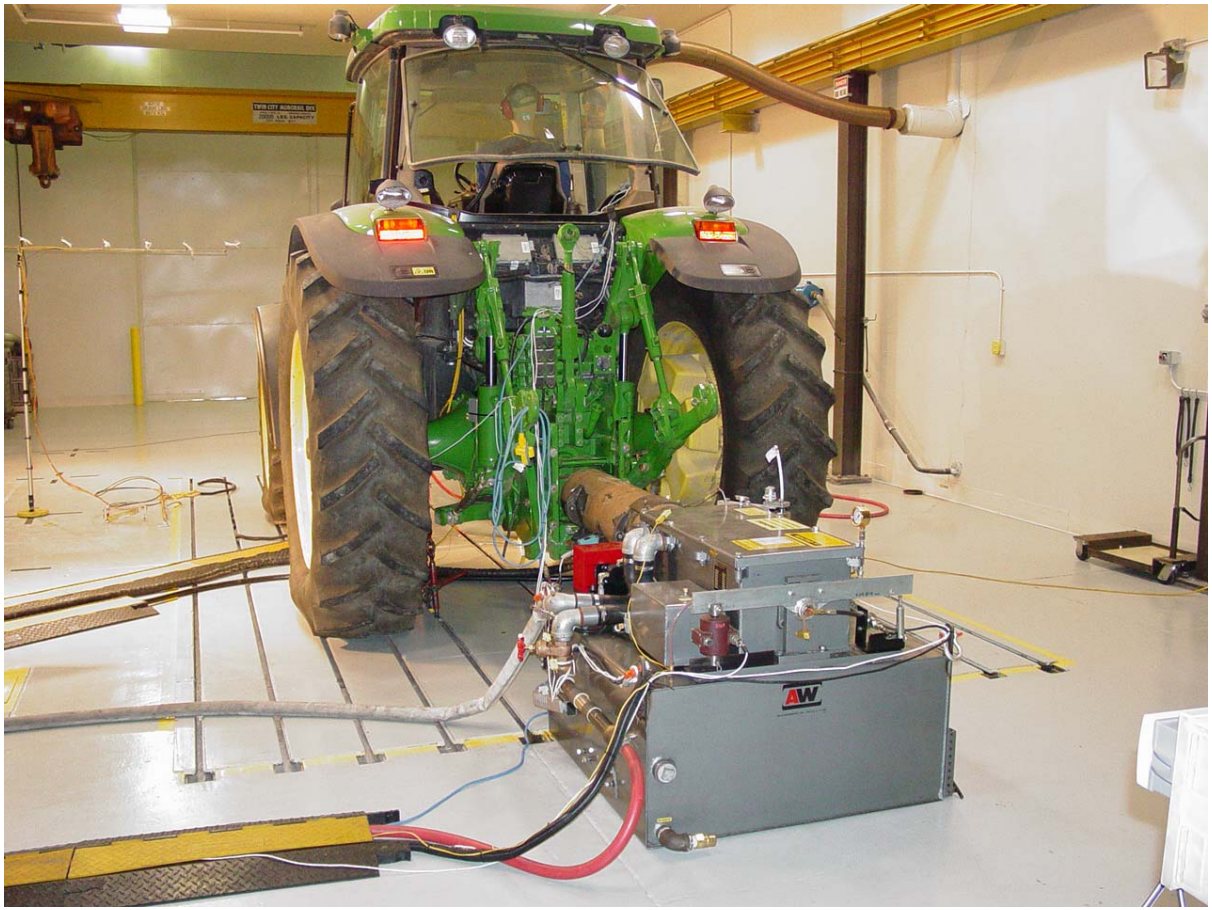


Inner Circuit for Cooling System

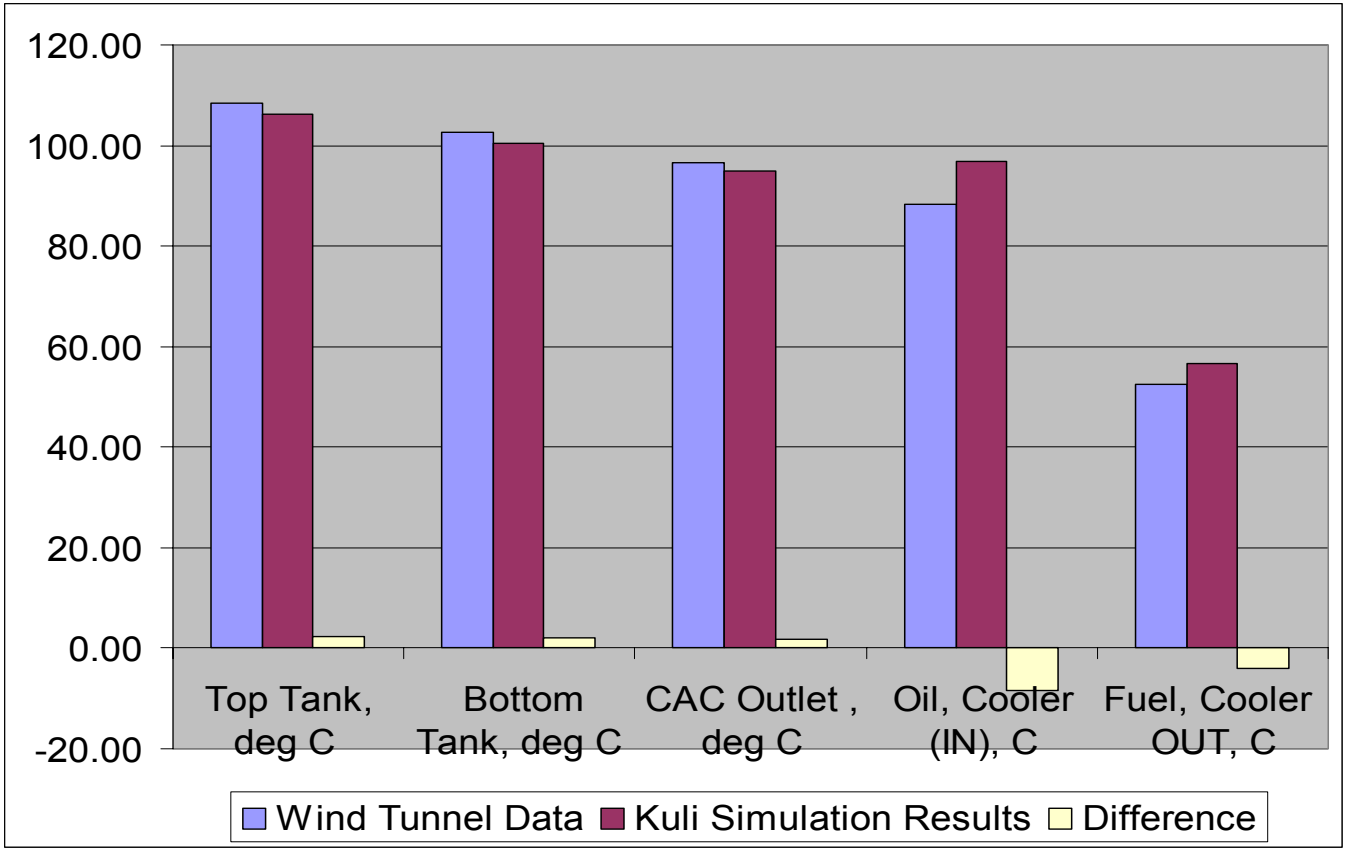


8000-20 Series Tractor in Wind Tunnel

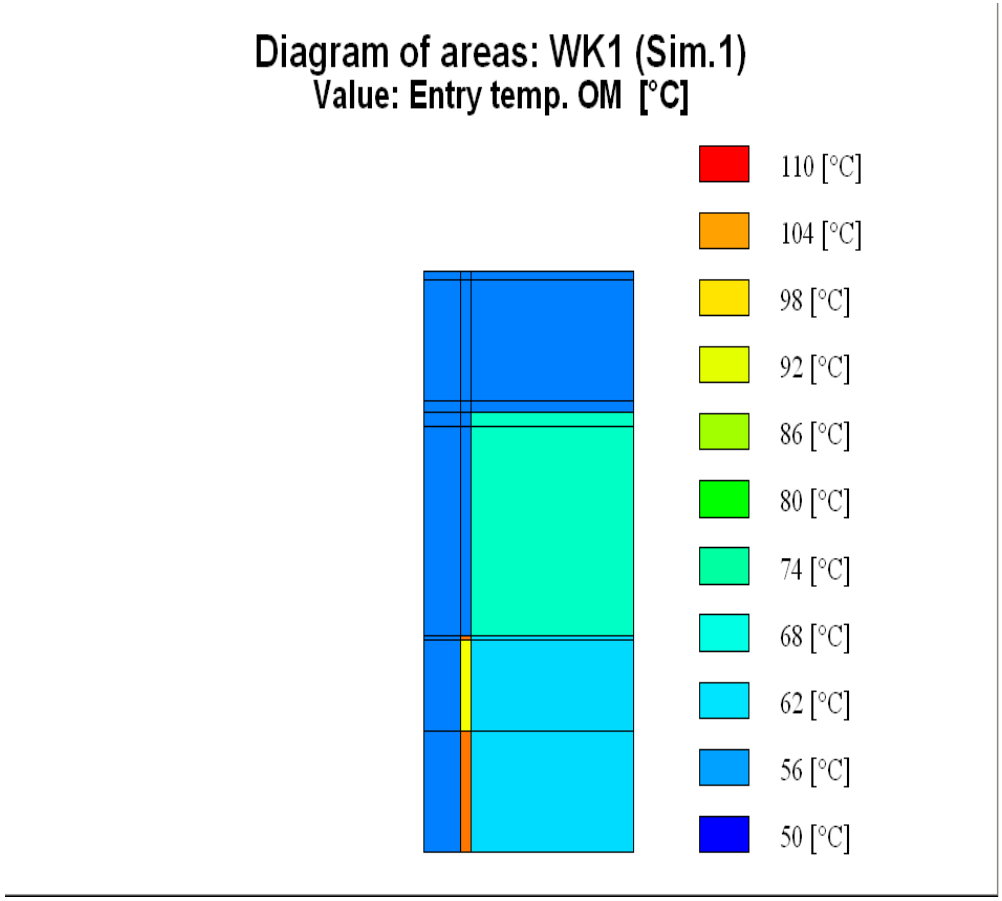
