

TRANSCRIPT

An Insider's View of the Chevy Volt:

A Michigan Engineering Webchat with Micky Bly

Executive Director and Group Global Functional Leader –

Global Electrical Systems, Hybrids, Electric Vehicles, Batteries, Infotainment & OnStar Engineering

General Motors Corporation

Monday, October 4, 2010

2-3 p.m.

Micky Bly:

Hey guys! Micky here. We're going to wait another 10 minutes before we start the chat, but I want to encourage you to submit your questions now. Thanks.

Monday October 4, 2010 1:51 Micky Bly

2:02

Micky Bly:

Good afternoon....I'm really happy to be here this afternoon....and I hope I get some really tough questions. I will answer as many as I can in the next hour...so lets get started.

Monday October 4, 2010 2:02 Micky Bly

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2:03

[Comment From djanand djanand :]

How long ago was the decision to develop batteries in-house made? And are GM batteries going to possibly be a product on their own for other automotive companies?

Monday October 4, 2010 2:03 djanand

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2:04

Micky Bly:

Shortly after we announced the Chevrolet Volt was going to be a production program, we started looking at the business model and engineering risk to purchase batteries or make them in-house.

Monday October 4, 2010 2:04 Micky Bly

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2:05

Micky Bly:

So we looked at our Powertrain model, where we make a percentage of our engines and transmissions and realized the advantages far outweighed the risks so in 2008, we announced GM plans to manufacture the Volt battery pack.

Monday October 4, 2010 2:05 Micky Bly

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2:06

Micky Bly:

We will still purchase batteries in the future, but we have decided that making some of amount allows GM to develop our core competencies in battery technology. We have over 100 years of manufacturing expertise that has been easily applied to our in-house battery production.

Monday October 4, 2010 2:06 Micky Bly

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2:06

Micky Bly:

Finally, at this time we have no plans to manufacture batteries from other companies.

Monday October 4, 2010 2:06 Micky Bly

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2:07

[Comment From Aditya Pappu Aditya Pappu :]

Hi Micky , Good Afternoon !! Could you please elaborate on the Battery Management System being used in Chevy Volt?

Monday October 4, 2010 2:07 Aditya Pappu

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2:09

Micky Bly:

The battery management system is a proprietary GM control model and has been developed over the last 12 -15 years in our R&D and product development areas. It is a very complex algorithm that must understand the batteries health, state of charge, usage, charging, needs and many others parameters including optimized fuel economy and owner experience.

Monday October 4, 2010 2:09 Micky Bly

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2:10

Micky Bly:

In the last 2 years, we have continued to refine the model with research into new materials and technologies including GM's research collaboration with UM in the ABCD (Advanced Battery Collaboration for Drivetrains).

Monday October 4, 2010 2:10 Micky Bly

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2:11

[Comment From Liz Michel Liz Michel :]

Going forward into the next decade, what percent of automobiles (worldwide - all auto companies) would you predict to be hybrids. And what types would you predict to dominate?

Monday October 4, 2010 2:11 Liz Michel

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2:13

Micky Bly:

There are a lot of highly paid consultants trying to figure out the answer to this question. There are many market drivers that must be understood when trying to understand this question....these include battery cost, govt. incentives, govt. investment, regulatory needs and electricity prices... and most important is the cost of gasoline.

Monday October 4, 2010 2:13 Micky Bly

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2:13

Micky Bly:

Today, there is a general understand of between 10 - 15 percent of vehicle production will have some level of electrification by 2020 globally.

Monday October 4, 2010 2:13 Micky Bly

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2:14

[Comment From djanand djanand :]

Is there a cross manufacturer standard for batteries or do you think batteries are going to be somewhat proprietary in their design?

Monday October 4, 2010 2:14 djanand

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2:15

Micky Bly:

There have been and will continue to be collaboration on standards with SAE and USABC in many areas of batteries. The problem with standardization is everyone agrees to standardize as long as it is there design that everyone else agrees to accept.

Monday October 4, 2010 2:15 Micky Bly

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2:16

Micky Bly:

We have had some success in a standard, at least in the US, with a standard charge port design working with SAE. It has been very well received and is included on the Chevrolet Volt.

Monday October 4, 2010 2:16 Micky Bly

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2:18

Micky Bly:

GM is open to further collaboration in battery design, but the reality is we see little standardization on battery form factor as technology in batteries is changing extremely fast today. If you look at the cell phone industry, they have not standardized a single cell in 15 years and we have to do it with over 200-300 cells in a vehicle....so you can see the problem.

Monday October 4, 2010 2:18 Micky Bly

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2:18

Micky Bly:

By the way....that standard is SAE J1772....you can find it on the web.

Monday October 4, 2010 2:18 Micky Bly

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2:19

[Comment From Seth Finkelman Seth Finkelman :]

In the 1990s, GM released the Chevrolet Impact and EV1, which were both failed projects. Why do you believe that the Chevrolet Volt will have a different, more positive result?

Monday October 4, 2010 2:19 Seth Finkelman

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2:22

Micky Bly:

The EV1 actually was not a failed project. It was the earliest entry into the EV market in the 1990s (you may know but there were EVs in the 1920, but we won't count those). ...we learned a lot from the EV1 to engineer a purpose built vehicle to satisfy a growing concern on oil dependency. We learned significant amount on high efficiency on electric motors and we learned that range anxiety was and still is a concern for customers.

