Torque Developments International

Oil Testing Project

This testing project was designed to investigate the performance of "high performance" oils.

We were specifically interested in measuring the effect that these oils had on the engines maximum effort output as well as their ability to cool the engine by way of direct heat exchange.

It is important to note that no attempt was made to gather data about the boundary layer film strength of these oil products or the ability for the oil to operate over extended periods of time.

Oil Testing - Test Detail

17/04/2013

Sam Borgman - Technical Director
Dennis Hayes - Master Technician
Location - West Thurrock, Essex, UK

Test Vehicle:
Honda Civic Type-R FN2

Test Engine:
Honda K20Z4

Modifications
Basic air box upgrade (HKS SPF)
Basic cat-back exhaust upgrade (HKS silent hi-power)
Hondata Flash-pro (calibrated by Torque Development International)

Test equipment:
Rototest VPA-R5/9 hub mounted chassis dynamometer - dead weight calibrated before testing and verified after (0.01% discrepancy)
Torque Developments ventilated test cell - airflow rate set to maximum
Data acquisition Rototest Data-Q 16

Test Method:
Engine coolant temperature was regulated to within a window of 90-94degC
Engine oil was between 75-76degC at the start of any given oil test set
The dyno cell ambient tempereture was controlled to within a tight window with a low temp of 21.0degC and 22.5degC
Engine oils were tested with the engine sump filled to the maximum level indicated by the manufacturers standard dipstick, level tested warm
DIN 70 020 dynamometer atmospheric correction protocol has been applied to the raw dynamometer measurements
The dynamometer test carried out was of the constant acceleration type
A start of test engine speed of 2000rpm, with the end of test defined by the engines rev limiter set to 8200rpm
The engine speed ramp rate used was 318.2rpm per second
The temperature of the engine oil in the engines sump was noted at the start of each test sweep
Three test sweeps were carried out in direct succession
This was followed by a 5minute period during which the engine is not running and the test cell airflow is turned off
After five minutes time had elapsed the test cell airflow was reinstated, the engine is restarted coolant temps are brought to within test parameters and then another three tests are performed in direct succession to one another
In total six separate whole sets of run data were created for each individual oil tested and the mean average results from all six data sets were taken to create the power and temperature measurements
Between the testing of different oil brands the engine was run up to temperature for 10minutes using specific break-in oil in order to prevent the mixing of the respective chemical packages