8000-20 Series Tractor in Wind Tunnel



Comparison of Wind Tunnel Data and Kuli Results for Hot Point



Temperature Distributions at Radiator for Hot Point Condition



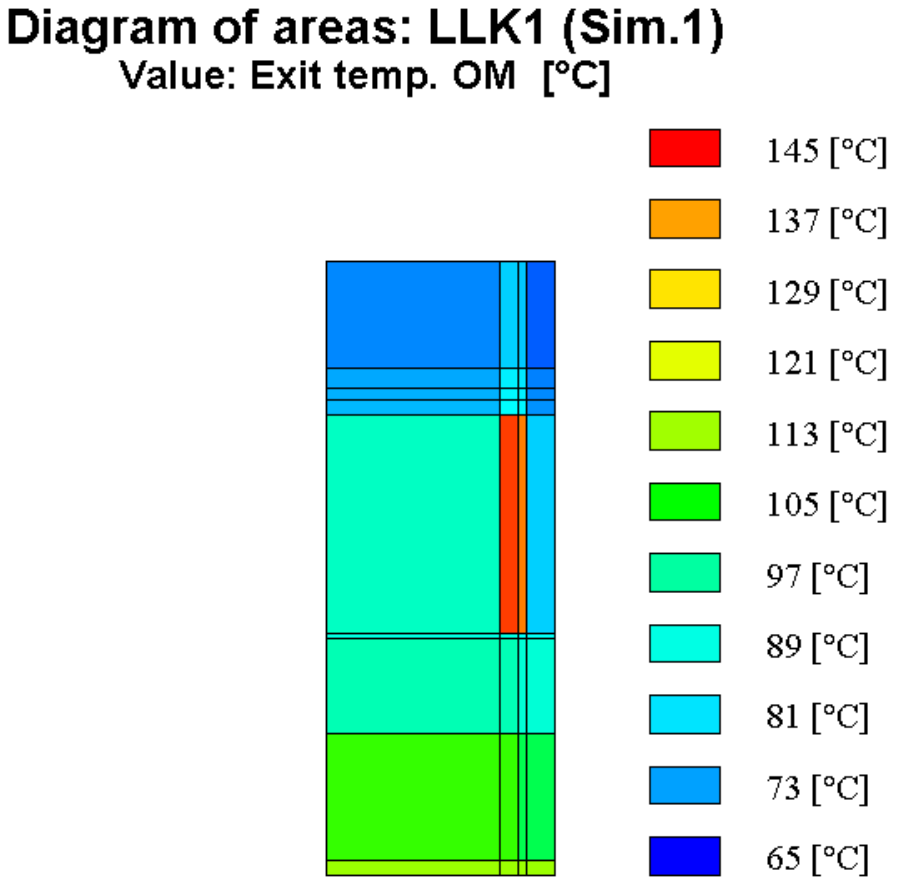
