2008.5 SkiDoo 4-Tech 1200 demo sled

SkiDoo dealer CJ Motorsports of Booneville, NY brought this demonstrator 4Tech 1200 four-stroke to dyno test. Like the 08 ETEC and SDI 600's this engine has a fuel bypass EFI system, where fuel is sent to the rail and excess fuel bypassed back to the tank via a 58 psi blowoff bypass regulator. This necessitated using both dyno fuel flowmeters—one to measure gross fuel flow (A) from pump to rail, then the bypassed fuel (B) is deducted and the difference is what's consumed by the engine.

We tried measuring airflow CFM by attaching the dyno airflowmeter to the cold air inlet, but air leaks somewhere caused that data to be incorrect. So we measured A/F ratio with our Innovate wide band A/F ratio meter, with O2 sensor reading exhaust gas at the muffler outlet.

To measure approximate cruising efficiency here is the warmed up engine held by the dyno at 6700 and throttle gradually opened with several data points measured. This shows us sub .40 lb/hphr BSFC in the midrange, which as expected should allow 4Tech 1200 riders much lower fuel consumption compared to conventional two-stroke sled engines.

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	LAMAF1 Ratio	BSFA-B lb/hph	AirTmp degF	FulA-B lb/hr	STPCor Factor	BaroP in/Hg
6704	66.7	85.1	14.2	0.42	64	33.9	1.037	29.27
6708	76.5	97.7	14.2	0.38	63	35.8	1.036	29.27
6665	81.2	103.1	14.1	0.39	62	38.8	1.035	29.27
6684	88.2	112.2	14.1	0.41	62	43.8	1.035	29.27
6647	90.4	114.5	13.1	0.43	63	46.9	1.036	29.27

Full throttle dyno tests were done with varying coolant temperatures with warm oil. While fuel flow remained constant from cool engines to hot, peak HP varied considerably, ostensibly from ignition timing being altered by ECU depending upon coolant temp, much like the ETEC 600 (on 4-strokes airflow is not effected by engine temp like it is on two-strokes). HP was at its lowest, 130 peak HP (coolant gauge highest, just before hot engine "fail-safe" rev limiter kicked in) and as high as 137 at the "happiest" coolant temperature—with the digital coolant gauge "needle" about halfway from cold to hot on our sled.

Moderately above or below halfway on the coolant temp gauge, peak HP would run about 134-136.

Here is the 4-Tech with coolant needle on the digital gauge at slightly below 50% of full scale. Note the flatness of the HP curve (plateau). Spring condition test riders of this sled reported to Mark at CJ that while accelerating up a mealy-snow ski slope, the engine would lose a few hundred revs but still feel like it was pulling just as hard. That HP plateau explains why that might happen, as opposed to the 08 SDI we dyno tested earlier

that could lose major HP and lose acceleration if it lost a few hundred revs due to snow conditions.

SkiDoo 4 Tech 1200 typical operating temperature

EngSpd RPM	STPTrq Clb-ft	STPPwr CHp	LAMAF1 Ratio	BSFA-B lb/hph	Fuel A lb/hr	FulA-B lb/hr	FuelP psig	BaroP in/Hg
6400	87.0	106.1	12.7	0.41	145.0	41.7	58.3	29.26
6500	87.0	107.7	12.6	0.41	144.5	42.1	58.3	29.26
6600	88.8	111.6	12.5	0.40	144.8	43.0	58.2	29.26
6700	89.0	113.6	12.5	0.41	145.3	44.6	58.1	29.26
6800	88.7	114.9	12.6	0.43	146.6	47.9	58.2	29.26
6900	87.6	115.1	12.6	0.42	145.5	46.5	58.1	29.26
7000	86.9	115.8	12.5	0.43	145.7	47.4	58.1	29.26
7100	86.6	117.0	12.4	0.43	145.8	48.3	58.0	29.26
7200	87.5	120.0	12.3	0.42	145.3	47.8	57.9	29.26
7300	87.3	121.3	12.3	0.44	146.7	50.9	57.9	29.26
7400	89.7	126.4	12.2	0.44	146.8	53.6	58.1	29.26
7500	90.1	128.7	12.2	0.43	145.3	52.9	58.1	29.26
7600	91.3	132.1	12.3	0.43	146.6	54.8	58.0	29.26
7700	91.8	134.6	12.4	0.44	147.1	56.2	57.9	29.26
7800	91.2	135.4	12.5	0.42	146.8	54.8	57.9	29.26
7900	89.9	135.3	12.4	0.43	147.4	55.9	57.9	29.26
8000	88.9	135.4	12.4	0.44	148.3	57.6	57.9	29.26
8100	88.0	135.7	12.4	0.45	148.4	58.1	57.9	29.26
8200	86.9	135.7	12.4	0.46	147.3	59.3	57.8	29.26
8300	85.9	135.8	12.4	0.46	147.3	59.9	57.9	29.26
8400	85.0	135.9	12.3	0.45	147.2	58.8	57.9	29.26
8500	83.6	135.2	12.3	0.45	146.5	58.8	57.8	29.26

Also for the people who are planning to pressure-charge this engine with turbo or supercharger, I included the A fuel flowmeter reading. This shows that the stock fuel pump should support close to 300 observed (not corrected) HP. So targeting this engine for 200-250 CHP on race gas should be no problem for the stock fuel pump. There is a rev limiter at just above 8500 RPM.

One other item noted during the test session was the stock exhaust header—a three into one unit that tucks closely to the cylinder head probably to enable it to clear the steering post in front of the engine. The shape of this header reminds me of the driver's side exhaust manifold on my first car, a '59 Ford 292. Perhaps some meaningful power can be added to this engine by creating a more fashionable equal length header/ collector into either the stock muffler or a (quiet please) tuned muffler. But noting the lean mixture of the stock EFI with the stock exhaust, adding airflow will likely require a Boondocker-like fuel enrichening device. If turbo boost is your desire that stock manifold should be dandy, leaving lots of room for turbochargers and intercoolers.

For visual comparison, here is a graph of Justin Fuller's stock Yamaha Nytro compared to this new SkiDoo 4 Tech, average of several dyno tests. Note that peak HP is similar, but the SkiDoo has that broader HP plateau. Also note the different shape of the two curves from bottom to top due to different cam profiles, intake, exhaust, timing programming etc.