The test oils

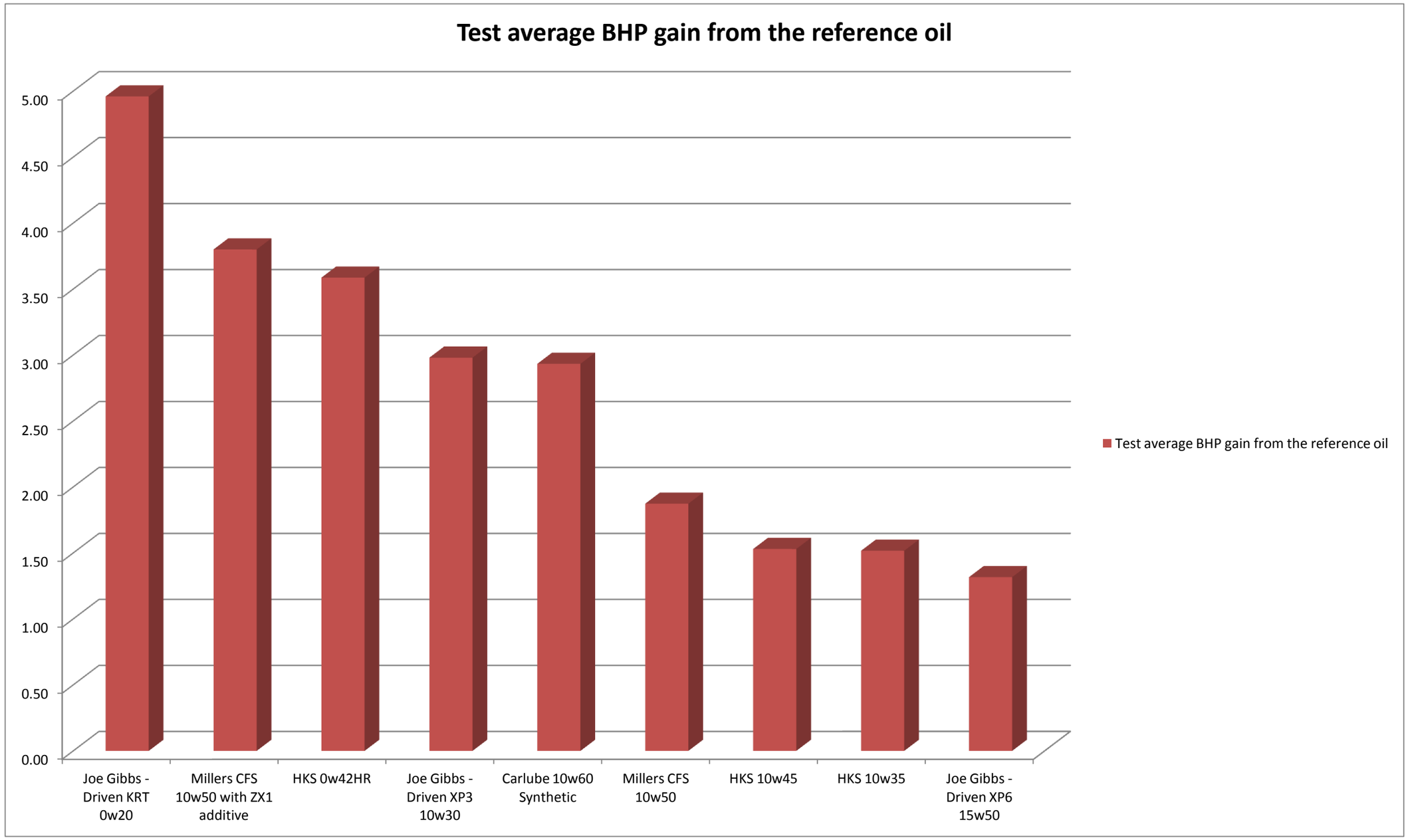
Gold Crest 10w40 Semi-synth (our basic reference oil)