Measured Temperatures

Top of Radiator 54.9 C

Middle of Radiator 68.5 C

Bottom of Radiator 62 C

Temperature Distributions at Charge Air Cooler for Hot Point Condition



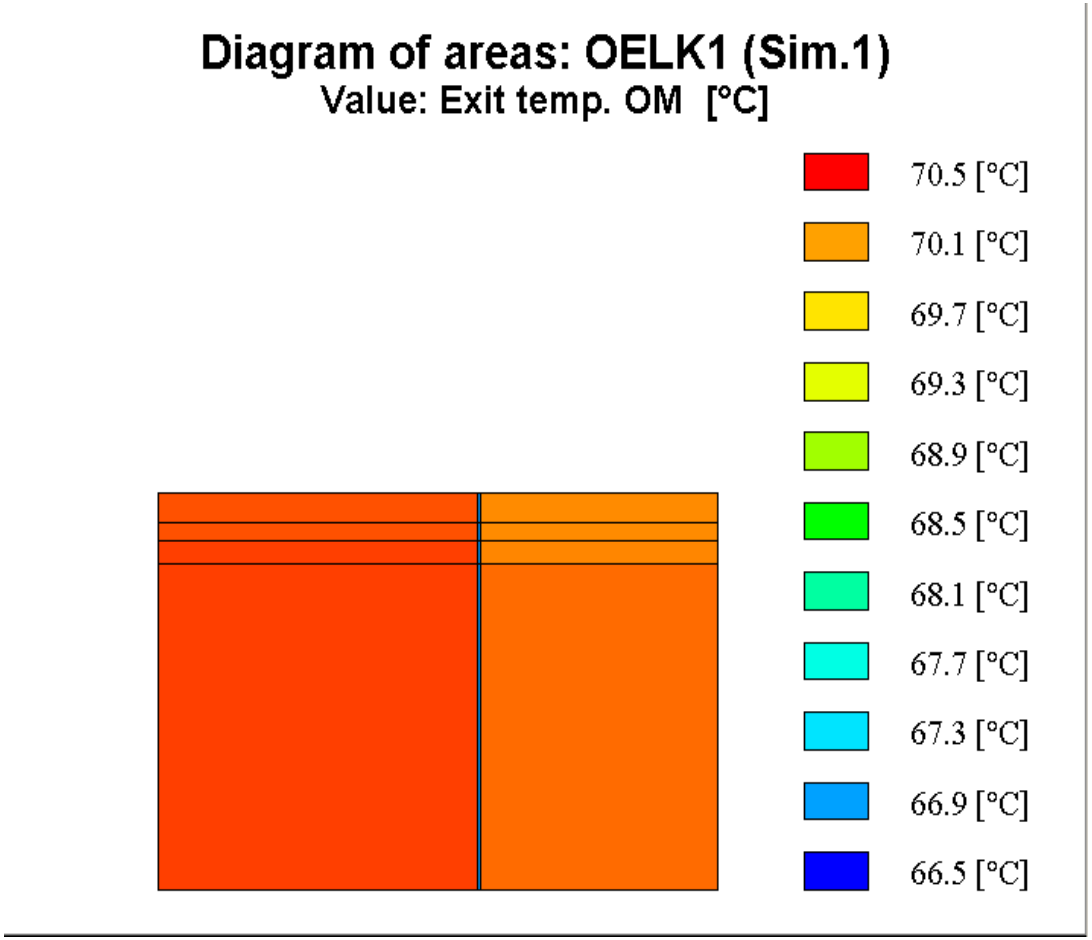
