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Interview: Ravi Shanker, President and CEO, Dow Kokam

By: Martin Kahl, Friday, March 11, 2011, *AutomotiveWorld.com*

Dow Kokam was established in September 2009 to build an advanced energy storage-oriented company to provide energy storage solutions for the transportation market, defence, utilities and other large industrial markets. The company is a joint venture between the Dow Chemical Company, TK Advanced Battery LLC and Groupe Industriel Marcel Dassault.

In January 2010, Dow Kokam acquired Societe de Vehicules Electriques (SVE), a subsidiary of Dow Kokam shareholder Groupe Industriel Marcel Dassault that develops high-performance battery and energy management systems.

In December 2010, Dow Kokam announced its first on-road contract, with French company PVI, a partner of Suez Environnement subsidiary SITA, to supply battery packs for the first fully electric 26-ton refuse truck. The company announced two further lithium-ion (Li-ion) battery supply contracts in March 2011. The first of these was with Motiv Power Systems, an electric drive power control system provider, which will use Dow Kokam's battery system to convert a Class 4, Ford E-450 diesel chassis to a completely electric system for a 20-passenger shuttle bus. The second of these deals was with ZeroTruck, which develops commercial electric trucks.

The company's recent contract wins are in the commercial vehicle sector, where Shanker believes electrification will play an increasingly important role. However, the company is confidently promoting its technology to performance-driven passenger car applications, and *AutomotiveWorld.com* understands that Dow Kokam cells were used in the Mercedes-Benz SLS AMG E-Cell and the Rolls-Royce Phantom Experimental Electric (EE).

At the 2011 Geneva Motor Show, *AutomotiveWorld.com* spoke to Ravi Shanker, Dow Kokam's president and chief executive. During the interview, Shanker underlined the importance of the PVI contract win to Dow Kokam. He also outlined what he sees as the advantages of his company's technology when compared to other battery offerings and expressed confidence at wider acceptance in the near future by passenger car and commercial vehicle OEMs of Dow Kokam battery technology.



Ravi Shanker, President and CEO, Dow Kokam, LLC

AutomotiveWorld.com: Can you please explain Dow Kokam's battery technology?

Ravi Shanker: Advanced lithium polymer is lithium-ion storage technology. It uses the classic lithium-ion-type architecture of an anode, a cathode and a polymer separator. It is the combination of these that creates differentiation in the product, and the differentiation comes from energy density, power density, the life-cycle and so on that consumers care about in terms of weight, range and fuel efficiency.

Our technology is currently very comfortably in the top quartile in these characteristics. Furthermore, the flexibility and the uniqueness of the manufacturing process lead to better performance in vehicles.

AW: Do you have a patent for this?

RS: The technology that we have brought in is licensed from Kokam, which is a Korean company, and they have patents. We as Dow Kokam are working closely with them to develop further intellectual property and it is entirely possible that we will have our own unique intellectual property in the future as well.

We started off with a good technology base, and the issue now is keeping up with industry growth. We look at this as the first mile of a marathon. We can see the first prototypes beginning to come out, the first roll-outs, and we think that there is a clear and evolving business case for this technology in the automotive world.

AW: You recently announced a contract with PVI for a 26t refuse truck. At which vehicle-types is your product targeted?

RS: We talk about energy storage, in transportation in the broad sense of the word, but we also offer energy storage for other applications including defence and some industrial applications.

AW: Can your batteries be used in non-vehicular applications?

RS: Yes, we have products for static equipment and non-vehicular military applications, and we even provide batteries for instrumentation in aerospace missions. Dow Kokam is an advanced energy solution provider. We are relatively indifferent as to where it is used, as long as it is performance-driven, and the value is clearly visible to the end-user or customer. It is a differentiated product.

AW: What differentiates your product to make it superior to other lithium-ion batteries or other battery technologies?

RS: Very simple. When OEMs consider putting a battery in a vehicle with a particular weight and in a particular space, the question they face is, how much energy can be put in that space? That is where we are differentiated - we are able to pack in more energy in a better quality battery. Our product also offers better technical characteristics such as internal resistance and form. Our product is large-format prismatic, which very few others are.

AW: Can you please explain what large-format prismatic means?

RS: This means it is flat, and prismatic, so it is flat and can be easily configured for optimum packaging. A cylindrical shape is harder to package and wastes space. All these things lend our technology to better applications and more cost-efficient use, and therefore deliver greater value. It is the combination of these factors, the powers that are behind us and Dow Chemical's chemistry background. Since this is ultimately chemistry and materials-enabled, we believe we have a long-term winning value proposition for people who work with us as well.

AW: In a previous interview with AutomotiveWorld.com, Chuck Reardon discussed Dow Kokam's manufacturing facilities. Can you please update us on the status of these manufacturing operations?

