

The

Fall 2012

# CTMA VIEW

The official voice of the Canadian Tooling & Machining Association



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# Eye on Innovation

By Paul Adair



## MADE IN CANADA

**W**orking on the roof at his cottage north of Winnipeg, Manitoba, Jim Kor of KOR Eco-Logic Inc., has a lot of time to think about cars.

"Cars are nowhere near what they should be," he says. "They are way too big, they are way too heavy, and there are way too many gadgets on them. A huge amount of our energy goes into moving all that stuff around. It's really a very inefficient box that we use to get around in. So what would a very efficient box look like?"

It was with this question in mind that Kor and his team have set out to design one of the world's most environmental cars, the Urbee. Short for urban electric, the Urbee has become somewhat of a media darling for the ecologically-minded, especially since its high placing at the 2010 Automotive X-Prize competition.

"The interest in this project has really centered around three things: how we made the body, the look of the car,

and the fact that it's one of the greenest cars in the world," says Kor.

The Urbee is the first car to have its body completely manufactured through Stratasys' 3D printing process, where millimetre-thin layers of additive materials are stacked together to form complex objects.

"Stratasys out of Minneapolis had shown the front end of a truck as a test sample," says Kor. "When we saw that, we wondered why we couldn't do the whole car this way."

"The benefit for us would be that we had the vehicle's body in the computer. We had simulated the aerodynamics so we knew this was the exact shape we wanted and this process would duplicate that shape precisely."

Although stylish, the appearance of the Urbee is a function of substance over style. Its futuristic shape, sleek contours, small size, and low profile are all aerodynamically designed to limit drag on the body while on the road.

"Our approach to the Urbee was that it had to be a safe car and that it had to be a practical car," says Kor.

"After that, every decision we made needed to revolve around energy efficiency. If it took a lot of energy, you just couldn't have it in the vehicle."

"In speeches, I say, quite seriously, that one day all cars will look like the Urbee because it follows the laws of physics. So when energy costs become extremely important, this shape will become the norm, as it should, unless we like wasting energy."

For those who have seen the Urbee in action, either on the road or at automotive shows, the response can be summed up succinctly. "There's one word and it's always, "Cool,"" says Kor with a laugh. "I don't know why. What does that mean? I've tried to analyze it just because we hear it a lot. And that's really cool."

The Urbee is powered by two electric motors that drive the front wheels for traversing the city. A small ethanol engine drives the front right wheel when on the highway. While the ethanol engine is in use, the batteries of the electric motors get recharged.

In the city, the Urbee can travel up to 70km/h before the ethanol engine kicks



The Urbee's body is completely manufactured through Stratasys' 3D printing process, during which millimetre-thin layers of additive materials are stacked together to form complex objects.

in. On the highway, the car can reach speeds of about 120km/h—astounding when you consider it only requires four horsepower to do so. In this way, the Urbee can be counted as one of the most fuel-efficient vehicles around.

Some industry estimates have the efficiency of the Urbee at upwards of 200 miles per gallon but Kor doesn't place a lot

of faith on estimated figures. "Numbers can be distorted," he says. "They can change a lot depending on how you drive."

"Generally, the car has a 30-mile range on lead acid batteries—not a particularly large range in the city. However, it'll drive indefinitely if the gas engine is running and generates a charge to the batteries."

Designing a new car as revolutionary as the Urbee is a costly venture. The first prototype alone was over \$1M, with it being largely a self-funded project. The upcoming second prototype promises to be just as pricey.

"Financially it's been incredibly challenging," says Kor. "This has been very expensive and we're all just designers

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The KOR Ecologic Inc. team.



URBEE

and engineers, so it's not like we're super affluent. We go as far we can based on the money we can afford to put into it."

However, this project has been a worthwhile endeavour for Kor and his team—the results of over 15 years of planning and design. "It feels good and very satisfying and, at times, I stop to smell the roses. But I also have an eye to the future. I just keep thinking about the potential of a project such as this and it's huge."

In order to realize the potential, the Urbee will need to change our culture's relationship with the automobile, and that won't happen overnight. "In the last hundred years, we have all been born into tonnes of cheap energy," says Kor. "To get over this way of thinking will just take some time."

"Imagine we're sailing around on a lake and all have square boats. Then one guy makes a streamlined sailboat. At first, it looks odd and everybody wonders what it's all about and no one will fund it. But at some point, everyone will have streamlined sailboats. I look at the Urbee like that." "The Urbee is the first car to have its body completely manufactured through Stratasys' 3D printing process, where millimetre-thin layers of additive materials are stacked together to form complex objects. ■■

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