

# INSIGHT

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**Making batteries for electric cars better, cheaper, faster**

Mohit Uberoi and his team at De Pere's MEGTEC are making it happen

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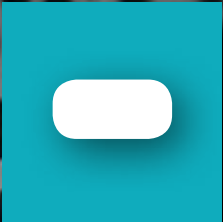
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Those betting on the future for electric cars know that a better, cheaper lithium-ion battery is a key to making the cars affordable and more widely sold. That said, it wouldn't be too much of a stretch to say that one of the next great leaps in lithium-





Mohit Uberoi and his team at De Pere's MEGTEC help make electric car batteries better, cheaper, faster



By Rick Berg

Photographs by  
Shane Van Boxtel,  
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ion battery technology owes its genesis to a wedding caterer in Kanpur, India. The wedding caterer's son is now president and CEO of MEGTEC Systems, based in De Pere, which won the Industry Supplier of the Year award last year at the international Battery Technology Expo. Award judges said MEGTEC's innovation had "the potential of reducing costs of electrode manufacturing by more than 50 percent." Industry experts say the primary factor driving the cost of electric vehicles is the battery component, so reducing the cost and weight of the battery and extending its operating life would go a long way toward reducing the cost of buying and operating those vehicles.

"It's wonderful to see the sort of technological innovation and vision for manufacturing scale-up that MEGTEC sees in their future," says Daniel Kammen, director of the Transportation Sustainability Research Center at the University of California-Berkeley. Kammen, a judge in the Battery Technology Expo awards, is currently on leave from Berkeley to serve as chief technical specialist for renewable energy and energy efficiency at the World Bank.

"What is important to note is that we can expect an impressive rate of cost reductions with production," says Kammen. "The learning curve for mass-produced products has been repeatedly verified and shows a 20 percent reduction in cost for each doubling of total manufacturing. This makes the MEGTEC plans reasonable based on established theory."

How MEGTEC got to this game-changing place in automotive history has a little bit to do with chance and a lot to do with creating a culture of innovation that keeps the company's engineers and consultants open to new possibilities.

## The road from Kanpur

That entrepreneurial spirit owes much to Mohit Uberoi's upbringing. The MEGTEC president and CEO grew up watching his father, Satish Uberoi, develop a series of small businesses – each evolving out of a discovery of need among his Kanpur neighbors and customers. The elder Uberoi still operates a profitable catering business in that city of 5 million on the Ganges – quite a challenge, considering Indian weddings often last three or four days with a thousand or more guests.

"My father was never afraid to take a risk and he was always focused on what his customers needed, and I learned a lot from that," says Uberoi, a chemical



**MEGTEC employs more than 700 people worldwide, including about 350 at the company's De Pere headquarters, engineering center and manufacturing facility.**

engineer by training but an entrepreneur by birth. His speech is precisely cadenced, as you would expect from an engineer, but he breaks into a warm and ready smile whenever talking about something dear to him. That would include his family, as well as the employees of the company he heads.

Uberoi's road from Kanpur to De Pere took him first to the Indian Institute of Technology in his home town, then to the University of Arizona, where he earned a doctorate in chemical engineering in 1990. He found work immediately at W.R. Grace in Baltimore, working in the company's research and development division, but he was already marked for bigger things.

"I was asked to be on a team with several senior managers, looking for new business opportunities for Grace, which was a \$10 billion company at the time," says Uberoi.

One of the Grace business units was a company called TEC Systems, based in De Pere, headed by President Alan Fiers, who was also on the business development committee with Uberoi.

"TEC Systems was a pioneer in developing drying technologies for the printing industry and one of the opportunities Grace wanted to pursue was to develop technologies to control emissions in the printing industry and other industries," says Uberoi. "So I spent a lot of time with Alan Fiers and got to know him pretty well."

When W.R. Grace sold TEC Systems to Sequa

Corporation in 1997, Sequa combined TEC with a French company called MEG (Materiels Equipements Graphiques) and created MEGTEC Systems, headquartered in De Pere. Fiers stayed on at the new company as president and asked Uberoi to come along to help develop an emissions control business at MEGTEC.

