

2016 Honda 1.5L L15B7 Tier 3 Fuel - Test Data Plots

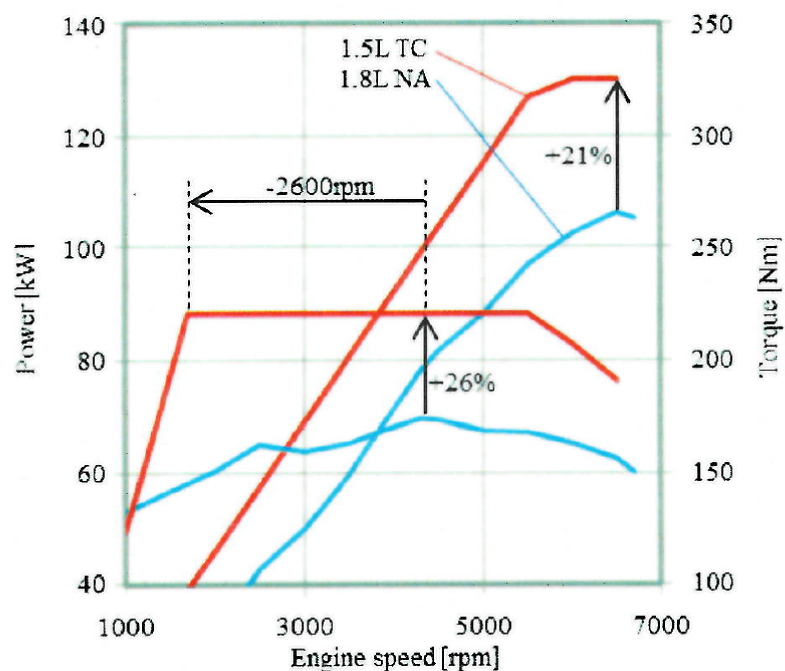
SUGGESTED CITATION: 2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Package. Version 2018-05. Ann Arbor, MI: US EPA, National Vehicle and Fuel Emissions Laboratory, National Center for Advanced Technology, 2018.

- - Dashed line indicates the maximum torque curve from published data
- Black dots indicate speed/load points at which steady state data was acquired
- △ Blue triangles indicate speed/load points at which initial data from the transient high load method was acquired
- ▲ Green triangles indicate speed/load points at which final data from the transient high load method was acquired
- × Red Xs indicate speed/load points where data was not collected or did not meet quality standards

Note: In these contour plots, individual data points may be ignored or removed, using our best engineering judgment, to correct irregularities in the visual presentation of the contour lines; additional details are contained in the test report.

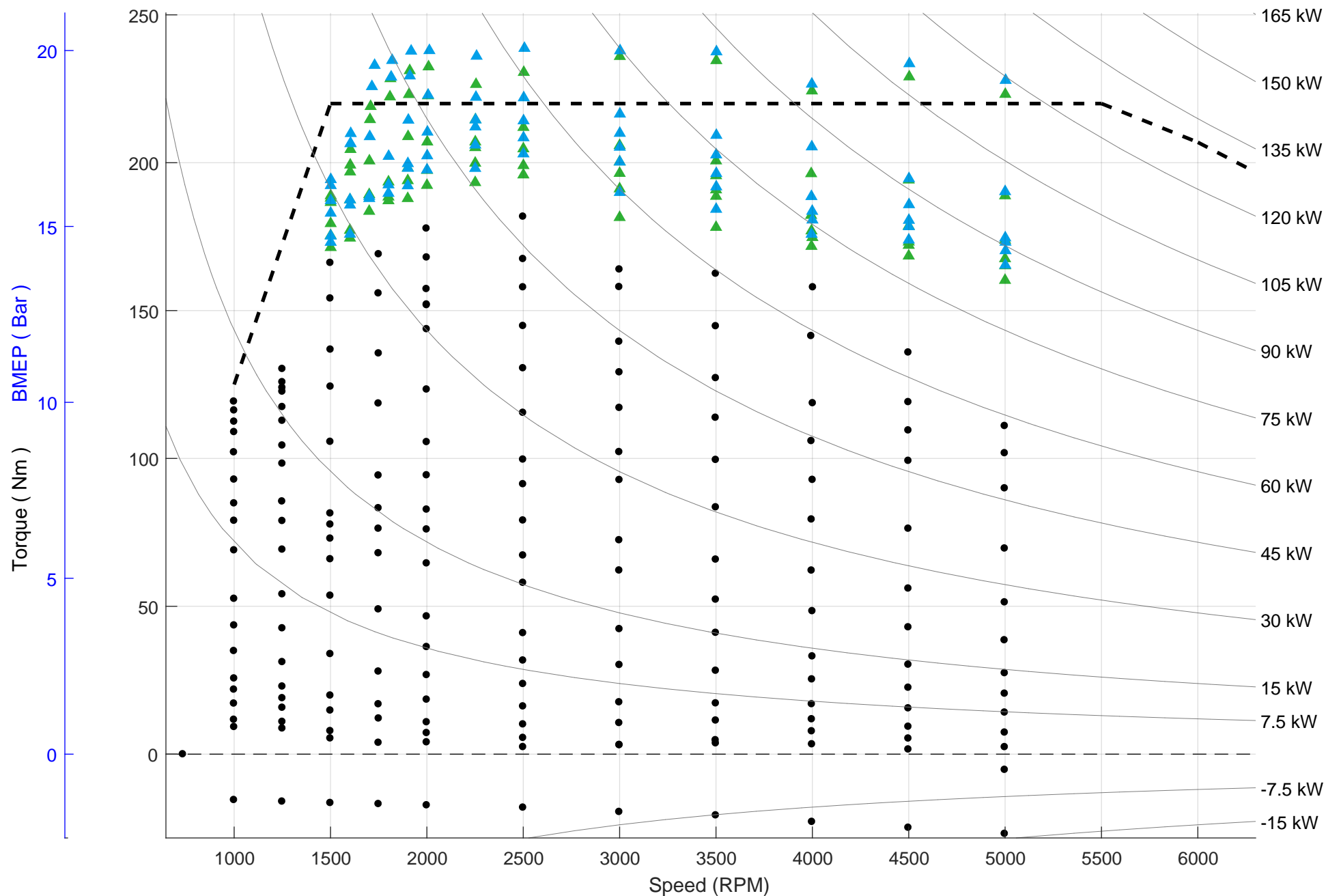
Published maximum torque data from:

Wada, Y., Nakano, K., Mochizuki, K., and Hata, R., "Development of a New 1.5L I4 Turbocharged Gasoline Direct Injection Engine," SAE Technical Paper 2016-01-1020, 2016, doi:10.4271/2016-01-1020.

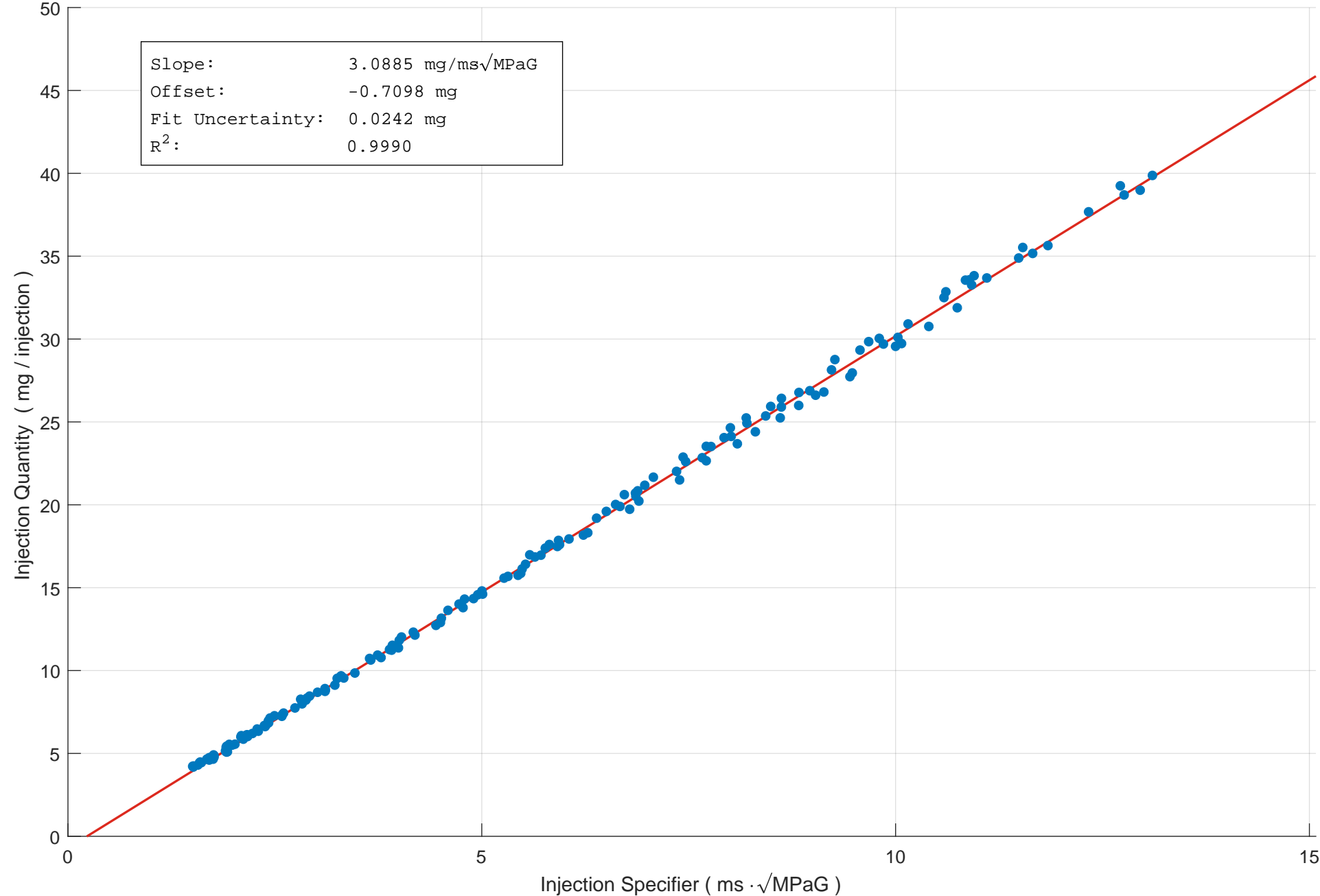


2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

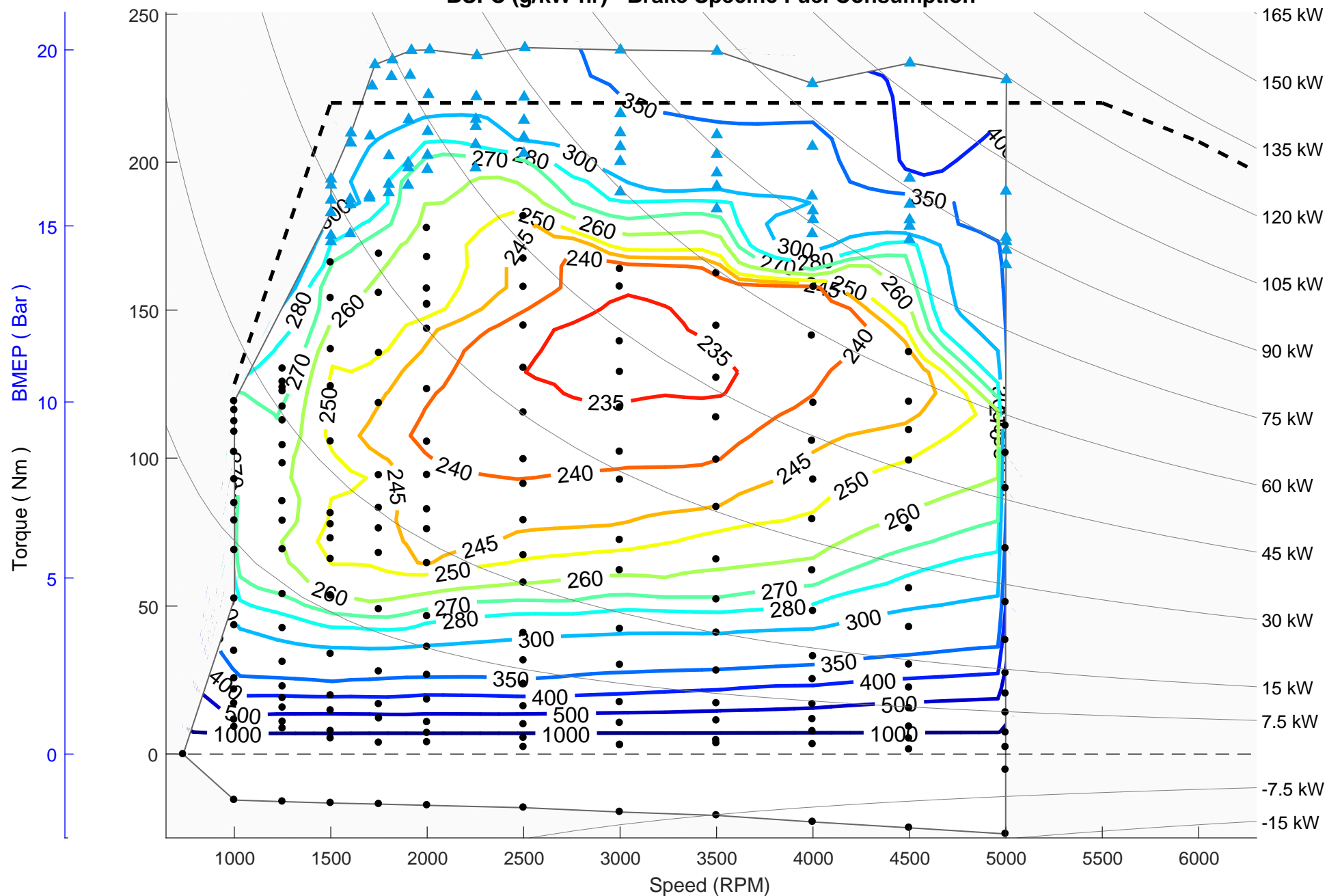
Test Data Points



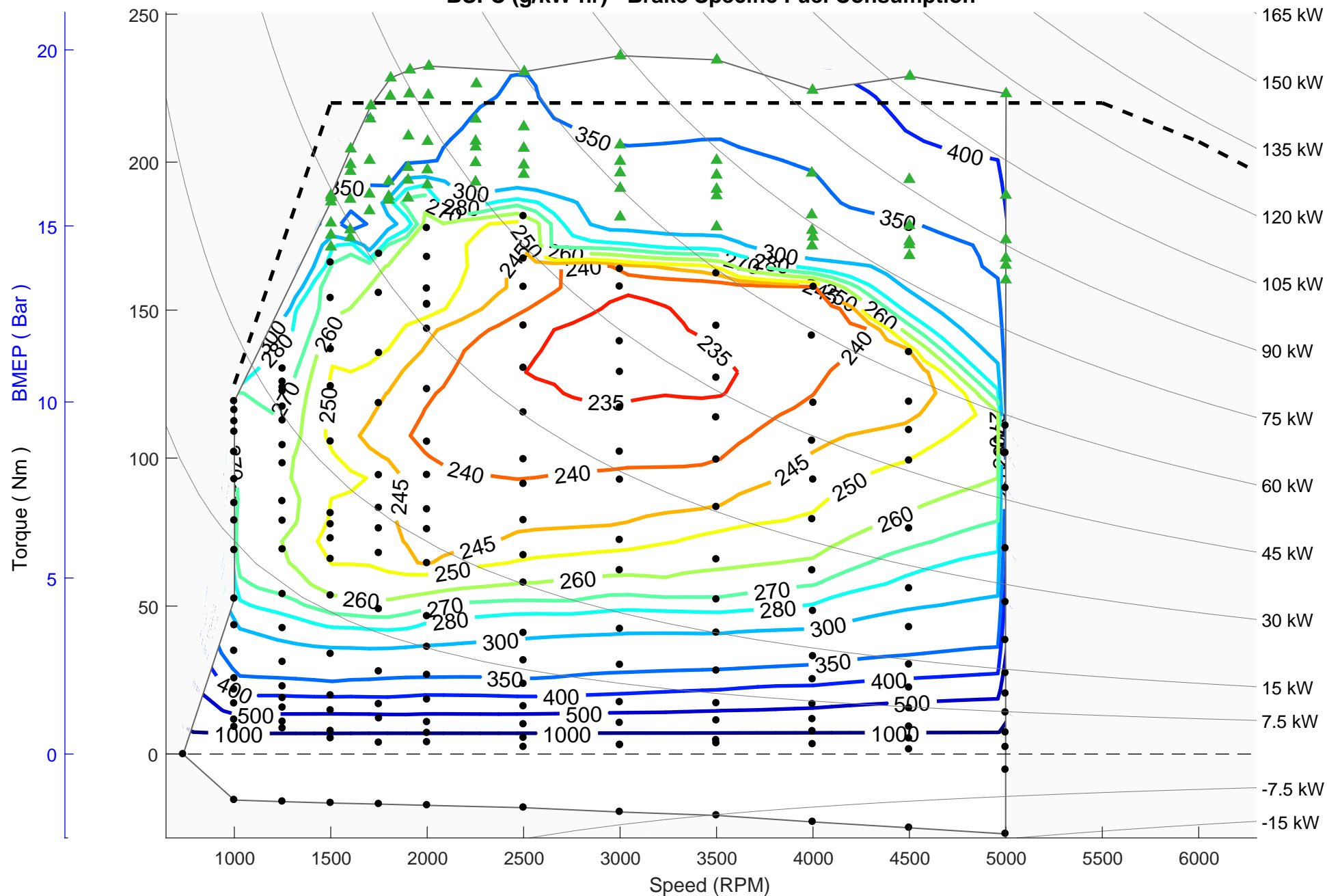
2016 Honda 1.5L L15B7 Tier 3 Fuel - Test Data Plots
Injector Calibration



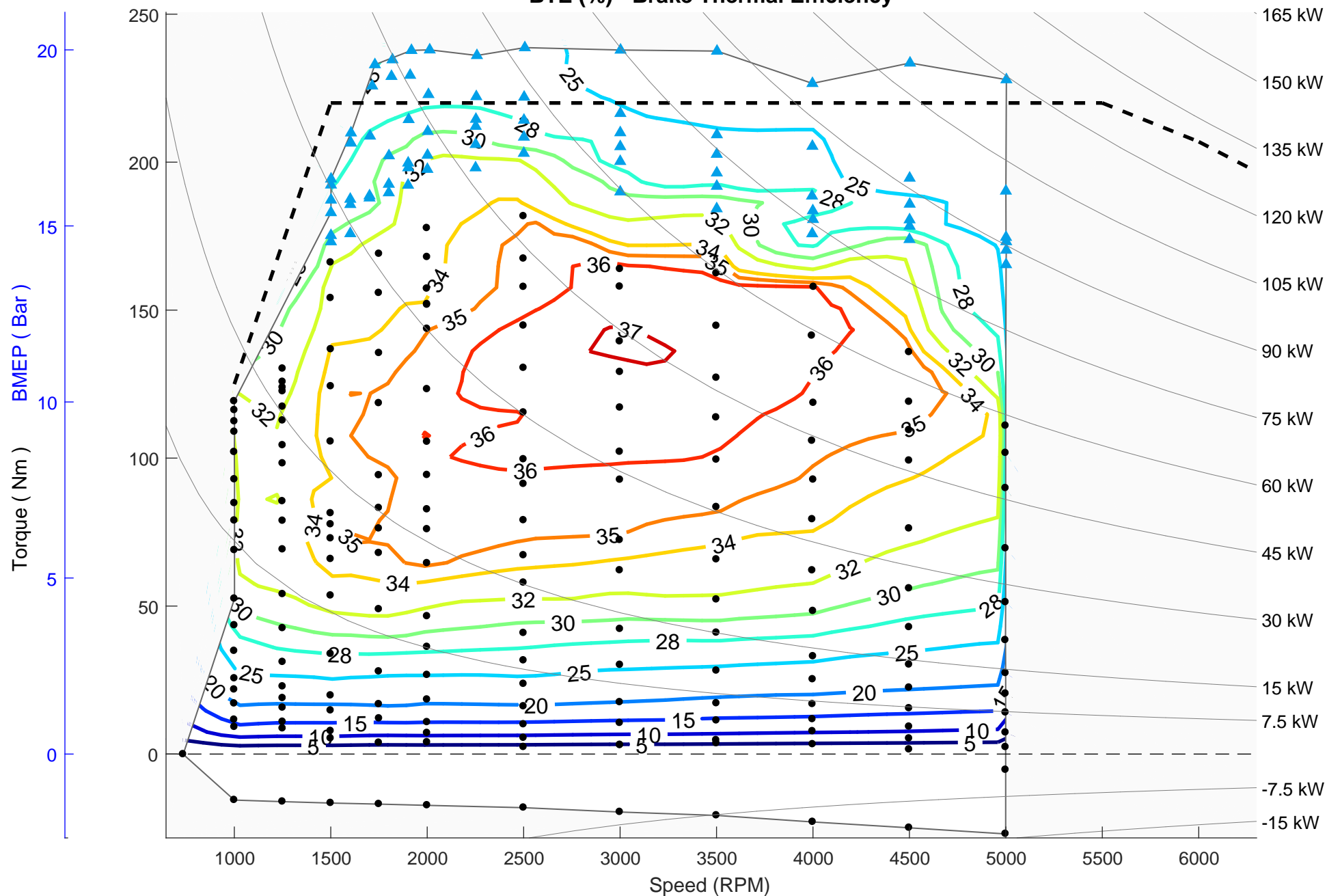
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
BSFC (g/kW-hr) - Brake Specific Fuel Consumption



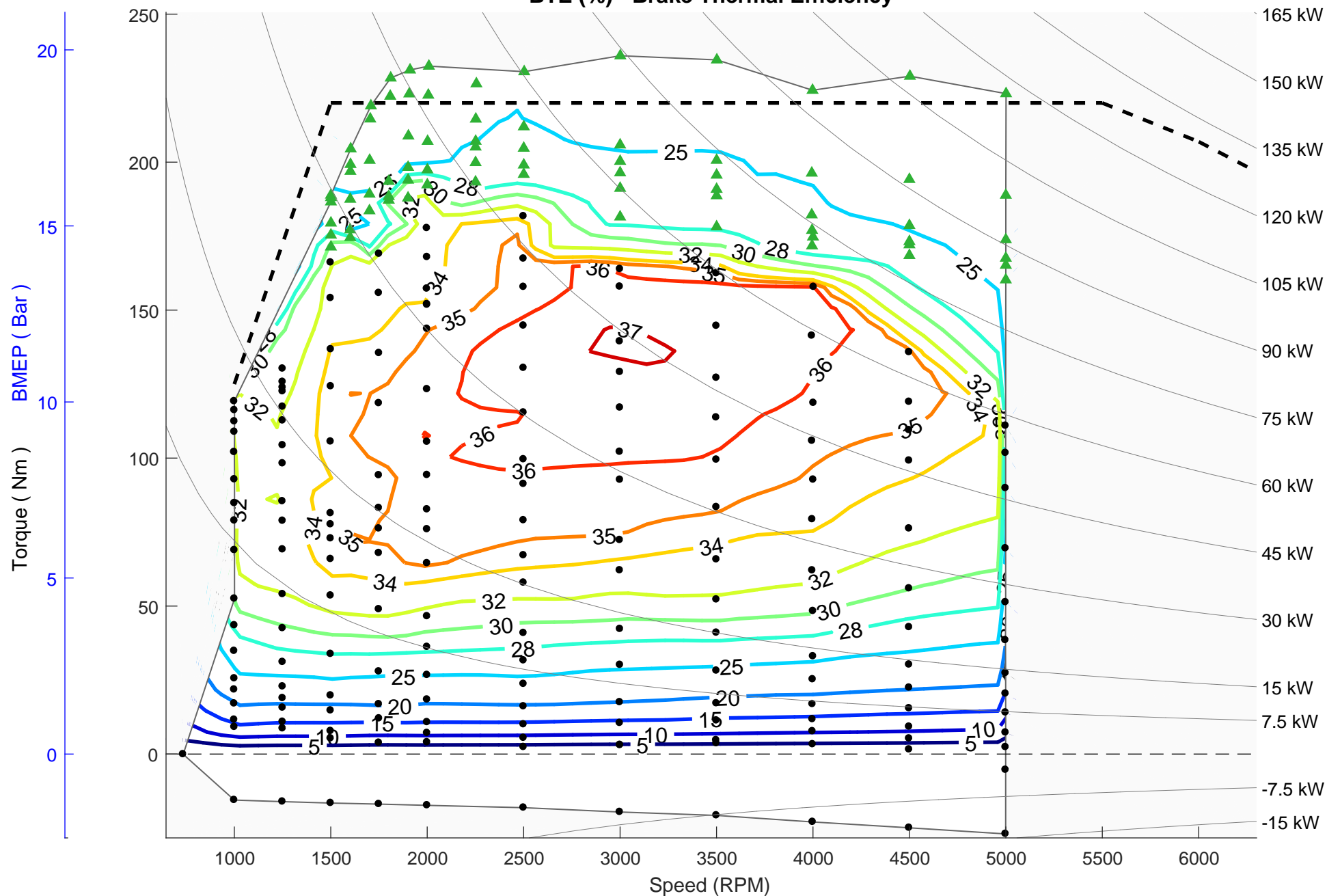
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
BSFC (g/kW-hr) - Brake Specific Fuel Consumption



