

Team Results for Clean Snowmobile Challenge 2012

2012 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2012/03/08 14:43:10
 Team Name : Michigan Tech
 Team Number : 6
 Model : Polaris
 Engine : Switchback Assault
 Displacement[cc] : 750cc
 100% Speed [rpm] : 7970
 100% Torque [Nm] : 89.5
 No of Strokes : 4
 Fuel : Gasoline H/C: 2.09 O/C: 0.13

ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	67.9	32.0	18.6	9.6	0.0
HC_m g/hr	:	0.00	10.49	203.74	82.25	13.15
CO_m g/hr	:	11.26	1781.80	4056.54	1961.54	418.00
NOx_m g/hr	:	1175.59	0.94	0.12	0.05	0.00
Soot_m mg/hr	:	981.93	948.79	5978.94	1662.64	8.40
N2O_m mg/hr	:	0.25	0.00	0.01	0.00	0.00
CO2_m g/hr	:	73614.82	42791.39	27114.33	20538.07	4338.01
CH4_m g/hr	:	0.14	7.80	98.81	45.53	4.09
W_HC g/hr	:	0.00	2.83	50.94	25.50	0.66
W_CO g/hr	:	1.35	481.08	1014.13	608.08	20.90
W_NOx g/hr	:	141.07	0.25	0.03	0.01	0.00
W_HCNOx g/hr	:	141.07	3.09	50.97	25.51	0.66
W_Soot mg/hr	:	117.83	256.17	1494.74	515.42	0.42
W_N2O g/hr	:	0.03	0.00	0.00	0.00	0.00
W_CO2 g/hr	:	8833.78	11553.68	6778.58	6366.80	216.90
W_CH4 g/hr	:	0.02	2.11	24.70	14.11	0.20

Total Weighted Power [kW] 24.436

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	79.92	2125.55	141.37	221.29
Specific Mass [g/kW-hr]	3.27	86.99	5.79	9.06
BSFC [g/kW-hr]	558.6			

Total Soot [mg/hr] 2384.58 Specific Soot [mg/kW-hr] 97.59

Not Used for Competition

Total N2O [mg/hr]	0.03	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	33749.74	Specific CO2 [g/kW-hr]	1381.17
Total CH4 [g/hr]	41.15	Specific CH4 [g/kW-hr]	1.68

EMISSION TESTS:

	Value	Limit	Result
Power	74.66	<96.94 kW	PASS
Soot	97.59	<100 mg/kW-hr	PASS
CO	86.99	<275 g/kW-hr	PASS
HC + NOX	9.06	<90 g/kW-hr	PASS
E-Score	182.22	>100	PASS
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST PASS

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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5
Total Points	points	389	1183	1192	1199	1193
PtsInMode	points	591	1183	1192	1199	1193
Speed	rpm	7970.26	6789.38	6002.04	5192.75	2780.32
Torque	Nm	81.33	45.08	29.60	17.71	0.00
Power	kW	67.88	32.05	18.60	9.63	0.00
BSFC	g/kw-hr	347.91	456.59	588.31	795.16	**
Fuel	g/hr	23616.79	14633.28	10944.66	7658.13	1615.17
T_int	degC	15.10	15.70	15.69	15.39	15.22
RelHumid	%	25.42	24.03	24.21	24.06	24.09
Baro	in Hg	28.80	28.80	28.80	28.79	28.79
Baro	mmHg	731.57	731.51	731.41	731.36	731.36
Pvap_kPa	kPa	0.38	0.38	0.38	0.37	0.37
Pvap_inHg	inHg	0.11	0.11	0.11	0.11	0.11
AbsHumidity	grains/lb	17.21	16.83	16.95	16.56	16.43
SatPres	kPa	97.15	97.15	97.13	97.14	97.14
Hum Factor		0.79	0.79	0.79	0.78	0.78
F_fac		1.00	1.00	1.00	1.00	1.00
K_fac		1.02	1.02	1.02	1.02	1.02
Humidity	g/kg	2.46	2.40	2.42	2.37	2.35
H2		0.00	0.30	1.06	0.68	0.68
WetDry Factor		0.86	0.86	0.87	0.87	0.87