RS: We have a small cell-production facility in Lee's Summit, near Kansas City in Missouri, which is geared towards industrial and defence applications, because it is small-format technology. We have some pack-manufacturing capability there as well, and we are expanding that facility into an R&D and application development facility. In addition, we are building a massive plant in Midland, Michigan. Our pack production facility in Le Bouchet, France, is currently capable of producing several thousand packs per year, and we are scaling that up as well.



In December 2010, Dow Kokam announced its first on-road contract, with French company PVI, a partner of Suez Environnement subsidiary SITA, to supply battery packs for the first fully electric 26-ton refuse truck.

AW: What can you say about the recent contract win with PVI? Where will your products be used, and what was required to ensure your battery technology was able to power a 26t refuse truck?

RS: The contract is with PVI in France. Our batteries are arranged in a series of racks with multiple packs in them.

AW: Does the size of the truck mean that there is plenty of space to locate the batteries?

RS: Actually, it is the opposite. Because our battery technology is so compact, you can use the available space to pack in considerable energy to power a refuse truck for its multiple cycles in a day. Refuse trucks are big, but remember that they also carry considerable weight. You have to store a lot of energy to push it around.

AW: That is an application where the vehicle is starting and stopping, moving up and down gradients - there is a lot of demand on the battery...

RS: ...it is a huge demand on the battery. It requires sophisticated engineering to integrate these multiple packs into the vehicle and into the electronics of the vehicle. This is a very good demonstration of the power of our technology, and how we can scale it up and integrate it into complex working environments.

AW: It was surprising that your first on-road contract was to supply a commercial vehicle. What role do you see for electrification in the commercial vehicle segment?

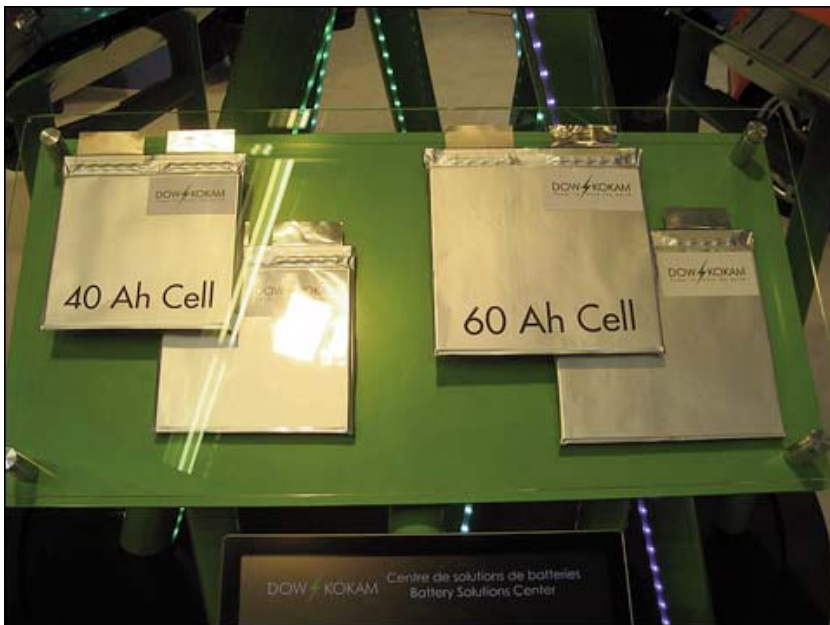
RS: We think there is a solid argument for electrification applications for the commercial vehicle segment. From a business perspective, we can think about environmental issues and other benefits to society, but from a total cost of ownership perspective, what fleet and commercial vehicle owners see is actual dollars spent. We think therefore that electric vehicles and electric solutions make a lot of sense now. The business case is here. This is a full battery electric vehicle application, for fleet vehicles that have non-regular routes, are very fuel-inefficient, have massive stop-start cycles, and work in environments where there may be other limitations, like idling fines for example.

AW: Now that this contract has been secured and announced, have you had interest from other parties?

RS: Significant interest, yes. More people are demanding samples from us. To use a cricket analogy, that contract win was a six. If we can solve that problem (supplying batteries to a 26t refuse truck) we can pretty much solve any problem associated with it. When we decided to take the project on, there was some question as to whether we should instead start with smaller vehicles and "learn" our way up. We took the risk. The reason we took the risk was that we had confidence in our technology, and in a team with experience and capability of working with electronic systems integration. To stay with the cricket analogy, if we had not succeeded, I would have been out for a duck!

AW: Can the Dow Kokam battery technology also be used in hybrid commercial vehicle applications?