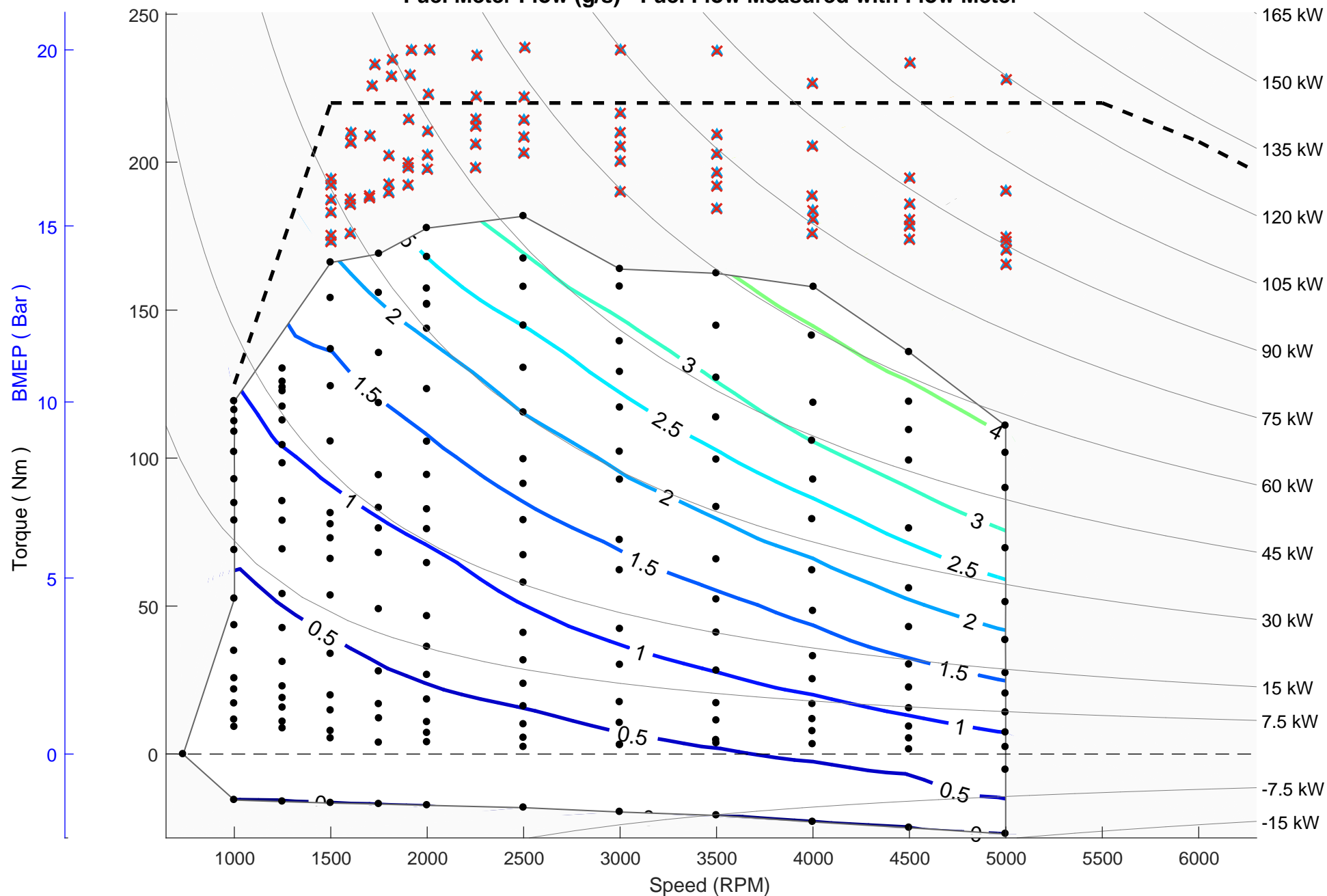
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
BTE (%) - Brake Thermal Efficiency



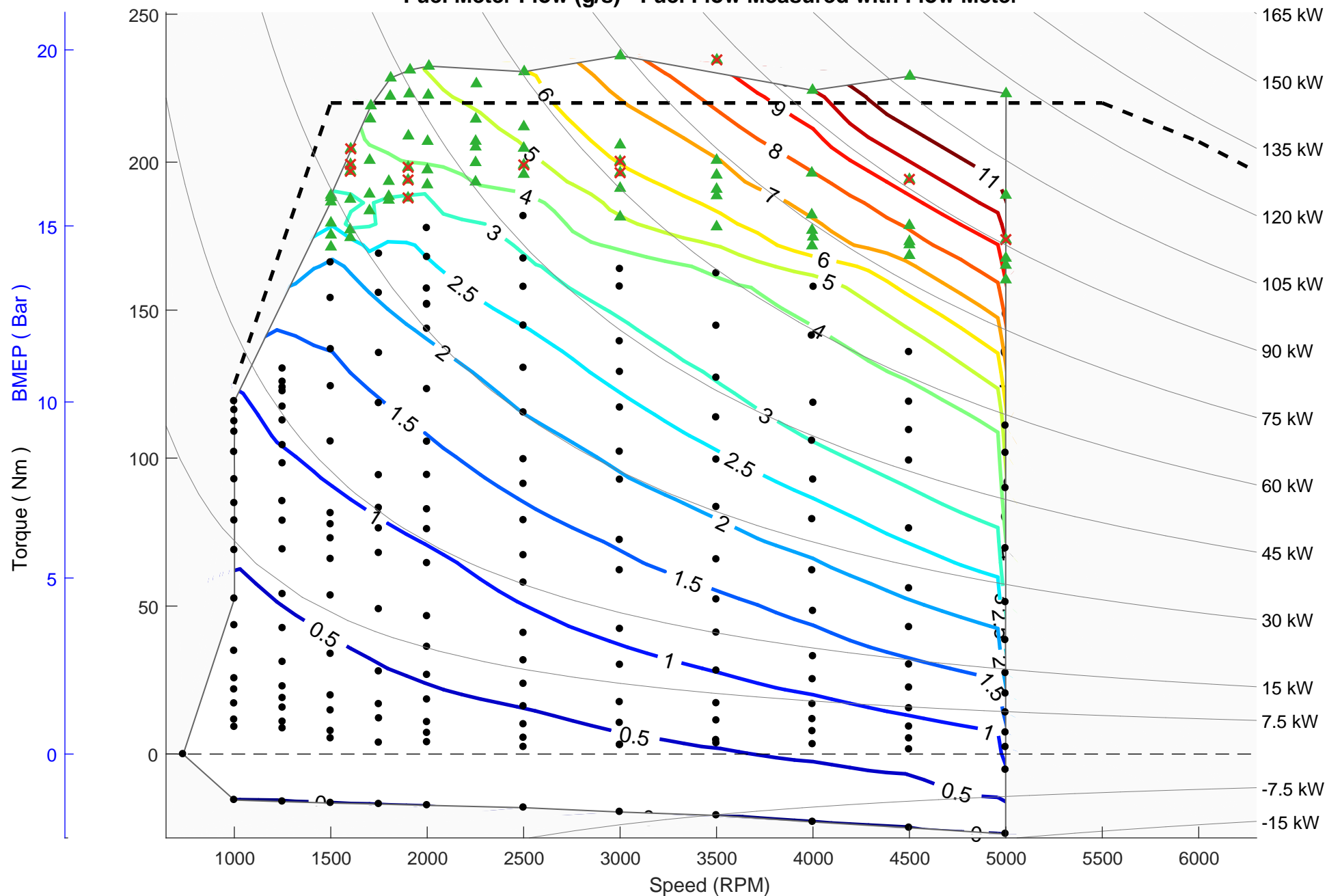
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
BTE (%) - Brake Thermal Efficiency



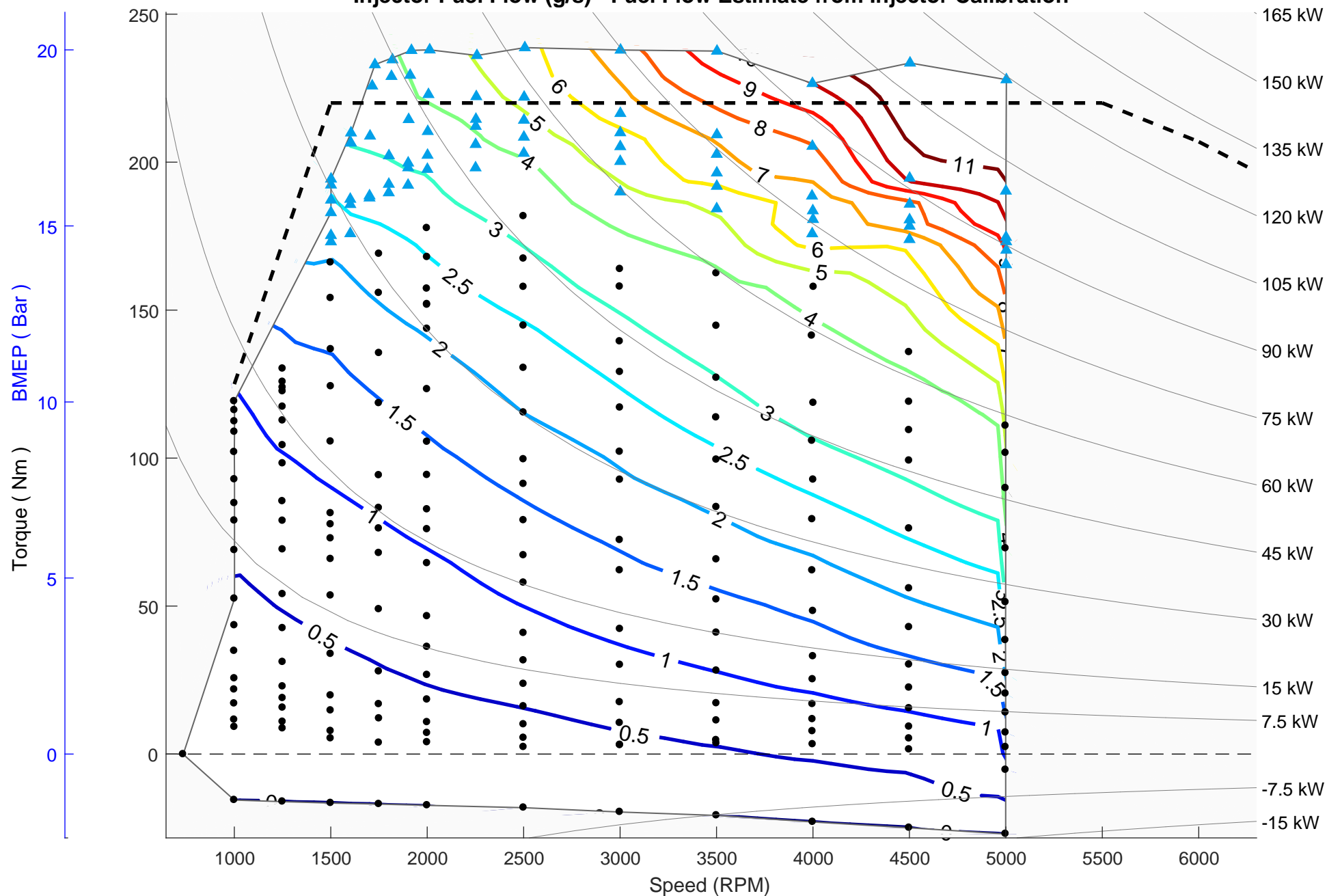
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Fuel Meter Flow (g/s) - Fuel Flow Measured with Flow Meter



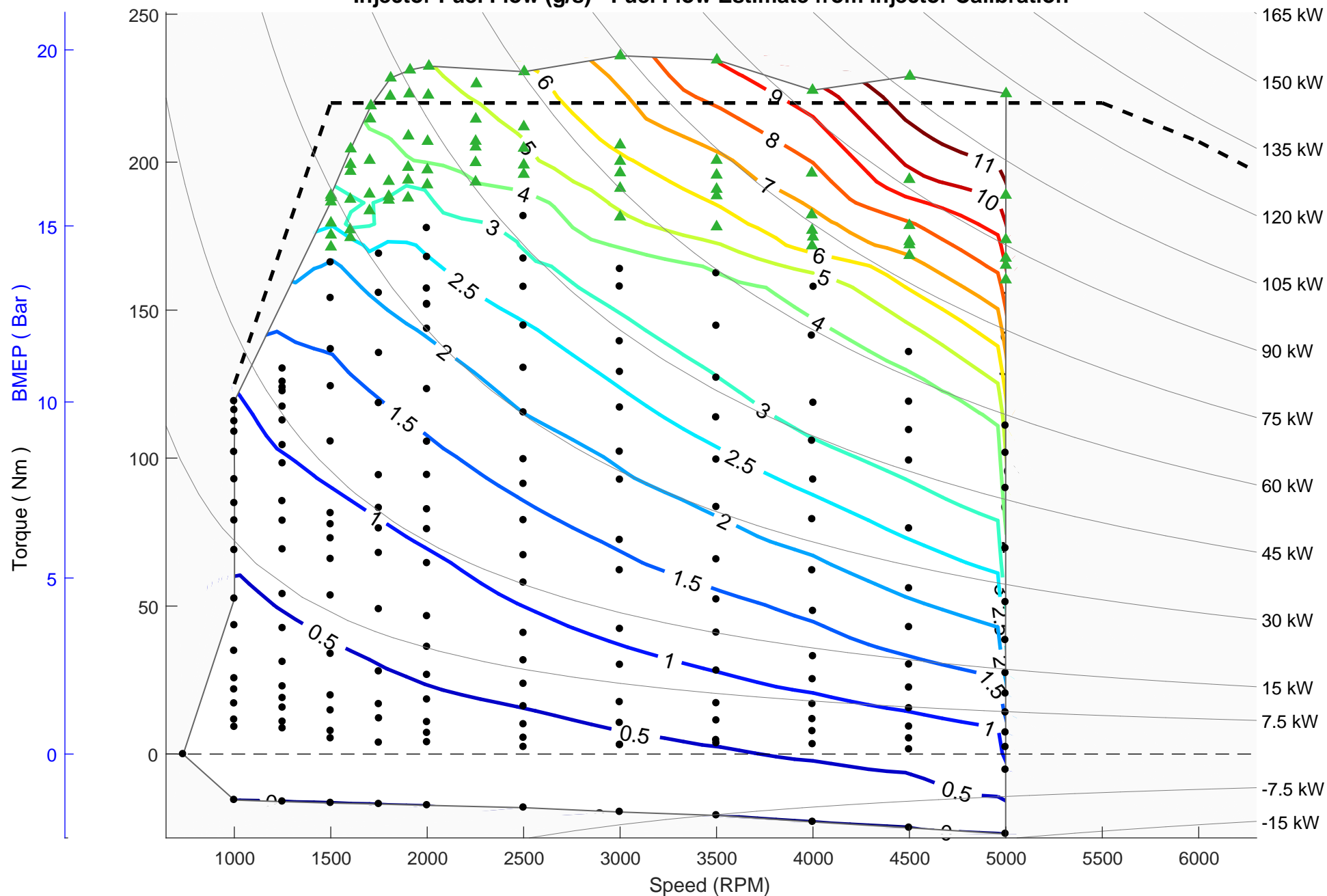
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Fuel Meter Flow (g/s) - Fuel Flow Measured with Flow Meter



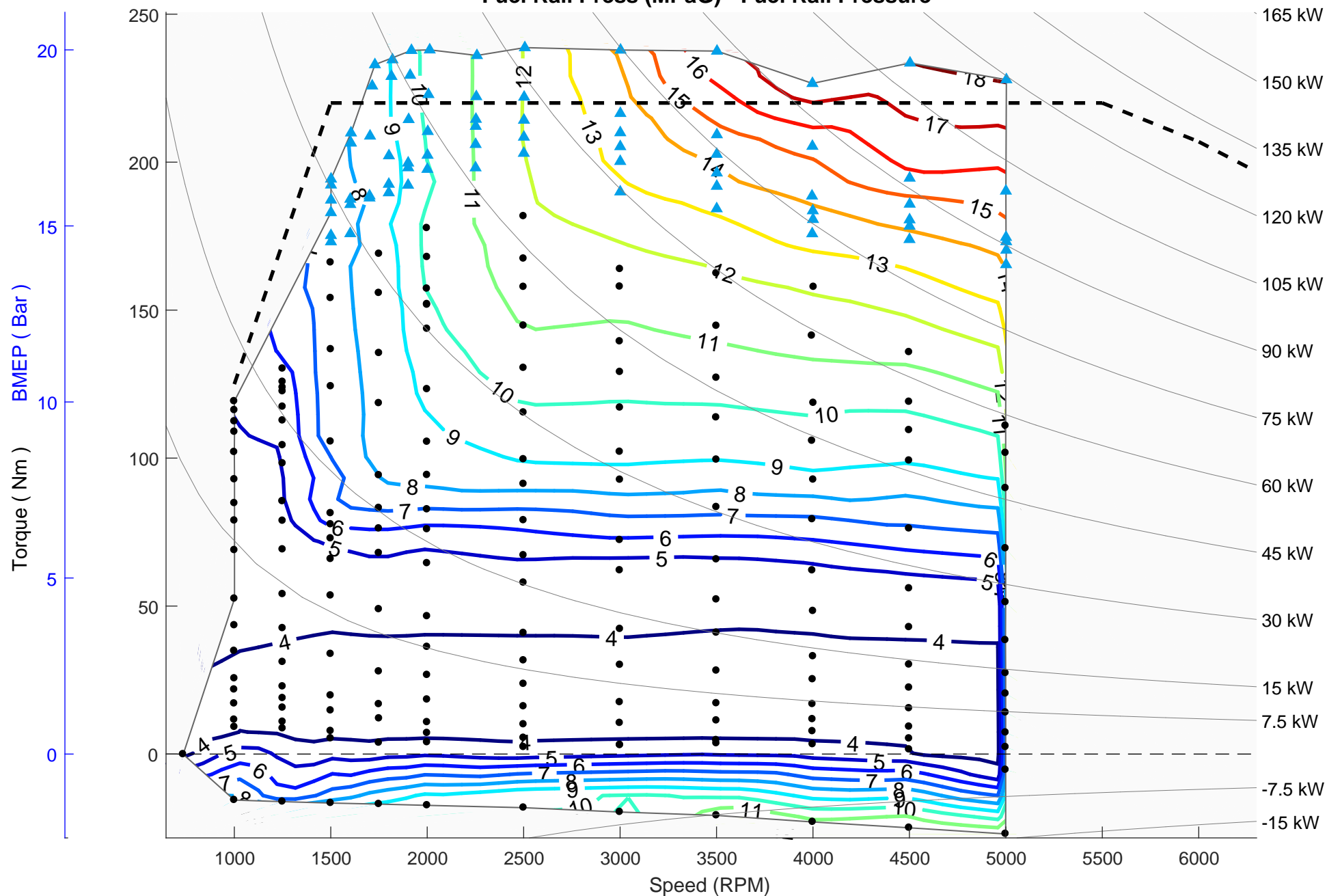
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Injector Fuel Flow (g/s) - Fuel Flow Estimate from Injector Calibration



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Injector Fuel Flow (g/s) - Fuel Flow Estimate from Injector Calibration

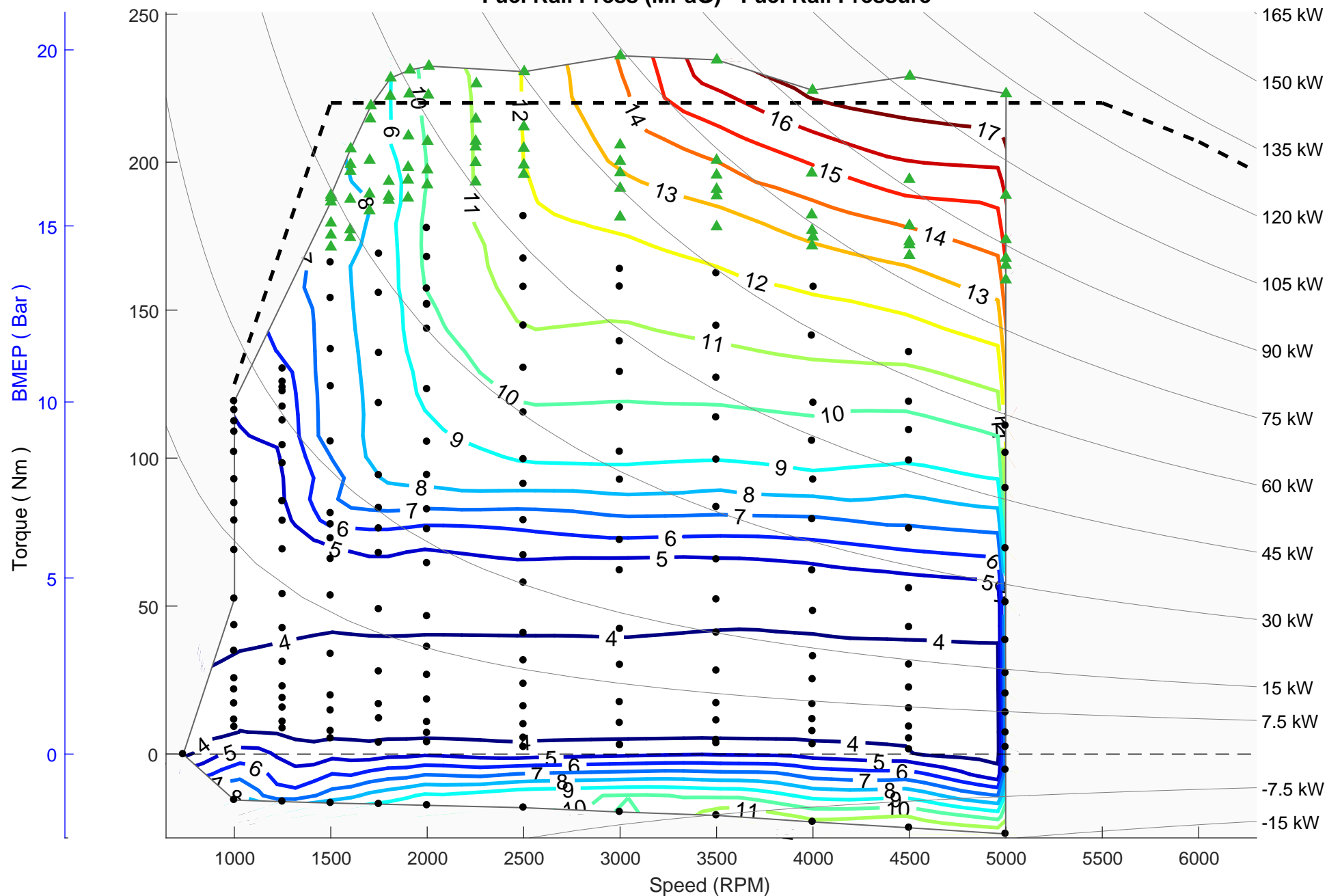


2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Fuel Rail Press (MPaG) - Fuel Rail Pressure*



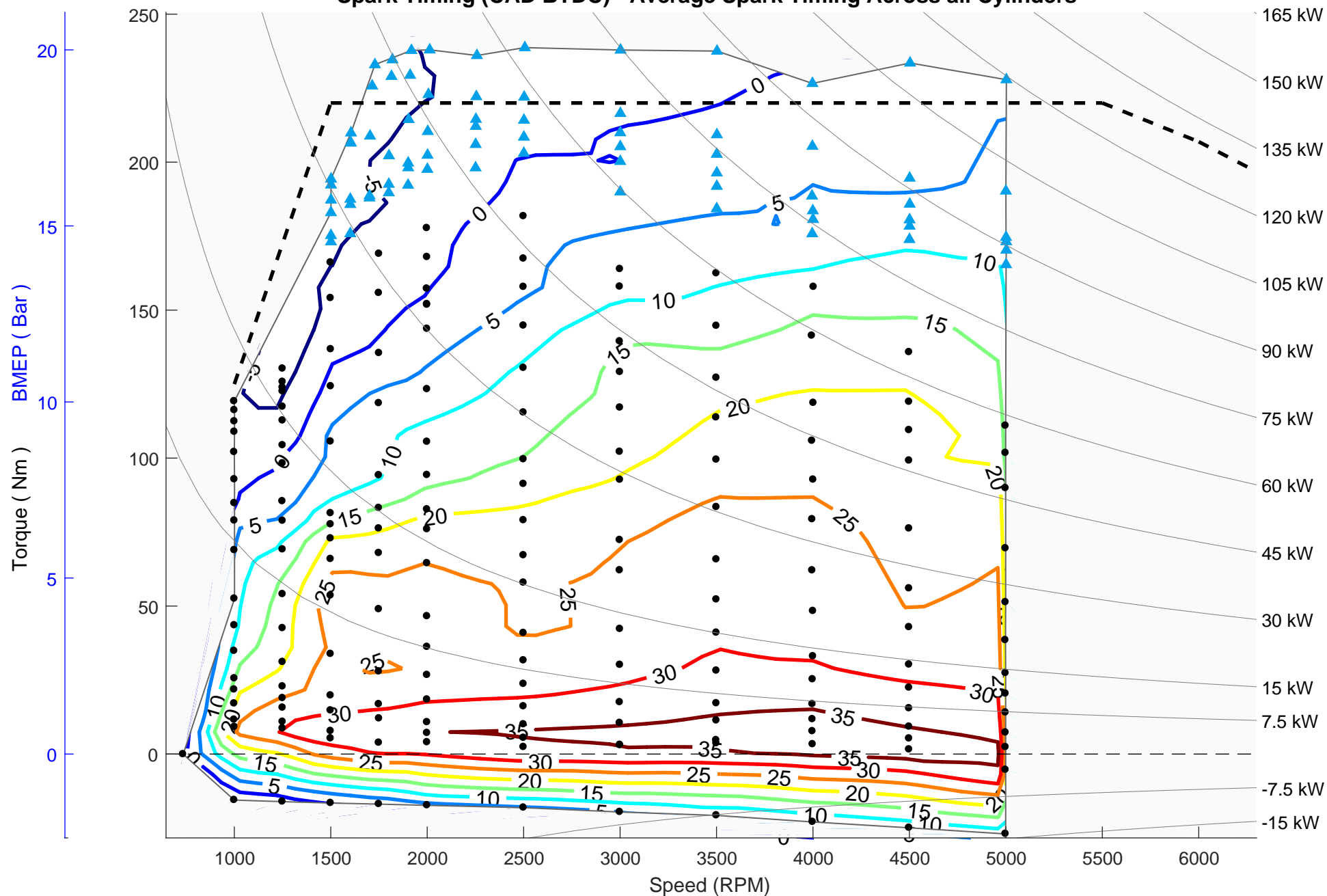
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2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Fuel Rail Press (MPaG) - Fuel Rail Pressure*



