2016 Polaris SKS Axys 800 test/ text by Jim Czekala

Heath Lynk, of Cobleskill, NY, came again to DTR, this time with a new zero mile long track SKS Axys 800 for breakin and to test a new SSI (Speed Shop Inc) modified "pipe mod" stock pipe that Heath had done. We also have a new BMP (Bikeman Performance) ceramic coated single pipe here that we wanted to test, sent here by a Canadian DTR member who will be tuning his new Axys here in a few weeks. Heath brought the first 2015 Axys 800 HO here back in Oct 2014 that we spent several hours breaking in, obtaining base numbers. Then Heath brought the same 2015 sled back to DTR last February after putting a few thousand miles on the trail, to see what it would finally produce after field running/ eliminating breakin mode from the 2015 ECU. Both test sessions are documented on this website, with the good running engine ultimately making HP in the mid 150's with ethanol fuel used in the non-ethanol ECU setting.

We did all of our testing today with 91 octane non-ethanol fuel (that we forgot to analyze) premixed with Polaris VES oil at 50-1, with the ECU switched to the leaner, more advanced timing non-ethanol fuel mode. The hood/ gauge pod was left in place, so air intake was through the stock ducting with frogskin covering the dash intake openings. With no mechanical airflowmeter used, there is no airflow or A/F data included today. The dyno cooling tower was tied into the sled's cooling system—with cooling tower Tstat set above 100F. This enabled us to do back-to-back dyno acceleration tests without the need for cooldown of the engine. We would do three or four back to back 10-12 second dyno tests, then the HP would level off, or tail off a bit as the ECU would add cooling fuel at elevated pipe Center Section temps. By running the engine for extended periods of time at WOT, we would see pipe Center Section temperature climb from 800F to 1100F and even higher—temperatures very likely experienced by mountain climbers and lake runners who run at WOT for minutes at a time!

Initial dyno test results showed much more HP than Heath's then-new 2015—where the 2015 was in the mid 140's HP initially, the 2016 was right at 150+ out of the box. This is due at least in part to the 2016's much leaner "breakin mode" fuel flow (after breakin, the 2016's final fuel flow is said to be 3% leaner than the 2015's calibration. We ran about 40 full throttle 10-12 second dyno tests before switching to the SSI and BMP exhausts. But the engine seemed to settle in to 152+ HP quickly.

Here are four back-to-back dyno tests with the stock exhaust—tests 22-25—showing the midrange HP drop, and peak HP, and peak HP RPM slide up to 8300-8400, as CS temps slid up from 800 to 1100+. Here's the run by run data, with a comparison graph.

Test 22

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AirInT	FulPrA	STPCor	DenAlt
RPM	CHp	Clb-ft	lb/hph	lbs/hr	degF	psig	Factor	Feet
6100	92.1	79.3	0.565	49.0	65.1	61.5	1.053	1824
6200	93.6	79.3	0.570	50.3	65.1	61.5	1.053	1824
6300	95.8	79.8	0.571	51.5	65.1	61.4	1.053	1824
6400	98.8	81.1	0.563	52.5	65.1	61.4	1.053	1824

6500	101.9	82.3	0.541	52.0	65.1	61.4	1.053	1824
6600	104.8	83.4	0.533	52.7	65.1	61.3	1.053	1824
6700	107.2	84.0	0.538	54.4	65.1	61.3	1.053	1824
6800	109.8	84.8	0.550	56.9	65.1	61.2	1.053	1824
6900	113.1	86.1	0.554	59.1	65.1	61.2	1.053	1824
7000	116.3	87.2	0.555	60.9	65.1	61.2	1.053	1823
7100	118.9	87.9	0.571	63.9	65.1	61.0	1.053	1823
7200	121.6	88.7	0.583	66.8	65.1	60.8	1.053	1823
7300	127.5	91.7	0.607	73.0	65.1	60.5	1.053	1823
7400	134.4	95.4	0.597	75.6	65.1	60.5	1.053	1823
7500	141.1	98.8	0.588	78.3	65.1	60.4	1.053	1824
7600	144.8	100.1	0.588	80.3	65.1	60.4	1.053	1824
7700	146.8	100.1	0.587	81.3	65.1	60.3	1.053	1825
7800	147.9	99.6	0.580	80.8	65.1	60.3	1.053	1825
7900	148.1	98.4	0.568	79.3	65.1	60.4	1.053	1826
8000	148.0	97.2	0.557	77.8	65.1	60.4	1.053	1826
8100	147.2	95.4	0.547	75.9	65.1	60.5	1.053	1826
8200	142.0	91.0	0.562	75.2	65.1	60.5	1.053	1828

