



Team Results for Clean Snowmobile Challenge 2017 Team 1



2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

```

Test Date       : 2017/03/08 10:40:28
Team Name      : Madison
Team Number    : 1
Model         : Rotax
Engine        : Rotax
Displacement[cc] : 600.00
100% Speed    : 6169
100% Torque   : 55.1
No of Strokes : 4
Fuel          : Gasoline           H/C: 2.38       O/C: 0.24
  
```

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	34.3	15.5	8.9	4.4	0.0	10.6
HC_m g/hr	:	1.28	1.85	2.50	0.62	0.43	0.62
CO_m g/hr	:	7.78	0.14	0.03	0.00	0.01	14.48
NOx_m g/hr	:	321.95	98.93	10.80	27.01	2.92	81.35
Soot_m mg/hr	:	52.15	12.75	0.04	0.01	0.03	6.02
N2O_m mg/hr	:	0.09	0.02	0.00	0.01	0.00	0.03
CO2_m g/hr	:	33667.40	17249.88	12882.26	7665.27	5055.64	14404.45
CH4_m g/hr	:	1.06	1.64	2.25	0.69	0.53	1.63
W_HC g/hr	:	0.15	0.50	0.62	0.19	0.02	0.62
W_CO g/hr	:	0.93	0.04	0.01	0.00	0.00	14.48
W_NOx g/hr	:	38.63	26.71	2.70	8.37	0.15	81.35
W_HCNOx g/hr	:	38.79	27.21	3.32	8.57	0.17	81.97
W_Soot mg/hr	:	6.26	3.44	0.01	0.00	0.00	6.02
W_N2O g/hr	:	0.01	0.00	0.00	0.00	0.00	0.03
W_CO2 g/hr	:	4040.09	4657.47	3220.56	2376.23	252.78	14404.45
W_CH4 g/hr	:	0.13	0.44	0.56	0.21	0.03	1.63

Total Weighted Power [kW] 11.887

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	1.49	0.98	76.56	78.05
Specific Mass [g/kW-hr]	0.13	0.08	6.44	6.57
BSFC [g/kW-hr]	431.5			

Total Soot [mg/hr] 9.72 Specific Soot [mg/kW-hr] 0.82

Not Used for Competition

Total N2O [mg/hr]	0.02	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	14547.14	Specific CO2 [g/kW-hr]	1223.78
Total CH4 [g/hr]	1.37	Specific CH4 [g/kW-hr]	0.12
RMC BSFC [g/kW-hr]	444.94		

EMISSION TESTS:

	Value	Limit	Result
Power	35.61	<96.94 kW	PASS
Soot	0.82	<50 mg/kW-hr	PASS
CO	0.08	<275 g/kW-hr	PASS
HC + NOX	6.57	<90 g/kW-hr	PASS
E-Score	205.60	>175	PASS
Valid Data for All 5 Modes			PASS
RMC			PASS
LAB EMISSION TEST			PASS



**Team Results for
Clean Snowmobile Challenge 2017
Team 1**



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	6168.44	5243.59	4626.97	4008.81	2169.88	4644.54
Torque	Nm	53.11	28.16	18.33	10.56	0.00	21.83
Power	kW	34.31	15.46	8.88	4.43	0.00	10.62
BSFC	g/kw-hr	321.48	365.36	475.19	566.21	**	444.94
Fuel	g/hr	11028.88	5649.99	4220.50	2510.43	1655.78	4724.47
T_int	degC	26.60	28.25	24.61	20.21	22.42	23.78
RelHumid	%	24.92	22.93	22.40	23.82	22.06	23.50
Baro	in Hg	28.44	28.44	28.45	28.44	28.45	28.44
Baro	mmHg	722.33	722.48	722.52	722.36	722.60	722.41
Pvap_kPa	kPa	0.70	0.71	0.57	0.48	0.50	0.57
Pvap_inHg	inHg	0.21	0.21	0.17	0.14	0.15	0.17
AbsHumidity	grains/lb	32.13	32.20	25.95	21.75	22.71	26.06
SatPres	kPa	95.60	95.61	95.76	95.83	95.84	95.74
Hum Factor		0.83	0.83	0.81	0.80	0.80	0.81
F_fac		1.04	1.04	1.03	1.02	1.03	1.03
K_fac		1.05	1.05	1.05	1.04	1.04	1.04
Humidity	g/kg	4.59	4.60	3.71	3.11	3.24	3.72
H2		0.00	0.00	0.00	0.00	0.00	0.01
WetDry Factor		0.84	0.84	0.85	0.85	0.86	1.00



**Team Results for
Clean Snowmobile Challenge 2017
Team 1**



Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	14.64	40.11	70.13	27.77	27.90	15.47
CO	%	0.00	0.00	0.00	0.00	0.00	0.02
N2O	ppm	3.18	1.17	0.41	2.11	0.41	2.43
CH4	ppm	10.85	31.99	57.00	27.94	31.14	36.75
CO2	%	12.58	12.25	11.84	11.29	10.81	11.81
O2	%	0.30	0.93	1.41	2.35	3.12	1.77
CNOx	ppm	1150.56	672.30	94.95	380.53	59.83	638.10
AHC	ppm	1.43	1.42	1.16	1.05	1.34	1.34
C2H2	ppm	1.03	0.84	0.88	0.59	0.76	0.85
C2H4	ppm	1.37	1.25	1.14	0.49	0.39	1.12
C3H6	ppm	1.11	0.96	0.82	0.73	0.88	0.85
C4H6	ppm	1.15	1.06	1.06	0.86	0.97	1.30
ETOH	ppm	0.00	0.00	0.00	0.00	0.00	0.00
H2O	%	16.32	15.75	15.38	14.56	13.84	0.00
HCHO	ppm	0.80	1.61	0.79	0.51	0.83	1.08
HCN	ppm	0.37	0.39	0.43	0.33	0.34	0.35
HNCO	ppm	2.14	1.89	2.03	2.41	2.18	2.32
MECHO	ppm	0.58	0.25	0.20	0.20	0.14	0.25
NC5	ppm	0.00	0.00	0.00	0.00	0.00	0.00
NH3	ppm	5.76	0.47	0.19	0.55	1.25	8.62
NO	ppm	1386.11	797.30	116.50	437.45	73.16	769.93
NO2	ppm	1.73	9.91	0.60	38.23	1.52	15.85
Soot	mg/m3	0.34	0.16	0.00	0.00	0.00	0.09
AFR	:1	11.38	11.76	12.06	12.75	13.35	12.32



**Team Results for
Clean Snowmobile Challenge 2017
Team 1**



Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.002	0.002	16.323	87.932	1.016	15.546	0.985
2	0.000	0.005	15.750	87.709	1.014	16.024	0.953
3	0.000	0.008	15.382	86.889	1.004	16.402	0.929
4	0.000	0.003	14.561	86.558	1.001	17.276	0.882
5	0.000	0.003	13.837	85.884	0.993	18.027	0.843

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	1.283	-0.228	-0.028	-0.256	104.256	4.256
2	1.849	-0.683	-0.085	-0.769	103.705	3.705
3	2.498	-0.988	-0.124	-1.112	102.454	2.454
4	0.618	-1.560	-0.195	-1.755	101.819	1.819
5	0.427	-1.963	-0.245	-2.209	100.842	0.842

Power Run

Team 1

TeamNumber	1
TeamName	Madison
Model	Rotax
Engine	Rotax

Displacement cc	600.00
RatedSpeed	6169
RatedTorque	55.1