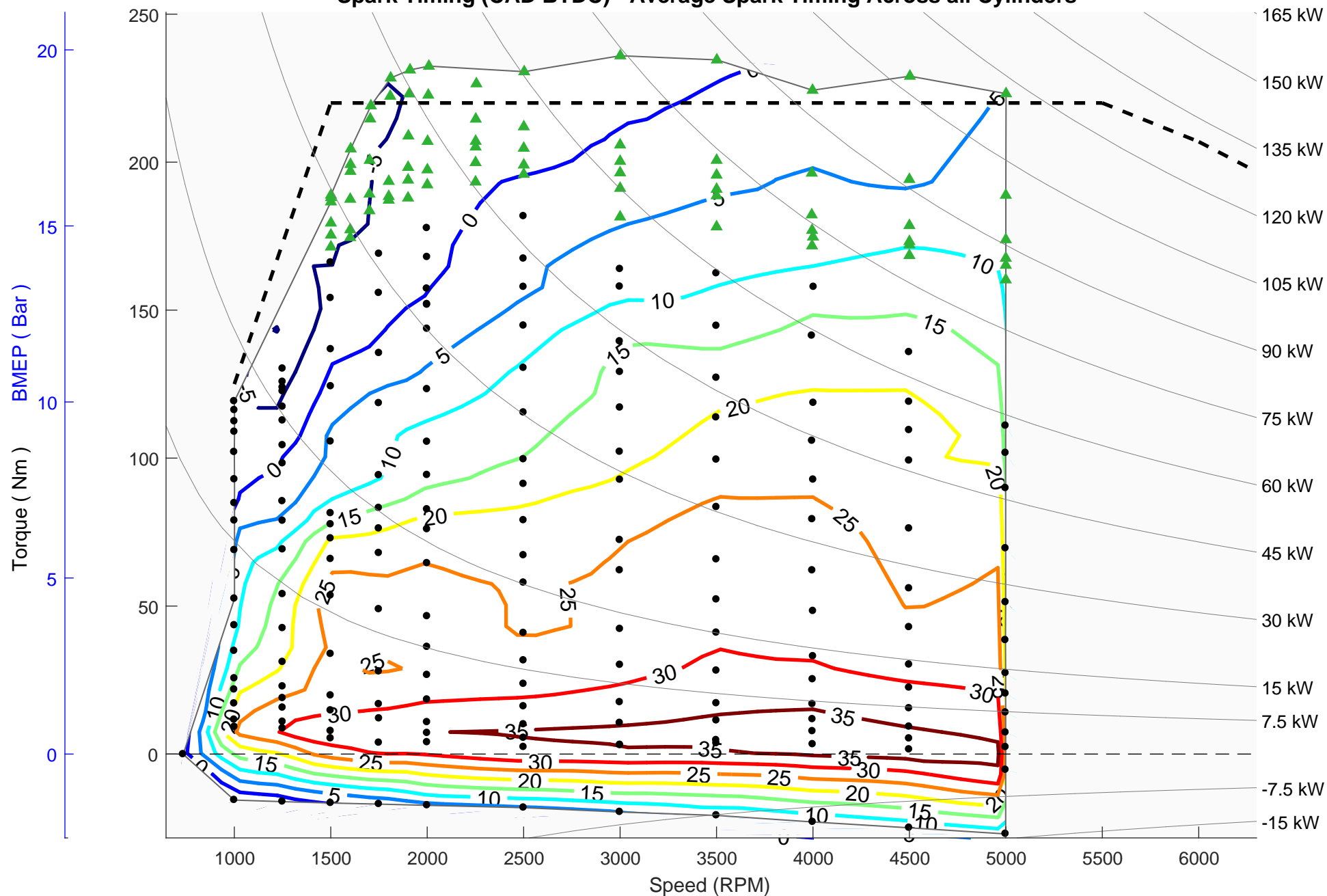
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2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Spark Timing (CAD BTDC) - Average Spark Timing Across all Cylinders*

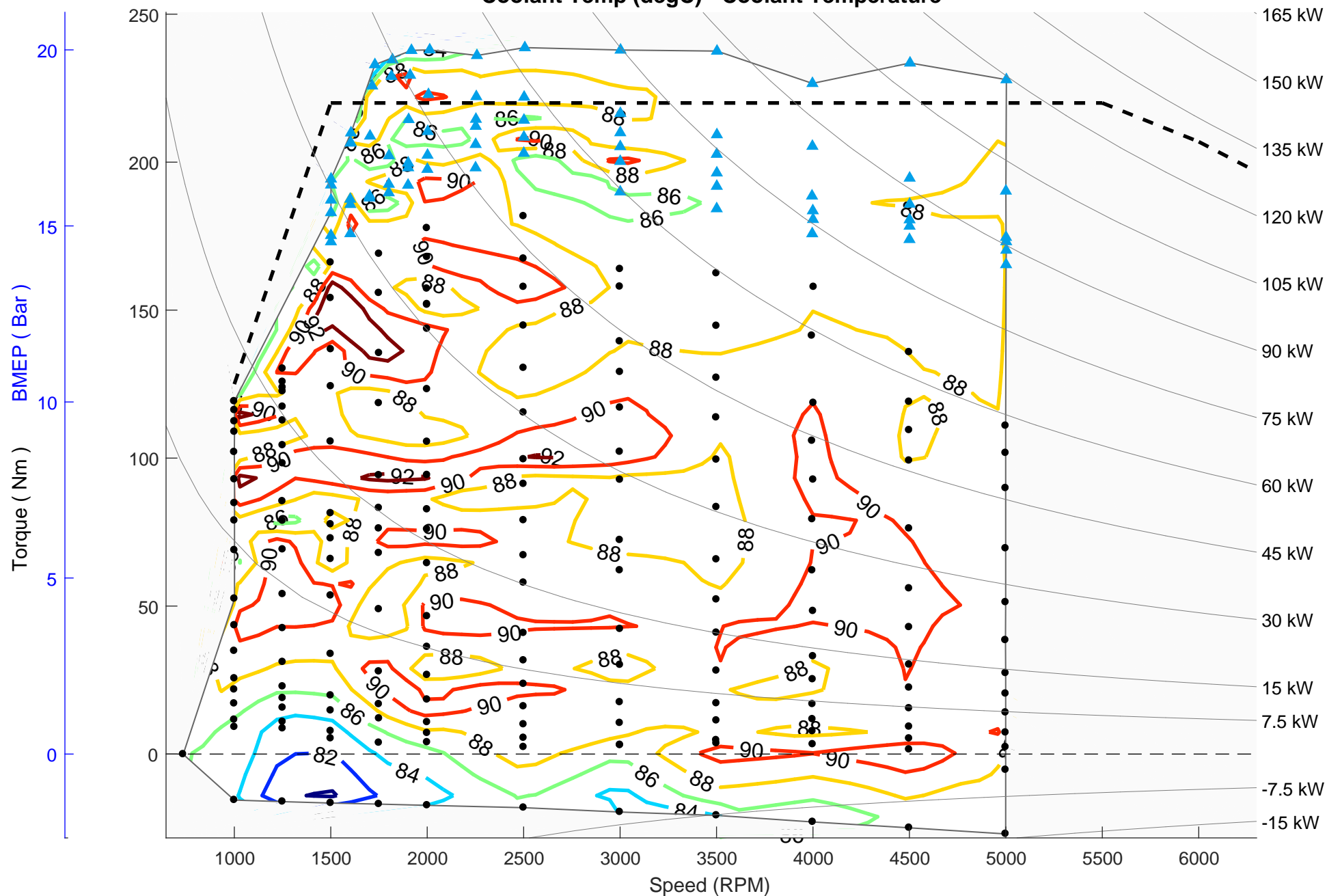


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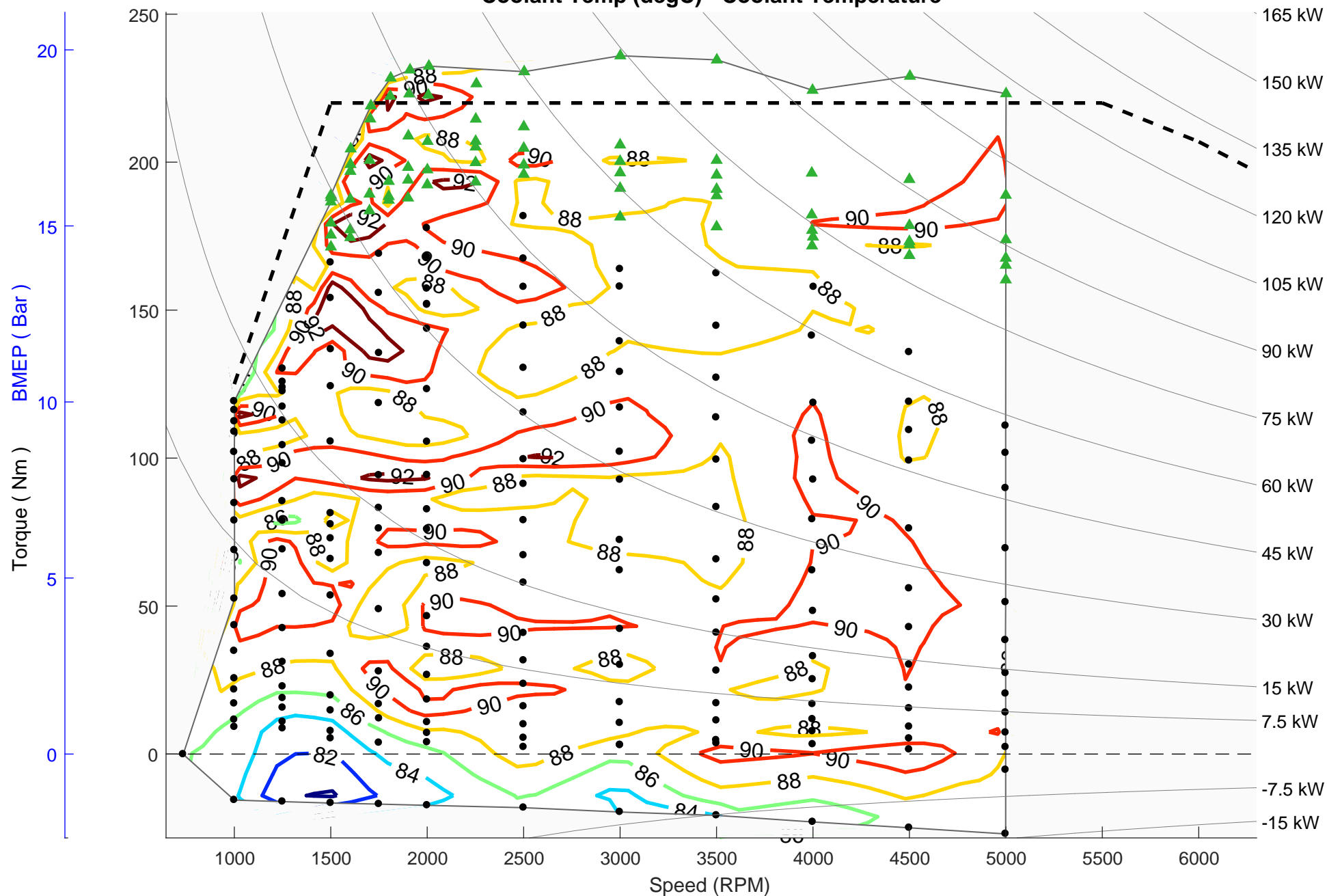
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Spark Timing (CAD BTDC) - Average Spark Timing Across all Cylinders*



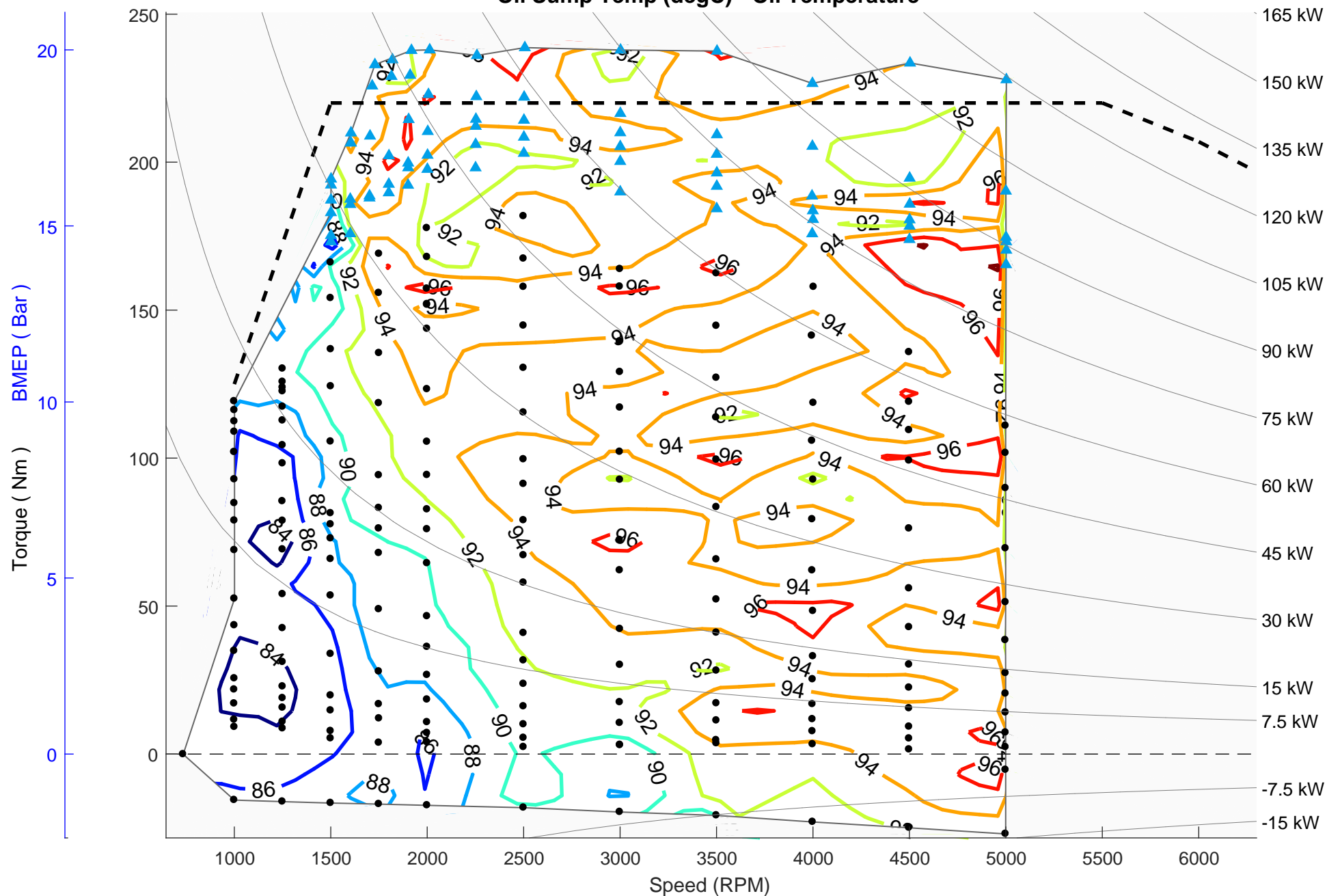
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Coolant Temp (degC) - Coolant Temperature



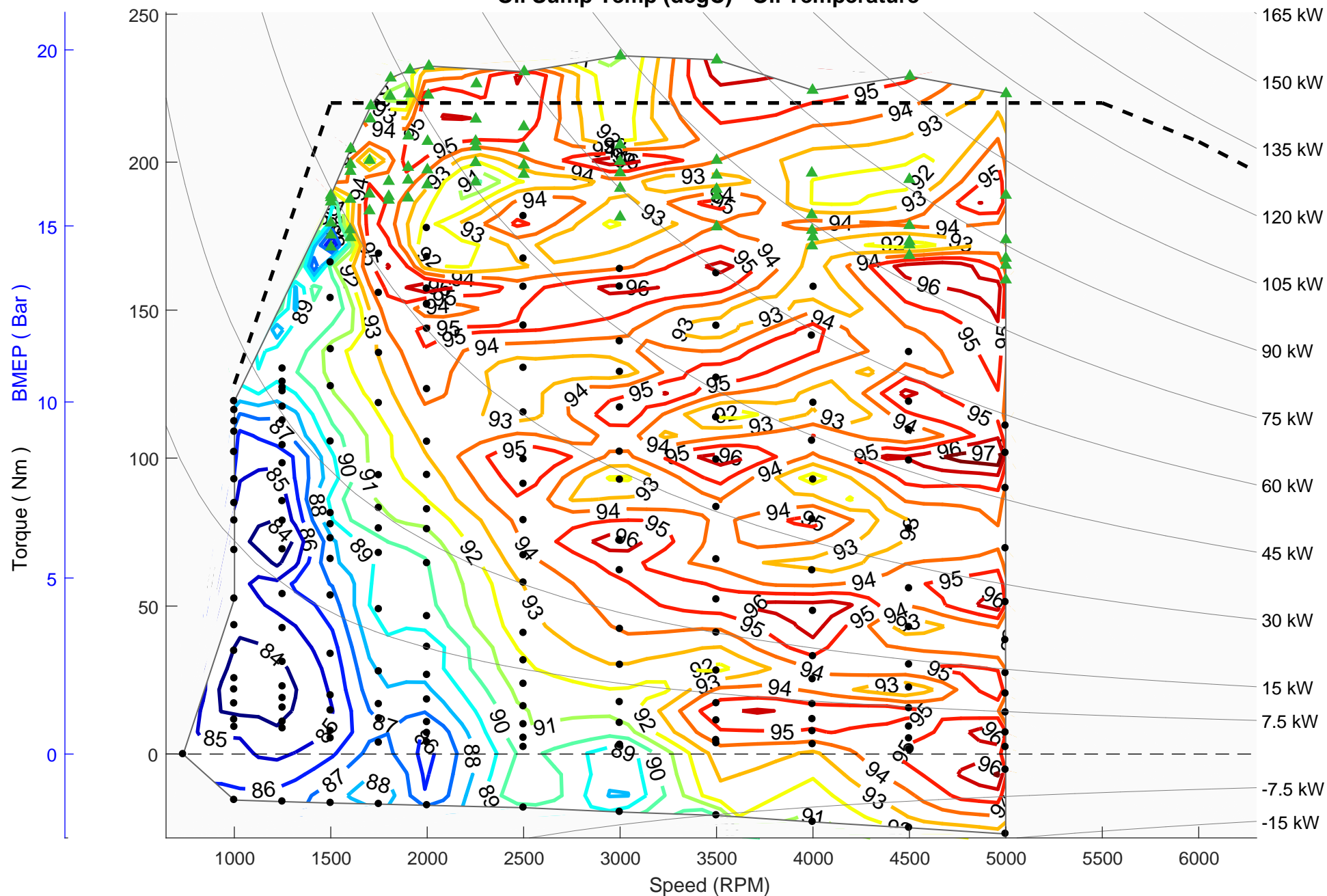
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Coolant Temp (degC) - Coolant Temperature



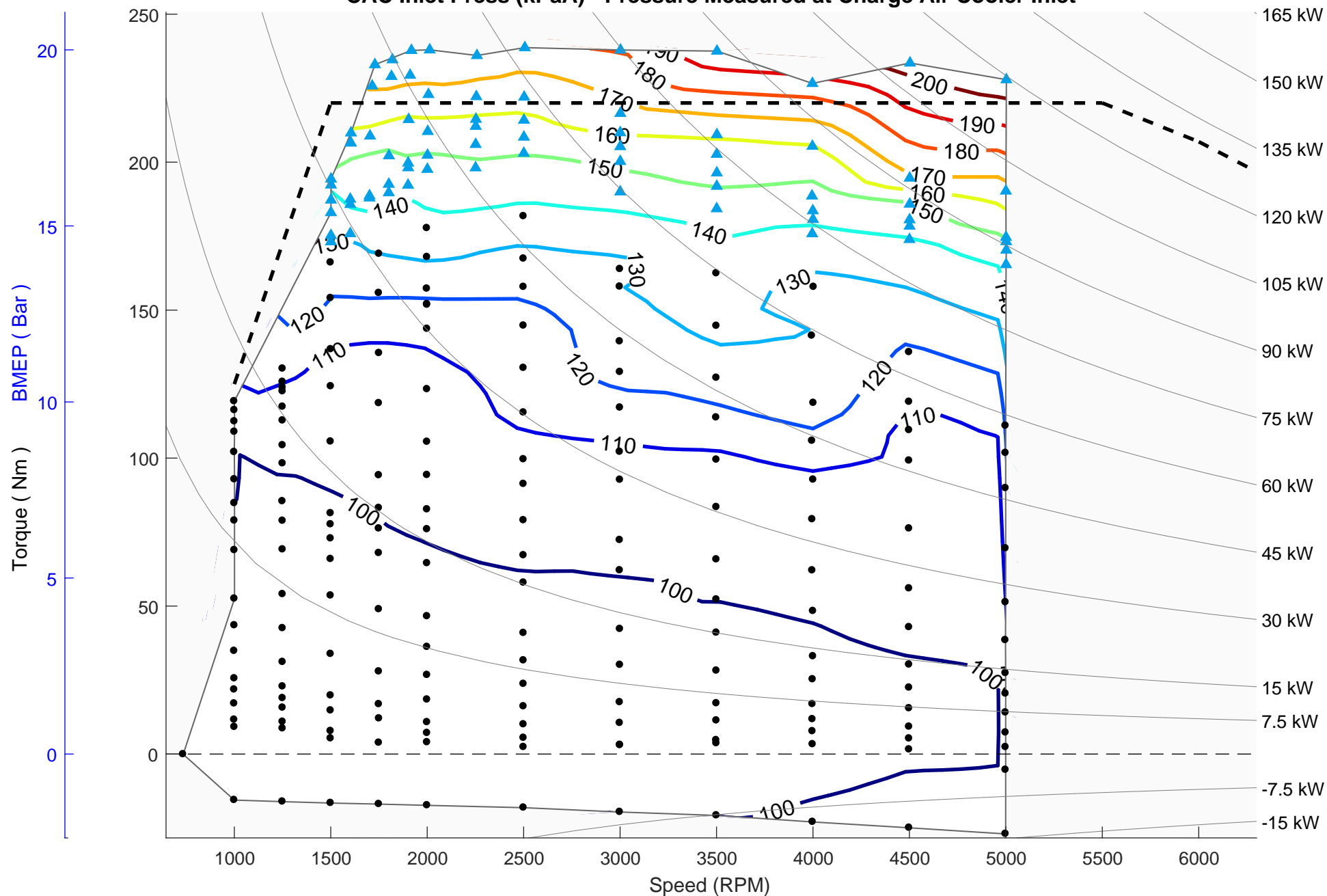
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Oil Sump Temp (degC) - Oil Temperature



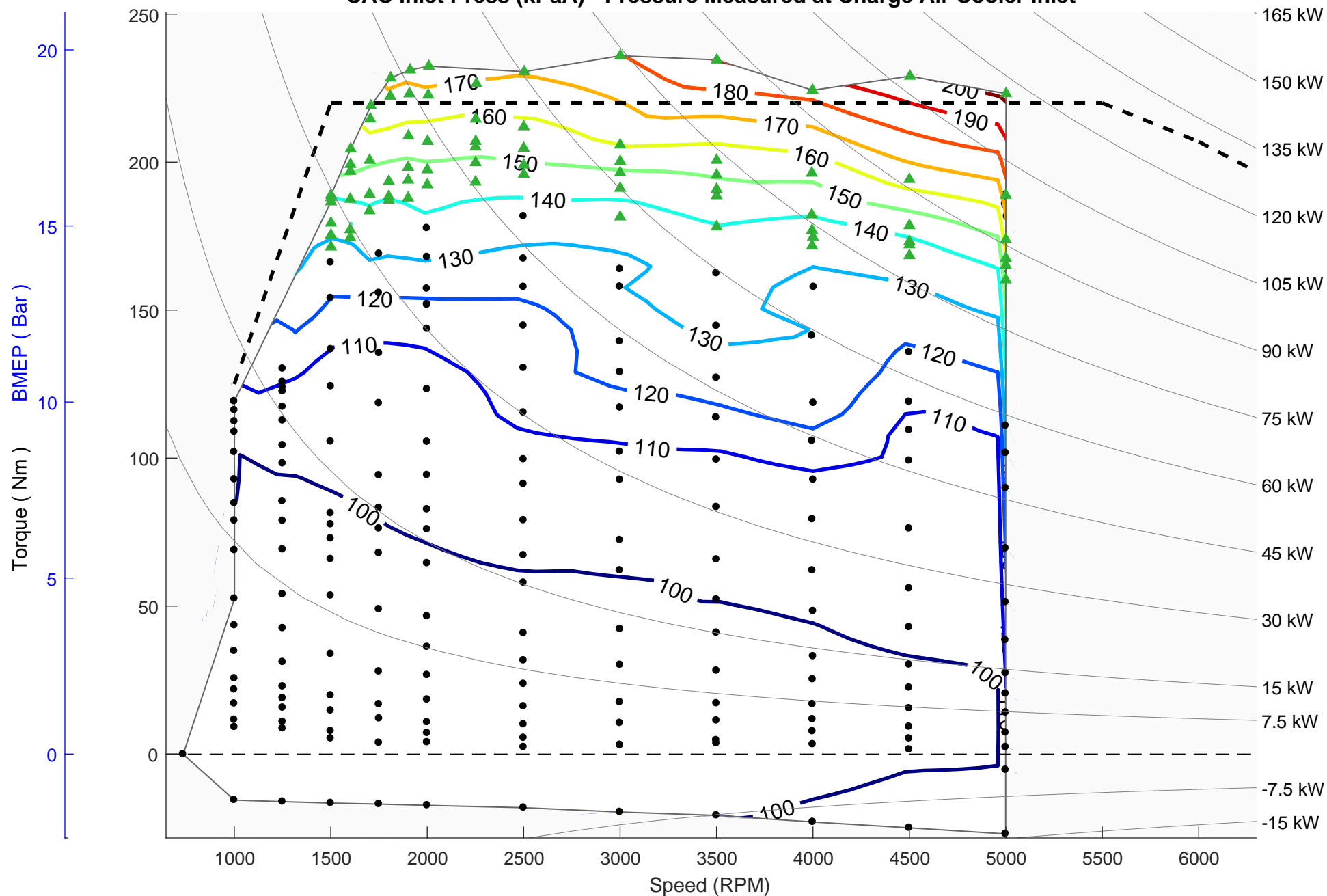
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Oil Sump Temp (degC) - Oil Temperature