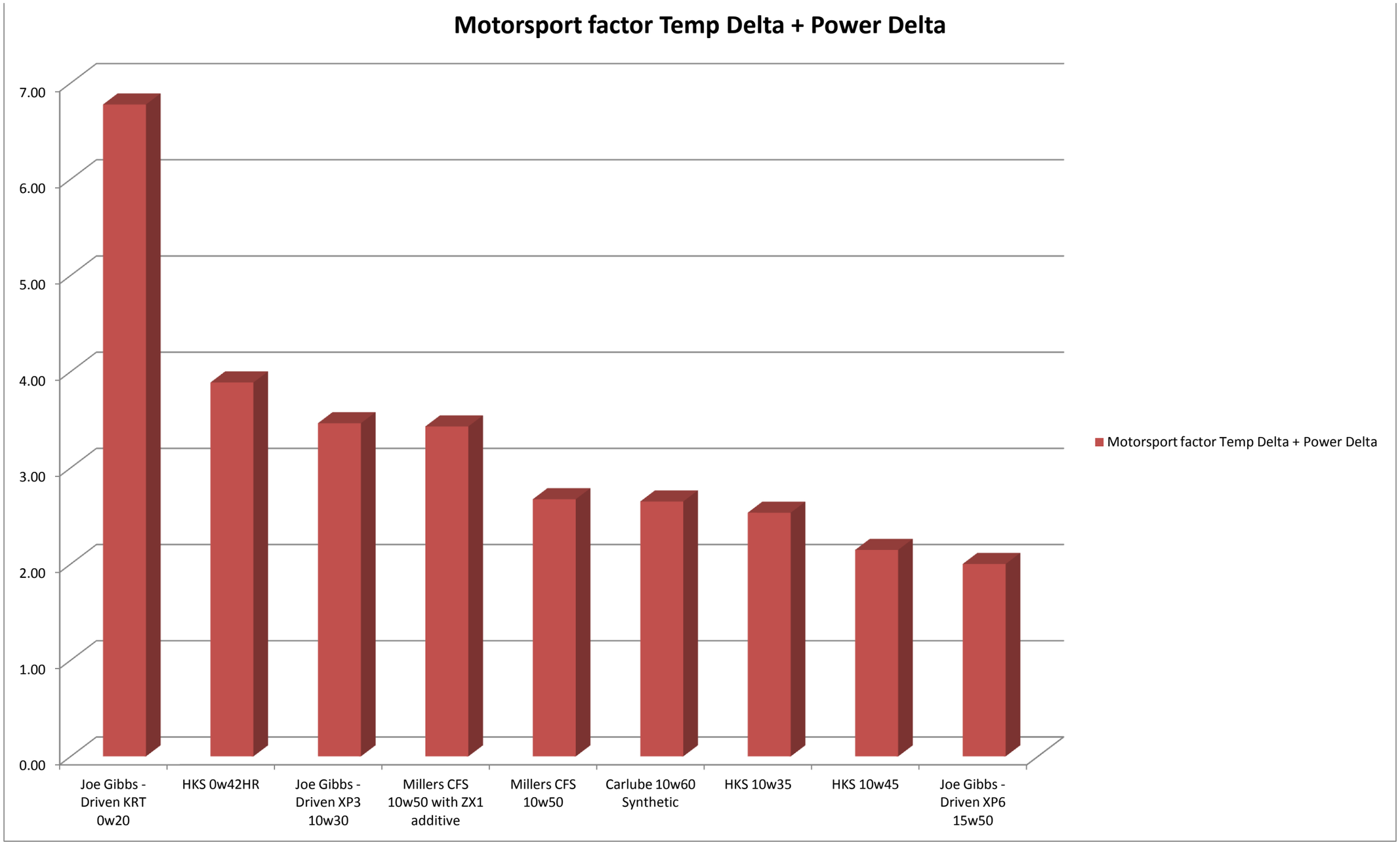
HKS 10w35
HKS 10w45
HKS 0w42HR

Carlube 10w60 Synthetic

Joe Gibbs - Driven XP6 15w50
Joe Gibbs - Driven XP3 10w30
Joe Gibbs - Driven KRT 0w20

Millers CFS 10w50
Millers CFS 10w50 with dose of ZX1 oil additive


Test average BHP gain from the reference oil
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Joe Gibbs - Driven KRT 0w20
Millers CFS 10w50 with ZX1 additive
HKS 0w42HR
Joe Gibbs - Driven XP3 10w30
Carlube 10w60 Synthetic
Millers CFS 10w50
HKS 10w45
HKS 10w35
Joe Gibbs - Driven XP6 15w50
Test average BHP gain from the reference oil


Motorsport factor Temp Delta + Power Delta
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Joe Gibbs - Driven KRT 0w20
HKS 0w42HR
Joe Gibbs - Driven XP3 10w30
Millers CFS 10w50 with ZX1 additive
Millers CFS 10w50
Carlube 10w60 Synthetic
HKS 10w35
HKS 10w45
Joe Gibbs - Driven XP6 15w50
Motorsport factor Temp Delta + Power Delta

Test Order

	Test Avg BHP (DIN) 6000-8000rpm	BHP Delta from Ref	Test Avg Oil temp delta over a test run (DegC)	DegC Delta from Ref
Gold Crest 10w40 Semi-synth (Reference oil)	184.26	0.00	0.85	0.00
HKS 10w35	185.78	1.52	1.87	1.02
HKS 10w45	185.79	1.53	1.47	0.62
HKS 0w42HR	187.85	3.59	1.15	0.30
Carlube 10w60 Synthetic	187.19	2.93	0.57	-0.28
Joe Gibbs - Driven XP6 15w50	185.58	1.32	1.53	0.68
Joe Gibbs - Driven XP3 10w30	187.24	2.98	1.33	0.48
Joe Gibbs - Driven KRT 0w20	189.22	4.96	2.67	1.82
Millers CFS 10w50	186.13	1.87	1.65	0.80
Millers CFS 10w50 with ZX1 additive	188.06	3.80	0.48	-0.37