“I talked to my wife, Arti, and told her about this opportunity, except we would have to move to Wisconsin,” says Uberoi. “We thought it would be for a couple of years only, but it would be a great chance for me to expand my experience. I was interested in creating and developing businesses, like my father did.”

A couple of years have turned into 13 and Uberoi has become embedded in a world he thought he would only be visiting for a short time. He’s active in the Appleton community and their three children attend the Classical School, where he is president of the board.

Along the way, Uberoi also succeeded Fiers as president and CEO of MEGTEC in 2003. MEGTEC has expanded globally, with manufacturing, sales and service operations in Shanghai, Singapore, Australia, India, France, Germany, Sweden and the United Kingdom, but world headquarters remains on Prosper Drive in De Pere. The company holds more than 100 patents and employs more than 700 – about half of them in the United States. The De Pere operation employs about 350.

“In Europe, we’ve grown primarily through acquisitions,” says Uberoi, “buying companies and incorporating them into the MEGTEC portfolio, but in Asia it’s been all greenfield –



all from the ground up. We’ve bought the land, hired the employees, built the factories. And we’ve done that because we recognized that to provide products and service to those markets, we had to be there. It would not be feasible to ship our products, which are quite large, from De Pere to China, for example.”

In 2008, Sequa sold MEGTEC to a group of investors, including Hamilton Robinson Capital Partners, a private equity firm based in Connecticut. At the time of the purchase, Hamilton Robinson officials said MEGTEC would remain a stand-alone company with no major change in management structure or day-to-day business operations. “We have been very impressed with the performance and track record of MEGTEC under Mohit Uberoi and his management team, and look forward to working with them to further develop the business,” Hamilton Robinson managing partner Scott Oakford said at the time of the acquisition.

## Culture of innovation

**M**EGTEC is getting a lot of attention now for its lithium-ion battery technology process, but the company has been an innovation leader in other industries as well. Uberoi notes that the company has 14 engineering solutions centers globally and that staff regularly network with one another to exchange experience and ideas. Most important, he says, development teams work with suppliers and end users to identify needs and develop solutions.

MEGTEC recently partnered with Hewlett-Packard and Green Bay-based EMT International on the development of HP’s line of high-speed digital inkjet web presses. MEGTEC supplies the print dryers to HP’s presses, built at EMT.

Ed Schwallie, director of operations and supply chain for Hewlett-Packard, says it was the ability of MEGTEC’s technicians and those at EMT that enabled HP to establish leadership in the digital printing market.

“We needed partners who understood the demands of the market and who were able to help us develop solutions quickly,” says Schwallie, who is based in HP’s Corvallis, Ore., headquarters. “We found that flexibility and innovation in these two companies, which just happened to be located in Northeast Wisconsin.

MEGTEC’s recent innovations include a thermal oxidizer that controls emissions in the coal mining industry. That abatement system earned a Climate

Protection Award from the U.S. Environmental Protection Agency in 2008. Last year, MEGTEC was awarded a contract to build the world's largest methane abatement system for a coal mine in China's Chongqing region. The system is expected to capture 97 percent of the methane from the mine's exhaust stream and use energy released in the process to heat water for nearby buildings.

In many cases, innovation has been a matter of taking an existing MEGTEC technology and converting it to other industrial uses. For example, the company has a long history of providing dryers, coating equipment and emissions-control equipment for the printing industry, but has been able to expand its reach with similar technologies for other industries, such as food processing, automotive, electronics and pharmaceutical.

"We call them adjacent markets," says Uberoi.

It was, in fact, a patented air-flotation coating and drying process developed for the printing industry that led MEGTEC to the world of electric and hybrid cars.

"The whole battery business for us really started in 2006 when someone who was familiar with what we did in the printing industry came to us," says Uberoi. "They were looking for a drying and coating process for battery electrodes, similar to what we do in the printing industry with our dryers."