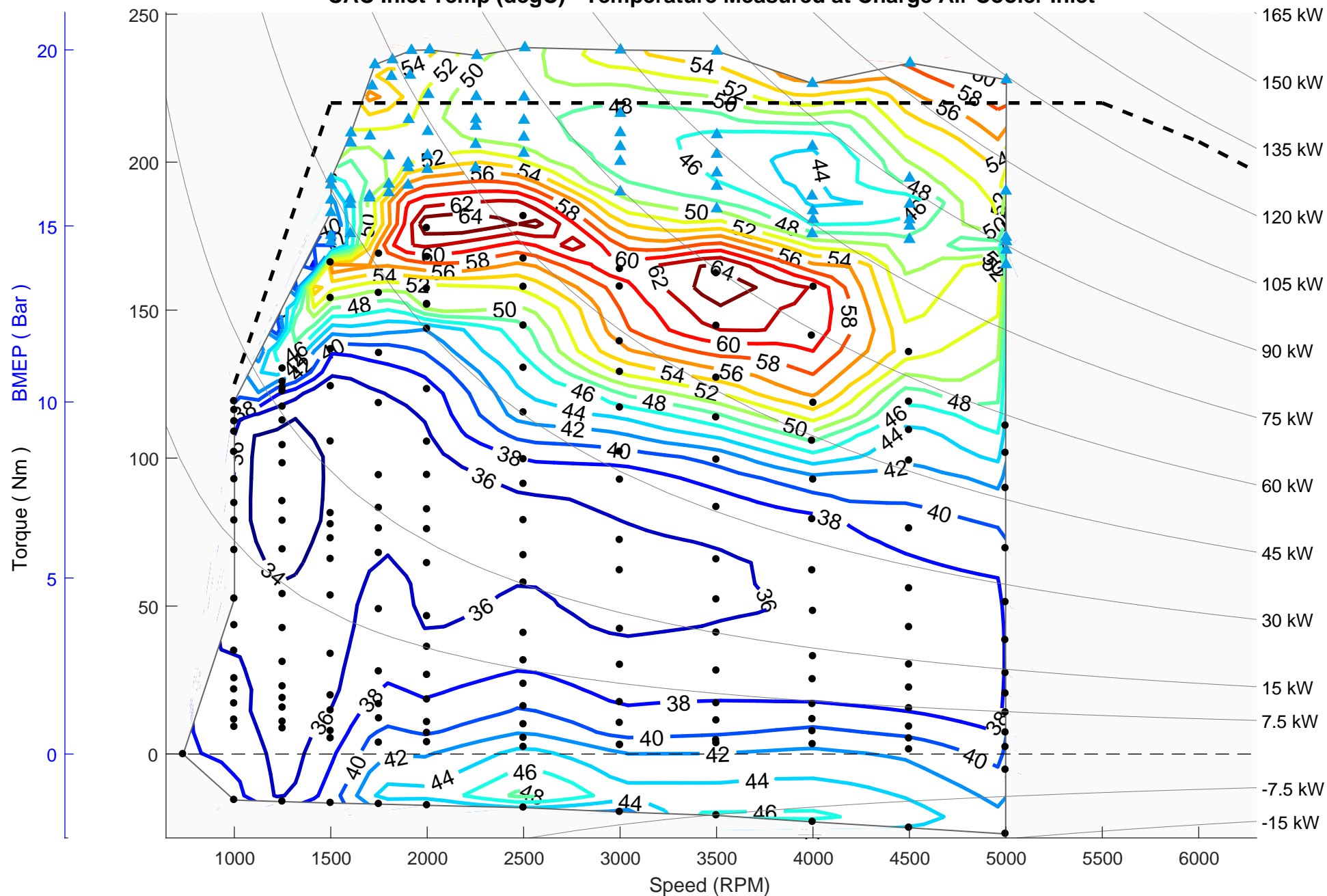
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
CAC Inlet Press (kPaA) - Pressure Measured at Charge Air Cooler Inlet



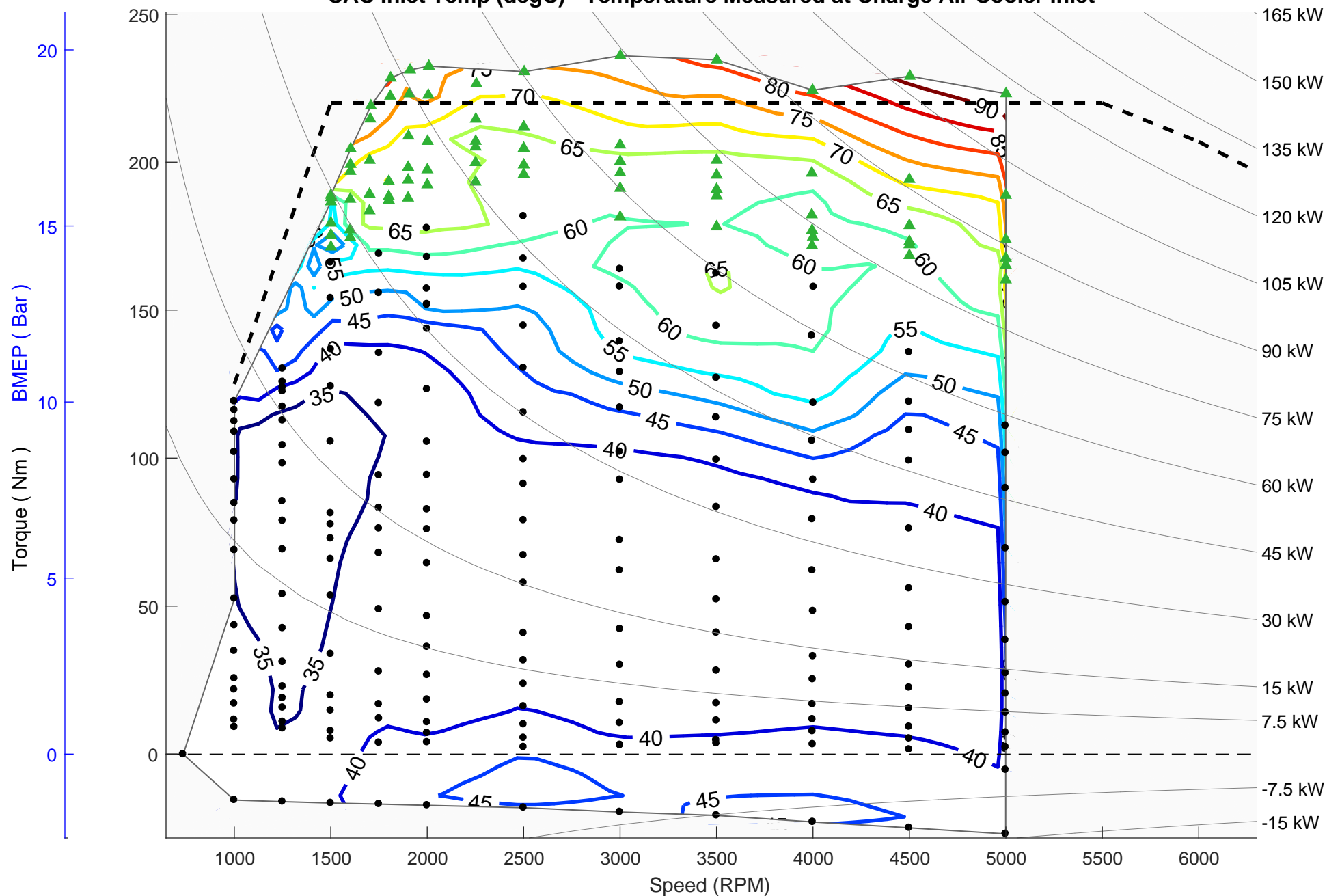
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
CAC Inlet Press (kPaA) - Pressure Measured at Charge Air Cooler Inlet



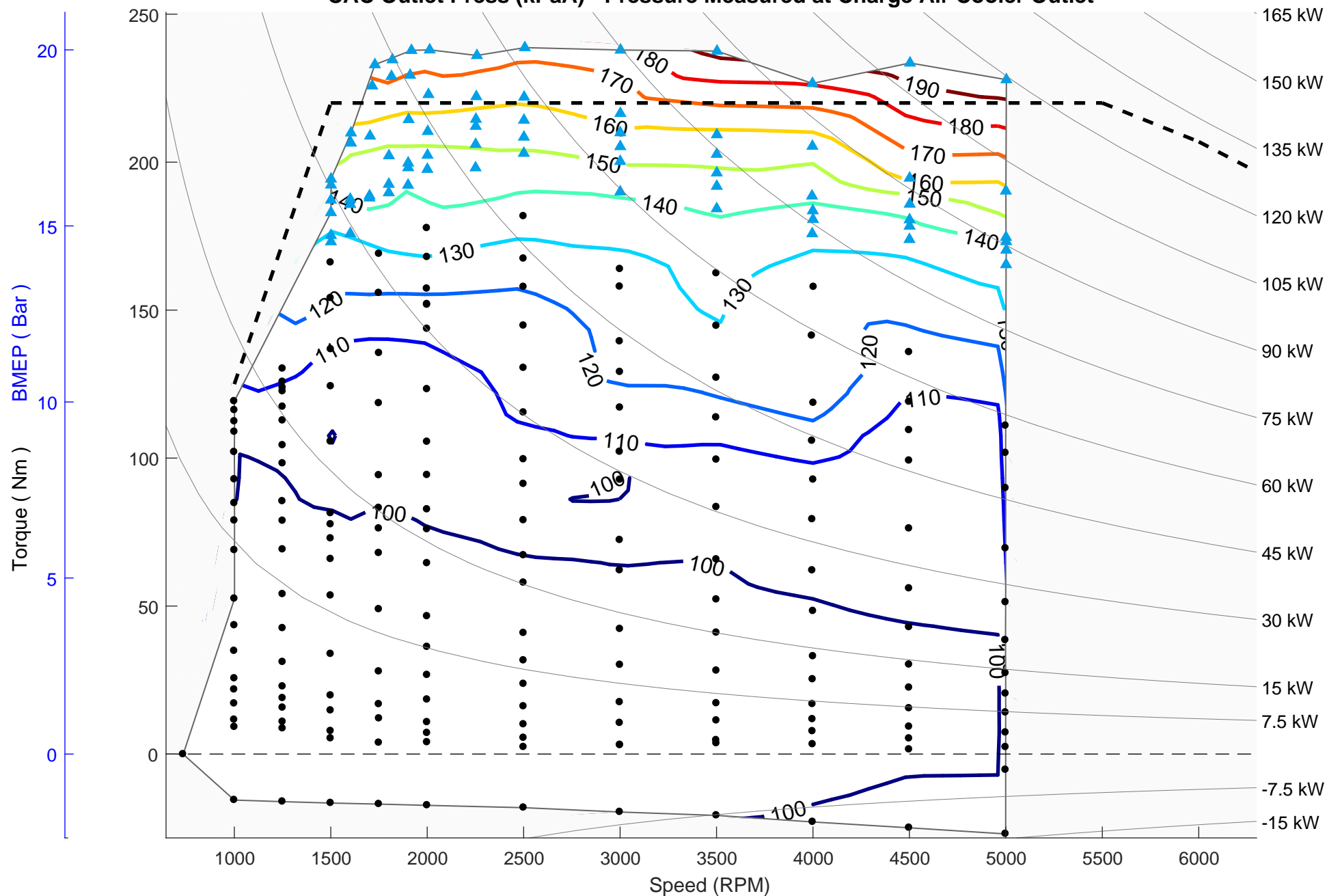
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
CAC Inlet Temp (degC) - Temperature Measured at Charge Air Cooler Inlet



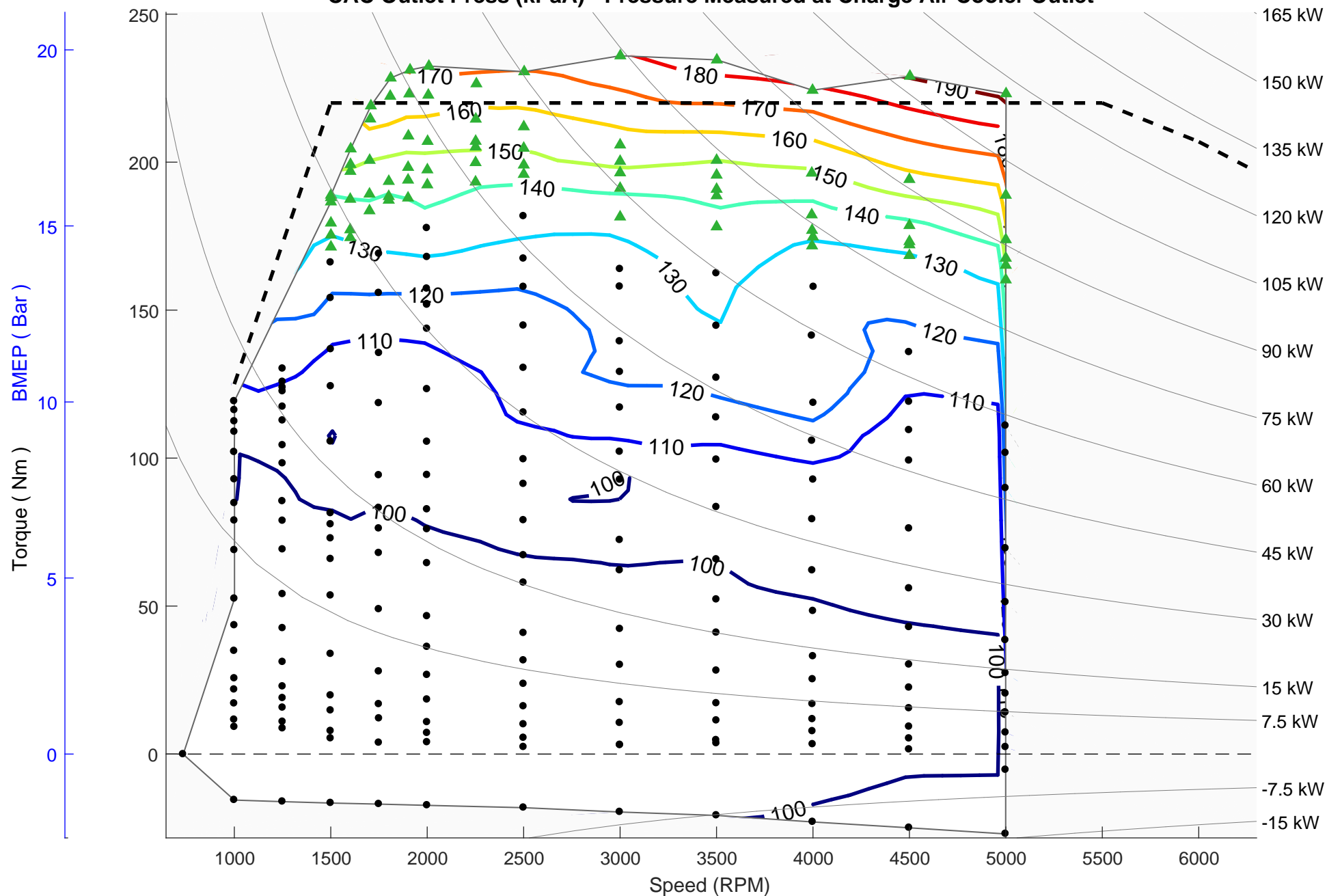
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
CAC Inlet Temp (degC) - Temperature Measured at Charge Air Cooler Inlet



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
CAC Outlet Press (kPaA) - Pressure Measured at Charge Air Cooler Outlet



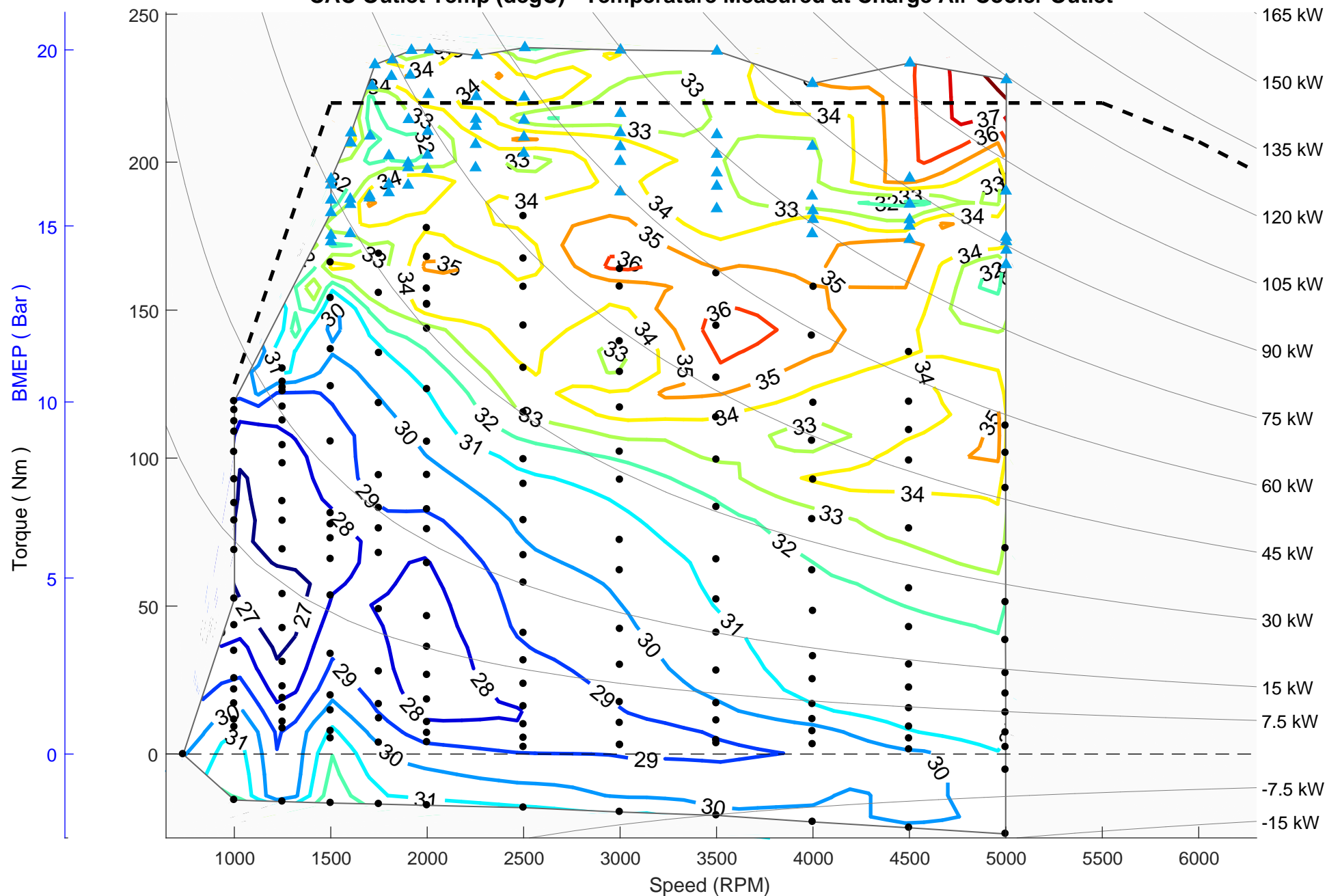
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Steady State and High Load Final
CAC Outlet Press (kPaA) - Pressure Measured at Charge Air Cooler Outlet



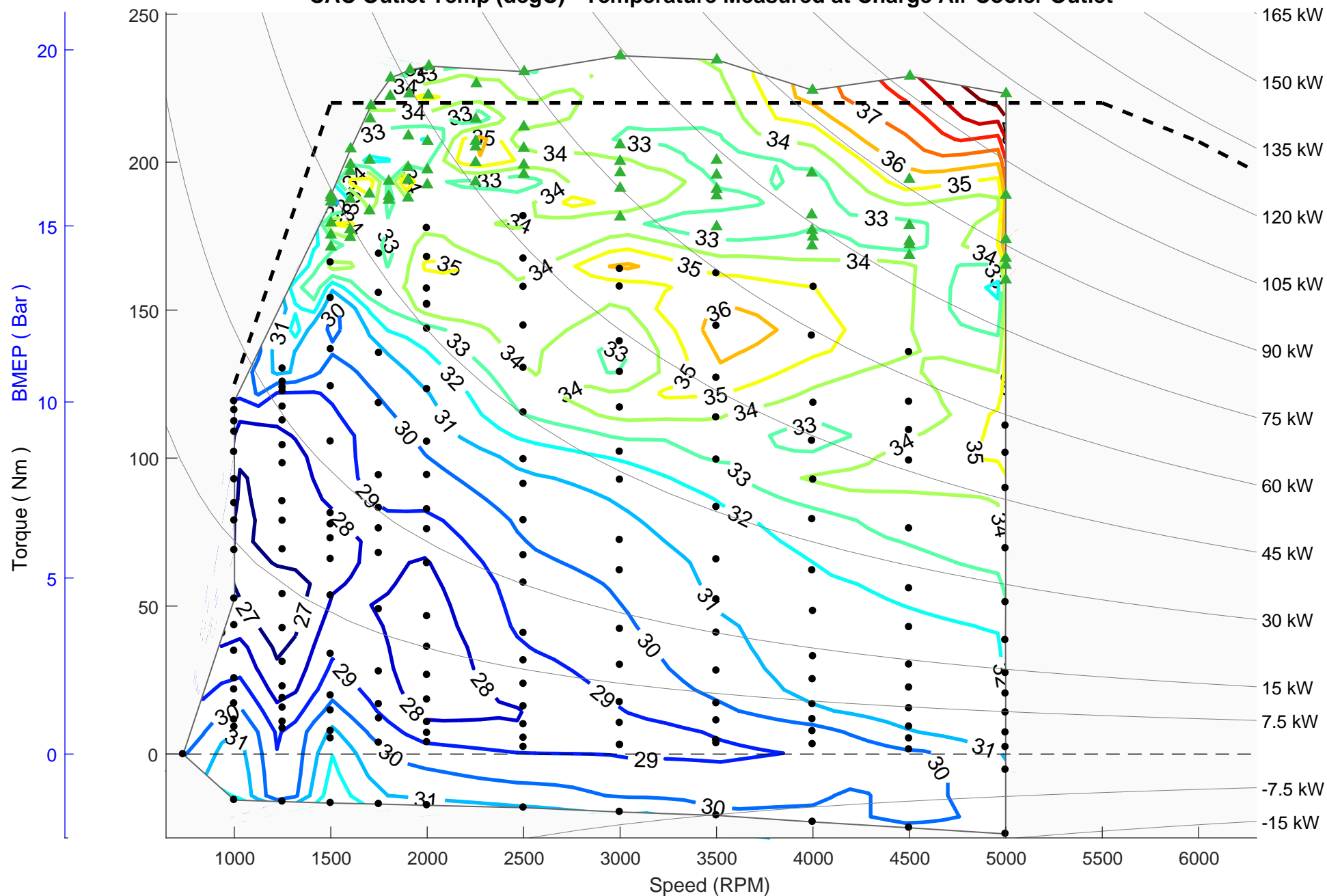
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