Power Gain Order

	Test Avg BHP (DIN) 6000-8000rpm	Test average BHP gain from the reference oil	Test Avg Oil temp delta over a test run (DegC)	DegC Delta from Ref
Gold Crest 10w40 Semi-synth (Reference oil)	184.26	0.00	0.85	0.00
Joe Gibbs - Driven KRT 0w20	189.22	4.96	2.67	1.82
Millers CFS 10w50 with ZX1 additive	188.06	3.80	0.48	-0.37
HKS 0w42HR	187.85	3.59	1.15	0.30
Joe Gibbs - Driven XP3 10w30	187.24	2.98	1.33	0.48
Carlube 10w60 Synthetic	187.19	2.93	0.57	-0.28
Millers CFS 10w50	186.13	1.87	1.65	0.80
HKS 10w45	185.79	1.53	1.47	0.62
HKS 10w35	185.78	1.52	1.87	1.02
Joe Gibbs - Driven XP6 15w50	185.58	1.32	1.53	0.68

Motorsport Suitability Factor Order

	Test Avg BHP (DIN) 6000-8000rpm	BHP Delta from Ref	Test Avg Oil temp delta over a test run (DegC)	DegC Delta from Ref	Motorsport factor Temp Delta + Power Delta
Gold Crest 10w40 Semi-synth (Reference oil)	184.26	0.00	0.85	0.00	0.00
Joe Gibbs - Driven KRT 0w20	189.22	4.96	2.67	1.82	6.78
HKS 0w42HR	187.85	3.59	1.15	0.30	3.89
Joe Gibbs - Driven XP3 10w30	187.24	2.98	1.33	0.48	3.46
Millers CFS 10w50 with ZX1 additive	188.06	3.80	0.48	-0.37	3.43
Millers CFS 10w50	186.13	1.87	1.65	0.80	2.67
Carlube 10w60 Synthetic	187.19	2.93	0.57	-0.28	2.65
HKS 10w35	185.78	1.52	1.87	1.02	2.53
HKS 10w45	185.79	1.53	1.47	0.62	2.15
Joe Gibbs - Driven XP6 15w50	185.58	1.32	1.53	0.68	2.00

Viscocity Order

	Test Avg BHP (DIN) 6000-8000rpm	BHP Delta from Ref	Test Avg Oil temp delta over a test run (DegC)	DegC Delta from Ref	Motorsport factor Temp Delta + Power Delta
Gold Crest 10w40 Semi-synth (Reference oil)	184.26	0.00	0.85	0.00	0.00
Joe Gibbs - Driven KRT 0w20	189.22	4.96	2.67	1.82	6.78
Joe Gibbs - Driven XP3 10w30	187.24	2.98	1.33	0.48	3.46
HKS 10w35	185.78	1.52	1.87	1.02	2.53
HKS 0w42HR	187.85	3.59	1.15	0.30	3.89
HKS 10w45	185.79	1.53	1.47	0.62	2.15
Millers CFS 10w50 with ZX1 additive	188.06	3.80	0.48	-0.37	3.43
Millers CFS 10w50	186.13	1.87	1.65	0.80	2.67
Joe Gibbs - Driven XP6 15w50	185.58	1.32	1.53	0.68	2.00
Carlube 10w60 Synthetic	187.19	2.93	0.57	-0.28	2.65

Gold Crest 10w40 (Reference Oil)

Dyno results DIN corrected

Engine speed (RPM)	Run Number 7 TEST RUN 1	Run Number 8 TEST RUN 2	Run Number 9 TEST RUN 3	Run Number 10 TEST RUN 4	Run Number 11 TEST RUN 5	Run Number 12 TEST RUN 6
6000	167.1	167.4	167	166.6	167.1	*Bad Data*
6500	178.2	178.7	178.8	177.7	178.3	*Bad Data*
7000	188.3	189.4	189.4	188.1	188.2	*Bad Data*
7500	192.8	194	194.2	193	194.2	*Bad Data*
8000	193.3	194	193.9	192.5	194.3	*Bad Data*
Test Run Average BHP (din)	183.94	184.7	184.66	183.58	184.42	*Bad Data*
Test oil temp delta (DegC)	0.1	0.9	0.8	0.8	1.3	1.2

Whole test average BHP (din)	**184.26**
Whole test average oil temp delta (DegC)	**0.85**