Test 23

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AirInT	FulPrA	STPCor	DenAlt
RPM	CHp	Clb-ft	lb/hph	lbs/hr	degF	psig	Factor	Feet
6100	90.9	78.3	0.561	48.0	65.3	61.6	1.054	1842
6200	92.5	78.4	0.545	47.5	65.3	61.6	1.054	1843
6300	94.8	79.0	0.549	49.0	65.3	61.5	1.054	1843
6400	97.5	80.0	0.547	50.2	65.3	61.5	1.054	1843
6500	100.5	81.2	0.542	51.3	65.3	61.5	1.054	1844
6600	103.7	82.5	0.543	53.1	65.3	61.4	1.054	1844
6700	106.3	83.3	0.558	55.9	65.3	61.3	1.054	1844
6800	108.8	84.0	0.569	58.3	65.3	61.3	1.054	1845
6900	111.5	84.9	0.573	60.2	65.3	61.3	1.054	1845
7000	114.3	85.7	0.570	61.3	65.3	61.2	1.054	1846
7100	116.9	86.5	0.585	64.4	65.3	61.1	1.054	1845
7200	120.2	87.7	0.603	68.3	65.3	60.9	1.054	1845
7300	126.5	91.0	0.624	74.3	65.3	60.7	1.054	1845
7400	132.1	93.8	0.613	76.3	65.3	60.6	1.054	1845
7500	137.4	96.2	0.598	77.4	65.3	60.7	1.054	1845
7600	141.8	98.0	0.593	79.3	65.3	60.6	1.054	1845
7700	144.5	98.6	0.598	81.5	65.3	60.6	1.054	1845
7800	146.4	98.6	0.601	82.8	65.3	60.5	1.054	1844
7900	147.8	98.2	0.590	82.1	65.4	60.5	1.054	1845
8000	148.9	97.8	0.575	80.6	65.4	60.6	1.054	1846
8100	149.9	97.2	0.561	79.2	65.4	60.7	1.054	1846
8200	150.6	96.4	0.548	77.8	65.4	60.7	1.054	1848
8300	150.2	95.0	0.536	75.8	65.4	60.8	1.054	1848
8400	148.6	92.9	0.526	73.6	65.4	60.9	1.054	1848