CAC Outlet Temp (degC) - Temperature Measured at Charge Air Cooler Outlet



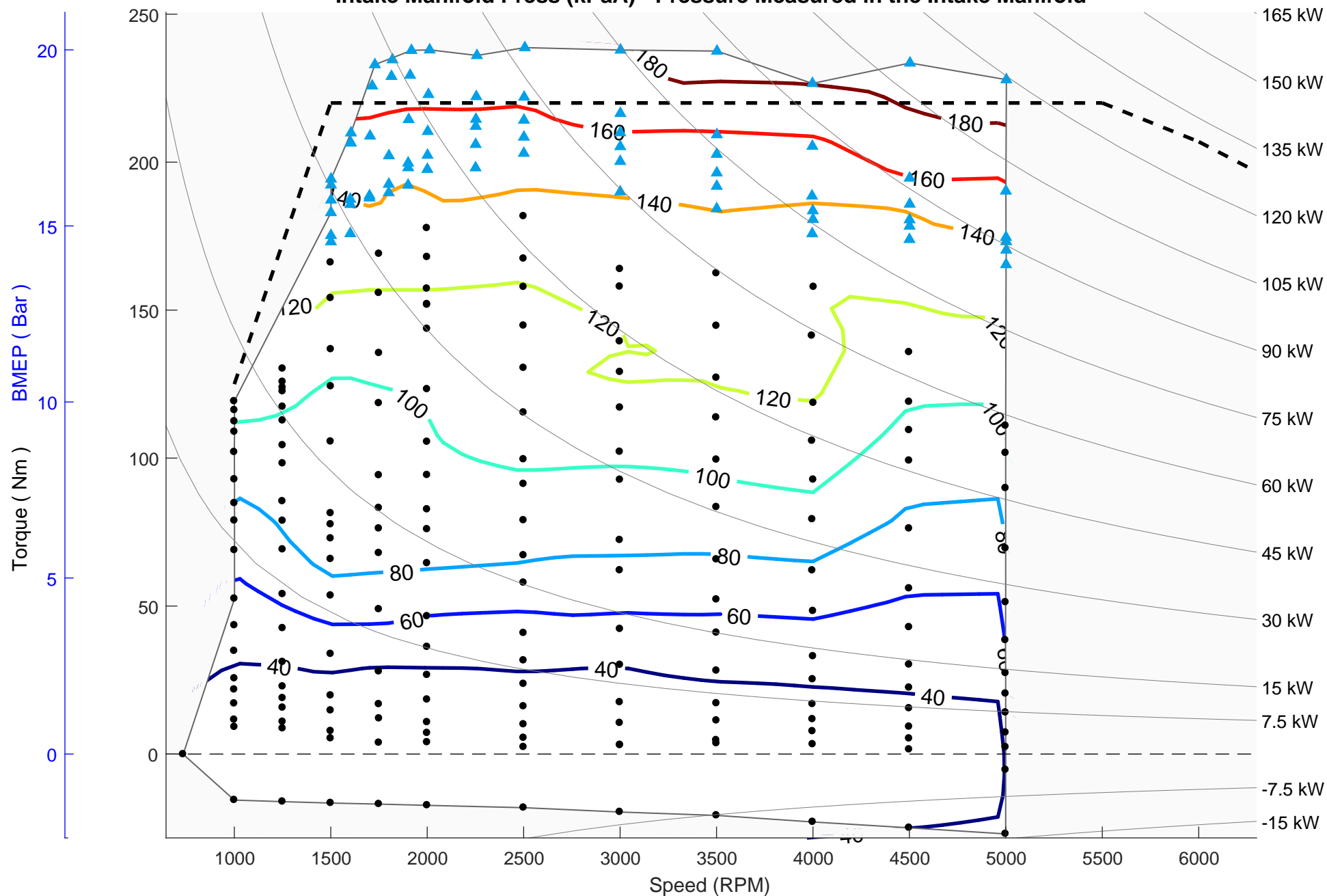
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
CAC Outlet Temp (degC) - Temperature Measured at Charge Air Cooler Outlet



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

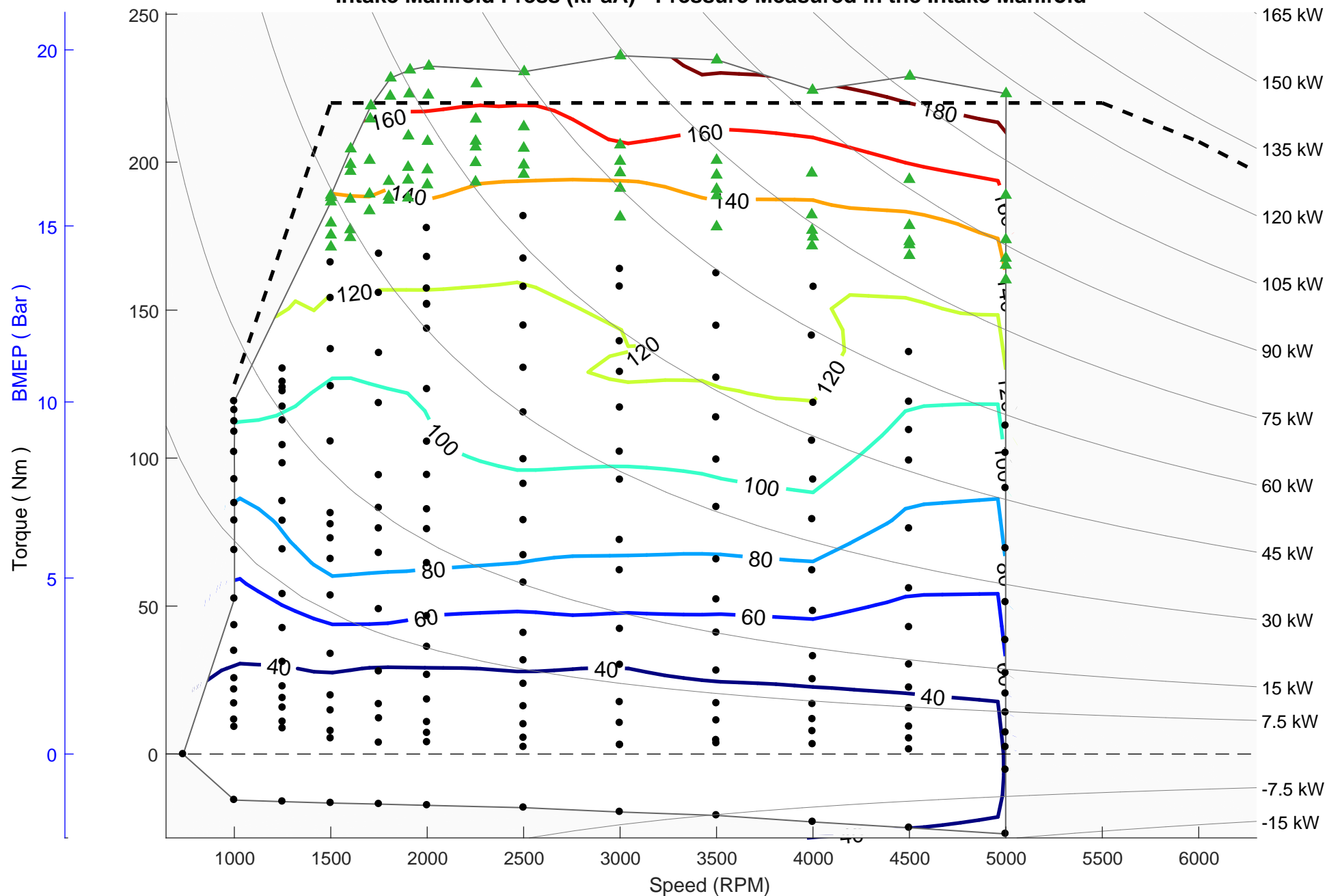
Intake Manifold Press (kPaA) - Pressure Measured in the Intake Manifold



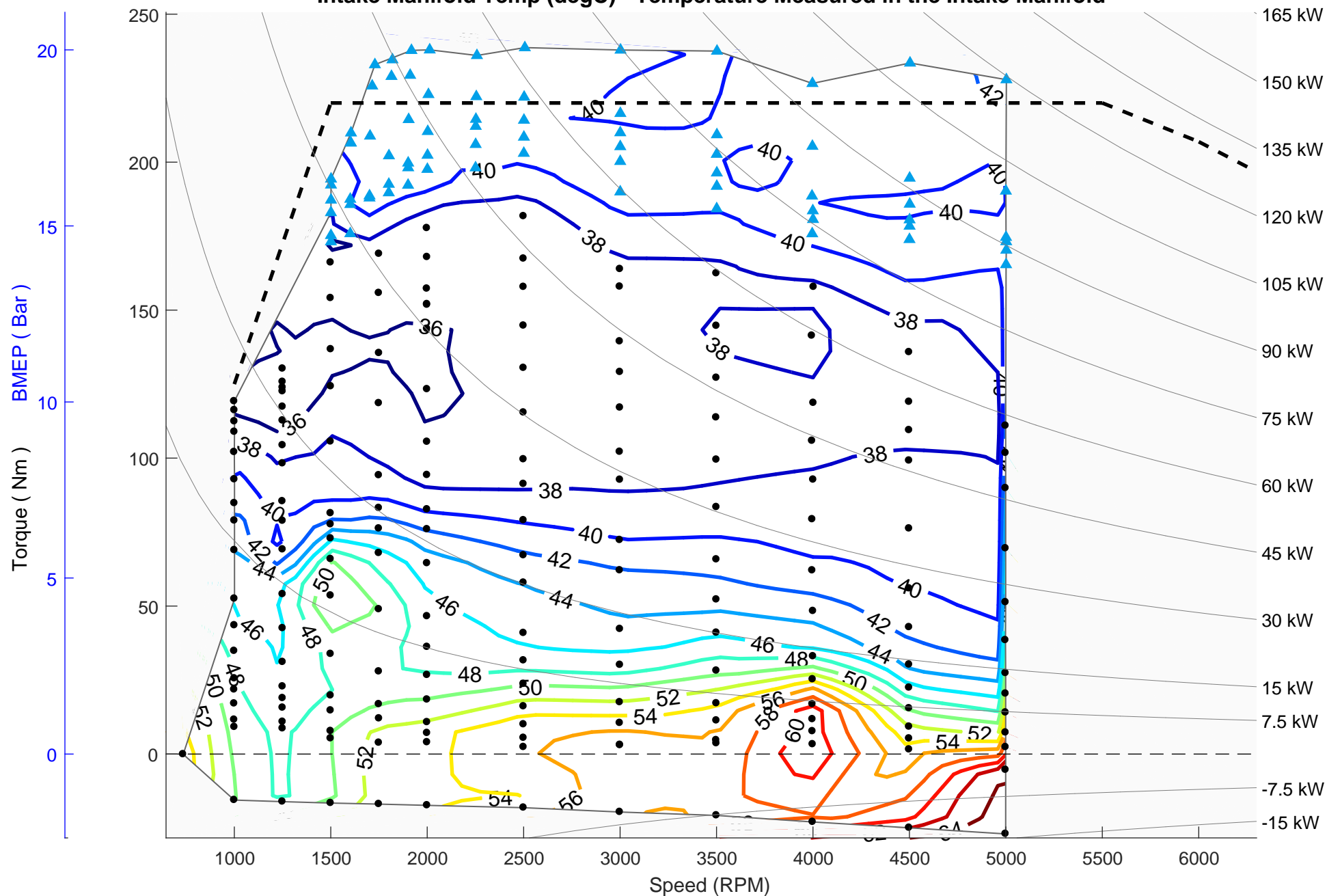
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

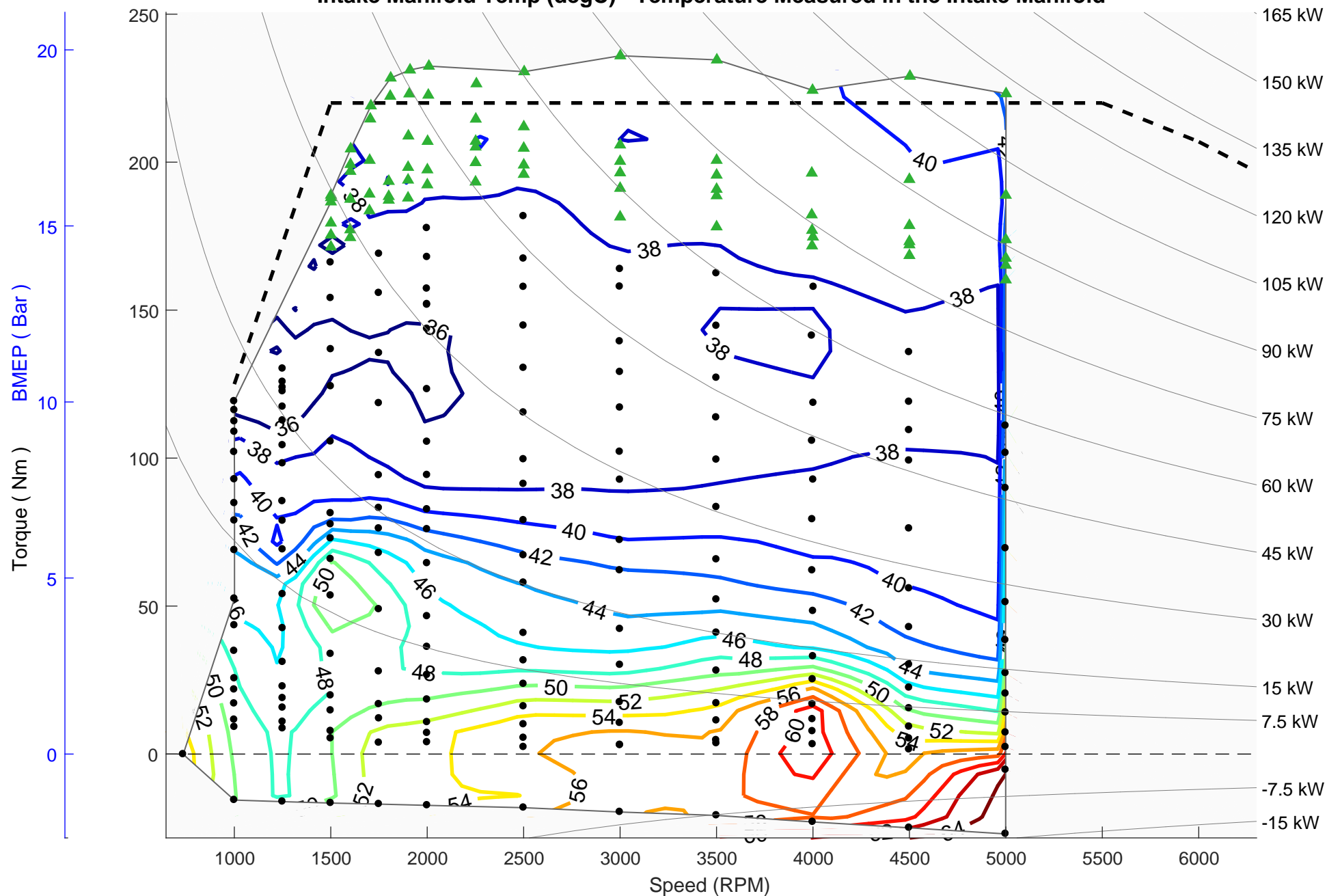
Intake Manifold Press (kPaA) - Pressure Measured in the Intake Manifold



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Intake Manifold Temp (degC) - Temperature Measured in the Intake Manifold



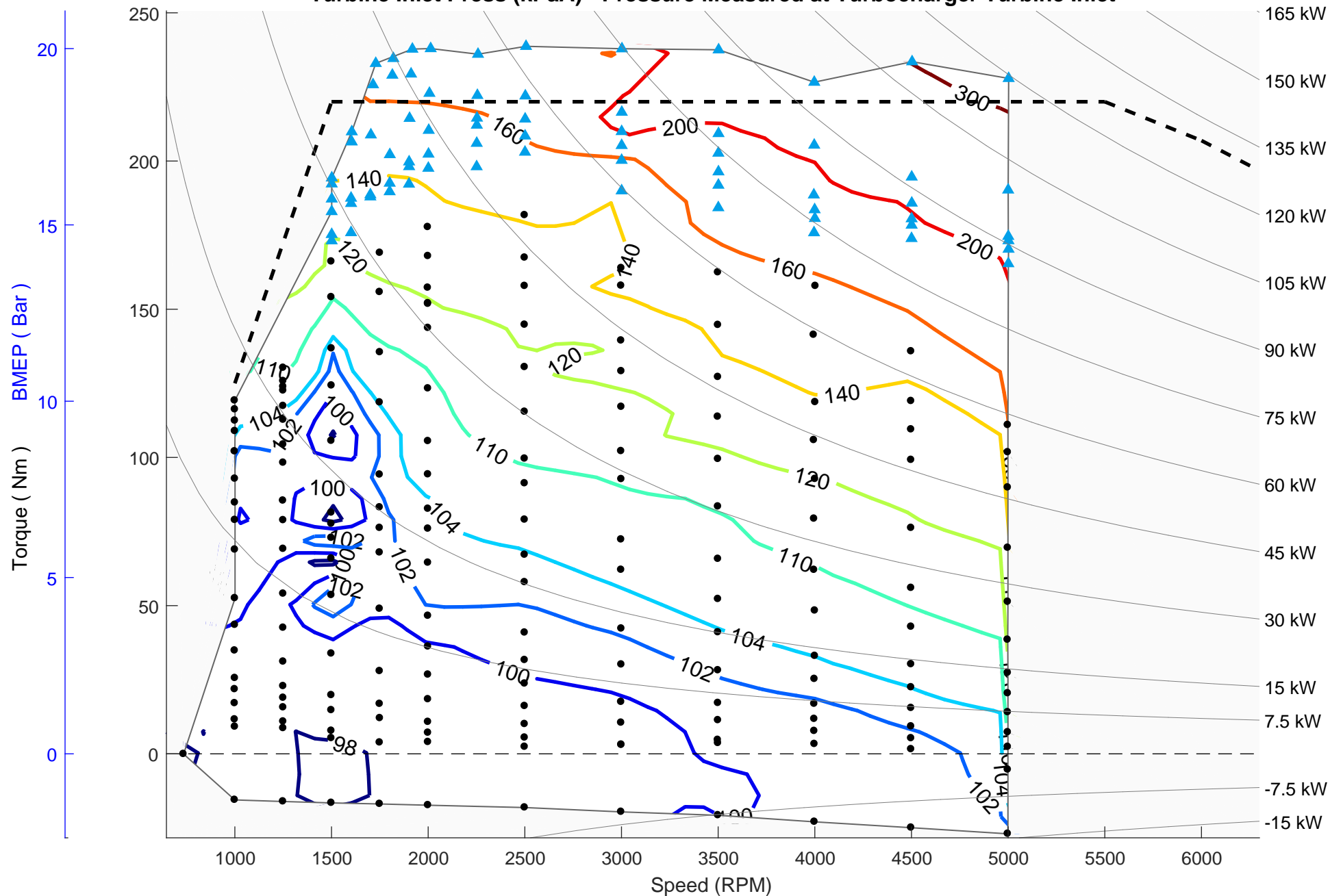
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Intake Manifold Temp (degC) - Temperature Measured in the Intake Manifold



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

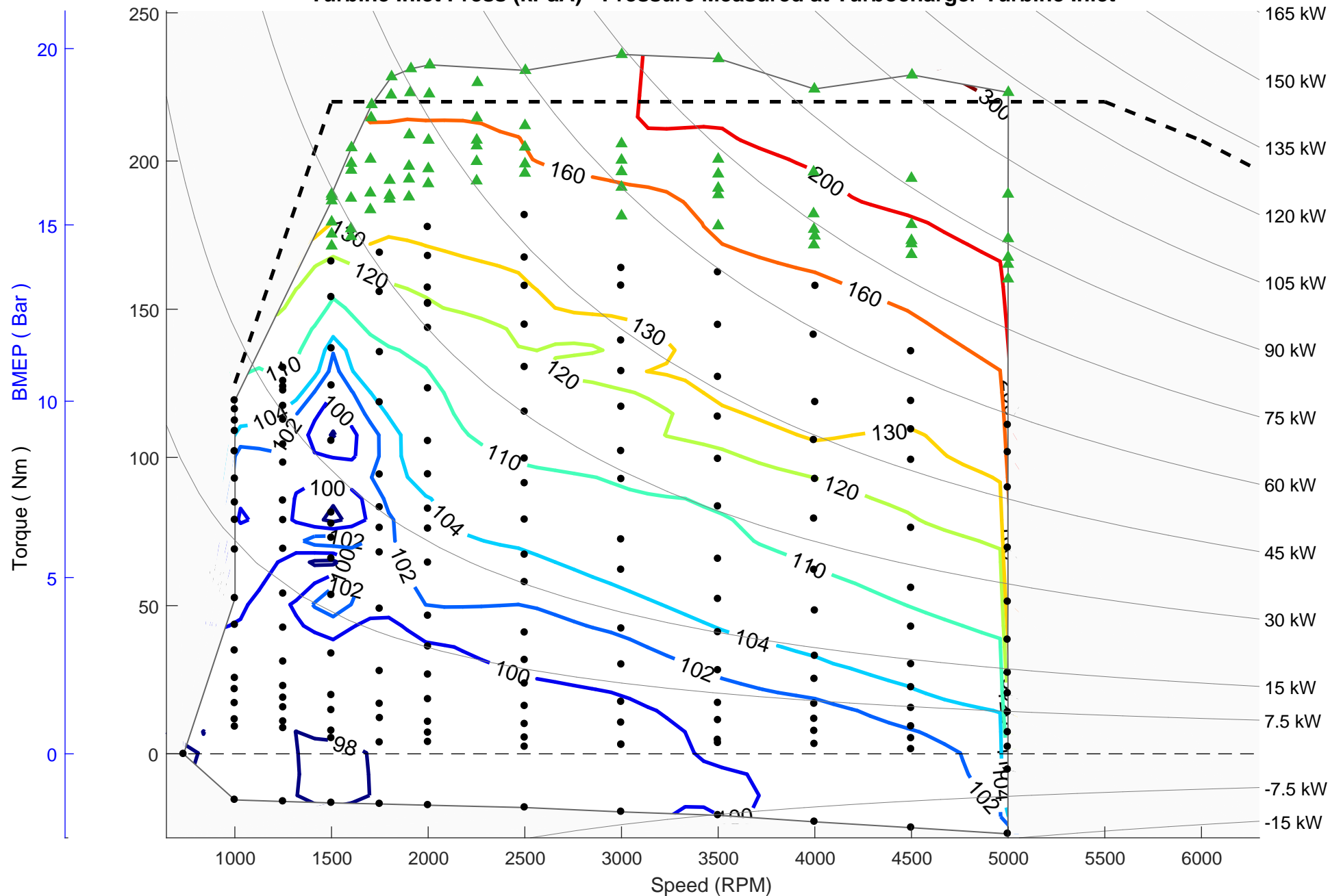
Turbine Inlet Press (kPaA) - Pressure Measured at Turbocharger Turbine Inlet



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

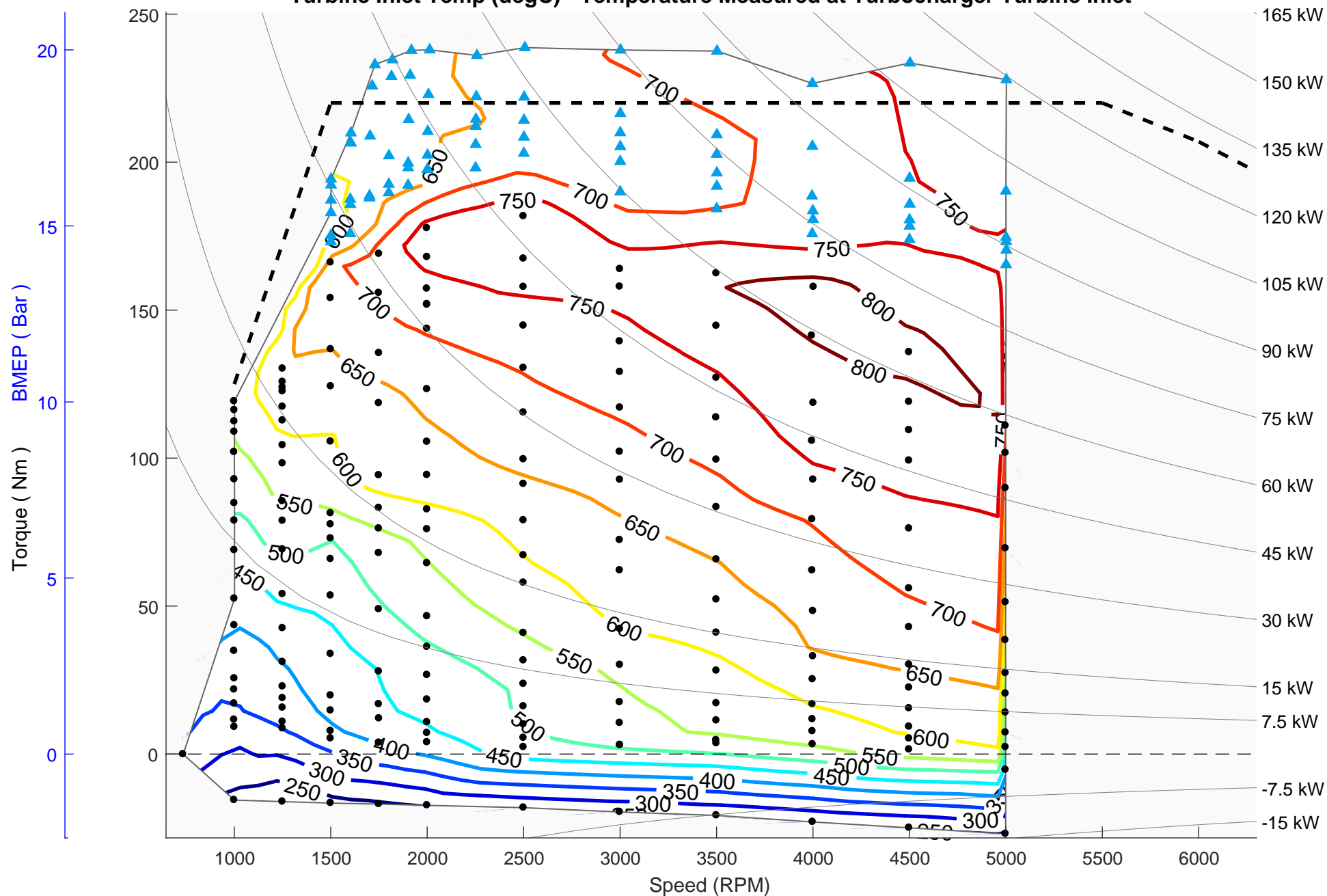
Turbine Inlet Press (kPaA) - Pressure Measured at Turbocharger Turbine Inlet



