



# Team Results for Clean Snowmobile Challenge 2014 Team 1 ECO



## 2014 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2014/03/06 11:53:07  
Team Name : Madison  
Team Number : 1  
Model : Skidoo MX2 Sport 6000ACE  
Engine : Rotax  
Displacement[cc] : 600.00  
100% Speed : 6676  
100% Torque : 47.8  
No of Strokes : 4  
Fuel : gasoline H/C: 1.99 O/C: 0.03

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	27.8	14.4	9.3	4.1	0.0	9.5
HC_m g/hr	:	70.62	55.94	55.26	59.33	0.47	17.69
CO_m g/hr	:	4385.94	2113.47	1892.55	1882.36	62.05	1990.14
NOx_m g/hr	:	0.99	0.29	0.14	0.03	0.00	0.84
Soot_m mg/hr	:	9.63	3.17	0.84	1.31	1.51	5.28
N2O_m mg/hr	:	0.00	0.00	0.00	0.00	0.00	0.00
CO2_m g/hr	:	24385.35	14114.97	11907.13	11675.42	13944.24	14345.40
CH4_m g/hr	:	11.38	5.25	3.95	4.22	0.30	4.80
W_HC g/hr	:	8.47	15.10	13.82	18.39	0.02	17.69
W_CO g/hr	:	526.31	570.64	473.14	583.53	3.10	1990.14
W_NOx g/hr	:	0.12	0.08	0.04	0.01	0.00	0.84
W_HCNOx g/hr	:	8.59	15.18	13.85	18.40	0.02	18.53
W_Soot mg/hr	:	1.16	0.85	0.21	0.41	0.08	5.28
W_N2O g/hr	:	0.00	0.00	0.00	0.00	0.00	0.00
W_CO2 g/hr	:	2926.24	3811.04	2976.78	3619.38	697.21	14345.40
W_CH4 g/hr	:	1.37	1.42	0.99	1.31	0.01	4.80

Total Weighted Power [kW] 10.823

### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	55.81	2156.72	0.24	56.05
Specific Mass [g/kW-hr]	5.16	199.27	0.02	5.18
BSFC [g/kW-hr]	633.9			

Total Soot [mg/hr] 2.70 Specific Soot [mg/kW-hr] 0.25

### Not Used for Competition

Total N2O [mg/hr]	0.00	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	14030.66	Specific CO2 [g/kW-hr]	1296.35
Total CH4 [g/hr]	5.09	Specific CH4 [g/kW-hr]	0.47
RMC BSFC [g/kW-hr]	586.21		

### EMISSION TESTS:

	Value	Limit	Result
Power	33.41	<96.94 kW	PASS
Soot	0.25	<100 mg/kW-hr	PASS
CO	199.27	<275 g/kW-hr	PASS
HC + NOX	5.18	<90 g/kW-hr	PASS
E-Score	156.73	>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	RMC
Total Points	points	600	1200	1200	1200	1200	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	6675.52	5674.38	5006.38	4339.50	2025.94	4969.13
Torque	Nm	39.76	24.28	17.70	9.03	0.00	18.30
Power	kW	27.79	14.43	9.28	4.10	0.00	9.52
BSFC	g/kw-hr	360.90	388.67	516.67	1149.83	**	586.21
Fuel	g/hr	10030.62	5608.31	4794.01	4719.19	4472.03	5581.73
T_int	degC	36.33	44.56	44.40	37.06	42.72	39.84
RelHumid	%	13.83	14.01	14.06	14.07	14.20	14.06
Baro	in Hg	28.94	28.93	28.93	28.94	28.93	28.94
Baro	mmHg	735.10	734.90	734.87	734.95	734.81	734.96
Pvap_kPa	kPa	0.64	0.96	0.96	0.68	0.90	0.77
Pvap_inHg	inHg	0.19	0.29	0.28	0.20	0.27	0.23
AbsHumidity	grains/lb	28.72	43.31	43.14	30.29	40.26	34.69
SatPres	kPa	97.36	97.01	97.01	97.31	97.07	97.21
Hum Factor		0.82	0.87	0.87	0.83	0.86	0.84
F_fac		1.04	1.07	1.07	1.05	1.06	1.05
K_fac		1.05	1.06	1.06	1.05	1.06	1.05
Humidity	g/kg	4.10	6.19	6.16	4.33	5.75	4.96
H2		1.25	1.03	1.09	1.10	0.03	0.96
WetDry Factor		0.88	0.88	0.88	0.88	0.87	1.00



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## Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	1032.26	1436.24	1661.18	1807.30	14.17	451.48
CO	%	3.21	2.71	2.85	2.87	0.09	2.54
N2O	ppm	0.00	0.00	0.00	0.00	0.02	0.06
CH4	ppm	145.65	117.97	103.96	112.55	7.84	107.35
CO2	%	11.35	11.54	11.40	11.33	13.39	11.66
O2	%	0.00	0.00	0.00	0.00	0.00	-0.03
CNOx	ppm	4.42	2.29	1.32	0.25	0.01	6.51
AHC	ppm	63.86	95.10	112.93	122.15	0.08	90.44
C2H2	ppm	3.33	3.07	3.21	2.27	2.56	2.87
C2H4	ppm	72.88	75.67	71.57	87.14	0.08	64.87
C3H6	ppm	30.26	41.34	42.69	45.88	0.10	35.12
C4H6	ppm	29.61	32.21	31.32	19.21	2.63	24.79
ETOH	ppm	6.97	8.49	5.73	7.42	4.44	7.06
H2O	%	12.02	12.26	12.34	12.48	12.58	0.00
HCHO	ppm	0.41	0.25	0.42	0.45	0.18	0.36
HCN	ppm	1.86	1.76	1.59	1.74	1.14	1.76
HNCO	ppm	13.65	13.89	13.58	8.68	1.09	10.69
MECHO	ppm	1.01	1.24	1.81	2.52	0.00	1.42
NC5	ppm	5.17	26.45	44.51	49.75	0.69	29.74
NH3	ppm	827.57	848.01	801.28	528.06	48.51	665.91
NO	ppm	5.00	2.35	1.21	0.35	0.19	7.62
NO2	ppm	0.39	0.30	0.31	0.06	0.00	0.20
Soot	mg/m3	0.08	0.05	0.01	0.02	0.03	0.08
AFR	:1	12.43	12.51	12.39	12.34	14.03	12.82



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	1.416	0.117	12.020	77.133	0.892	13.191	1.000
2	1.174	0.164	12.265	77.499	0.896	13.354	1.000
3	1.241	0.189	12.338	77.357	0.894	13.270	1.000
4	1.255	0.207	12.481	77.454	0.895	13.241	1.000
5	0.036	0.002	12.578	80.555	0.931	14.688	1.000

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	70.622	0.117	0.015	0.132	96.120	3.880
2	55.943	0.164	0.020	0.184	96.001	3.999
3	55.265	0.189	0.024	0.213	95.954	4.046
4	59.329	0.207	0.026	0.232	96.057	3.943
5	0.470	0.002	0.000	0.002	96.942	3.058

# Power Run

## Team 1 ECO

TeamNumber	1
TeamName	Madison
Model	Skidoo MX2 Sport 6000ACE
Engine	Rotax

Displacement cc	600.00
RatedSpeed	6676
RatedTorque	47.8