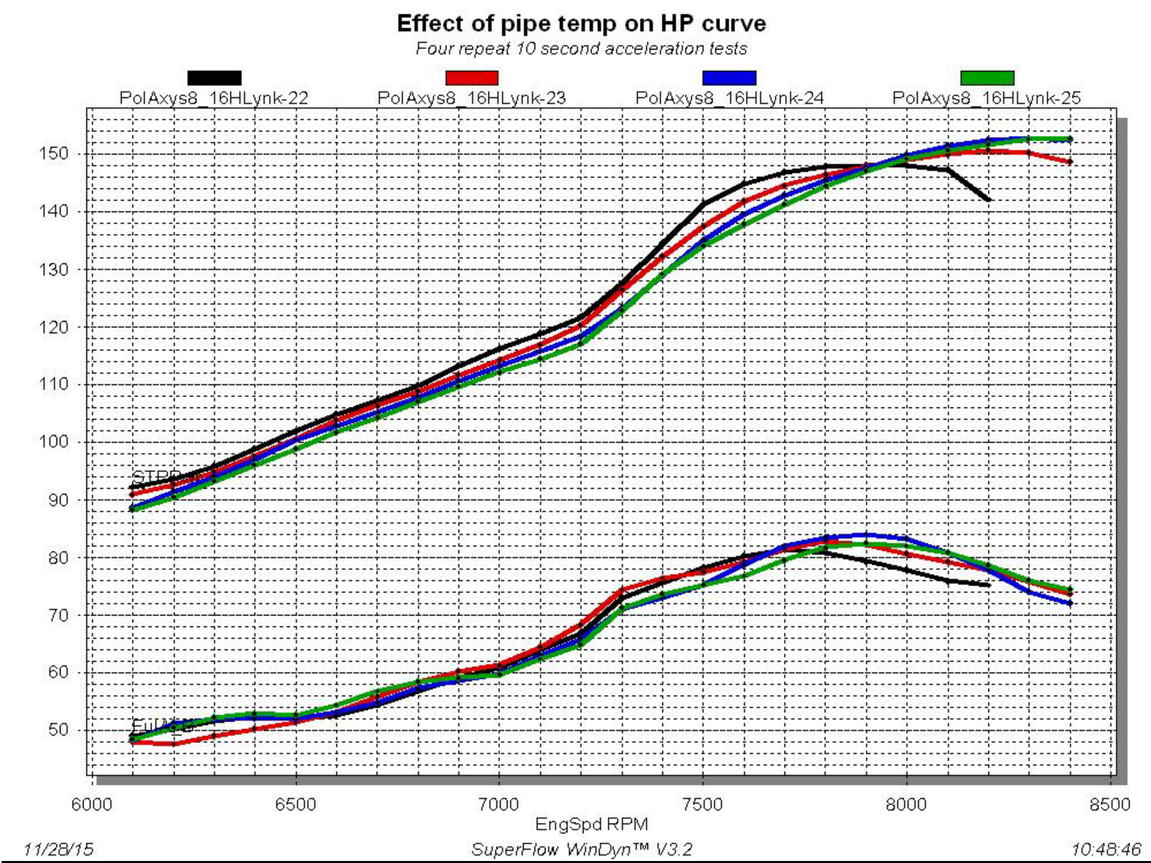
Test 24

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AirInT	FulPrA	STPCor	DenAlt
RPM	CHp	Clb-ft	lb/hph	lbs/hr	degF	psig	Factor	Feet
6100	88.6	76.3	0.578	48.2	65.6	61.6	1.054	1864
6200	91.4	77.4	0.595	51.2	65.6	61.6	1.054	1865
6300	94.0	78.4	0.588	52.1	65.6	61.5	1.054	1866
6400	96.9	79.5	0.571	52.1	65.7	61.5	1.054	1868
6500	100.3	81.0	0.551	52.0	65.7	61.5	1.054	1869
6600	102.8	81.8	0.549	53.1	65.7	61.4	1.054	1869
6700	105.1	82.4	0.554	54.8	65.7	61.3	1.054	1870
6800	107.7	83.2	0.565	57.3	65.7	61.3	1.054	1871
6900	110.6	84.2	0.563	58.6	65.7	61.3	1.054	1873
7000	113.3	85.0	0.561	59.8	65.7	61.3	1.054	1873
7100	115.7	85.6	0.578	62.9	65.7	61.1	1.054	1875
7200	118.3	86.3	0.591	65.8	65.7	61.0	1.054	1875
7300	123.2	88.7	0.612	71.0	65.8	60.7	1.054	1876
7400	128.9	91.5	0.601	73.0	65.8	60.7	1.054	1876
7500	135.1	94.6	0.591	75.2	65.8	60.7	1.054	1877
7600	139.5	96.4	0.599	78.7	65.8	60.6	1.054	1879
7700	142.8	97.4	0.609	81.9	65.8	60.6	1.054	1880
7800	145.4	97.9	0.609	83.4	65.8	60.5	1.054	1880
7900	147.6	98.2	0.604	83.9	65.8	60.6	1.054	1881
8000	149.8	98.3	0.591	83.3	65.8	60.6	1.054	1883
8100	151.5	98.2	0.567	80.9	65.9	60.7	1.054	1883
8200	152.4	97.6	0.542	77.7	65.9	60.8	1.054	1884
8300	152.7	96.6	0.515	74.0	65.9	60.9	1.054	1885
8400	152.3	95.3	0.503	72.1	65.9	60.9	1.055	1886