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

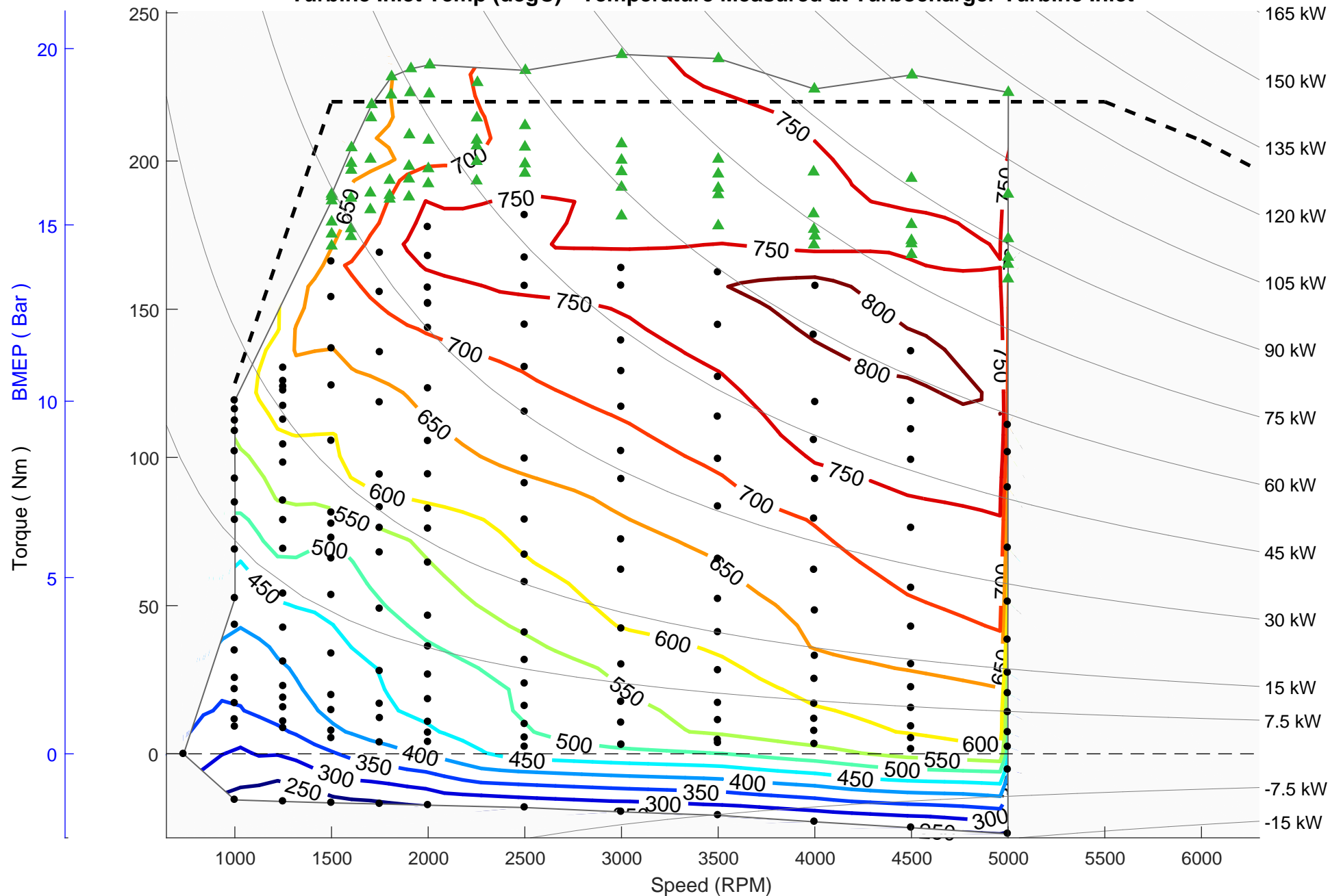
Turbine Inlet Temp (degC) - Temperature Measured at Turbocharger Turbine Inlet



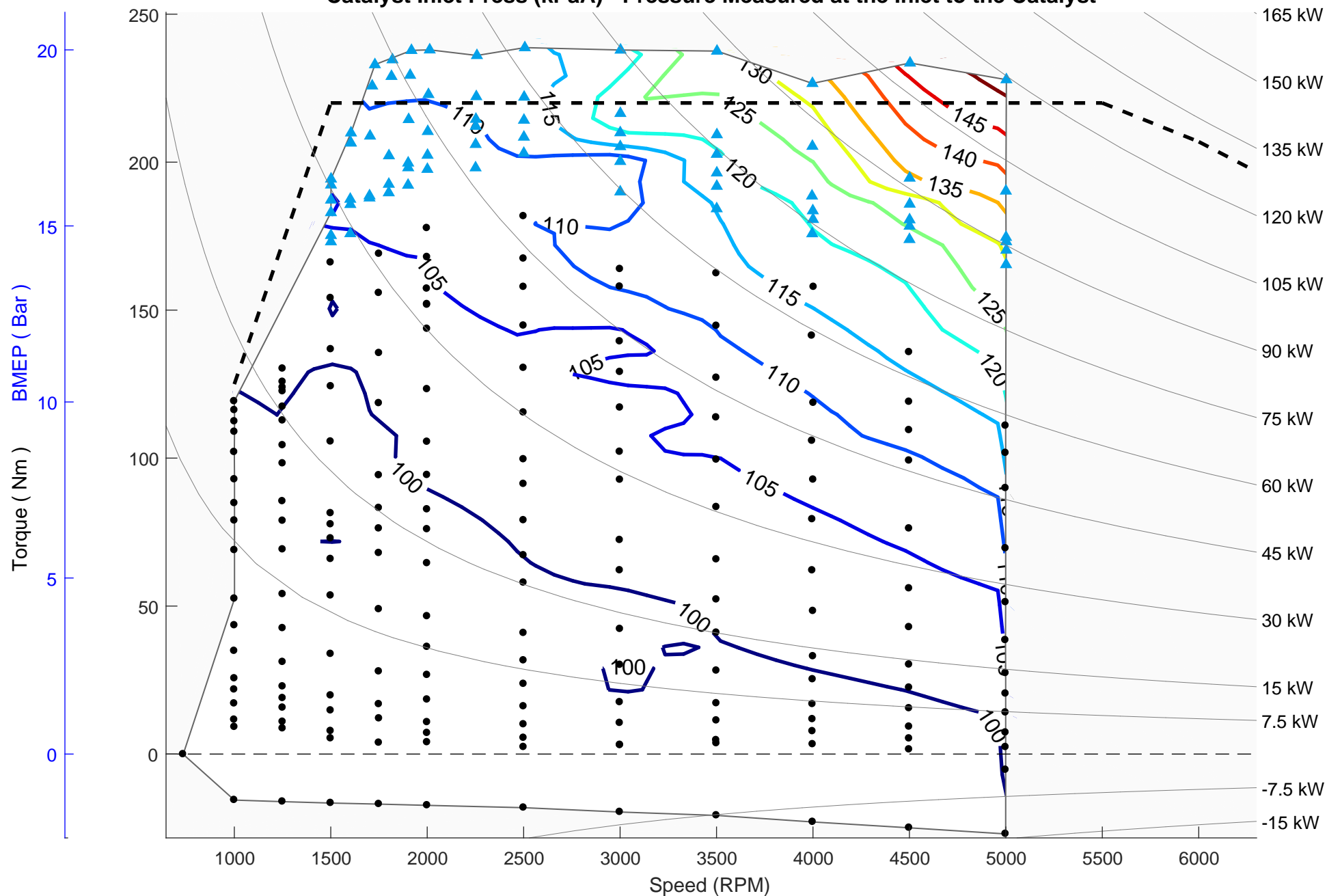
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

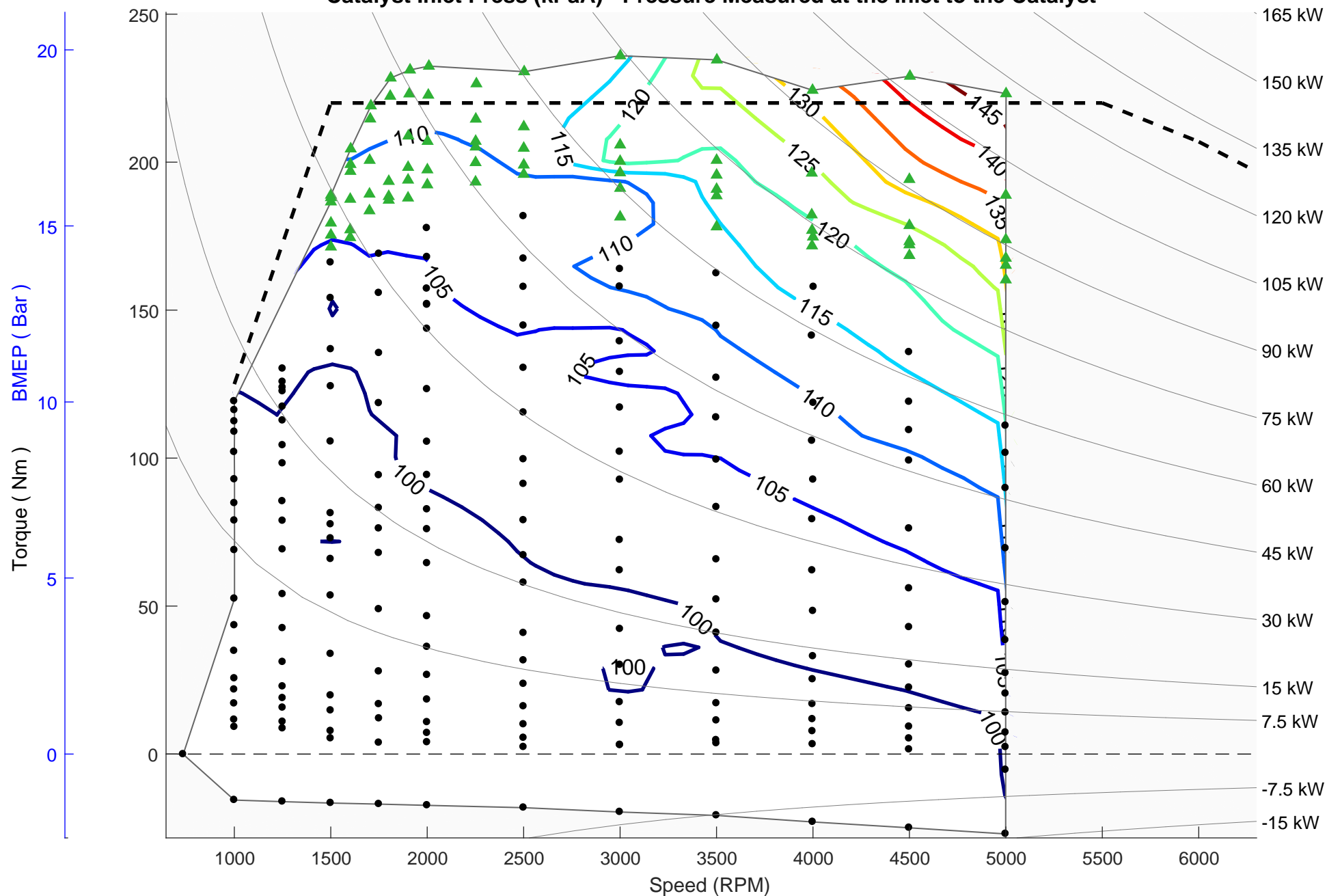
Turbine Inlet Temp (degC) - Temperature Measured at Turbocharger Turbine Inlet



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Catalyst Inlet Press (kPaA) - Pressure Measured at the Inlet to the Catalyst



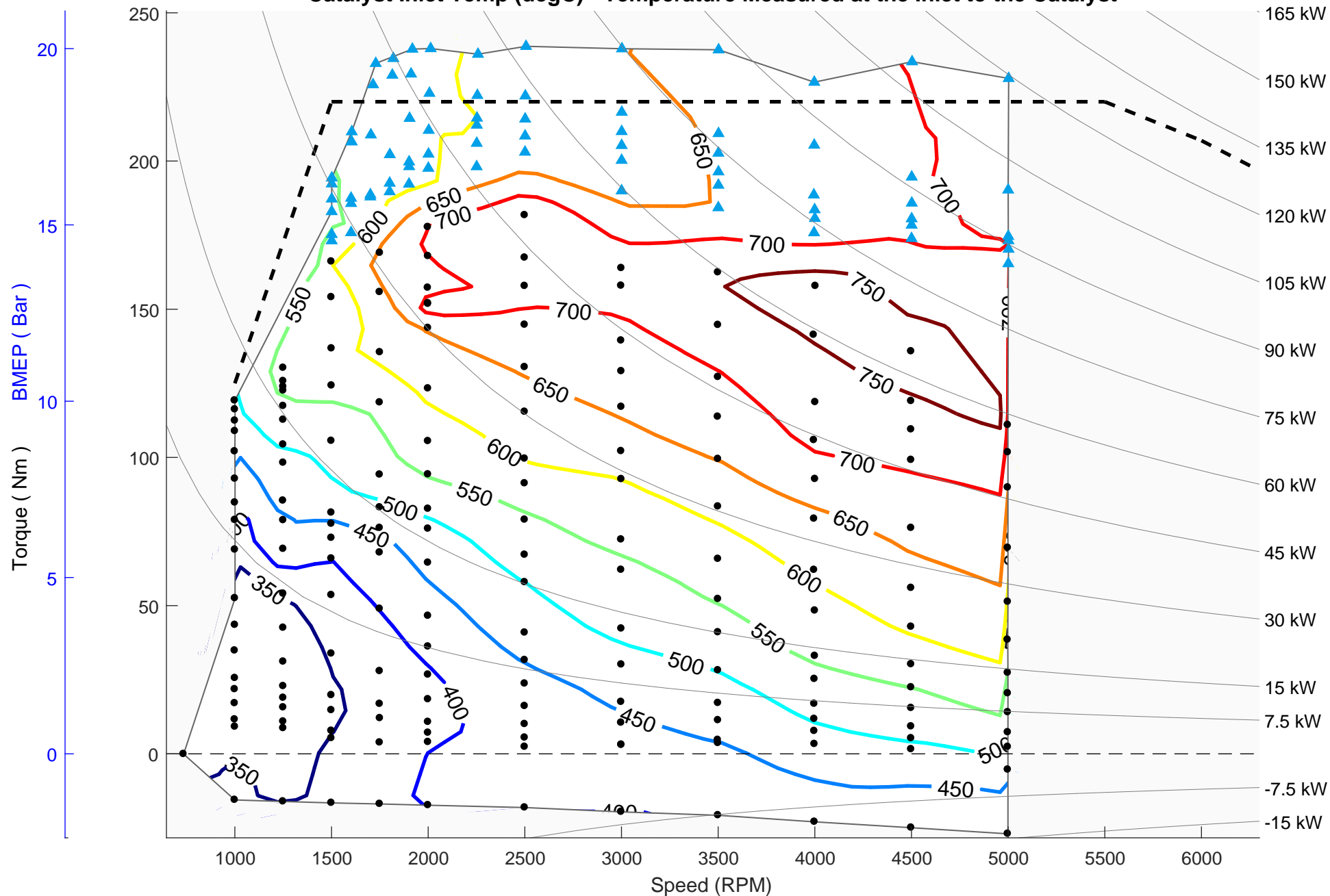
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Catalyst Inlet Press (kPaA) - Pressure Measured at the Inlet to the Catalyst



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

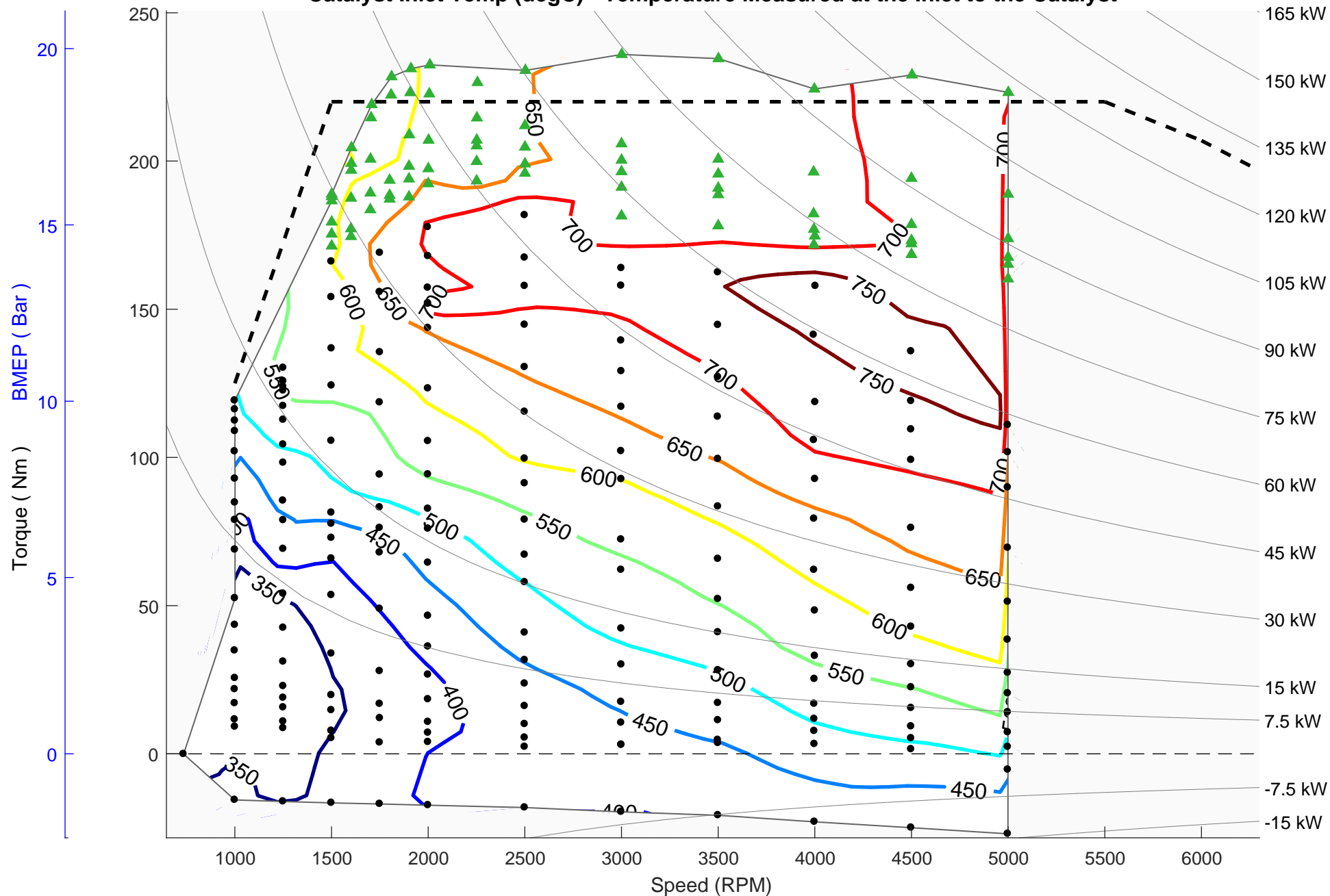
Catalyst Inlet Temp (degC) - Temperature Measured at the Inlet to the Catalyst



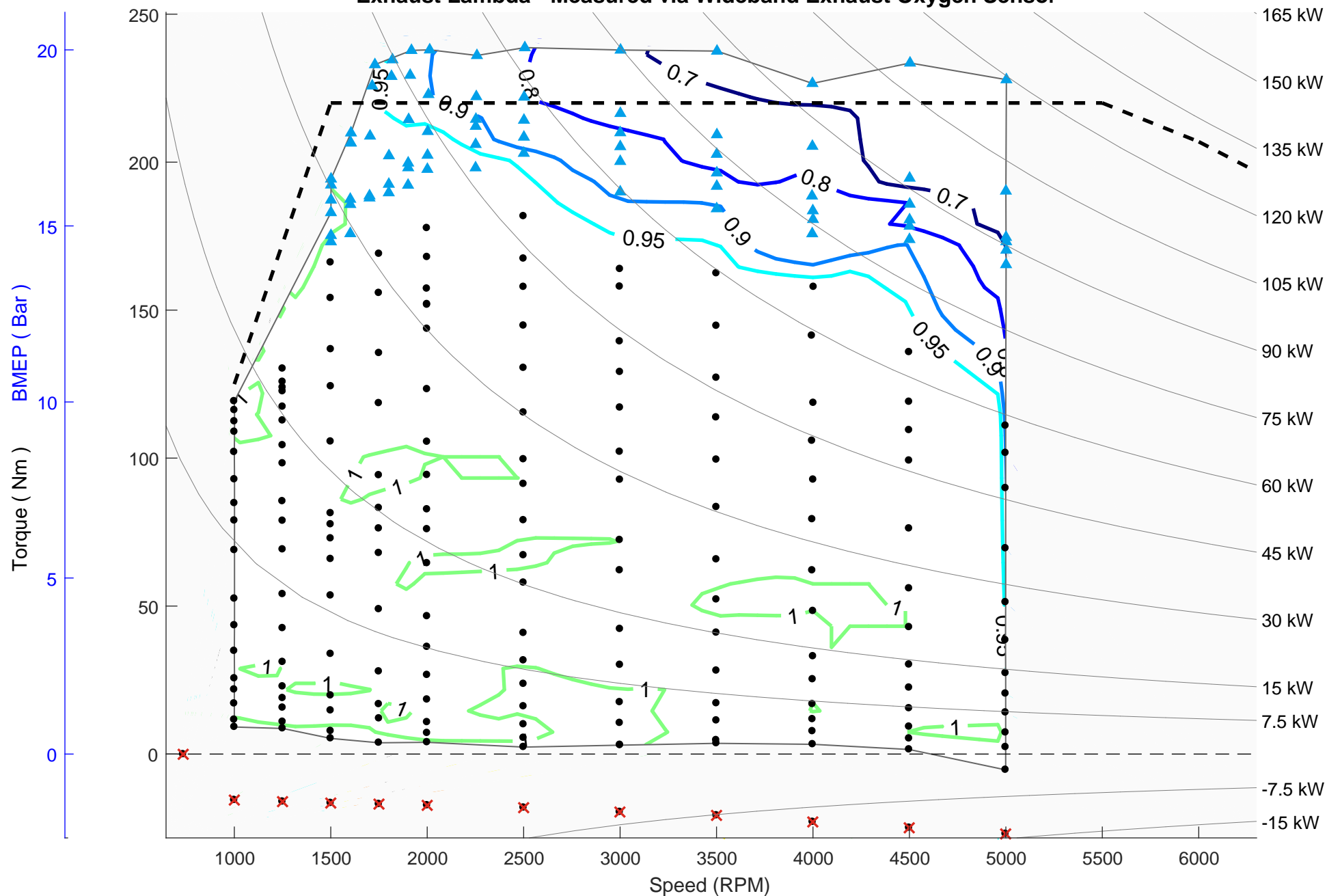
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

Catalyst Inlet Temp (degC) - Temperature Measured at the Inlet to the Catalyst

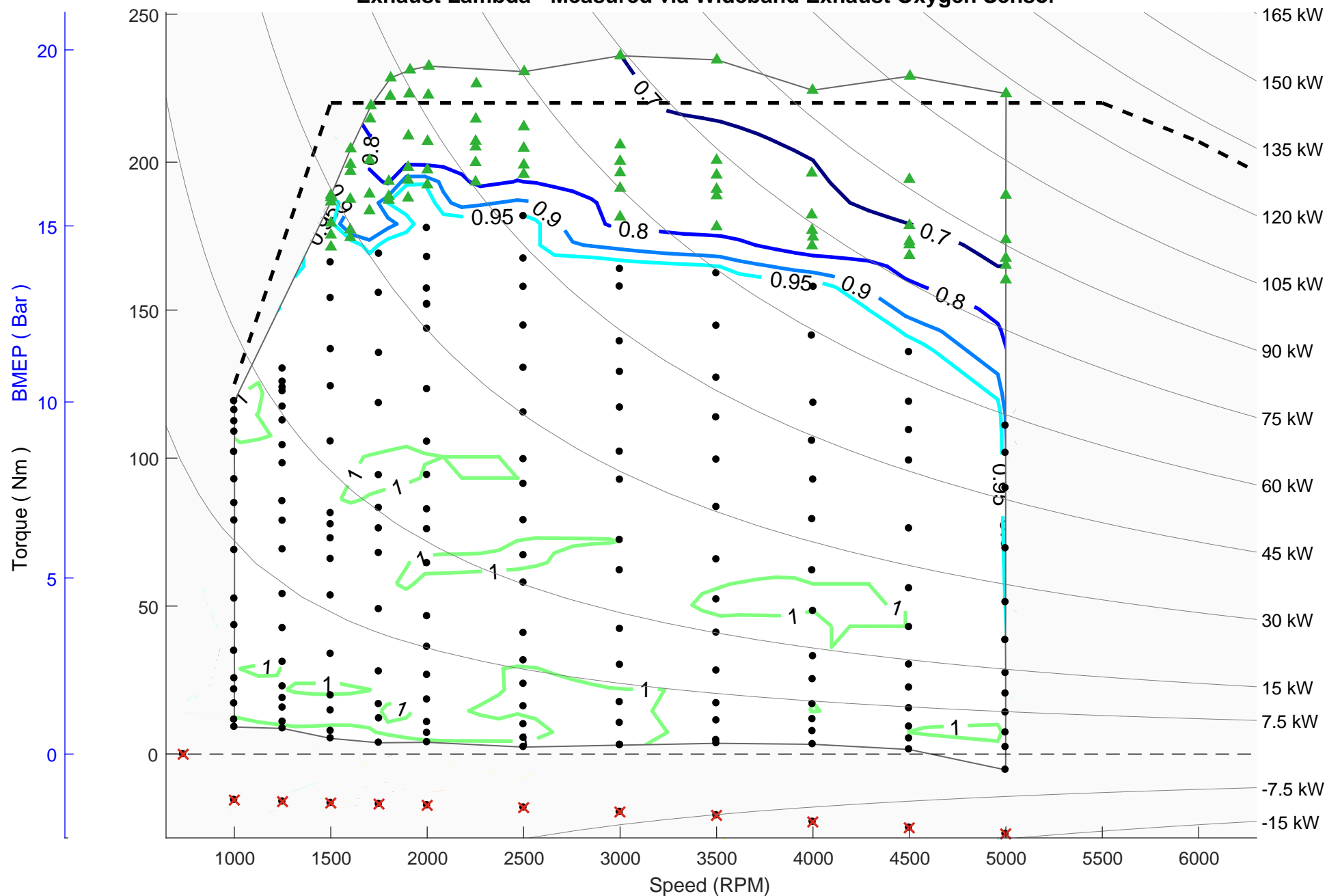


2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Exhaust Lambda - Measured via Wideband Exhaust Oxygen Sensor*



