SIEMENS

Automotive and transportation

Muses

New generation of urban electric vehicles developed in six months with NX

Products

NX, Teamcenter

Business challenges

Develop and deliver urban vehicles in 6 months

Quickly ensure project financing

Accelerate the design-through-manufacturing lifecycle

Create a base platform from which to launch a diverse range of vehicle models

Keys to success

Design flexibility and an integrated concept-through-delivery process

Collaboration with experts from Siemens PLM Software

Market receptivity and demand for the urban vehicle series

Results

Demonstrated the base vehicle platform in December 2010 as part of the Yvelines General Council's design challenge for the clean urban vehicle of the future

Integrated design-through-manufacturing solution is key factor in cutting cycle time

More than an electric car

"The Mooville is much more than an electric car; it is a concept that will change the way people get around in the city," says Patrick Souhait, general director at Muses. The company has dedicated several models to transportation services that will be built on a unique platform, with the first models to be used to deliver parcels and transport a limited number of passengers.

Vehicle development has been fast. "Thanks to the ease of use and operational efficiency of NX, we were able to roll out our first vehicle only six months after research began," notes Souhait. "We've already presented the vehicle at the Geneva International Motor Show/SITL (Semaine Internationale du Transport et de la Logistique) in Paris and at HANNOVER, MESSE in Germany."

In October 2009, the Yvelines General Council launched a call for projects for the clean urban vehicle of the future. More than 40 projects were submitted. "On April 16, 2010, our project was one of the four selected by the council and we were awarded about one quarter of the €3 million budget to develop a rolling demonstrator model," says Souhait.

"The first design produced using NX came out in August 2010 and the first prototype rolled out in February 2011. In March, Muses received the 'pole of competitiveness innovative enterprise' seal of quality, which we expected to attract additional investors interested in new applications for the vehicle." He adds, "Participation in this urban vehicle competition definitely accelerated our development schedule. Soon we plan to turn our focus to vehicle designs aimed at transporting people."

Muses also benefited from the involvement of Scientipôle Initiative, an organization dedicated to helping local, innovative companies grow through a combination of financial support and productivity-enhancing tools and services.

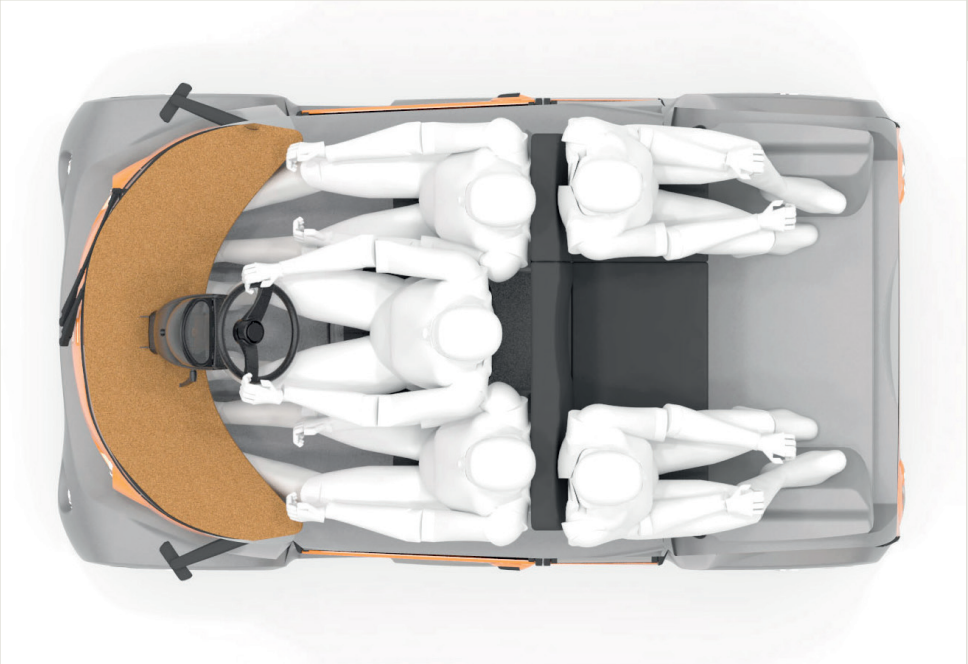
Results *(continued)*

Selected as one of four finalists in the competition

Introduced the Mooville vehicle series at the Geneva International Motor Show

Delivered vehicles within 6 months for trial use by two fleet vehicle users: Chronopost International, an express parcel delivery specialist, and Dilitrans, an urgent transportation service

Scheduled to begin formal vehicle sales in December 2011



"The contributions of Scientipôle Initiative supported our business model, as well as our production and sales strategy," says Souhait.

Muses used its initial capital infusion to demonstrate its first model, the Mooville, which is now in trial use by two fleet vehicle users: Chronopost International, an express parcel delivery specialist, and Dilitrans, an urgent transportation service. Another capital investment is funding the completion of the second phase of the project, budgeted at approximately €2.3 million. "The second phase includes the production and sales of 120 vehicles," notes Souhait.

After the formal launch of the first inner-city delivery vehicle, scheduled for the end of 2011, the rate of production will accelerate through 2012 to culminate with the launch of the first small public transit vehicle.

A creative solution to urban delivery and transport

Souhait notes that many people view owning a car in a city as a hassle, especially in certain high-density urban markets. The majority of vehicles operating in such environments are not only destined to lose value, but typically sit idle most of the time. In addition, parking a car in a city can be a real challenge and sometimes quite expensive. Then there's gas and the maintenance costs. Increasing numbers of city dwellers are seeking a creative solution to address their transportation needs, preferably avoiding vehicle ownership. Muses' Mooville has been specifically designed to address these considerations. The company has targeted two main purposes for its vehicle: inner-city delivery (logistics), and limited public transit.