Measured Temperatures

Top of CAC 69.3 C

Middle of CAC 93.1 C

Bottom of CAC 112.8 C

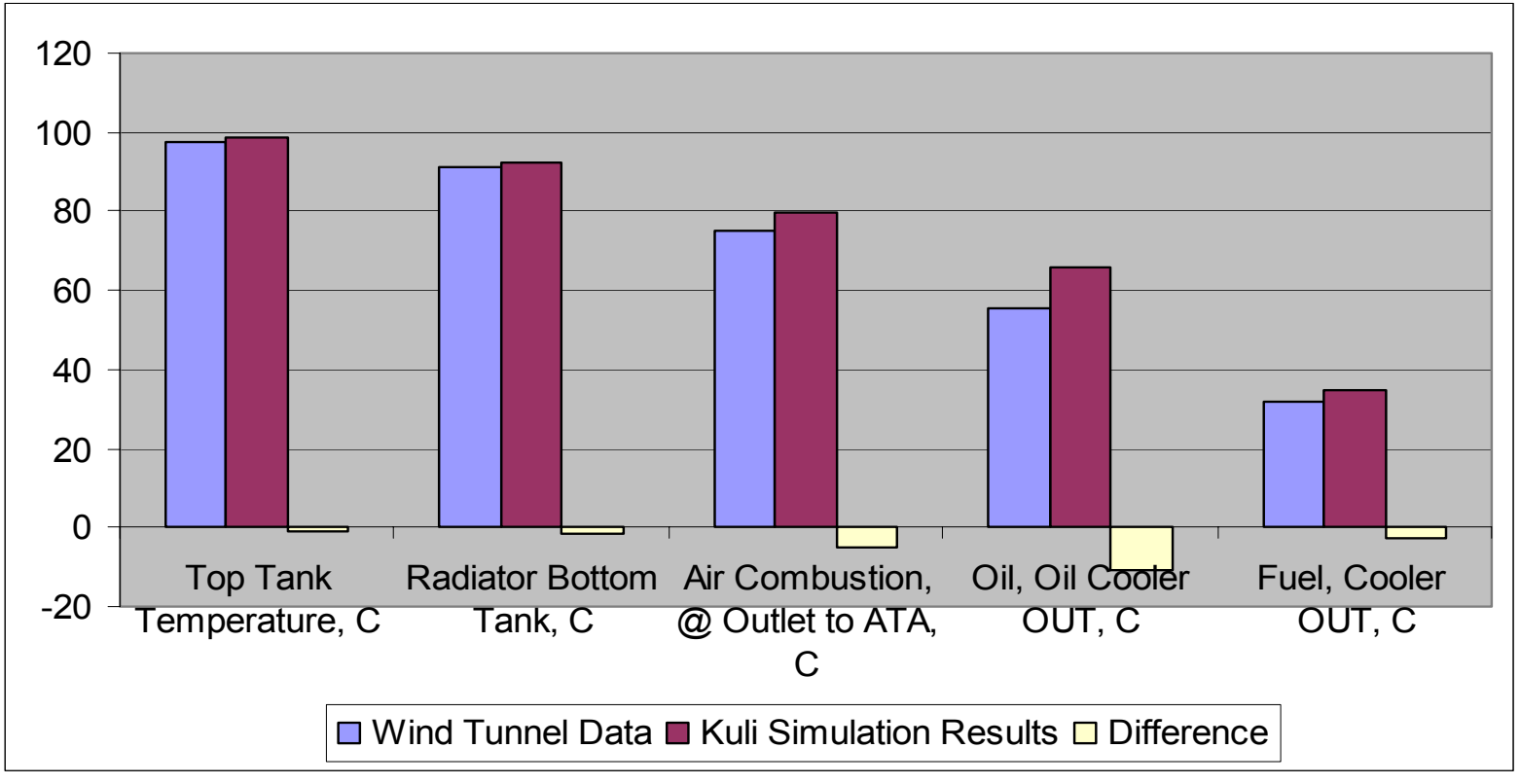
Temperature Distributions at Hyd/Trans Oil Cooler for Hot Point