RS: Yes. If you look at the range of vehicle electrification options, it goes from full battery electric at one end through plug-in hybrid to hybrids, including micro-hybrids, at the other end. Our technology is focused on the full battery end, but there is no reason why it cannot be used at the hybrid end of the scale. The technology is fundamentally here, including the energy density and the power density. There are however other factors to consider, in terms of capacity, size and competitive advantage. In general, we believe that as the economics of these things get better, in terms of our mass production and our continuous innovation, the industry will see more migration towards plug-in hybrid and battery electric, rather than just mild hybrids. With mild hybrid systems, you essentially have the weight and cost of two systems, and the cost of engineering and combining both. You could instead start offsetting costs in the batteries with a reduction in the IC engine requirements, and integration would become easier. Easier, but not easy - everything is relative. The industry is picking up speed rapidly. Two years ago, none of the OEMs had electric cars. Now pretty much every OEM has one.



"Because our battery technology is so compact, you can use the available space to pack in considerable energy" - Ravi Shanker, president and CEO, Dow Kokam

AW: Without wishing to sound aggressive, if your technology is so good, why is it not in some of these mainstream vehicles that you are referring to?

RS: Very simple. We (Dow Kokam) were not there - we didn't exist. Anything that is in a large platform that has been announced has been in development for three to four years. It is not an aggressive question at all. In fact, I wish the company had been established three years ago! People have been playing around with our technology, and they love it. Many of the current EV prototypes have Dow Kokam cells in them. This technology is here, and proven. It just wasn't available at scale. Now we are putting together an organisation that can interface with these customers, and fulfil the desire to be served at capacity.

AW: *That also implies that you are at risk of not being on any vehicle which comes to market in the next couple of years, because they have already begun their development.*

RS: We will clearly not be on those vehicles that will launch this year or next year. For us, potential customers are those developing future platforms.

AW: *How does the cost of a lithium-ion battery pack compare to one of your advanced lithium polymer equivalents?*

RS: I cannot discuss numbers with you, but our philosophy has always been one of value delivered. Think about it in terms of pure chemistry - there are chemistries which are cheaper, and constructions which are cheaper. For example, laptop cells that are being mass-produced are going to be cheaper than what we produce. A different chemistry, like ion-phosphate chemistry, it is going to be fundamentally cheaper. We do see ourselves as being more expensive than those. But in terms of relative value, we expect to be able to deliver better value. It is a classic example of focusing on value delivery, and that value shows up when OEMs are looking at space constraints, and weight constraints, yet demanding performance, acceleration and lifetime.

AW: *How does your technology perform in terms of battery duration and lifetime?*

RS: In terms of the chemistry that we use, we probably have the best demonstrated lifecycle. We are also proven at a cell level, and on top of that we have a battery management system that came with the French team that we acquired. The whole battery management system is state-of-the-art, and has avionic design in mind. Thermal management, control, safety features, battery lifecycle management - our management of all this is really state of the art. We have benchmarked it and all of it is all top quartile or maybe even better. The only thing we cannot know is what is going on inside OEMs' development labs, but even there as we look at academic literature, we are at the cutting edge.



"Dow Kokam is an advanced energy solution provider. We are relatively indifferent as to where it is used, as long as it is performance-driven, and the value is clearly visible to the end-user or customer" - Ravi Shanker, president and CEO, Dow Kokam

AW: *What can you say about your battery technology in terms of recyclability?*

RS: For a very young company, we have taken a very aggressive approach in this area. We are looking at ways to reduce the whole lifecycle impact. We now have plans in place to aggressively attack the whole recyclability of the whole battery pack and designing next-generation technologies at the chemistry, cell and pack level to make them much easier to dismantle, recover and recycle. At the materials level in particular it is just as important from an economic standpoint.

AW: *A growing trend in the automotive industry is for OEMs and Tier suppliers to form alliances and even joint ventures on materials and new technology development. Are you working in partnership with any particular OEMs to help develop their programmes?*

RS: Those are the kinds of targets that we have. Any of those relationships that we have are of course private, but think of us as being very much engaged in very on-purpose, dedicated programmes.

AW: *You mentioned military applications. What do you offer in this area?*

RS: We supply small battery packs for soldiers to carry on recon missions, which are much lighter and have a much better lifetime than the ones they have been using. We are also in some cutting edge high-end applications, like joint strike fighters. We supply small battery packs through to products for high-voltage battery applications, and everything in between, including unmanned vehicles and robots for bomb detection, and some applications I cannot talk about. We can offer products for a wide range of applications, and part of the challenge is how to prioritise, ensuring that we keep enough of a robust portfolio, and leverage the versatility and the diversity of the technology that it brings, whilst at the same time focusing on the delivery to other places. That is the dilemma we are constantly debating. It's a good dilemma!

AW: *What do you see as the prospects for Dow Kokam over the next few years?*

RS: I would say, give us a few years, and we will be pretty much everywhere!

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<http://www.automotiveworld.com/news/commercial-vehicles/86259-interview-ravi-shanker-president-and-ceo-dow-kokam>