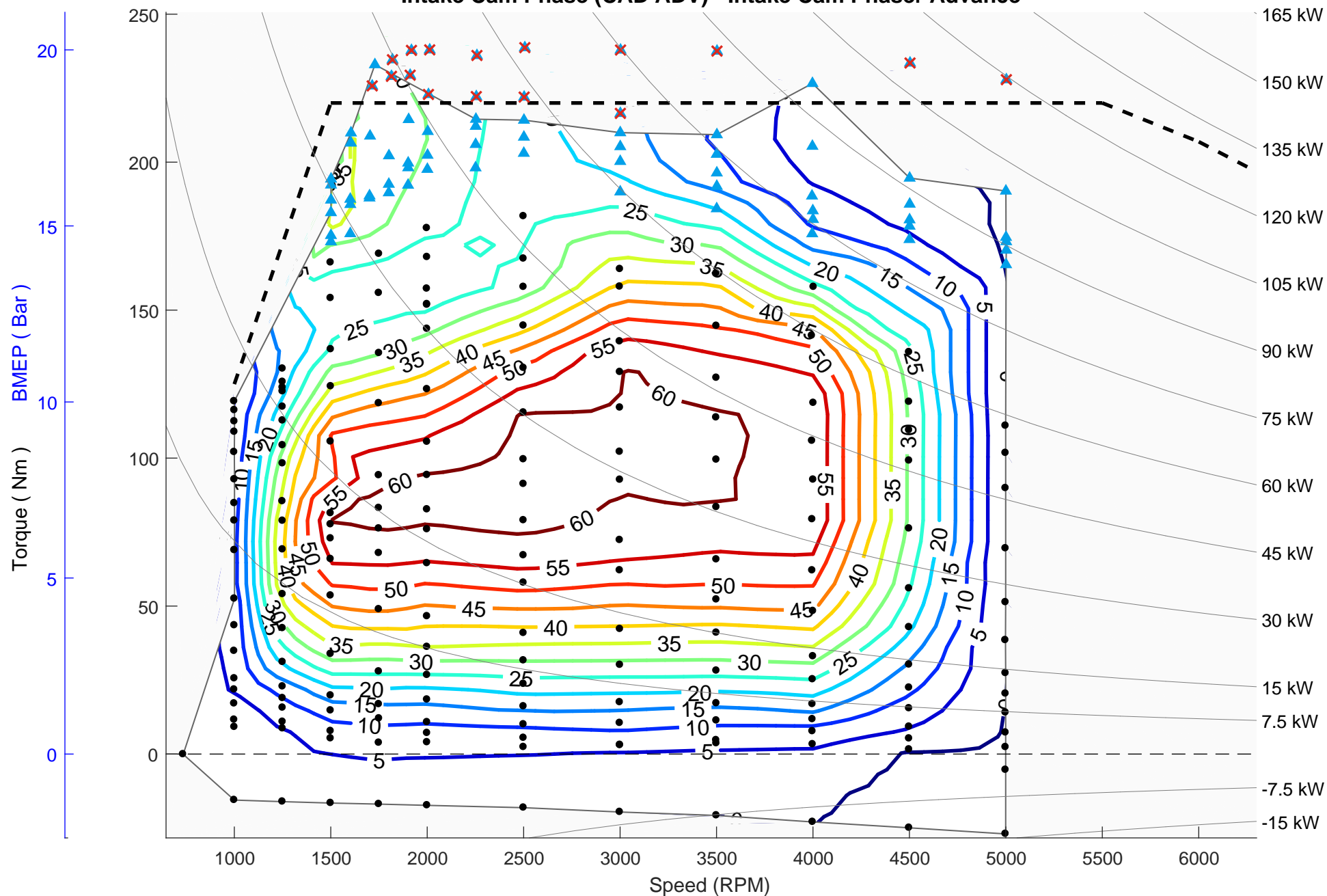
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2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Exhaust Lambda - Measured via Wideband Exhaust Oxygen Sensor*

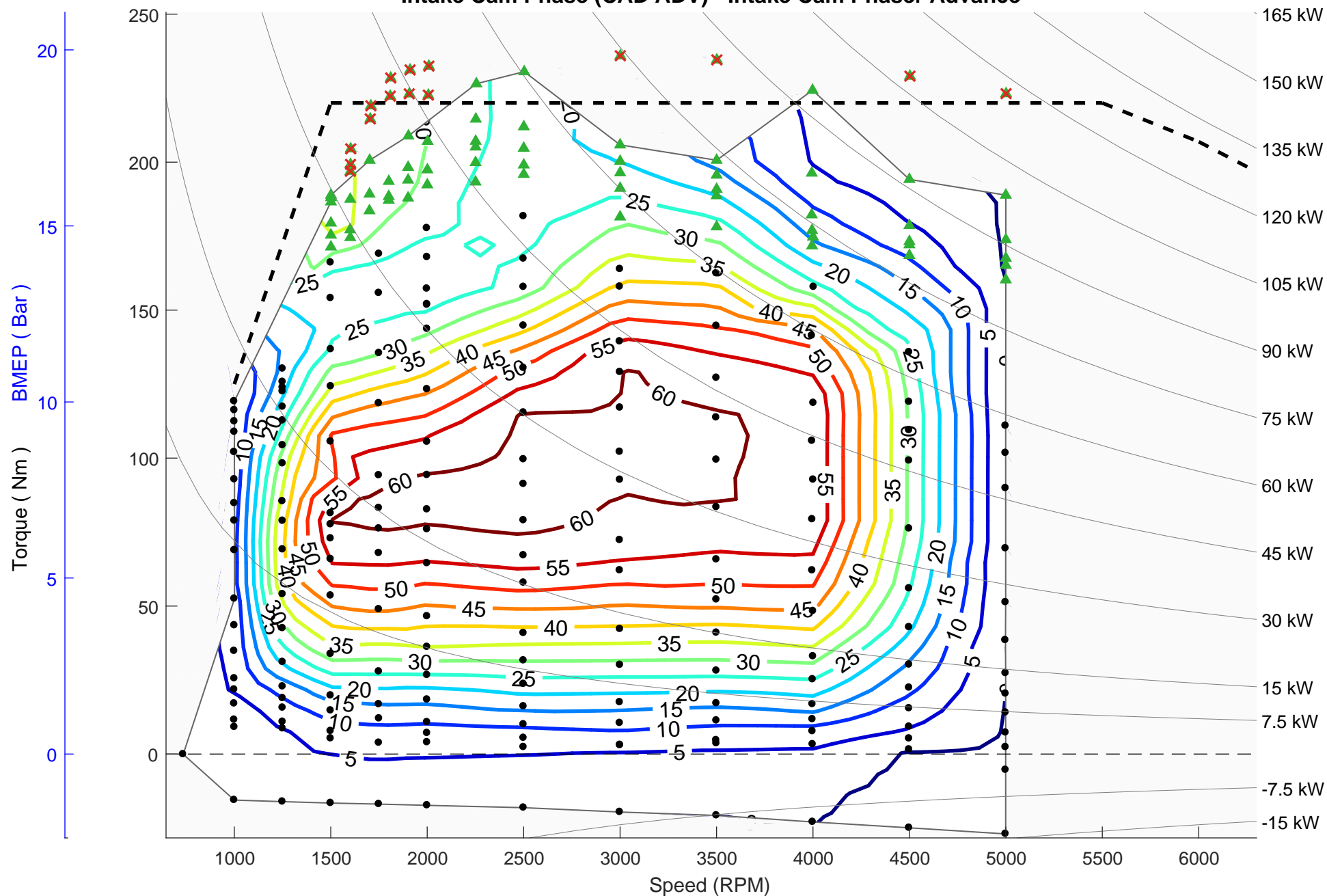


* Reference Only

2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Intake Cam Phase (CAD ADV) - Intake Cam Phaser Advance



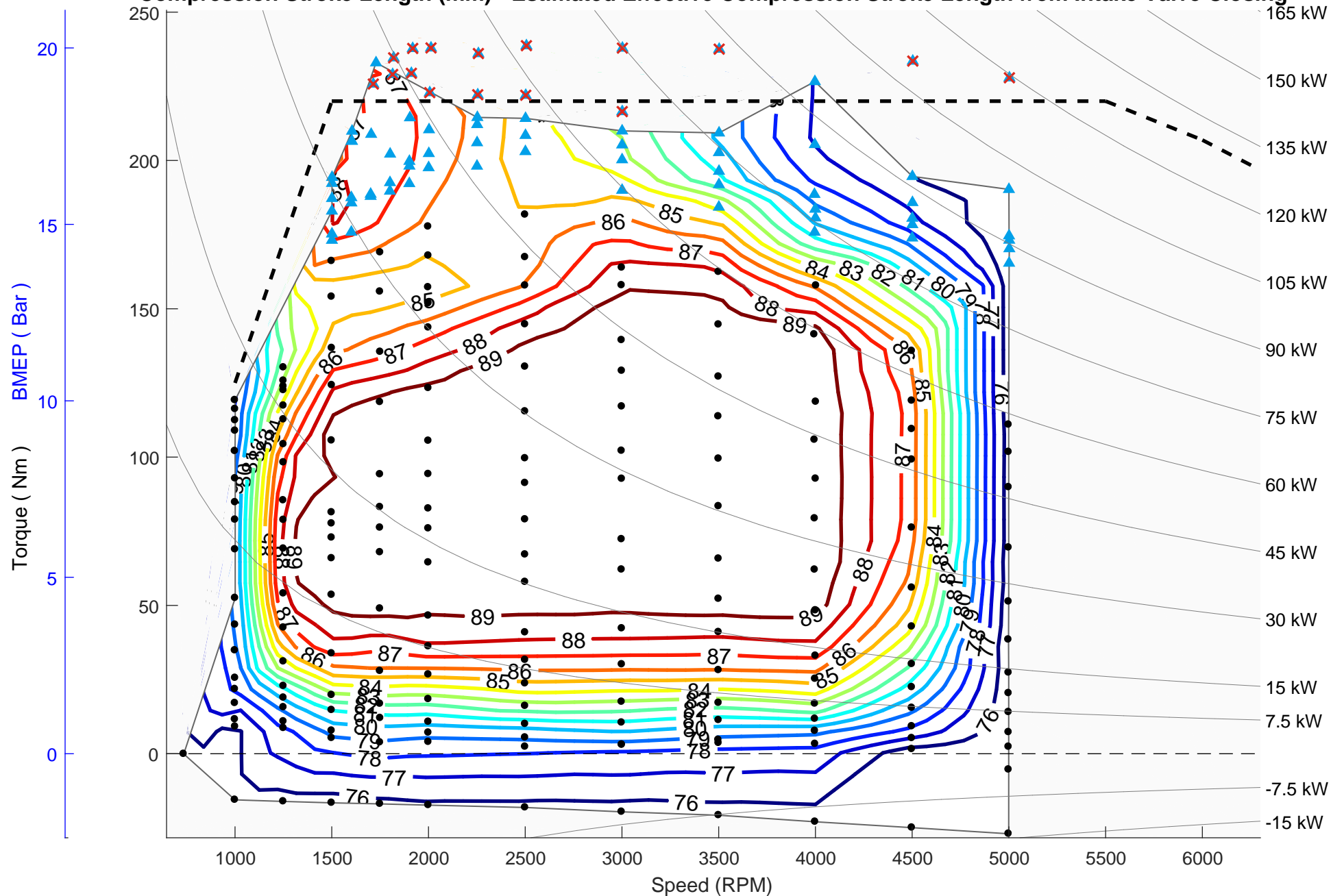
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Intake Cam Phase (CAD ADV) - Intake Cam Phaser Advance



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

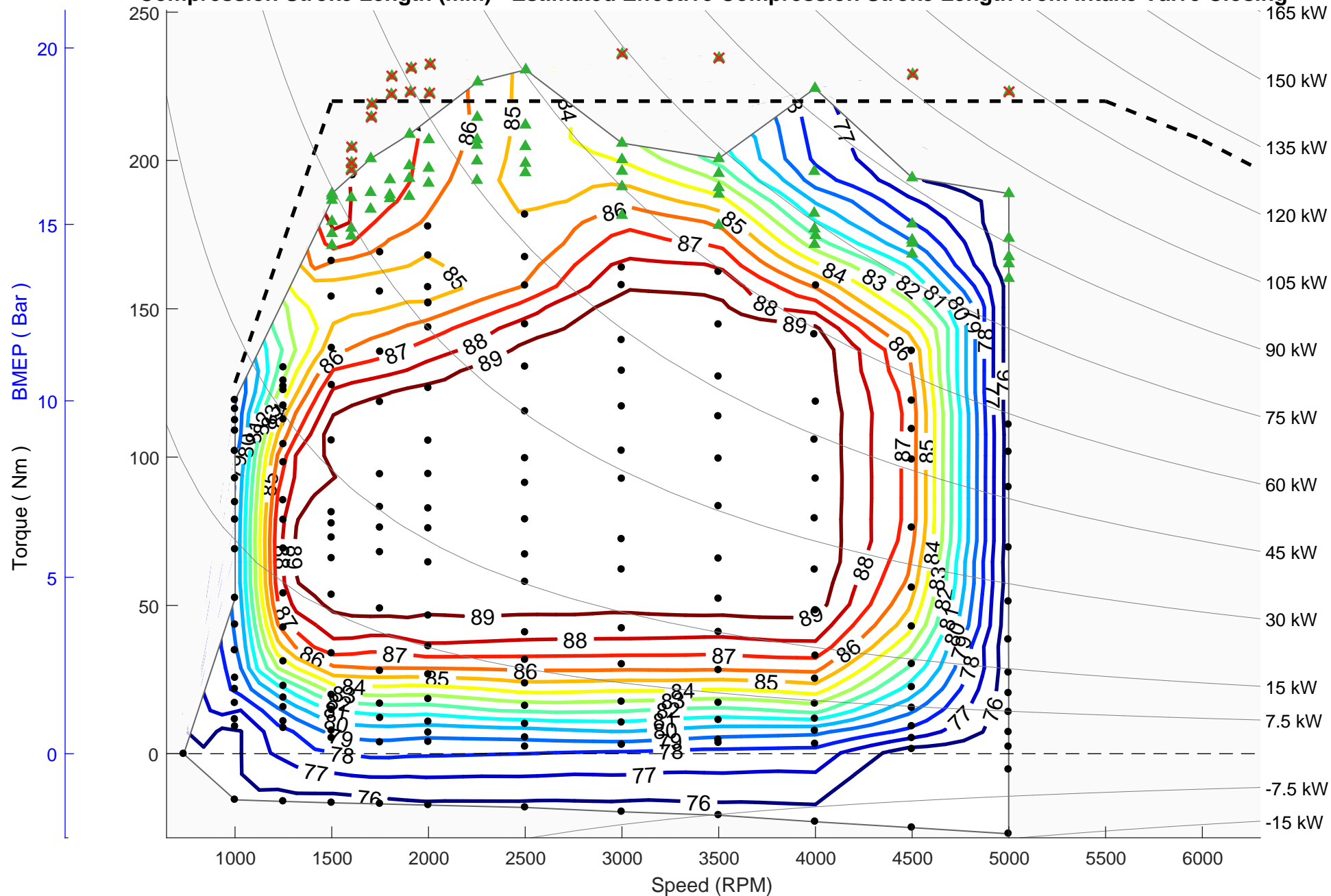
Compression Stroke Length (mm) - Estimated Effective Compression Stroke Length from Intake Valve Closing



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

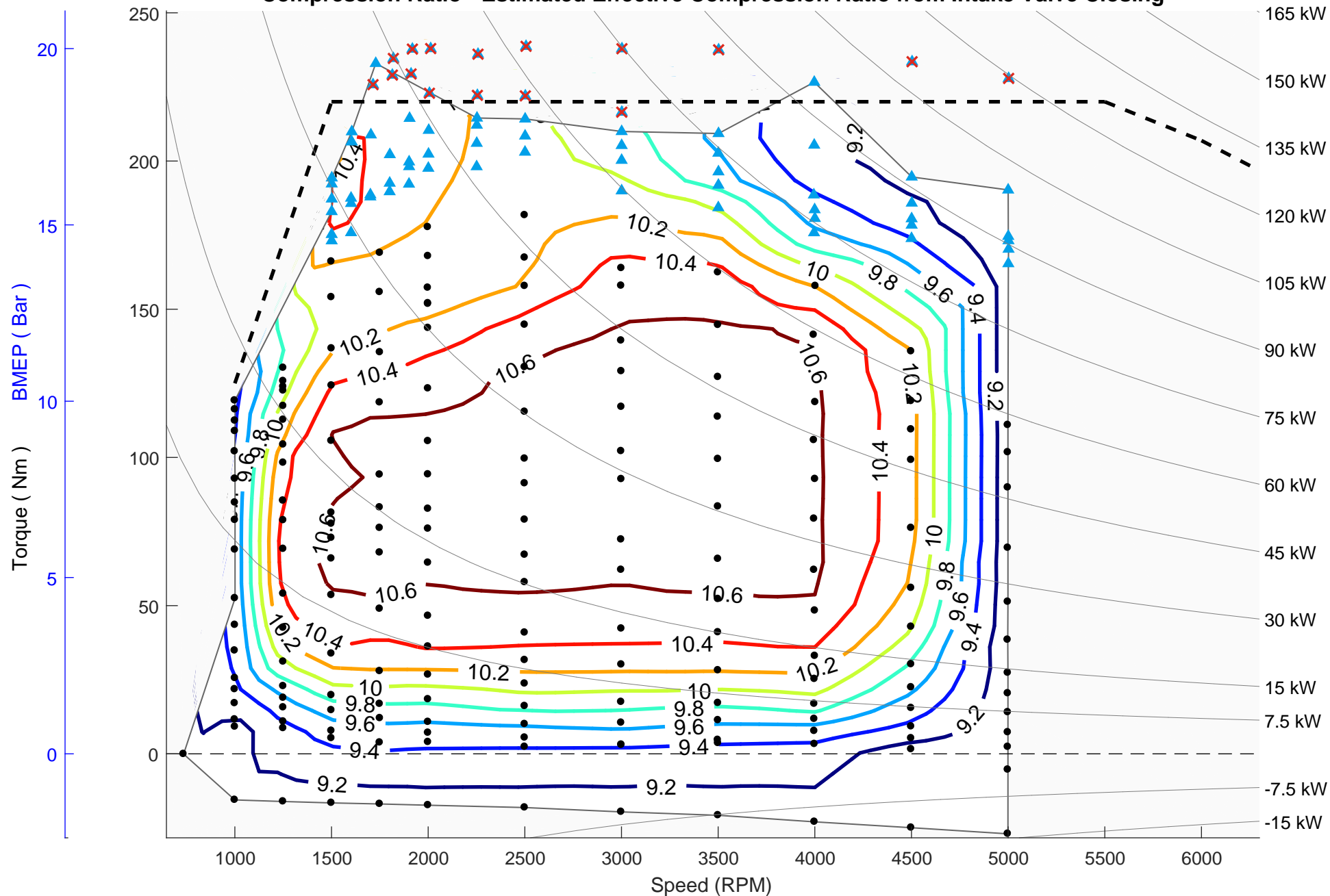
Compression Stroke Length (mm) - Estimated Effective Compression Stroke Length from Intake Valve Closing



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

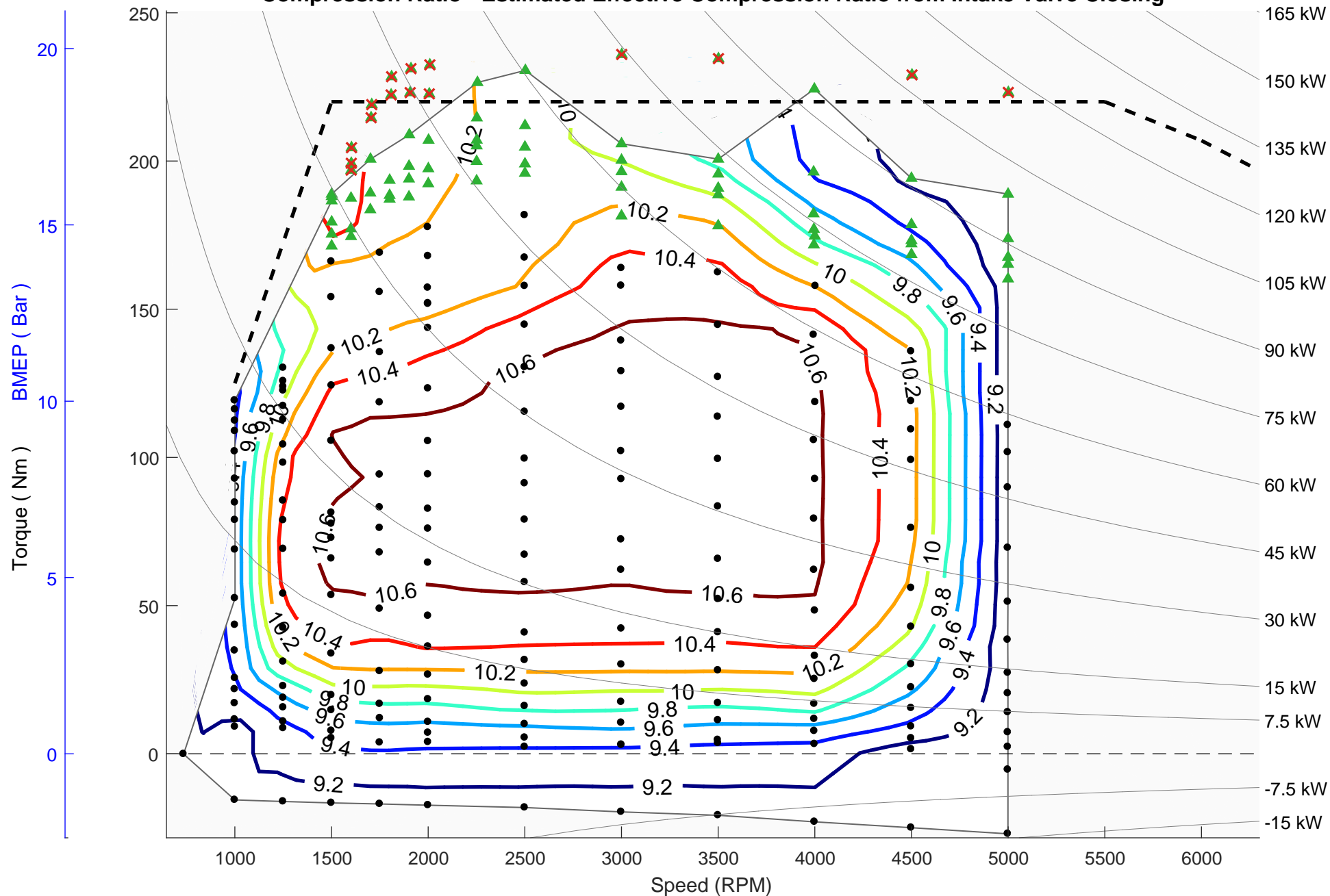
Compression Ratio - Estimated Effective Compression Ratio from Intake Valve Closing