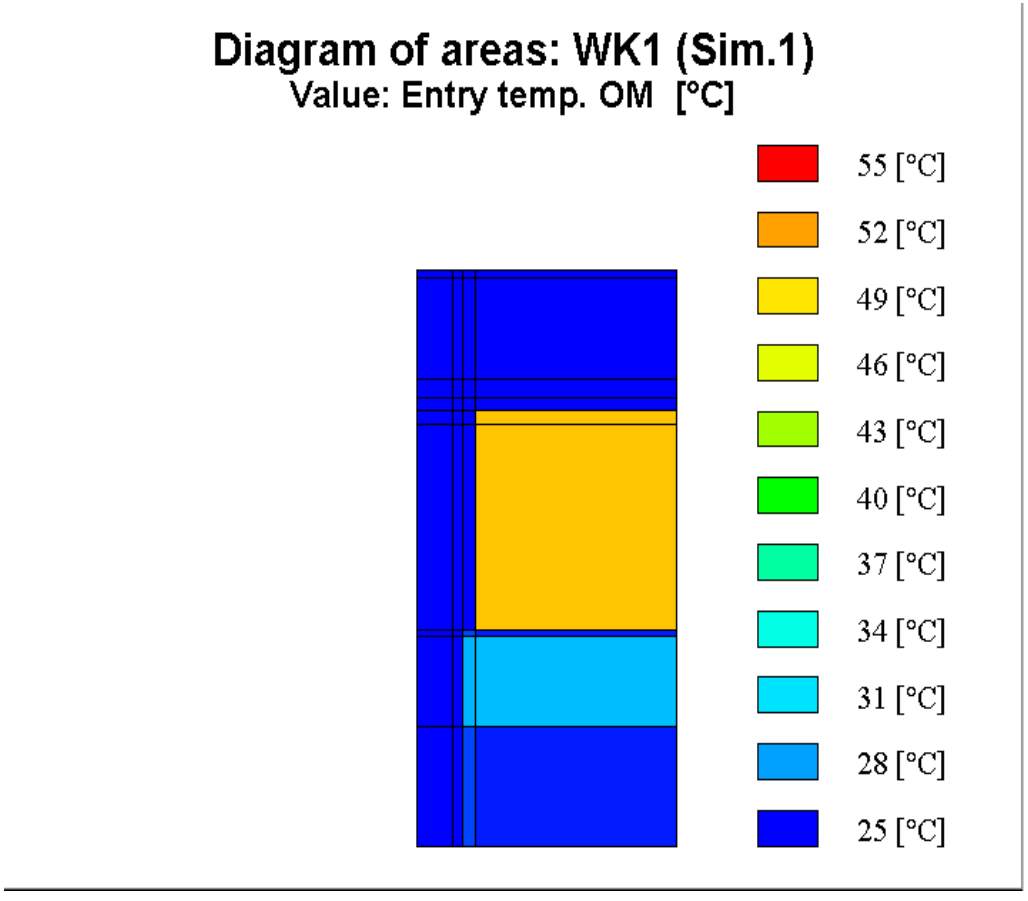
Measured Temperatures

Mean of three measurements 68 C

Comparison of Wind Tunnel Data and Kuli Results for Nebraska Point



Temperature Distributions at Radiator for Nebraska Point Condition



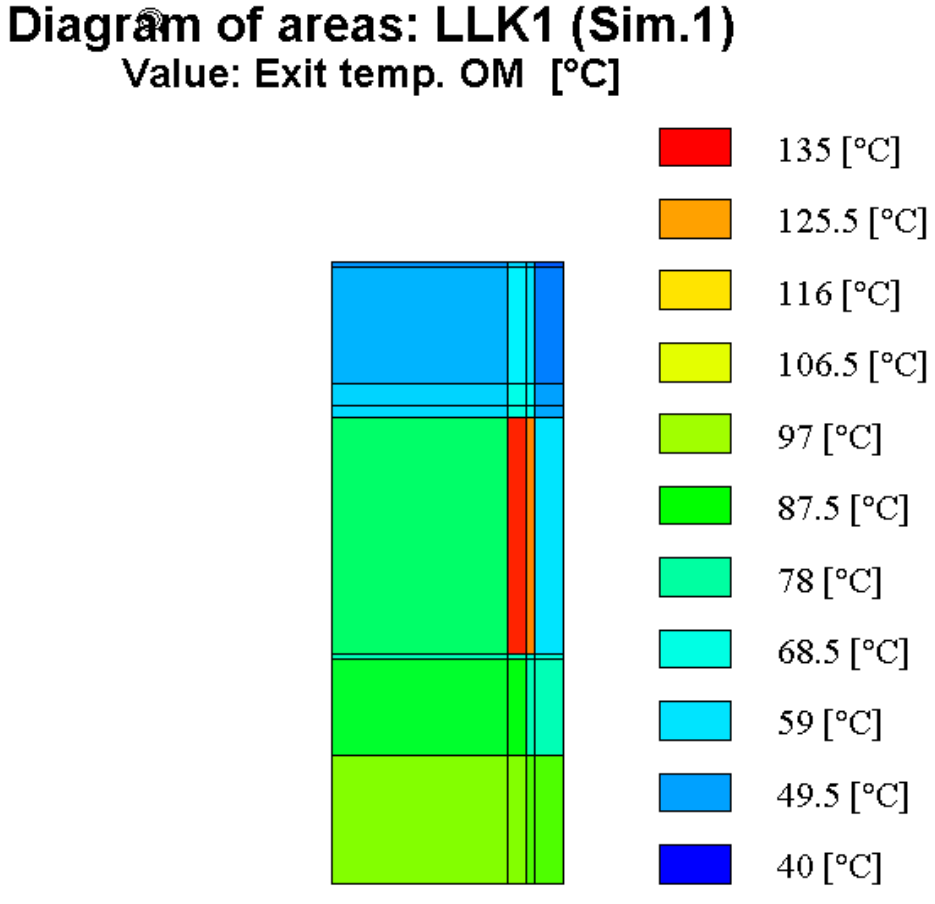
Measured Temperatures

Top of Radiator 29.6 C

Middle of Radiator 47.4 C

Bottom of Radiator 26 C

Temperature Distributions at Charge Air Cooler for Nebraska Point