Test 25

EngSpd	STPPwr	STPTrq	BSFA_B	FulA_B	AirInT	FulPrA	STPCor	DenAlt
RPM	CHp	Clb-ft	lb/hph	lbs/hr	degF	psig	Factor	Feet
6100	88.1	75.9	0.584	48.4	66.3	61.6	1.055	1914
6200	90.4	76.6	0.594	50.5	66.3	61.6	1.055	1914
6300	93.2	77.7	0.596	52.3	66.3	61.6	1.055	1916
6400	96.1	78.8	0.586	52.9	66.3	61.6	1.055	1916
6500	98.8	79.9	0.566	52.6	66.3	61.6	1.055	1917
6600	101.7	80.9	0.568	54.3	66.3	61.5	1.055	1917
6700	104.3	81.7	0.578	56.7	66.3	61.4	1.055	1918
6800	107.0	82.7	0.581	58.4	66.4	61.4	1.055	1920
6900	109.6	83.4	0.573	59.1	66.4	61.3	1.055	1920
7000	112.1	84.1	0.566	59.6	66.4	61.3	1.055	1920
7100	114.4	84.7	0.579	62.3	66.4	61.2	1.055	1921
7200	117.1	85.4	0.589	64.8	66.4	61.0	1.055	1921
7300	122.7	88.3	0.618	71.3	66.4	60.8	1.055	1922

7400	129.1	91.6	0.607	73.7	66.4	60.7	1.055	1923
7500	134.1	93.9	0.596	75.1	66.4	60.7	1.055	1924
7600	137.8	95.2	0.592	76.7	66.4	60.6	1.055	1924
7700	141.3	96.3	0.598	79.5	66.4	60.6	1.055	1924
7800	144.4	97.2	0.602	81.7	66.4	60.5	1.055	1925
7900	147.0	97.7	0.596	82.4	66.5	60.6	1.055	1926
8000	149.1	97.9	0.584	81.9	66.5	60.6	1.055	1927
8100	150.5	97.6	0.571	80.8	66.5	60.7	1.055	1928
8200	151.6	97.1	0.552	78.7	66.5	60.8	1.055	1928
8300	152.5	96.5	0.531	76.1	66.5	60.9	1.055	1929
8400	152.7	95.5	0.518	74.4	66.5	61.0	1.055	1930