HKS 10w35

Dyno results DIN corrected

Engine speed (RPM)	Run Number 15 TEST RUN 1	Run Number 16 TEST RUN 2	Run Number 17 TEST RUN 3	Run Number 18 TEST RUN 4	Run Number 19 TEST RUN 5	Run Number 20 TEST RUN 6
6000	167.7	169.2	168.6	167.6	167.8	168.2
6500	180	180.7	180.8	177.8	178.8	179.3
7000	190.5	191.3	191.7	188.3	189.2	190
7500	195.9	196.3	196.6	194.2	195.2	195.8
8000	195.6	196.1	196.2	193.9	194.9	195.1
Test Run Average BHP (din)	185.94	186.72	186.78	184.36	185.18	185.68
Test oil temp delta (DegC)	1	0.5	1.4	4.5	2.5	1.3

Whole test *average* BHP (din)	**185.78**
Whole test *average* oil temp delta (DegC)	**1.87**

HKS 10w45

Dyno results DIN corrected

Engine speed (RPM)	Run Number 21 TEST RUN 1	Run Number 22 TEST RUN 2	Run Number 23 TEST RUN 3	Run Number 24 TEST RUN 4	Run Number 25 TEST RUN 5	Run Number 26 TEST RUN 6
6000	167.5	168.5	168.6	168.9	168.7	168.5
6500	178.7	180.2	180.8	179.3	179.7	179.5
7000	188.8	190.2	191	189.6	189.9	190.2
7500	193.8	195.5	196.6	194.7	196.2	196.4
8000	193.7	195.2	196.3	194.8	195.8	196.1
Test Run Average BHP (din)	184.5	185.92	186.66	185.46	186.06	186.14
Test oil temp delta (DegC)	-0.5	0.7	0.5	2.6	4.1	1.4

Whole test *average* BHP (din)	**185.79**
Whole test *average* oil temp delta (DegC)	**1.47**

HKS HR 0w42

Dyno results DIN corrected

Engine speed (RPM)	Run Number 27 TEST RUN 1	Run Number 28 TEST RUN 2	Run Number 29 TEST RUN 3	Run Number 30 TEST RUN 4	Run Number 31 TEST RUN 5	Run Number 32 TEST RUN 6
6000	169	169.4	169.9	170.4	169.9	169.9
6500	181.3	182.1	182.6	180.8	181.2	181
7000	192.5	193.2	193.1	191.4	192	191.5
7500	197.1	198.7	198.1	196.6	197.5	197.5
8000	197.5	198.4	198.9	197.8	197.8	198.3
Test Run Average BHP (din)	187.48	188.36	188.52	187.4	187.68	187.64
Test oil temp delta (DegC)	0	1	0.9	2.6	1.5	0.9

Whole test *average* BHP (din)	**187.85**
Whole test *average* oil temp delta (DegC)	**1.15**

Carlube 10w60 synth

Dyno results DIN corrected

Engine speed (RPM)	Run Number 33 TEST RUN 1	Run Number 34 TEST RUN 2	Run Number 35 TEST RUN 3	Run Number 36 TEST RUN 4	Run Number 37 TEST RUN 5	Run Number 38 TEST RUN 6
6000	169.1	169	168.8	168.7	169	169.3
6500	180.9	181	181.7	180	180.6	180.4
7000	191.4	191.9	191.9	190.7	191.8	191.4
7500	196.1	197.5	197.9	196.5	197.8	197.3
8000	196.2	198.2	198.1	196.4	198.2	198
Test Run Average BHP (din)	186.74	187.52	187.68	186.46	187.48	187.28
Test oil temp delta (DegC)	0.6	1.5	0.9	1	-0.3	-0.3

Whole test *average* BHP (din)	**187.19**
Whole test *average* oil temp delta (DegC)	**0.57**

Joe Gibbs Driven XP6 15w50

Dyno results DIN corrected

Engine speed (RPM)	Run Number 39 TEST RUN 1	Run Number 40 TEST RUN 2	Run Number 41 TEST RUN 3	Run Number 42 TEST RUN 4	Run Number 43 TEST RUN 5	Run Number 44 TEST RUN 6
6000	166.3	167.3	167.2	167.9	167.9	168.6
6500	178.7	180.4	180.4	179.3	179.6	179.5
7000	188.7	190.9	191.1	189.9	189.8	190.5
7500	194	195.5	196.1	194.3	195.6	196.3
8000	194.1	194.9	195.1	195.7	195.1	196.6
Test Run Average BHP (din)	184.36	185.8	185.98	185.42	185.6	186.3
Test oil temp delta (DegC)	0.9	2.1	2.6	0.8	1	1.8