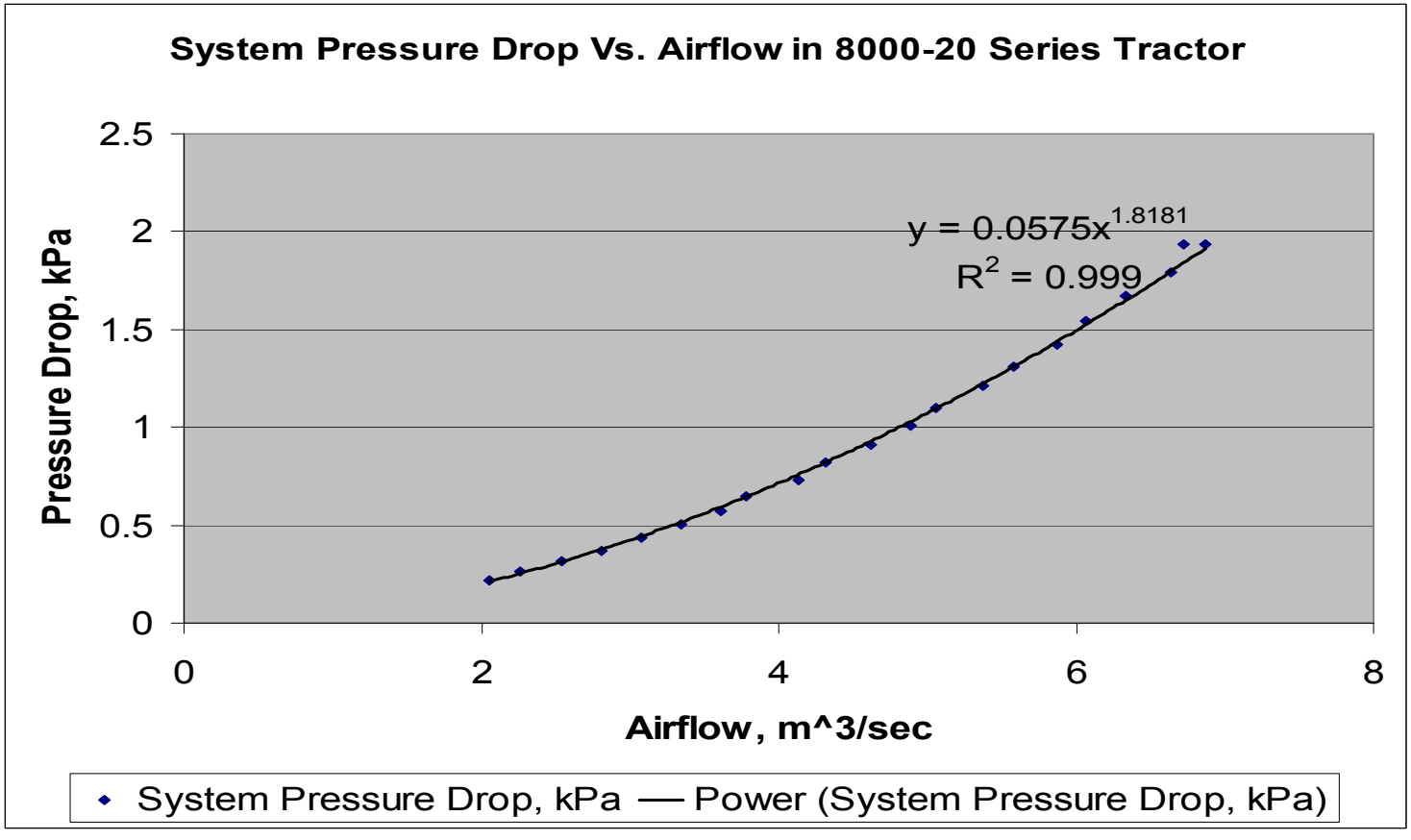
Measured Temperatures

Top of CAC 53.7 C

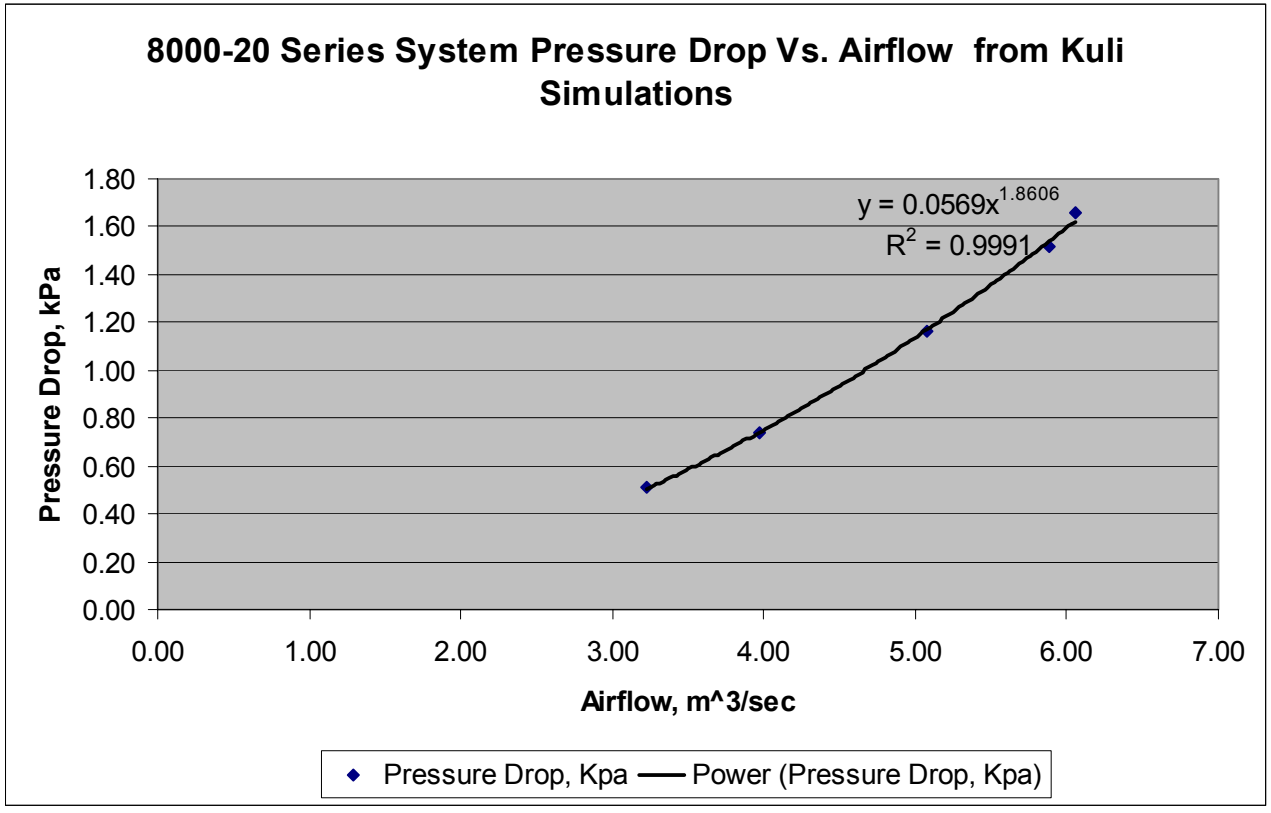
Middle of CAC 83.1 C

Bottom of CAC 96.8 C

System Resistance Curve for 8000-20 Series Tractor from Flow Box Test



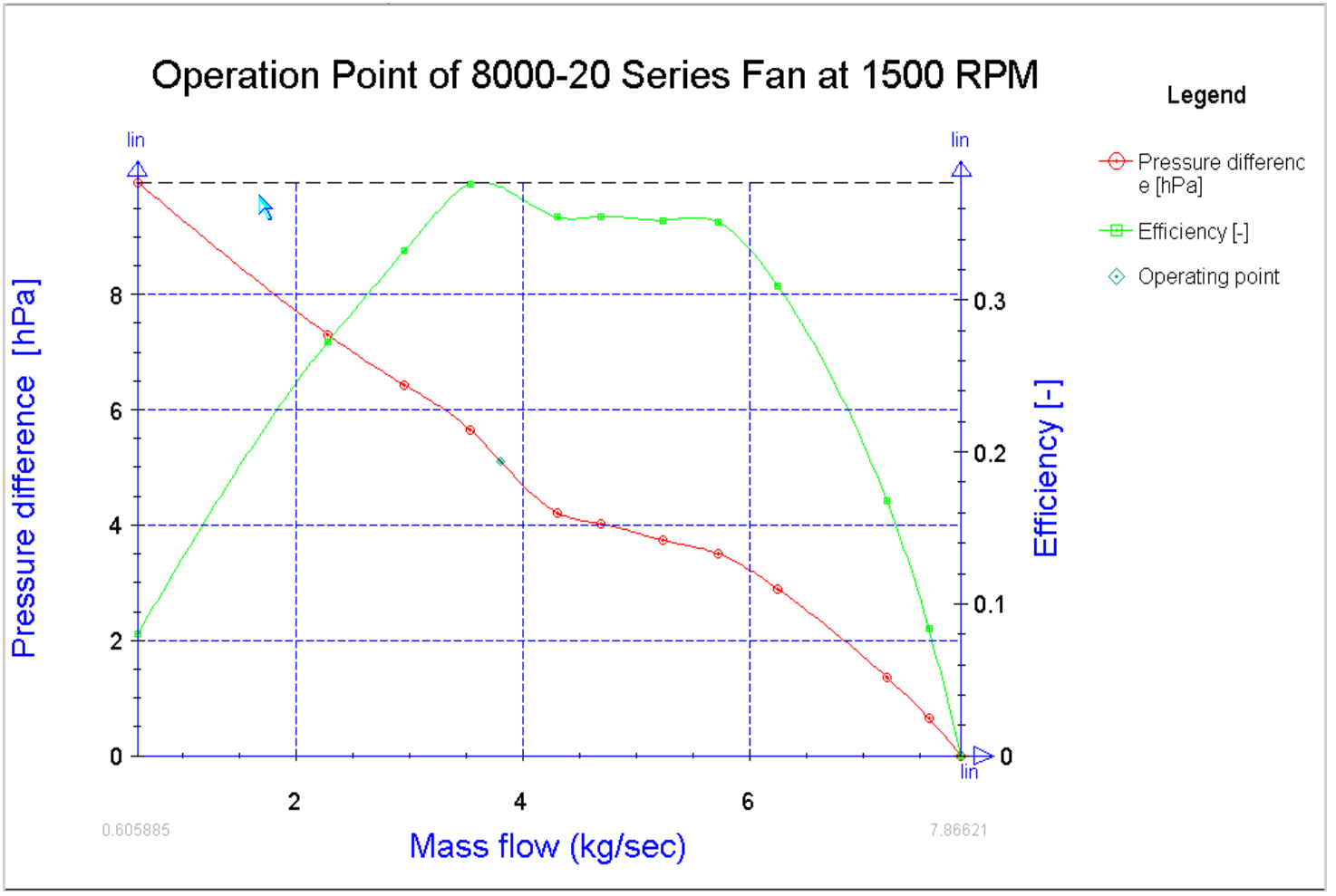
System Resistance Curve for 8000-20 Series Tractor using Kuli Simulations



Methods used to Generate System Resistance Curve using Kuli

- Run Kuli for various fan speeds like a speed sweep
- Get the fan operating point for each Kuli run
- Use the fan operating points to generate the system resistance curve

Operating Point of 8000-20 Series Fan



Conclusions and Comments

- The correlations between wind tunnel data and Kuli simulation results are good for both hot point and Nebraska point test conditions

- The correlation between Kuli generated system resistance curve and actual system resistance curve from measurements is good

- The reasonably good correlations between Kuli results and actual test data are big steps in improving the confidence in Kuli simulations, and results

Conclusions and Comments

- Generation of system resistance curves is little time consuming in Kuli
- There should be automatic generation of the system resistance curve within Kuli