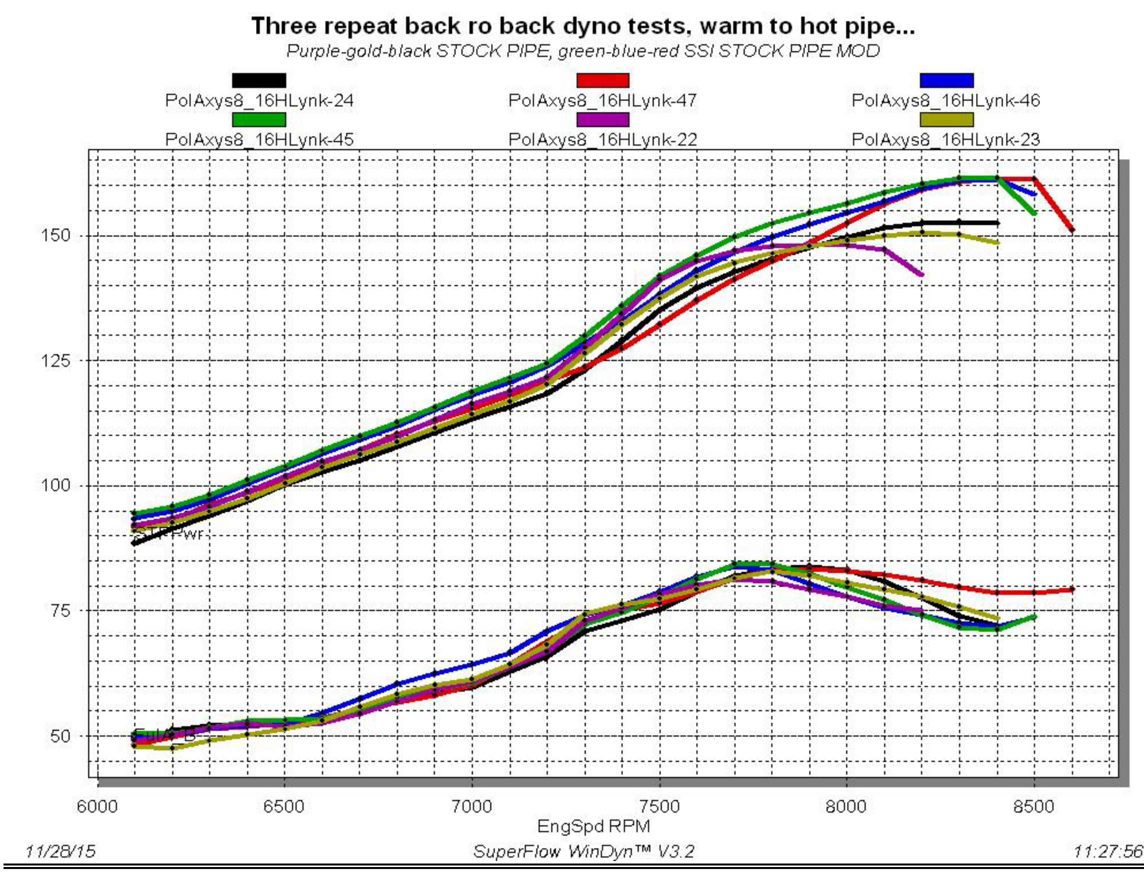


Note that with the hottest pipes, there is no tail-off shown in the HP curves. This is because the HP drops past the last data point, and the test has been stopped *before reaching the next 100 RPM point.* The dyno operator (me) keeps an eye on the real-time graph that appears on the dyno monitor as the run progresses, and when HP drops, the test is concluded—sometimes 10 or 20 RPM too soon to show the downward slope. This graph also shows how it's best to have clutches shift initially at 77-7800 at warm pipe HP peak, then tuned to slide up to higher RPM as the speed of sound increases with pipe CS temp, causing the peak HP RPM to increase accordingly—all the way to 83-8400 RPM if held at WOT long enough! Remember—we're trying to get clutches to shift at a continually increasing peak HP RPM as pipe temp climbs.

Next Heath installed the ECU from his broken in 2015 Axys, and there appeared to be very little change in fuel flow—meaning the broken in 2015 ECU fuel flow is very similar to the 2016 pre-breakin mode.