"The Mooville truly meets the needs of a growing number of municipalities that are proactively managing inner-city traffic concerns," says Souhait. "This includes finding optimum solutions whereby vehicles, cyclists and pedestrians can function harmoniously, as well as operate within the new 'Zone 30' standard in France, where the maximum speed is 30 kilometers per hour." Souhait points out, "Our vehicles support an environmental-friendly, soft mobility. The lower part of our vehicle is particularly well-suited to adaptation," emphasizes Souhait. "Our idea was to develop a self-sufficient, motorized urban platform on which different types of urban vehicles can be built, and we've accomplished that."

"NX offers all the design and production functionalities that we need, which allows us to be very efficient. I appreciate the ease of use and open approach of NX; it's perfectly suited for an engineer."

Luc Michel
President
Muses

One platform, three versions

The vehicle features a small passenger or cargo compartment, depending on its application: 2.88 meters long, 1.6 meters wide and more than 1.85 meters high. Seating up to six people, it will be propelled by a clean electrical engine. A lead battery, with a range of approximately 100 miles, is planned for the delivery truck. Lithium batteries are being considered for other models. Plans include a hybrid system that utilizes energy-generating batteries, with the capacity to recover the energy produced by the car during braking and deceleration. A four-wheel steering system with in-wheel electric engines promotes exceptional maneuverability in traffic. It also allows entry into eco-friendly neighborhoods and makes parking navigation easy in short spaces.

While the original vehicle design's size was too small for some applications, a larger version, featuring a longer chassis, is planned. There will also be a third version of the vehicle, with substantially increased capacity for logistics and delivery applications and the ability to attach a self-propelled trailer supporting a container. Ultimately, Muses plans to offer a range of vehicles with a load capacity from $2m^3$ to $14m^3$.

"We went from a design competition project, aspiring to conceptualize clean-running urban vehicles of the future, to a market-based project aimed at producing and selling vehicles with two uses: delivery and small public transit."

Patrick Souhait
General Director
Muses

Use of NX enables vehicle delivery in six months

Muses uses NX™ software from Siemens PLM Software to quickly bring its unique urban friendly vehicle to market. "NX is a great product development tool," says Luc Michel, Muses' president. "We have been designing successful products using Siemens PLM Software technology for nearly 20 years. I am very familiar with NX and it's a real asset to deliver a new generation of urban vehicles. However, three of the seven designers in our research department had never used NX before this project, but they were able to be highly productive after only two months of in-house training. Most importantly, use of NX allows our team to focus on the job at hand and enabled us to develop the first model of our compelling, new electrical vehicle, the Mooville, within six months.

"We are installing and using the latest version of NX. It is a very complete package, addressing our full spectrum of needs, from pre-research to production. NX allowed us to prepare the assembly tools or an NC (numerical control) machine tool program and, in the same day, modify a part for aesthetic or other reasons with automatic updates. With integrated CAD, CAM and CAE (computer-aided design, computer-aided manufacturing and computer-aided engineering) functionality, NX perfectly suits our needs, enabling us to move from design to production very quickly."

Michel explains the design process: "We start with a pre-project exclusively designed with 3D modeling, because 2D drawings are excluded from the chain during the prototype production phases. Then the design team is brought into the process to detail the project, following the technical solution previously studied. It is essential to associate the design with the technical solution. Our goal is to create products combining functionality and aesthetics."

At the end of the preliminary phase, the research department immediately starts work on the 3D parts definition. "This enables us to manage the manufacturing of the molds or the body assembly tools without going through the traditional method involving cardboard making, wood or foam models," says Michel. "Using NX, we exclusively use digital models; we go straight from design to production."

With the design simulation capabilities of NX fully integrated within the CAD functionality, designers can develop surface models and readily make calculations on completed parts. "For example, working on our new urban vehicle platform, we studied the deformation of the structure under its own weight as well as assessed it relative to the resulting constraints on it," says Michel. "This enabled us to quickly identify any critical zones that needed to be strengthened."

In urban environments, the right combination of shapes and functions can lead to impressive market success. Michel emphasizes, "Using NX, we can create beautiful, ultra-utilitarian vehicle solutions, like the Mooville, that are environmentally sustainable for the long-haul, and deliver an absolutely soft footprint in terms of urban mobility. We expect the Mooville to be agile in the most demanding urban landscapes."

Solutions/Services

NX
www.siemens.com/nx

Teamcenter
www.siemens.com/teamcenter

Client's primary business

Muses designs, develops, produces and sells urban vehicles for the transportation of goods and people.
www.mooville-by-muses.com

Client location

Conflans Saint-Honorine
France

Muses utilizes a digitally controlled, 3-axis milling machine to manufacture the molds for the body parts and the positioning tools. "Some parts of the car were still to be designed three weeks before the start of the Geneva Motor show," notes Michel. "In three weeks, using NX, we designed the parts, made the mold and produced them. The NX design-through-manufacturing capability is a key element in realizing significant time savings."

Using Teamcenter to increase productivity

Muses is also using Teamcenter® software to manage technical data, including following up on modifications. Muses is in the early stages of leveraging Siemens PLM Software's powerful digital lifecycle management solution. Souhait explains, "Teamcenter offers a lot more than we've used to date. We plan to accelerate our Teamcenter use soon. Teamcenter offers strong and productive tools and we plan to increase communication and collaboration between our research and production departments."

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Luc Michel
President
Muses

Siemens PLM Software

Americas +1 314 264 8287
Europe +44 (0) 1276 413200
Asia-Pacific +852 2230 3308

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