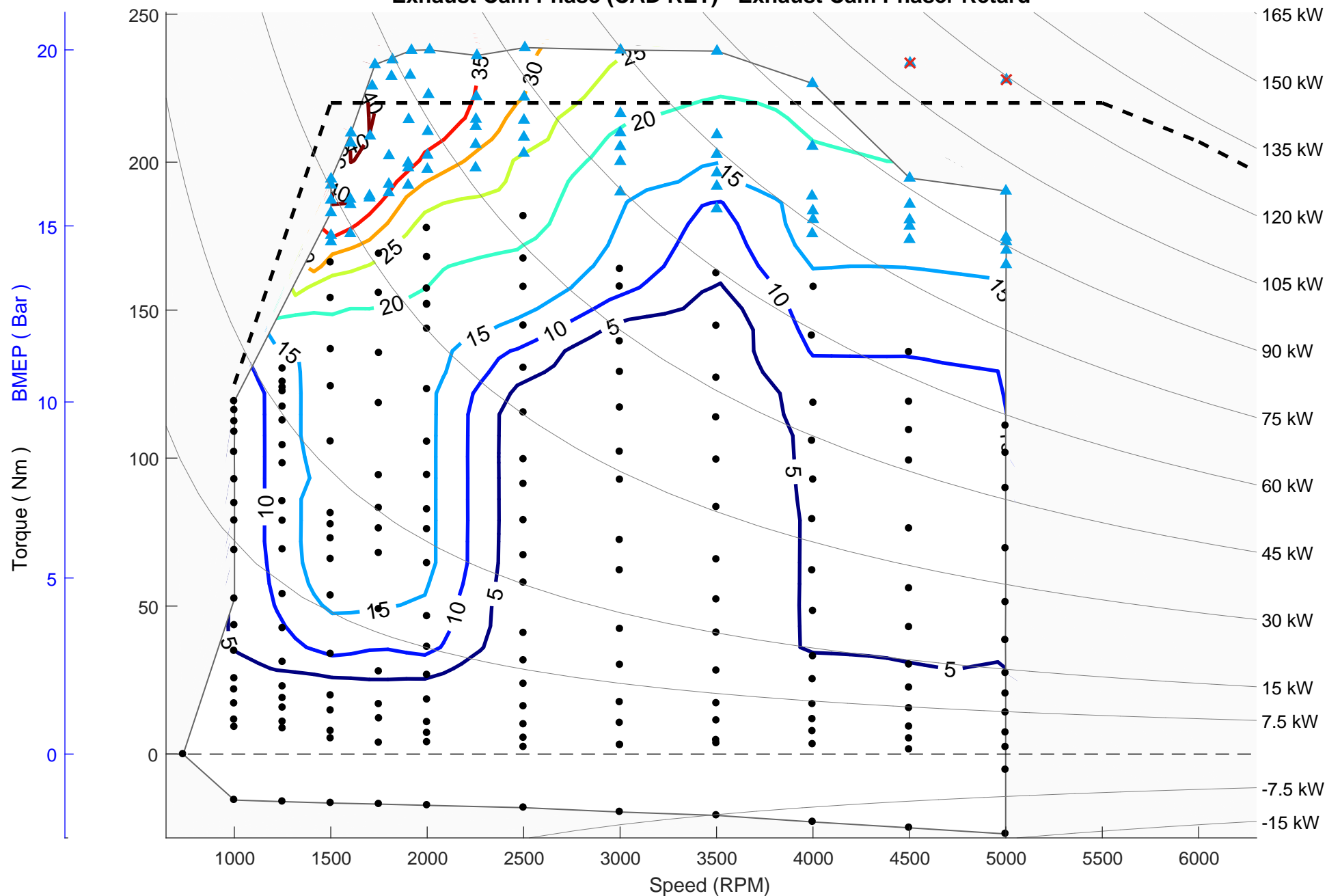
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

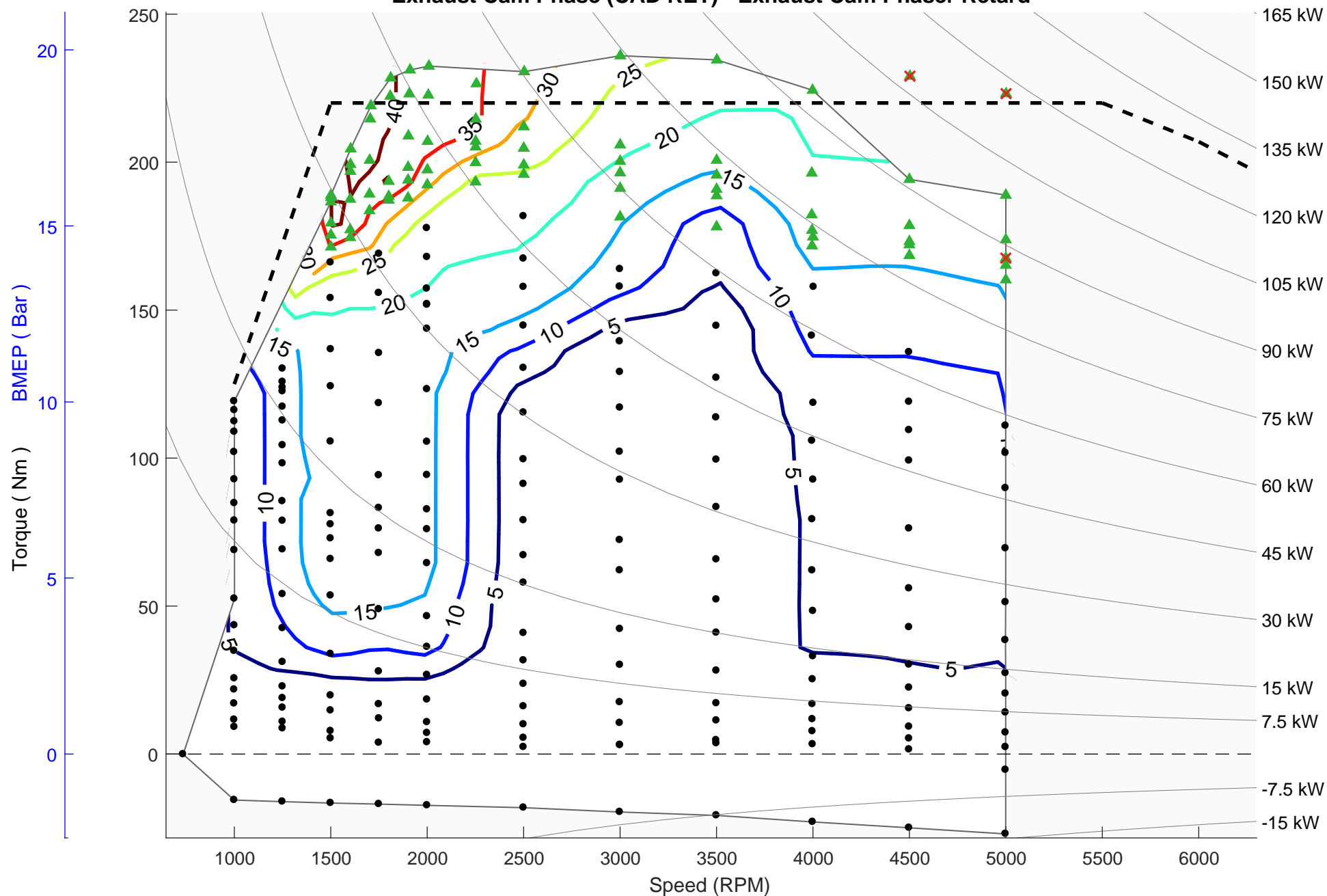
Compression Ratio - Estimated Effective Compression Ratio from Intake Valve Closing



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Exhaust Cam Phase (CAD RET) - Exhaust Cam Phaser Retard



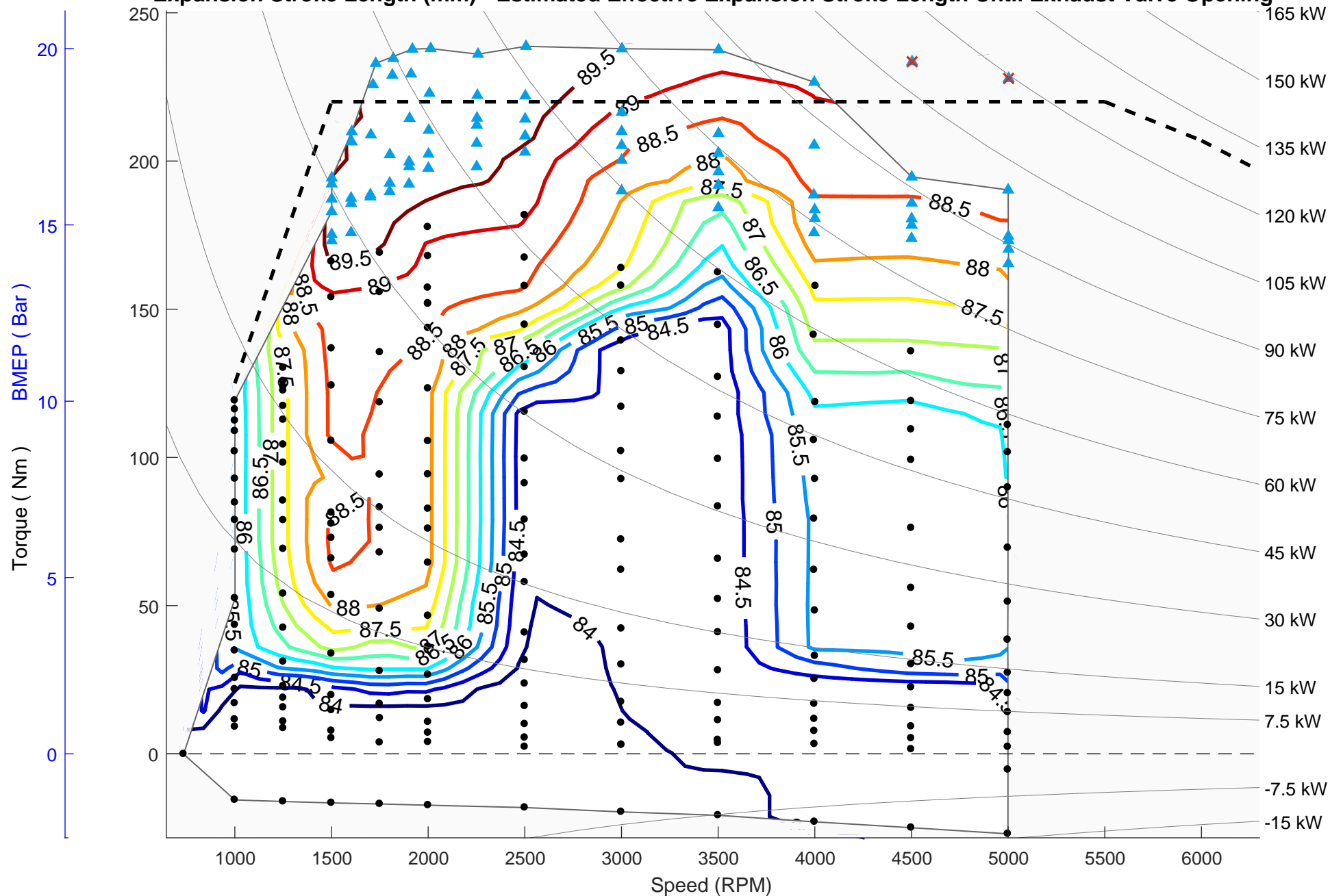
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Final
Exhaust Cam Phase (CAD RET) - Exhaust Cam Phaser Retard



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

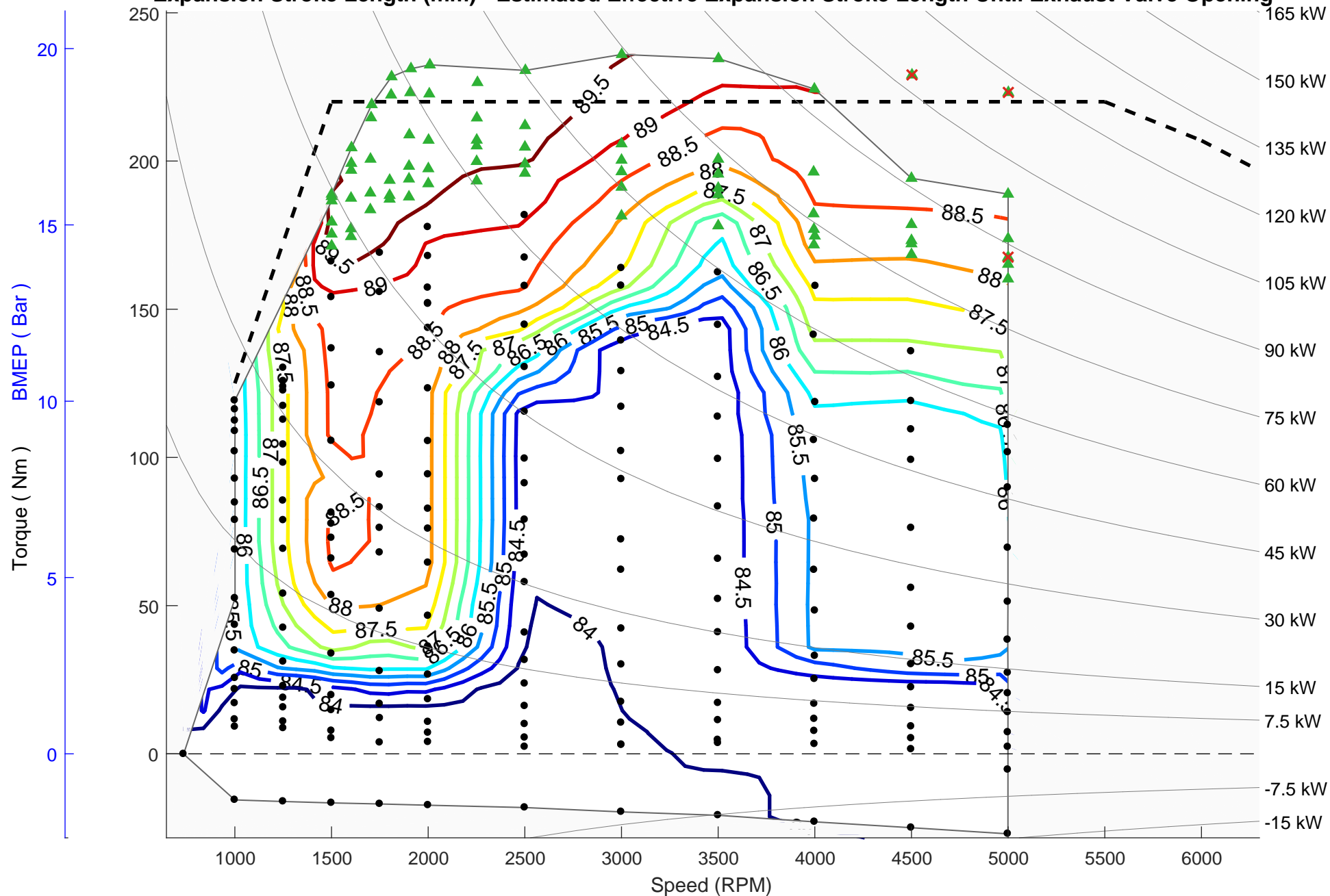
Expansion Stroke Length (mm) - Estimated Effective Expansion Stroke Length Until Exhaust Valve Opening



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

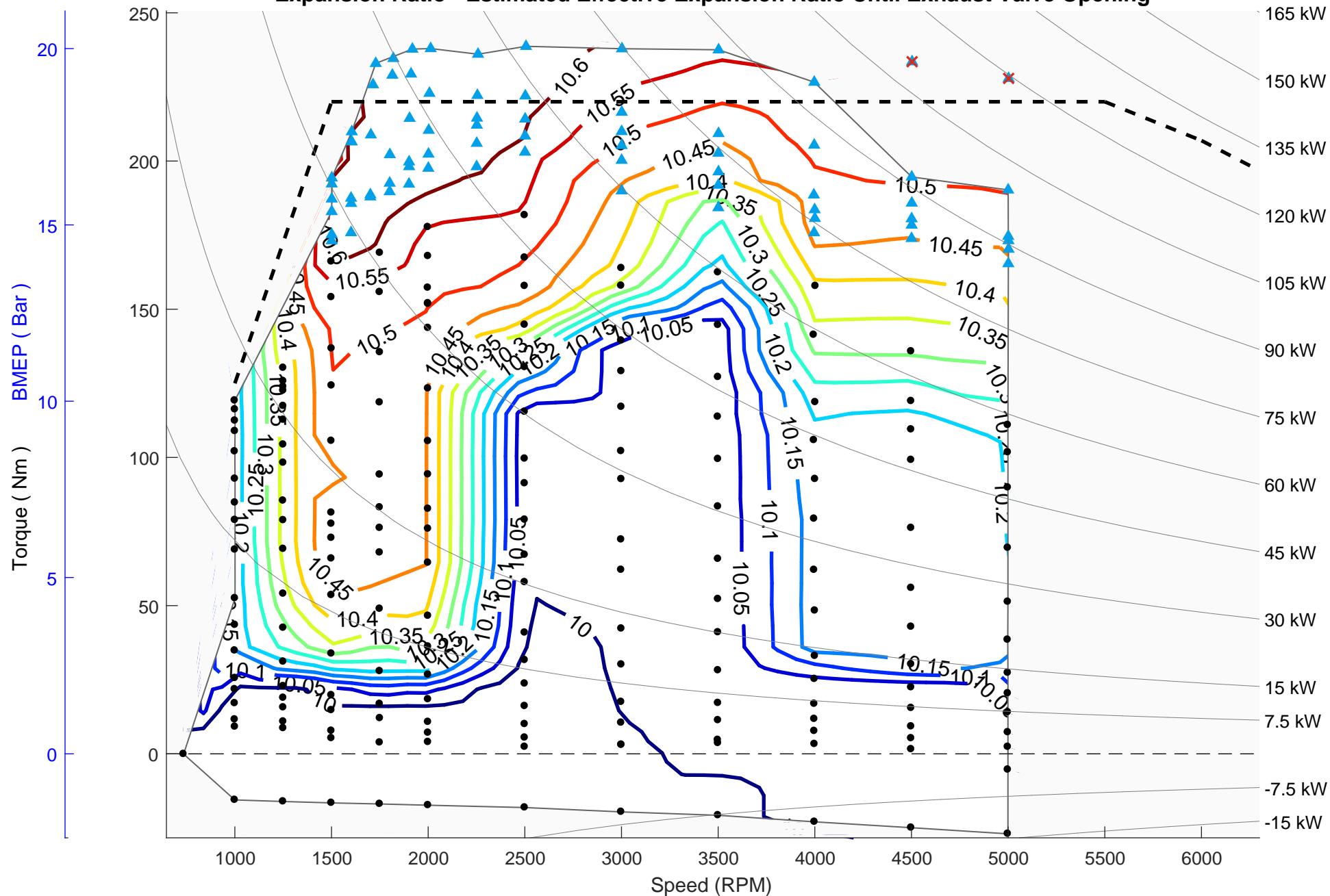
Expansion Stroke Length (mm) - Estimated Effective Expansion Stroke Length Until Exhaust Valve Opening



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Initial

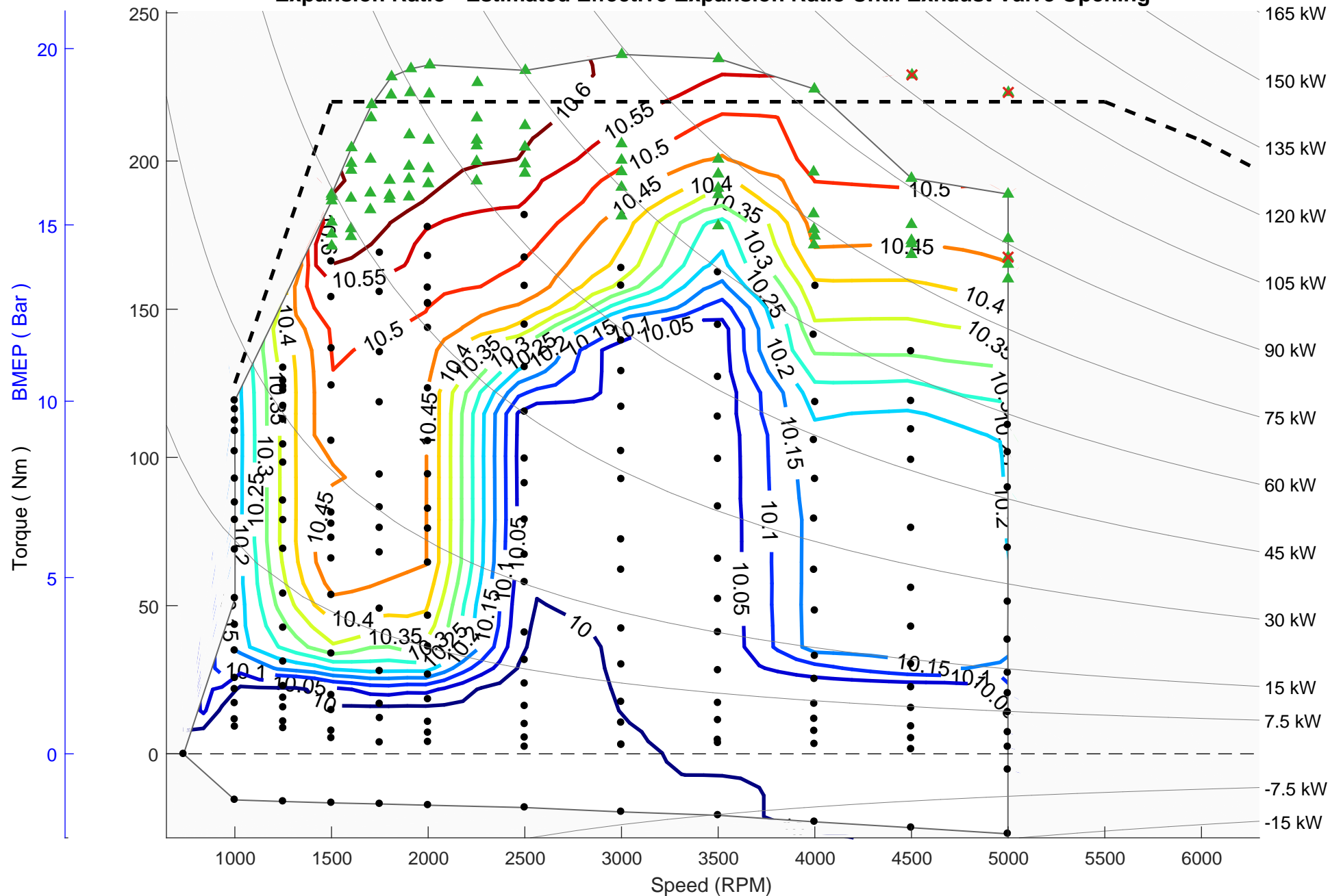
Expansion Ratio - Estimated Effective Expansion Ratio Until Exhaust Valve Opening



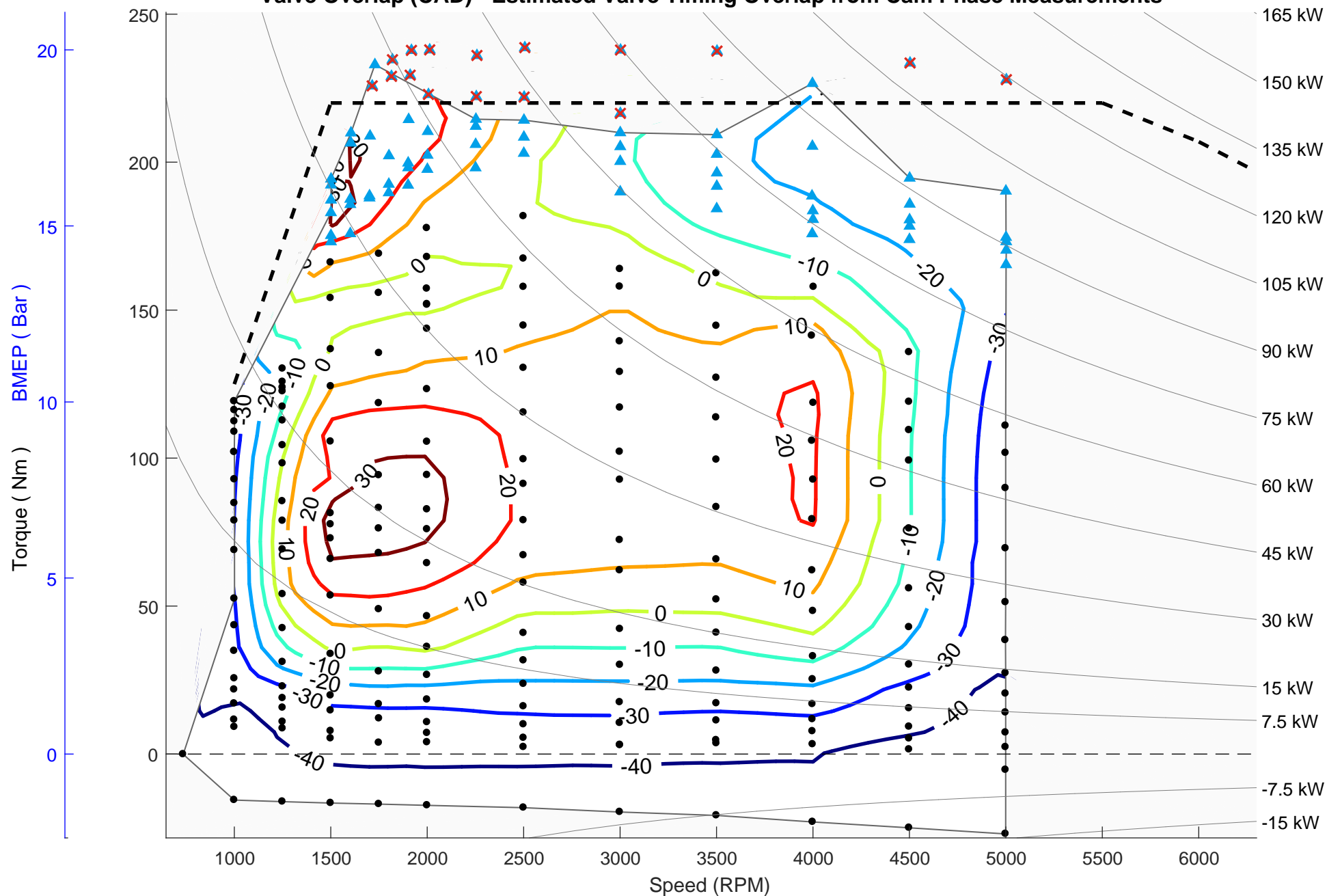
2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

Expansion Ratio - Estimated Effective Expansion Ratio Until Exhaust Valve Opening



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots
Steady State and High Load Initial
Valve Overlap (CAD) - Estimated Valve Timing Overlap from Cam Phase Measurements



2016 Honda 1.5L L15B7 Engine Tier 3 Fuel - Test Data Plots

Steady State and High Load Final

Valve Overlap (CAD) - Estimated Valve Timing Overlap from Cam Phase Measurements

