

E54 – Zero Emissions

SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY

Researchers



Environmental Impact

- An electric snowmobile has no pollutants
 - LiFe-Po₄ batteries have long life-cycles and are more stable than other battery types
 - Few additional parts
 - EM-CVT for increased CVT efficiency

Features

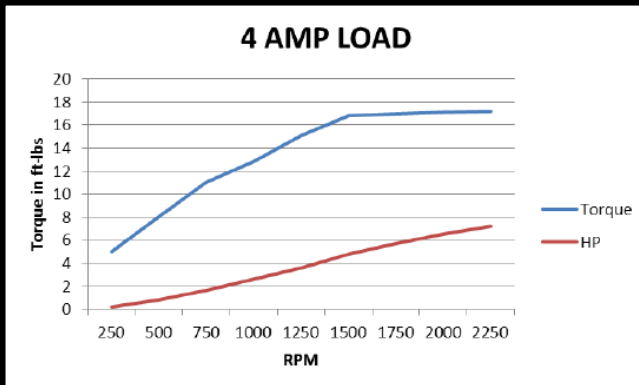
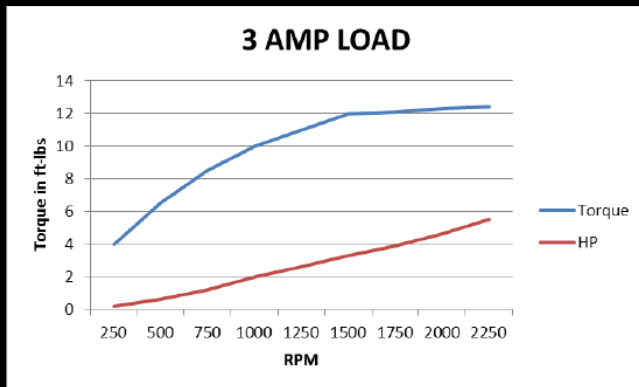
- Feels like a stock snowmobile
- Range of up to 20 miles
 - 8 kW-h
 - Efficient 3-Phase AC Motor, EM-CVT

Features

- **Electro-Mechanical CVT (EM-CVT)**
 - The distance between the primary sheaves is controlled by an actuator and microcontroller
 - Allows us to capitalize on our power-band more effectively
 - Allows complete control of gear ratios at lower RPM's

Features

- EM-CVT



RPM	Motor T	T(5.5)	T(5)	T(4.5)	T(4)	T(3.5)	T(3)	T(2.5)	T(2)	T(1.5)	T(1)
1	76	902.04	820.04	738.04	656.03	574.03	492.02	410.02	328.02	246.01	164.01
500	74	878.31	798.46	718.61	638.77	558.92	479.08	399.23	319.38	239.54	159.69
1000	73	866.44	787.67	708.90	630.14	551.37	472.60	393.84	315.07	236.30	157.53
1500	72	854.57	776.88	699.19	621.50	543.82	466.13	388.44	310.75	233.06	155.38
1900	71	842.70	766.09	689.48	612.87	536.26	459.65	383.05	306.44	229.83	153.22
2000	67	795.22	722.93	650.64	578.34	506.05	433.76	361.47	289.17	216.88	144.59
2500	50	593.45	539.50	485.55	431.60	377.65	323.70	269.75	215.80	161.85	107.90
3000	38	451.02	410.02	369.02	328.02	287.01	246.01	205.01	164.01	123.01	82.00
3500	30	356.07	323.70	291.33	258.96	226.59	194.22	161.85	129.48	97.11	64.74
4000	25	296.73	269.75	242.78	215.80	188.83	161.85	134.88	107.90	80.93	53.95
4500	20	237.38	215.80	194.22	172.64	151.06	129.48	107.90	86.32	64.74	43.16
5000	17	201.77	183.43	165.09	146.74	128.40	110.06	91.72	73.37	55.03	36.69
5500	15	178.04	161.85	145.67	129.48	113.30	97.11	80.93	64.74	48.56	32.37
6000	12	142.43	129.48	116.53	103.58	90.64	77.69	64.74	51.79	38.84	25.90

Torque calculations at various RPM's and Gear Ratios

Features

- Safety
 - 1200 Lumen headlight with S.O.S. and Strobe
 - Fuses protect all systems during electrical failure
 - Tether, Kill Switch, Ground Fault, BMS, & Loss of LV will turn off the snowmobile.