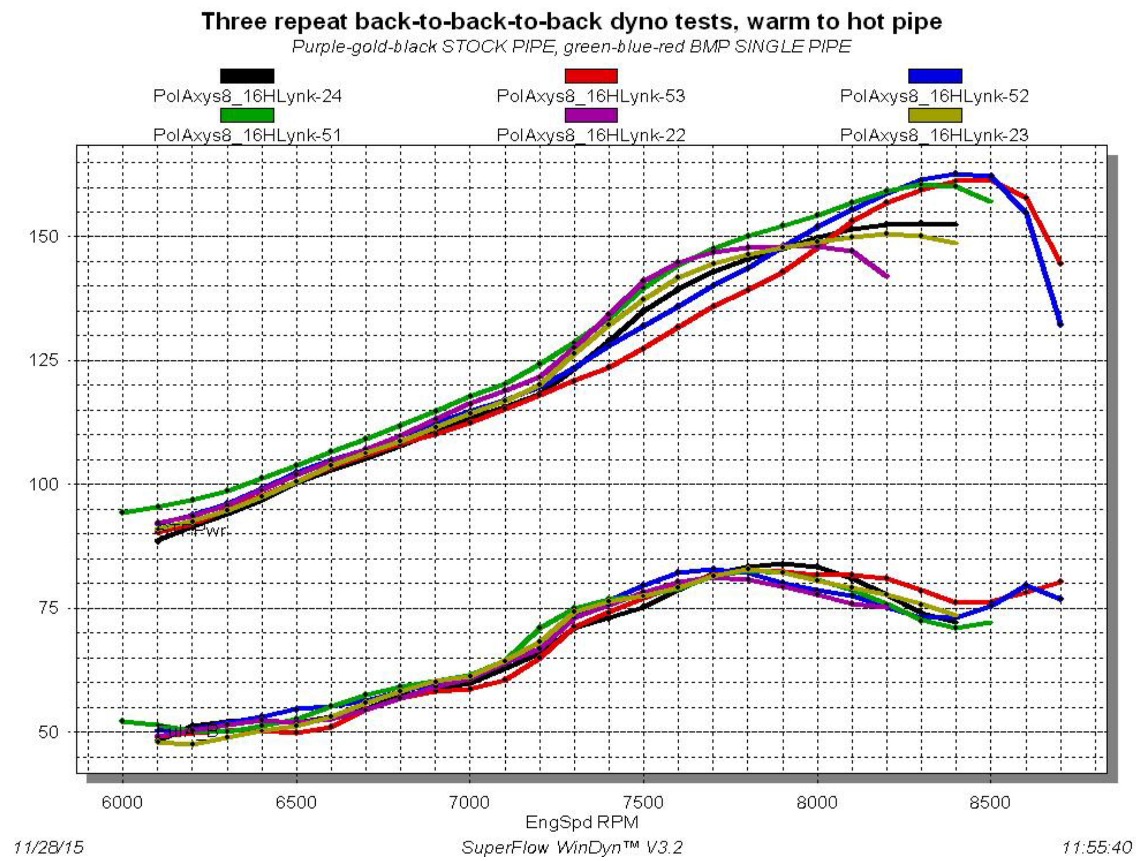
Now Heath installed the stock pipe from his 2015 Axys, modified by SSI for $250 (a custom internal stinger and a CS spacer welded in). Heath had painstakingly reinstalled the factory insulating heat shield, and we picked up nearly 10 HP. While we weren't measuring airflow, our past experience has shown these pipe mods to increase airflow—meaning with fixed fuel flow our effective A/F ratio would be leaned out—maybe even a bit too much for max HP. We theorize that the newly installed internal "pipe mod" stinger cuts a clean "cookie cutter" hole in the sound wave—returning more sound energy back to the exhaust port which reduces sound out the muffler and instead packs more A/F mixture back into the cylinder—not only increasing airflow but also increasing effective compression ratio. This leaner mixture/ increased exhaust gas flow through the pipe created even higher pipe CS temps, causing fuel flow to rise at some high temp (1200F+?). This is seen in the comparison graphs as a high RPM rise in fuel flow lb/hr. Here are tests 1,2,3 with stock pipe versus tests 1,2,3 with SSI modified stock pipe.

Compare three tests stock pipe to three tests SSI pipe mod:

