

Engine Comments:

Projected Performance

Engine RPM	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
Brk Tq, ft lb	71.4	73.7	83.8	101	106	97.0	101	98.3	93.6	80.7
Brake HP	40.80	56.1	79.8	115	142	148	173	187	196	184
Exh Pres, PSI	0.0	0.1	0.1	0.3	0.5	0.6	0.8	0.9	1.1	1.2
Int Vac, "Hg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vol Eff, %	70.0	72.2	81.9	99.3	106.7	101.9	106.4	105.9	106.7	99.5
Actual CFM	48.21	66.2	94.0	137	171	187	220	243	269	274
Fuel Flow, lb/hr	16.84	23.14	32.84	47.75	59.8	65.3	76.8	84.9	94.1	95.6
Nitrous, lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ntrs Fuel, lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BMEP, PSI	136	140	159	192	202	184	192	187	178	153
A/F Mxtr Qlty, %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BSFC, lb/HP-hr	0.413	0.412	0.412	0.415	0.423	0.442	0.445	0.453	0.480	0.519
Thermal Eff, %	36.69	37.24	37.30	36.72	36.29	35.63	35.76	35.75	34.60	33.59
IMEP, PSI	153	160	182	218	231	217	227	226	220	199
Frctn Tq, ft-lbs	9.20	10.64	12.13	13.68	15.28	16.93	18.64	20.41	22.24	24.13
Frctn HP	5.25	8.11	11.55	15.63	20.36	25.79	31.94	38.86	46.58	55.1
FMEP, PSI	17.50	20.24	23.08	26.02	29.06	32.20	35.46	38.82	42.30	45.90
Mech Eff, %	88.6	87.4	87.3	88.0	87.4	85.1	84.4	82.8	80.8	77.0
Motoring HP	6.19	8.93	13.15	17.93	23.51	35.07	40.93	48.24	64.9	75.4
Pumpng Work, HP	-0.93	-0.82	-1.60	-2.30	-3.15	-9.28	-8.98	-9.38	-18.34	-20.28
Residual Exh, %	9.8	13.0	4.2	1.4	0.8	6.3	5.1	2.6	1.5	1.6
Shrt Circuit, %	0.0	0.0	0.3	1.7	2.2	0.0	0.0	0.0	0.4	0.8
Exh Temp, deg F	1192	1171	1221	1257	1241	1362	1330	1315	1386	1339
Mx Cyl Pres, PSI	901	999	1155	1407	1494	1397	1426	1360	1332	1181
Mx Cyl Tmp, deg F	4091	4011	4381	4524	4536	4273	4289	4302	4310	4239
In Port Tmp, deg F	139	144	113	103	98	105	94	88	80	77
Piston Spd, ft/min	1240	1653	2067	2480	2893	3307	3720	4133	4547	4960
Piston Gs @ TDC	400	710	1110	1600	2180	2840	3600	4440	5380	6400
Coolant HP	16.90	21.58	27.76	33.22	39.22	46.23	52.3	57.7	65.8	72.0
Blow By, CFM	0.7	0.7	0.8	0.9	0.9	0.9	1.0	0.9	0.9	0.9
In Tun Pres, PSI	0.1	0.7	0.2	1.9	3.1	5.2	6.7	5.9	6.1	6.5
Avg In Vel, ft/sec	80	106	133	159	186	212	239	265	292	318
Avg Ex Vel, ft/sec	70	93	116	140	163	186	209	233	256	279
Mach #	0.109	0.146	0.182	0.219	0.255	0.291	0.328	0.364	0.401	0.437
Act In FlowArea,%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Act Ex FlowArea,%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Valve Toss										
Knock Index	1.7	2.6	3.3	4.4	4.6	4.2	3.9	3.3	2.9	2.1
Spark Advnc, deg	25.0	30.0	30.5	31.0	31.5	32.0	31.7	31.3	31.0	31.0
Injctr Dty Cyc, %	17.5	24.1	34.2	49.7	62.3	68.1	80.0	88.4	98.0	99.6
Inj Plse Wdth, ms	7.0	7.2	8.2	9.9	10.7	10.2	10.7	10.6	10.7	10.0
Calc Error	0	0	0	0	0	0	0	0	0	0

