

## GM Powertrain

When the next-generation Chevrolet Volt debuts at the North American International Auto Show in January, it will feature an all-new Voltec extended range electric vehicle (EREV) propulsion system substantially developed from Volt owners including data collected on their driving behaviours.

Based on a GM study of more than 300 year 2011 and 2012 Volts in service in California for more than 30 months, many owners are exceeding the EPA-rated label of 35 miles of EV range per full charge, with about 15 percent surpassing 40 miles of range. Current generation Volt owners have accumulated more than 600 million EV miles.

Like the battery system, the next-generation Volt's drive unit was reengineered with a focus on increased efficiency and performance, improved packaging and reduced noise and vibration characteristics. The two-motor drive unit operates approximately 5 to 12 percent more efficiently and weighs 100 pounds (45 kg) less than the current system.



## Chevy Voltec

General Motors' industry-leading battery technology has been improved for the next-generation Volt. Revised cell chemistry, developed in conjunction with LG Chem, increases storage capacity by 20 percent on a volume basis when compared to the original cell, while the number of cells decreases from 288 to 192. The cells are positioned lower in the pack for improved (lower) center of gravity and the overall mass of the pack has decreased by almost 13kg. Approximately 20 million battery cells have been produced for the more than 69,000 Chevrolet Volts on the road today with industry-leading quality levels of less than two problems per million cells produced. The battery system continues to use the Volt's industry-leading active thermal control system that maintains electric range over the Volt's life.

## Student EV

The trick to getting Grimsel to work lies in the substantial electronic systems of traction control and torque distribution to precisely control each wheel hub motor, minimizing wheel spin and maximizing vehicle acceleration.

The chassis is a one-piece carbon fibre monocoque designed and manufactured by the team that's very light and very strong. It has a torsional stiffness of 4500 Nm/deg achieved at a weight of only 18.3kg including roll hoops. The vehicle rides on 7.5 in wide tires and one piece carbon fibre rims, all held together with pushrod suspension on the front and rear axles.

Grimsel's synchronous motors produce 37kW at a weight of 3.4kg each attached to planetary gearbox's integrated into the suspension uprights successfully transmit the 407Nm of torque from each motor to each wheel. Competing against more than 500 teams, AMZ has achieved three overall wins and an average of 920 points out of a possible 1,000, making Grimsel the team's most successful vehicle.

## Grimsel



Students from Zurich and Lucerne University of Applied Sciences and Arts have claimed a new world record for electric car acceleration. Piloting their EV dubbed "Grimsel" from 0 to 100 km/h in just 1.785 seconds over 30 meters, the students smashed the previous record of 2.134 seconds set by the Delft University of Technology in 2013.

Set at the military airfield in Dübendorf, Switzerland, and awaiting official ratification by the Guinness World Book of Records, the new record was made even more amazing by the fact that it was set by students who also designed and built the vehicle themselves as part of the Formula Student team at the Academic Motorsports Club Zurich (AMZ).

Developed in less than 12 months by a 30-strong team of students, Grimsel is constructed from carbon fiber, has a total weight of just 168 kg and generates around 147kW. Driven through an integrated planetary gearbox, the cars four individual AMZ M4 wheel hub motors produce 37kW, transmitting a tire-shredding 1630Nm of total torque at the wheels.

## LG Chem



Korean battery giant LG Chem held a groundbreaking ceremony this week in Nanjing, China, where it started construction on a new EV battery plant. The new facility will be able to produce enough batteries annually to supply more than 100,000 EVs when it opens by the end of 2015. It will supply batteries to Chinese automakers such as SAIC, Qoros and others. LG Chem set up a joint venture in August with two Chinese state-run companies – the Korean company owns half of the joint venture, and the other half is shared by the Chinese partners. The company has invested “hundreds of millions of dollars” in the new factory, and expects it to generate a total of 1 trillion won in revenue by 2020. LG Chem has also announced a deal with Audi to supply Cells for the marques Hybrid and plug in hybrid models, not an insignificant range as Audi has plans for hybrid versions of all their “Key” models by 2020. At present LG Chem supplies EV cells to GM, Ford, Hyundai-Kia, Renault and Volvo for their numerous electric variants.

## VW-EV Mission to China



Last week Volkswagen AG said it would launch more than 20 models of battery-driven cars in China over the next few years. "In the near future, Volkswagen will be offering Chinese drivers over 20 NEVs, from small cars to large-sized SUVs, from plug-in hybrids to pure electric cars," Jochem Heizmann, head of Volkswagen Group China, said. Heizmann was speaking to reporters in Shanghai, where the German carmaker is launching a week-long campaign to promote e-mobility in China's financial hub. Volkswagen lags global rivals including BMW, Tesla Motors and Nissan in selling pure electric cars in China. Volkswagen has previously said it plans to introduce

into China more than 15 electric or plug-in hybrid cars for Volkswagen and other brands it owns by 2018, many of which will be locally produced. China, suffering from worsening pollution, has stepped up efforts to promote use of electric cars, having rolled out incentive policies and tougher fuel-efficiency and emission rules. Beijing has set an aggressive target of putting 5 million green vehicles on Chinese roads by 2020. Volkswagen will launch the tiny e-up! in China this year, and plans to follow up next year with the e-Golf and Golf GTE plug-in hybrid. Electrification will gradually be extended to other models such as the midsize Passat, and could eventually include almost every product segment.

## The *SHAPE* of Things to Come??



## Boulder EV's DT-1000

Out of Lafayette Colorado comes Boulder EV, an organisation that builds electric fleet transport vehicles to order. Boulder offer two size options, the 500 and 1000 series both come in a variety of layouts from flatbeds to delivery trucks and everything in between. The 1000 range come with a 105kW/hr LFP battery pack that provides a 160km range at up to 70mph (120kmh). 120kW (220kW peak) comes from an AC permanent magnet motor driving the rear wheels, torque maxes out at 700Nm. To recharge this 7000 Kg (max weight) beast be prepared to hang around for 10 to 12 hours. For the 500 range, power output is 100kW (140kW peak) and 900Nm of torque from the Brushless DC permanent magnet motor. Energy storage is in the form of a 72kW/hr Lithium Iron Phosphate pack. Bodies of the Boulder range are lightweight fiberglass, but driver comfort is optimised with integral heating/Air conditioning, and heated seats.



## This Month's Technology Review

For those who have been using the ZEVA Electric Vehicle Management System (EVMS) you may be interested to know that a rather impressive display panel is available to interrogate the EVMS Core system. The EVMS monitor Version 2 is a 3.2" full colour touchscreen that reads pack voltage, current, power, state of charge, temperature and auxiliary voltage. Furthermore BMS info including cell count, highest/lowest/average cell voltages, individual cell readings to 0.01v and state of balance. Interestingly the Monitor can be set to configure a range of parameters for any CAN device. see <http://www.zeva.com.au/index.php?product=119>