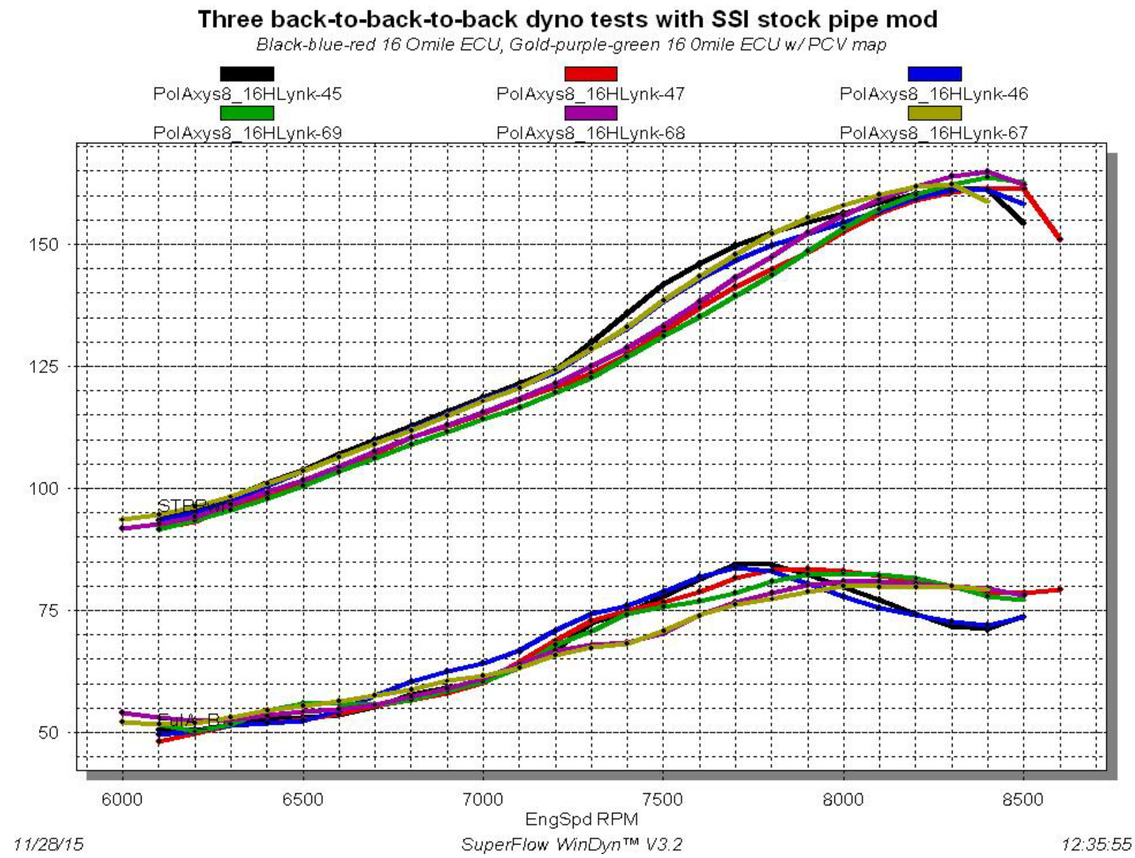


Now Heath installed the BMP ceramic coated single pipe with the stock muffler, and it, too, picked up about 10 HP! Once again, here are three back to back tests of the BMP compared to the stock pipe.

Compare three tests stock pipe to three tests BMP ceramic coated pipe:



Since Heath would be using this SSI modded stock pipe on his new STS, he reinstalled it and the DynoJet PCV with timing control. We came up with a fuel map that leaned out the 100% throttle midrange and added some at high revs, along with a few degrees of timing. Now we have safer top end fuel flow, lower peak CS temps (preventing overenrichment), and more HP. Here’s three tests with SSI pipe mod with and without the PCV tune.