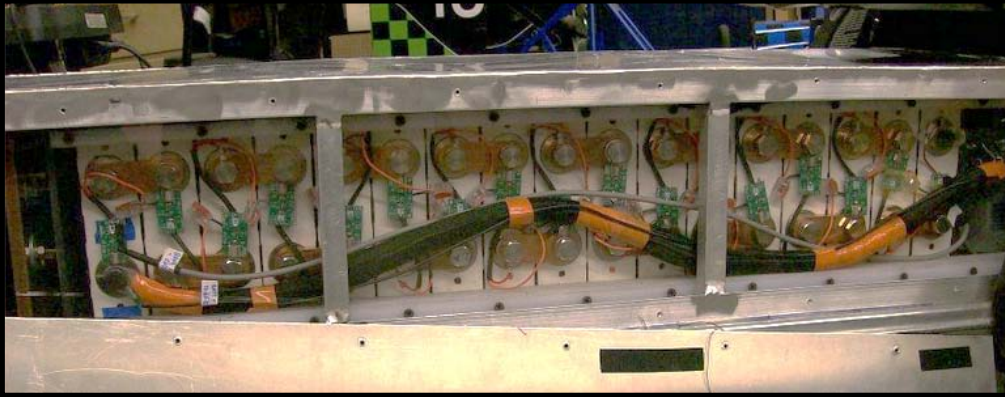
Dealers & Mechanics

MSRP: \$28,000



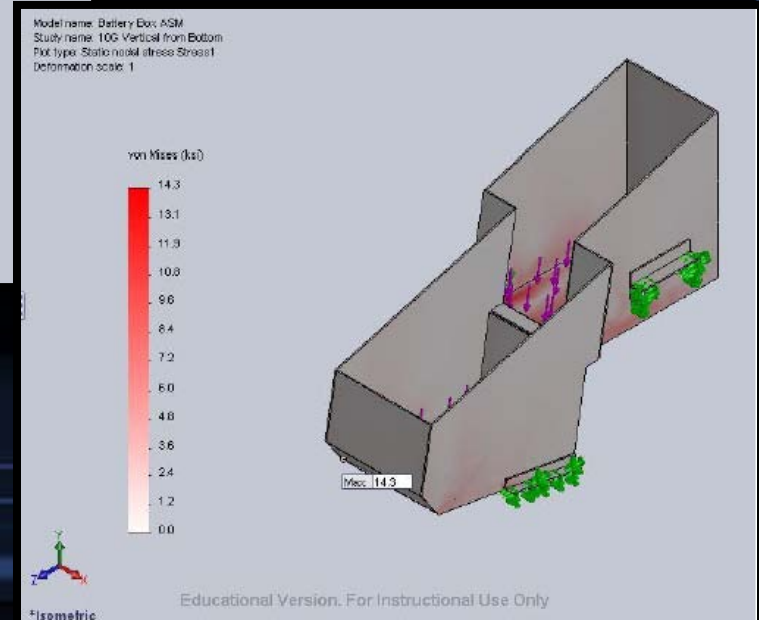
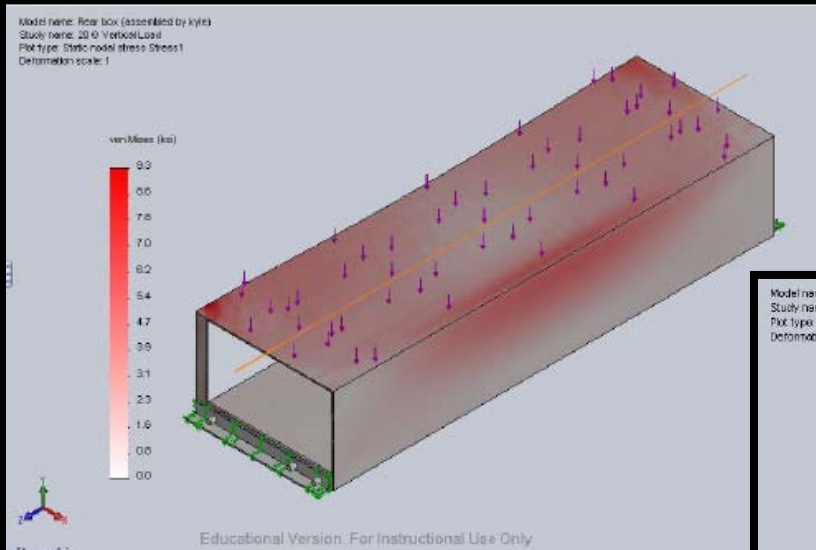
Serviceability

- Two Battery Packs
 - Easy to lift & remove
 - Connections and BMS are easy to see



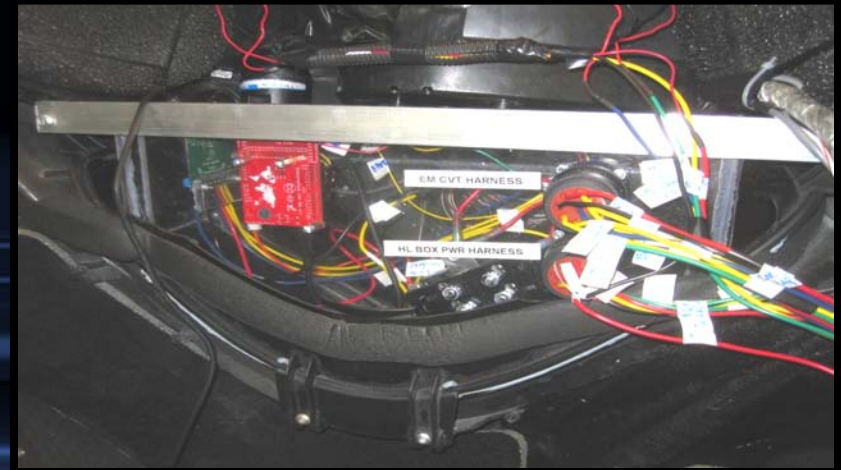
Serviceability

Durable



Serviceability

- Electrical
 - Clear wiring schematics
 - Labeled and color coded
 - Shut downs in one localized location
 - Charging time: 8-10 Hours



Questions?



ELECTRIC SNOWMOBILE TEAM