Energy density is draw of new Li-Ion batteries

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The entire automobile industry, as well as those concerned with the environment and our reliance on petroleum, is working on or hoping for a breakthrough in the area of batteries.

The hope is that an answer will be found that will result in batteries with:

- Enough power for a range of several hundred kilometres on a single charge;
- The ability to be recharged quickly and easily;
- Low weight;
- Reasonable cost.

Billions of dollars have been spent so far on the quest and with the increasing popularity of hybrid vehicles the battery has come under even more scrutiny.

Continental AG and Mercedes have announced the most recent advance in this area — a rechargeable lithium-ion battery, the first for a production passenger vehicle.

The battery was developed by Continental, best-known in North America for its tires. But with annual sales of more than $10-billion, the German firm, with more than 150,000 employees at 200 locations in 36 countries, is a major international supplier to the auto industry for everything from brake systems and instrumentation to power train, chassis and infotainment systems.

Continental's powertrain division developed and will supply the new battery and related components to be used in the Mercedes S400 BlueHybrid to be unveiled later this year as a 2009 model.

Rechargeable lithium-ion batteries are commonly used in consumer electronics. Li-Ion batteries have no "memory effect" and are noted for their excellent energy-to-weight ratio, making them ideal for portable devices like laptop computers. Because of their high energy density, they are getting increased attention by aerospace, defence and automotive companies.

Mercedes will be the first auto maker to adapt the technology to the requirements of a passenger vehicle. The company sees the lithium-ion battery as one of the keys to the success of hybrid and electric drive systems because its higher energy density provides a much improved range over the nickel metal batteries currently used in these applications.

The combination of compact dimensions and superior performance is attractive to the auto industry where range and weight are the biggest hurdles to overcome.

The new lithium battery developed by Continental boasts a weight/power ratio of 1,900 watts per litre. Additional features include good ampere-hour efficiency and long-service life combined with reliability and the ability to operate at low temperatures.

The development of this new technology was possible because of 25 patents held by Daimler, which helped with the integration of the new battery into the climate control system of the vehicle.

Li-Ion batteries generate a fair amount of heat, as anyone who has used a laptop can attest. Daimler engineers have come up with a way to ensure the new lithium-ion battery supplied by Continental always works at the optimal temperature of between 15 and 35 degrees C. This, in turn, maximizes battery performance and life.

Continental will also supply the inverter and converter to be used in the S400 BlueHybrid. The inverter is in charge of the energy flow between the battery and electric motor, while the converter links the battery to the car's electric system, eliminating the need for an alternator.

Mercedes says the S400 BlueHybrid will consume less than eight litres/100 km of gasoline. But green doesn't prevent mean — the S400 will accelerate from zero to 100 km/h in less than eight seconds and have a top speed of more than 250 km/h. It will not be surprising if the company finds a way to combine this significant new hybrid feature with its BlueTec diesel technology.

General Motors announced earlier this month at the Geneva auto show that it will offer a similar system in 2010 using lithium-ion batteries developed by Hitachi.