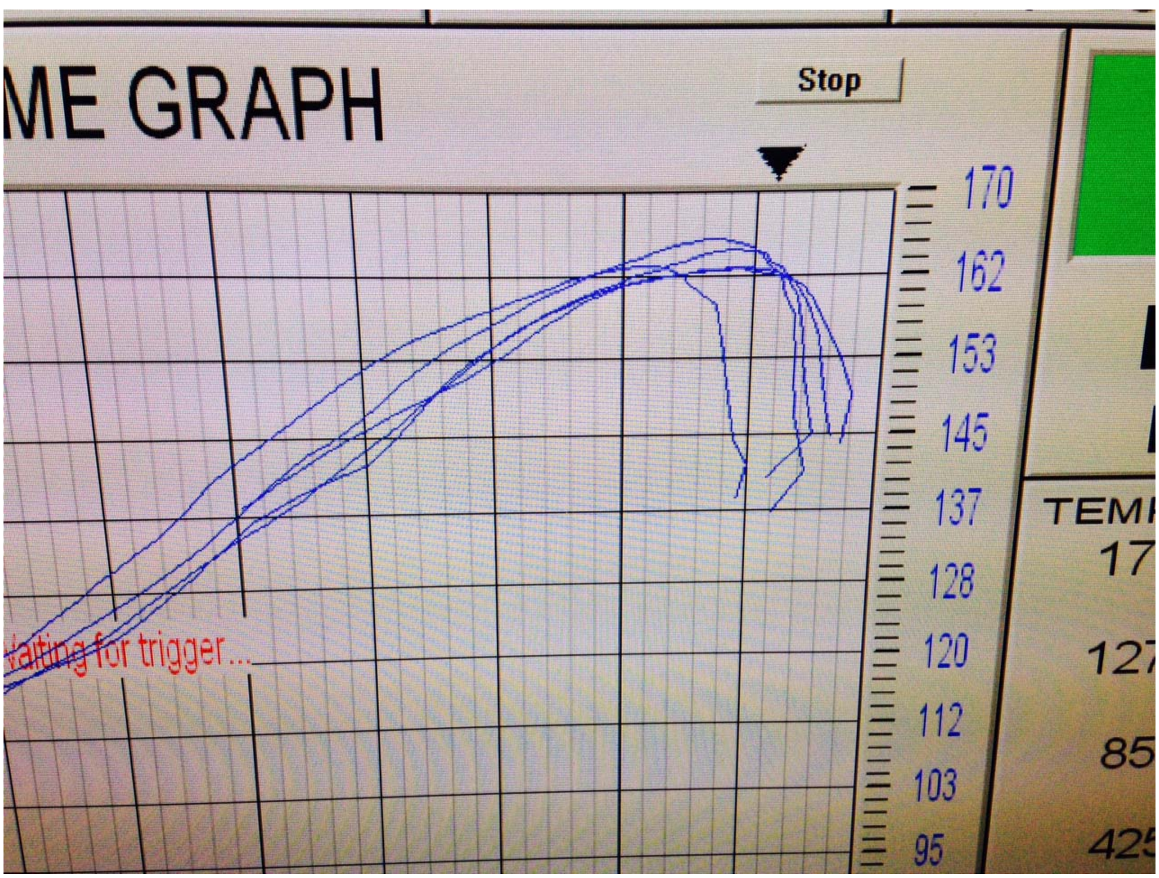


Here's the test data from the second hot run of the SSI pipe mod/ PCV tune. Note that Heath will probably need to add 3% to the WOT fuel numbers in the PCV map to compensate for the 2016 ECU fuel flow dropping 3% on breakin. It's likely that we will get similar results on the BMP single pipe when we install that and tune it for the pipe's new owner in a few weeks.

EngSpd RPM	STPPwr CHp	STPTrq Clb-ft	BSFA_B lb/hph	FulA_B lbs/hr	AirInT degF	FulPrA psig	STPCor Factor	DenAlt Feet
6000	91.7	80.3	0.623	54.0	59.9	62.2	1.051	1540
6100	92.7	79.8	0.605	53.0	59.9	62.2	1.051	1540
6200	94.2	79.8	0.588	52.3	59.9	62.2	1.051	1540
6300	96.7	80.6	0.575	52.6	59.9	62.2	1.051	1540
6400	99.2	81.4	0.570	53.4	59.9	62.2	1.051	1541
6500	101.6	82.1	0.564	54.2	59.9	62.2	1.051	1541
6600	104.4	83.1	0.555	54.7	59.9	62.2	1.051	1541
6700	107.6	84.4	0.547	55.6	59.9	62.2	1.051	1542
6800	110.4	85.3	0.549	57.3	59.9	62.2	1.051	1542
6900	113.1	86.1	0.553	59.0	59.9	62.1	1.051	1543
7000	115.7	86.8	0.559	61.1	59.9	62.1	1.051	1543
7100	118.3	87.5	0.573	64.0	59.9	62.0	1.051	1543
7200	121.4	88.5	0.582	66.7	59.9	61.8	1.051	1544
7300	124.9	89.9	0.575	67.8	59.9	61.8	1.051	1544

7400	128.9	91.5	0.562	68.5	59.9	61.8	1.051	1545
7500	133.1	93.2	0.559	70.3	59.9	61.7	1.051	1545
7600	138.3	95.6	0.566	73.9	59.9	61.5	1.051	1546
7700	143.1	97.6	0.567	76.6	59.9	61.4	1.051	1546
7800	147.3	99.2	0.565	78.6	59.9	61.4	1.051	1546
7900	152.4	101.3	0.556	80.1	59.9	61.4	1.051	1547
8000	155.9	102.4	0.549	80.9	60.0	61.4	1.051	1547
8100	159.2	103.2	0.538	80.9	60.0	61.4	1.051	1548
8200	161.8	103.7	0.526	80.4	60.0	61.4	1.051	1548
8300	163.9	103.7	0.516	79.8	60.0	61.5	1.051	1549
8400	164.9	103.1	0.511	79.4	60.0	61.6	1.051	1549
8500	162.2	100.2	0.511	78.1	60.0	61.7	1.051	1549

Here's a pic of the dyno monitor "Real Time Graph" that we watch carefully during each dyno test—as soon as the test begins to tail off, the test is stopped, sometimes before the next 100 RPM data recording point.




SKS
800
POLARIS
AXYS