PkTq=106@7000 Avg=90.7
 PkHP=196@11000 Avg=132

Engine Input Specs

Short Block, File: Hayabusa 1299 stock

Hayabusa 1299cc stock block

Block/Pistons/Rods		Accessories
Bore, in	3.19	Fan Type: Electric
Stroke, in	2.48	Wtr Pump: Lower Pulley Ratio
# of Cylinders	4	Engine Inertia/Crank Design
Rings: 3 Standard Tension		Inertia: Typ Inductive Dyno
Rod Length, in	4.72	Crank Design: Low Windage
Pstn Skrt: Smaller Skirt		
Bearing Size	.55	
Pstn Top: No Coating		
Cyl Lckg: Low Leakage		

Head(s), File: Hayabusa petrik 28inch

Hayabusa Stage 1 ported head by kstbh with 1mm oversized exhaust valve and -0.40" intake port, std intake port length is 4.7"
 Piston volume is -5cc for valve holes
 Normal chamber volume is 18cc. Gasket is 0.020" and deck is 0.020"

Intake Port Specs		Exhaust Port Specs	
Port Layout: 2 valves join to 1 port		Port Layout: 2 valves join to 1 port	
Valve Diameter, in	1.299	Valve Diameter, in	1.12
Avg Port Diameter, in	1.54	Avg Port Diameter, in	1.19
Port Length, in	4.7	Port Length, in	2.56
Single Flow Coef	na	Single Flow Coef	na
Anti-Reversion, %	0	Anti-Reversion, %	0
Combustion Chamber		Miscellaneous	
Compression Ratio	13.5	Mtrl/Coating: Modern Coated Alum.	
Chamber Design: Pent Roof		Burn Rating: Much Faster	
Int Valve Primary Angle	14	Exh Valve Primary Angle	14
Int Valve Canted Angle	0	Exh Valve Canted Angle	0
Int Valve-Deck Distance	.04	Exh Valve-Deck Distance	.01
Deck Ht Clearance	.02	Head Gasket Thickness	.02
---- Int Head Flow @ 28" ----		---- Exh Head Flow @ 28" ----	
Lift L/D CFM FlCf		Lift L/D CFM FlCf	
0.065 .050 54 .665		0.065 .058 42 .600	
0.130 .100 111 .684		0.130 .116 86 .614	
0.195 .150 157 .645		0.195 .174 119 .567	
0.260 .200 203 .625		0.260 .232 136 .486	
0.325 .250 229 .565		0.325 .290 143 .474	
0.390 .300 233 .575		0.390 .348 145 .481	

Intake System, File: Hayabusa intake stock with plenum

Hayabusa intake calculated for 4.85 runner taper uncertain, based on 1.8" opening. I.e. the opening is not calculated as part of the runner. Plenum values estimated.
 Airbox volume is about 550cu in of which about 122cu in is the area below the lid. Airbox entry hole is about 3.15"*1.77".

Manifold Specs (1 runner /cyl)		Carburetor(s)	
Runner Dia @ Head, in	1.61	Total CFM Rating	991
Runner Design: Tapered Runners		Secondary Throttles	na
Runner Length, in	4.45	Air Cleaner CFM Rating	na
Runner Flow Coef	3	Air Meter CFM Rating	na
Runner Taper, deg	2.65	Restrictor CFM Rating	na
Type: Single Plenum-Racing EFI		Plenum	
Int Heat: No Heat		Plenum Volume, cu in	na

Engine Input Specs

Fuel Delivery, File: Hayabusa intake stock with plenum

Fuel Injection		Carburetor	
Injector Rating, lb/hr	na	# Primary Venturies	0
Injector Rated Pres, PSI	na	# Secondary Venturies	1000
Operating Fuel Pres, PSI	na	Primary Venturi Diameter, in	0
Pressure Control	na	Secondary Venture Dia, in	0
Total # Injectors on Engine	na	Power Valve: Engine Input Specs	
Firing Method	na	Venturi Discharge Coef	8.4
		Air Bleed: 40%	

Exhaust System, File: Hayabusa Yoshimura

Hayabusa Yoshimura full exhaust, cfm rating assumed based on exit diameter.