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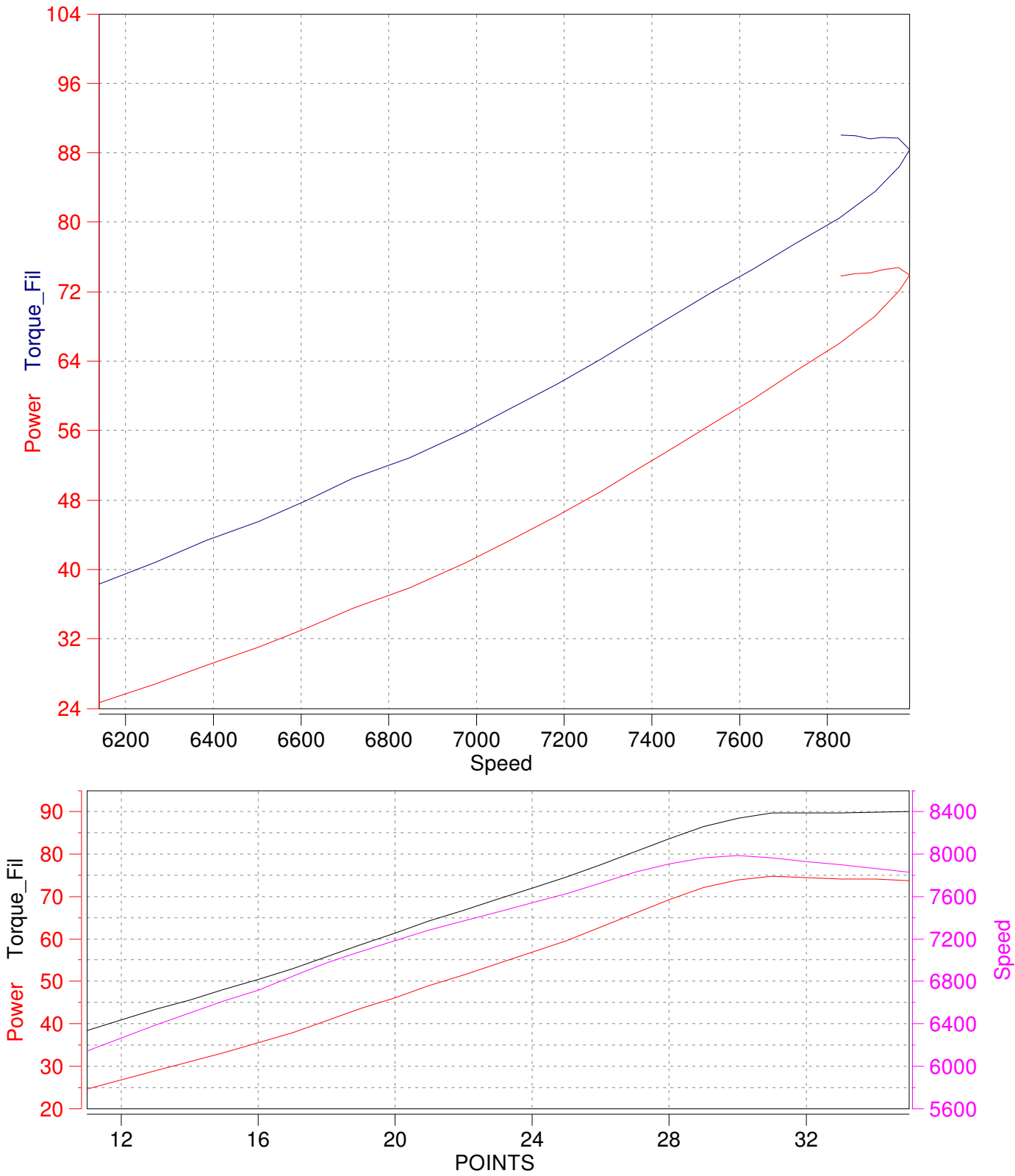
Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	0.00	95.73	2639.28	1476.89	1115.53
CO	%	0.00	0.82	2.65	1.77	1.79
N2O	ppm	4.39	0.12	0.33	0.20	0.20
CH4	ppm	0.66	62.83	1129.29	721.25	306.01
CO2	%	12.95	12.53	11.27	11.83	11.81
O2	%	0.26	0.00	0.00	0.00	0.00
CNOx	ppm	1978.21	2.64	0.48	0.25	0.06
AHC	ppm	0.00	1.96	107.51	43.86	57.78
C2H2	ppm	0.35	0.42	0.51	0.27	0.16
C2H4	ppm	0.36	4.82	155.32	96.13	54.96
C3H6	ppm	0.08	0.03	15.88	5.29	5.82
C4H6	ppm	0.19	5.22	10.70	5.37	4.11
ETOH	ppm	2.47	6.96	12.27	9.55	7.18
H2O	%	13.71	13.61	13.16	13.41	13.43
HCHO	ppm	0.14	0.14	0.25	0.15	0.23
HCN	ppm	0.14	0.34	1.97	0.44	0.76
HNCO	ppm	2.08	4.85	8.66	4.21	3.18
MECHO	ppm	0.05	0.13	0.59	0.20	0.21
NC5	ppm	0.51	0.63	1.80	1.46	8.09
NH3	ppm	1.16	143.53	318.62	157.22	71.89
NO	ppm	2514.49	3.28	0.22	0.10	0.05
NO2	ppm	1.05	0.12	0.50	0.31	0.08
Soot	mg/m3	3.11	5.03	45.65	17.52	0.42
AFR	:1	12.67	12.07	10.72	11.32	11.41

Power Run

TeamNumber	6
TeamName	Michigan Tech
Model	Polaris
Engine	Switchback Assault

Displacement cc	750cc
RatedSpeed	7970
RatedTorque	89.5



Measurement Accuracy (SAE paper 961804)

H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
0.001	0.000	13.714	83.005	0.959	15.163	0.987
0.344	0.011	13.614	81.033	0.937	14.469	1.000
1.215	0.304	13.162	78.412	0.906	13.368	1.000
0.781	0.171	13.408	79.564	0.920	13.875	1.000
0.788	0.129	13.434	79.563	0.920	13.905	1.000

ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
0.000	**	**	**	**	**
10.488	0.011	0.001	0.012	97.777	2.223
203.743	0.304	0.038	0.342	96.899	3.101
82.254	0.171	0.021	0.192	97.165	2.835
13.147	0.129	0.016	0.145	97.118	2.882