

Engine Simulation using ME 433 Equation from Lecture 7

Engine Parameters

Four-Stroke, Naturally Aspirated

Bore [in]	2.91339
Stroke [in]	2.059055
Cylinders [#]	3
Compression Ratio	12.65
Peak Engine Speed [RPM]	13,750

Notes

This is a simulation of the 2009 Triumph Street Triple R (675 cc)

74.0 mm
52.3 mm

Calculated Parameters - English Units

Vol_disp - Total [in ³]	41.18
Vol_disp - 1 cyl [in ³]	13.73
V_BDC - 1 cyl [in ³]	14.90
V_TDC - 1 cyl [in ³]	1.18
Peak Mean Piston Speed [ft/sec]	78.64

Calculated Parameters - SI Units

Vol_disp - Total [L]	0.675
Vol_disp - 1 cyl [L]	0.225
V_BDC - 1 cyl [L]	0.244
V_TDC - 1 cyl [L]	0.019
Peak Mean Piston Speed [m/sec]	23.97

WOT Parameters

Intake Pressure [psia]	14.7
Intake Temperature [°R]	540
Gas Constant [Btu/lbm-°R]	0.0685
n_R [revolutions per cycle]	2
Q_HV [Btu/lbm]	18,659
Air-Fuel Ratio [mass_air/mass_fuel]	12.5

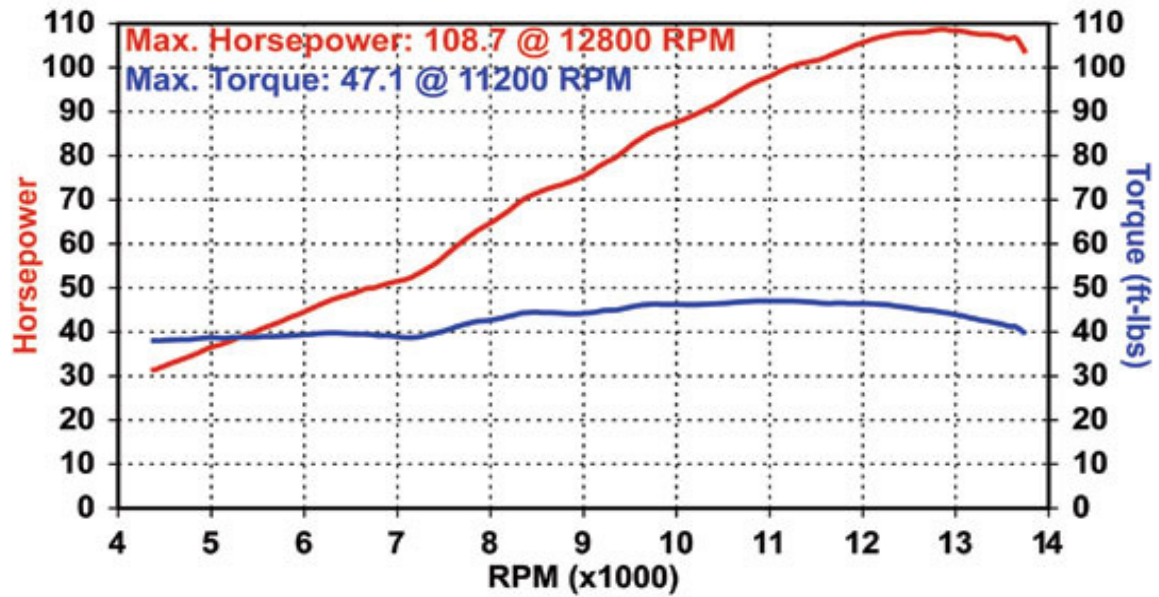
Lower Heating Value for Gasoline

Peak combustion efficiency of 0.85 for the specified AFR for gasoline

Predicting Power and Torque

	RPM							
	1700	3400	5100	6800	8500	10200	11900	13600
eta_t (cycle thermal efficiency)	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42
eta_m (mechanical efficiency)	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86
eta_c (combustion efficiency)	0.80	0.80	0.80	0.79	0.78	0.78	0.78	0.70
eta_v (volumetric efficiency)	0.45	0.55	0.62	0.68	0.82	0.94	0.97	0.95
Power [hp]	10.7	24.9	40.1	55.1	77.8	101.4	115.4	109.4
Torque [ft*lbf]	33.0	38.4	41.3	42.5	48.1	52.2	50.9	42.3

Dyno Plot for 2009 Triumph 675 Street Triple R (measured at wheel, not at crankshaft)



Math Model 2009 Triumph 675 Street Triple R