At that time, Tom Dougherty was head of Johnson Controls' advanced battery development business. Milwaukee-based Johnson Controls had a U.S. Department of Energy grant to develop new technology to reduce the cost and improve the performance of lithium-ion batteries for the hybrid and electric vehicle industry.

"I was looking all around the world for the technology that would help us to do that," says Dougherty, "and I wasn't finding much help anywhere. Then a colleague at Johnson Controls who had worked in the printing industry told me about this company up in Green Bay that had an air-flotation coating and drying process. It turns out that the answer was right in my back yard."

Dougherty and his team visited MEGTEC and came away impressed with the company's technical capabilities, as well as with Uberoi's and his staff's openness to new ideas.

"I've never seen such a receptive company in all my life," says Dougherty, a 37-year veteran at Johnson Controls, who retired in 2008 to head up Monolith Engines, a Waukesha-based firm that is developing



**➔ ONLINE:** [CLICK to see a video of Mohit Uberoi talking about MEGTEC's game-changing entry into the lithium-ion battery business.](#)

energy-efficient engines. "We talked about what was needed and the people at MEGTEC said, 'We'll make it happen.' That was always their attitude."

What sold Dougherty – and eventually a lot of others – was the realization that MEGTEC's air-flotation system would allow both sides of the electrode foil to be coated and dried simultaneously – an immediate time and cost savings over systems that can only coat one side at a time.

Just as significant, says Dougherty, is that running the material through the system only once has huge ramifications for quality control and elimination of waste.

"Let's say you run a roll through the process and get a perfect coating on one side," Dougherty says. "Now you have to rewind the roll and run it through again, and if you have a problem with it this time, you've wasted all that material and all the time and expense of the first run. The savings in terms of increased yield and reduced scrap is potentially enormous."

Dougherty and Uberoi were able to sell the concept to the European partners in the program that were building a battery manufacturing plant in Europe. The result was one of the first successful applications of lithium-ion technology in hybrid vehicles.

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"To start with, you need half as much equipment to produce the same amount of product in the same amount of time," he says, "and along with that you have reductions in energy costs and labor costs."

MEGTEC has a pilot line set up at its De Pere location



that allows battery and other advanced material developers to test coating formulations and other process parameters before they scale up for full production. The company now works with multiple battery manufacturers in the United States, Europe and China.

For Uberoi, it's just a natural extension of his company's culture of innovation.

"I'm a technical person myself and I've always been interested in innovation. I like research, but I'm a practical guy and I like to see how research can be put to use in developing products. So, all our people, including our engineers and other technical people, are empowered to take risks, accepting that not everything we try will be successful.

"We also have to continue to listen to our customers and what the markets want, as opposed to trying to be innovative in isolation. We're always listening." ①

"My father was never afraid to take a risk and he was always focused on what his customers needed, and I learned a lot from that." — Mohit Uberoi

## MEGTEC IN A NUTSHELL

MEGTEC is a global design, engineering, manufacturing and services company providing industrial equipment and services to various industries, including lithium-ion batteries and other advanced materials, solar films, membranes, automotive, engineered wood products, printing, chemical, electronics and other process industries.

- More than **20,000** equipment installations around the world.
- More than **100** patents.
- Employs more than **700** people on five continents, including **350** in De Pere.
- Headquartered in De Pere, with operations in France, Germany, Sweden, the United Kingdom, Singapore, China, Australia and India.

### BUSINESS UNITS


**Advanced Materials Processing:** Air flotation dryers and ovens, infrared dryers, coating equipment, laboratory/pilot testing, solvent recovery systems

**Environment, Climate & Energy:** Regenerative thermal oxidizers, catalytic oxidizers, heat recovery systems, bioscrubbers/bioreactors, greenhouse gas abatement

**Printing & Packaging:** Dryers, splicers, digital printing auxiliary equipment, roll loading systems, rewinders



### Advanced Materials Processing



Lithium-ion Batteries  
Solar Films  
Membranes  
Composites

### Environment, Climate & Energy



Air Abatement Systems  
Carbon Management  
Energy Recovery  
Biofuels & Renewable Energy

### Printing & Packaging Applications



Digital Printing  
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