Whole test *average* BHP (din)	**185.58**
Whole test *average* oil temp delta (DegC)	**1.53**

Joe Gibbs Driven XP3 10w30

Dyno results DIN corrected

Engine speed (RPM)	Run Number 45 TEST RUN 1	Run Number 46 TEST RUN 2	Run Number 47 TEST RUN 3	Run Number 48 TEST RUN 4	Run Number 49 TEST RUN 5	Run Number 50 TEST RUN 6
6000	169	169.4	169.2	168.6	169.2	169.6
6500	181.3	181.3	181.9	180.8	181.3	180.9
7000	191.5	192	192.1	191.1	191.4	191.8
7500	196.2	197.5	197.3	197.1	197.4	197.3
8000	196.6	197.4	197.1	196.7	197	197.2
Test Run Average BHP (din)	186.92	187.52	187.52	186.86	187.26	187.36
Test oil temp delta (DegC)	-0.5	2.8	2.5	1	0.9	1.3

Whole test *average* BHP (din)	**187.24**
Whole test *average* oil temp delta (DegC)	**1.33**

Joe Gibbs Driven KRT 0w20

Dyno results DIN corrected

Engine speed (RPM)	Run Number 51 TEST RUN 1	Run Number 52 TEST RUN 2	Run Number 53 TEST RUN 3	Run Number 54 TEST RUN 4	Run Number 55 TEST RUN 5	Run Number 56 TEST RUN 6
6000	170.7	171.2	170.9	170.1	170.4	170.3
6500	183.7	183.9	183.7	182.1	181.8	182
7000	194.6	194.6	194.3	192.4	193.4	193.1
7500	200.5	200.2	199.9	198.5	199.2	199.3
8000	199.6	199.9	200	198.4	198.6	199.3
Test Run Average BHP (din)	189.82	189.96	189.76	188.3	188.68	188.8
Test oil temp delta (DegC)	4.5	2.6	2.6	2.3	2.3	1.7

Whole test *average* BHP (din)	**189.22**
Whole test *average* oil temp delta (DegC)	**2.67**

Millers CFS 10w50

Dyno results DIN corrected

Engine speed (RPM)	Run Number 57 TEST RUN 1	Run Number 58 TEST RUN 2	Run Number 59 TEST RUN 3	Run Number 60 TEST RUN 4	Run Number 61 TEST RUN 5	Run Number 62 TEST RUN 6
6000	167.8	167.8	168.4	168.4	167.9	168.3
6500	180.2	180.6	181.3	179.7	179	179.8
7000	190.9	191.3	191.6	189.5	190.1	190.4
7500	195.2	196.4	196.5	195.3	196	196.4
8000	195.4	195.8	196.5	195.4	195.9	196.2
Test Run Average BHP (din)	185.9	186.38	186.86	185.66	185.78	186.22
Test oil temp delta (DegC)	1.5	3.9	0.9	0.8	2.7	0.1

Whole test *average* BHP (din)	**186.13**
Whole test *average* oil temp delta (DegC)	**1.65**

Millers CFS 10w50 + ZX1 treatment

Dyno results DIN corrected

Engine speed (RPM)	Run Number 63 TEST RUN 1	Run Number 64 TEST RUN 2	Run Number 65 TEST RUN 3	Run Number 66 TEST RUN 4	Run Number 67 TEST RUN 5	Run Number 68 TEST RUN 6
6000	171.1	170.6	170.8	170.1	169.8	*Bad Data*
6500	182.6	183	181.5	181.6	181.2	*Bad Data*
7000	193.1	192.8	191.8	191.4	191.2	*Bad Data*
7500	197.9	198.3	197.4	197.3	197.2	*Bad Data*
8000	198.4	199	197.6	197.8	198	*Bad Data*
Test Run Average BHP (din)	188.62	188.74	187.82	187.64	187.48	0
Test oil temp delta (DegC)	-0.7	2.3	-0.4	1	0.2	

Whole test *average* BHP (din)	**188.06**
Whole test *average* oil temp delta (DegC)	**0.48**