Header Primary (1 runner /cyl)		Full Exhaust System	
Stepped Primary, 2 steps		CFM Rating	400
Section 1, Inside Dia, in	1.31	Collector (Detailed)	
Section 1, Length, in	7.36	Collector Length, in	23.35
Section 2, Inside Dia, in	1.53	Collector Dia, in	2.2
Section 2, Length, in	12.77	Collector Taper, deg	1
Section 3, Inside Dia, in	1.78		
Section 3, Length, in	6.6		
Runner Flow Coef	3		

Cam/Valve Train, File: Hayabusa Yoshimura ST1 105-105

Hayabusa Yoshimura ST1 @ 105-105

Intake Cam Profile		Exhaust Cam Profile	
Centerline, deg ATDC	109	Cam File	ZX6080HI.C1
Duration @ .040	244	Centerline, deg BTDC	109
Opening @ .040	13	Duration @ .040	230
Closing @ .040	51	Opening @ .040	44
Max Lobe Lift, in	.354	Closing @ .040	6
Actual Valve Lash, in	.005	Max Lobe Lift, in	.307
Designed Valve Lash, in	.005	Actual Valve Lash, in	.005
Rocker Arm Ratio	1	Designed Valve Lash, in	.005
Profile Type: Aggr Solid Roller		Rocker Arm Ratio	1
Gross Valve Lift, in	.354	Profile Type: Aggr Solid Roller	
Dwell over Nose: 0 Deg-Std Profile		Gross Valve Lift, in	.307
Use a Cam File	No	Dwell over Nose: 0 Deg-Std Profile	
		Use a Cam File	No
		Overall Cam Specs	
		Total Cam Adv: Straight Up	

Valve Train Dynamics, File: Hayabusa Yoshimura ST1 105-105

Intake Valve Train		Exhaust Valve Train	
Gen Type: Direct Acting OHC		Gen Type: Direct Acting OHC	
Eff Valve Mass, gms	21	Eff Valve Mass, gms	
Eff Rckr Arm Stffnss, lb/in		Eff Rckr Arm Stffnss, lb/in	
Eff Lifter Mass, gms		Eff Lifter Mass, gms	
Eff Lifter Stiffness, lb/in	guess	Eff Lifter Stiffness, lb/in	guess
Spring Rate, lb/in		Spring Rate, lb/in	
Seated Spring Force, lbs	71	Seated Spring Force, lbs	

Engine Input Specs

Calculation Conditions, File: Hayabusa jasa ehdotus

Test Conditions

CorFctr: SAE Conds (77 deg, 29.6")
Barometric Pressure, "Hg na
Intake Air Temp, deg F na
Dew Point, deg F na
Elevation, feet na
Cooling Sys: Liquid Cooled
Coolant Temp, deg F 180
Accel Rate: 0 Steady State
Chassis Dyno Losses 0

Fuel Specs

Fuel Type: Gasoline
Fuel Octane (R+M)/2

Use Nitrous Oxide No

Use User Defined Spark Specs

RPM to Run

Starting RPM 3000
Number of RPM Steps 10
RPM Step Size 1000

Spark Curve, File: Hayabusa jasa ehdotus

Specs Determine Spark Curve Only (program determines burn rate)

Type: 4 Break Points in Curve

Break Point #1, Spark Advanc 20
Break Point #1, RPM 2000
Break Point #2, Spark Advanc 30
Break Point #2, RPM 4000

Break Point #3, Spark Advanc 32
Break Point #3, RPM 8000
Break Point #4, Spark Advanc 31
Break Point #4, RPM 11000