Monday October 4, 2010 2:22 Micky Bly

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2:23

Micky Bly:

The last point is one of the reasons we are very confident the Volt will be successful in the marketplace. It is a car that can satisfy all the needs of a customer . . . so far the response from the market has been amazing! It looks like the vehicle will be a great success . . . one that GM is proud of to be first again.

Monday October 4, 2010 2:23 Micky Bly

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2:23

[Comment From Eduardo Cerame Eduardo Cerame :]

What factors do you think are going to be the biggest challenge for electric cars to overcome in order to become more accepted by a gas loving public?

Monday October 4, 2010 2:23 Eduardo Cerame

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2:26

Micky Bly:

The first will be range anxiety . . . and I just talked about that. The next will be cost. And this is where a combination of federal, state, and local incentives will be key to encourage the marketplace to move to new technology. These vehicles must stand on their own in the future and we are already working on second and third generation motors and batteries that will drive the cost down.

Monday October 4, 2010 2:26 Micky Bly

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2:26

[Comment From Denise Denise :]

Will the battery be common for Europe as well?

Monday October 4, 2010 2:26 Denise

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2:26

Micky Bly:

Yes, it will be.

Monday October 4, 2010 2:26 Micky Bly

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2:27

[Comment From MJSixton MJSixton :]

Thanks for taking the time to answer questions this afternoon. Through the development and production of the Volt, what are the main areas you found needed the most attention in order to improve the overall efficiency of a complex hybrid drivetrain?

Monday October 4, 2010 2:27 MJSixton

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2:27

Micky Bly:

Great question!.....I could probably talk about this for hours!

Monday October 4, 2010 2:27 Micky Bly

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2:28

Micky Bly:

One of our biggest challenges early on was the battery supply base and its readiness to move from a consumer electronics industry to an electric propulsion industry. We selected LG Chem as our partner early on . . . as they are clearly the leader in this technology.

Monday October 4, 2010 2:28 Micky Bly

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2:29

Micky Bly:

As development continued, we quickly learned that the controls interactions between many ECUs would be a real challenge to coordinate and communicate between themselves.

Monday October 4, 2010 2:29 Micky Bly

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2:30

Micky Bly:

And finally . . . this year there has been significant focus with the onboard diagnostics.... in fact, we had to create over 1,000 new diagnostics for the battery and charger alone for regulator and compliance reasons.

Monday October 4, 2010 2:30 Micky Bly

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2:30

[Comment From Paul B Paul B :]

Is there a way to charge the Volt directly from DC renewable energy sources such as Solar and Wind, or do these sources need to be grid-tied, so the Volt can only be charged from the grid using SAE J1772? Looking to improve round trip efficiency.

Monday October 4, 2010 2:30 Paul B

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2:31

Micky Bly:

Today the Volt's only interface is with the grid, but as you may know, our grid in Michigan has a very diverse supply of energy sources including wind, natural gas, nuclear, and coal.

Monday October 4, 2010 2:31 Micky Bly

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2:32

[Comment From Guest Guest :]

Are you concerned about the consumer end of the electric power grid being able to support the newfound load if the volt catches on particularly well in certain cities/regions?

Monday October 4, 2010 2:32 Guest

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2:33

Micky Bly:

From all the analysis we have, there will be absolutely no issues or concerns with grid capacity at all. In fact, a rough calculation says that the grid could currently handle millions of Volts around the country with less than 5 percent increase in load. And remember, most vehicles will be plugged in at night, when the grid demand is very low.

Monday October 4, 2010 2:33 Micky Bly

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2:34

[Comment From Scott Scott :]

What plans are being developed for the repurposing/recycling of the battery packs at the end of their lifecycle as an auto component?

Monday October 4, 2010 2:34 Scott

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2:36

Micky Bly:

Thanks for your question, Scott. GM is very concerned about delivering technology that helps minimize the impact of transportation on the environment. Not only during production and customer usage, but also we are concerned about after vehicle life. Just last month, I announced that GM has joined with ABB to develop a technology roadmap and projects around secondary usage of the Volt battery. ABB is a leader in grid technologies, so we feel we both have a lot to learn over the next few years.

Monday October 4, 2010 2:36 Micky Bly

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2:37

[Comment From Brett Merkel Brett Merkel :]

Micky, I am curious how the Volt will handle the typical heating requirements present in the midwest winter climate. Does the Volt use a standard heater core that operates with the gasoline engine only, or will there be some sort of electric heater to take full advantage of its ability to plug in?

Monday October 4, 2010 2:37 Brett Merkel

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2:39

Micky Bly:

The Volt is designed to provide heat the battery and to the cabin from electrical sources, which would include the grid while plugged in and the battery when driving down the road. We have engineered in the vehicle many technologies that will allow the right balance of electric range and customers comfort. At extreme cold (less than 20 degree C), we will use the internal combustion engine and the primary heat source, something a pure EV could never do.

Monday October 4, 2010 2:39 Micky Bly

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2:40

[Comment From Lee Walker Lee Walker :]

Have there been any revisions to how EPA fuel economy will be labelled and reported to the consumer, and how are emissions calculated for EREV's? How does this affect the Volt in comparison to other electric or hybrid vehicles from other manufacturers?

Monday October 4, 2010 2:40 Lee Walker

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2:41

Micky Bly:

We have been actively been engaged with EPA and Argonne National Labs for the last year in support of fuel economy labeling. This is a very complex subject that has many agencies and OEs working around the clock to resolve. The key is to provide the customer a meaningful indicator of what they can expect when they buy a vehicle like the Volt. We hope to have news on this subject very soon.

Monday October 4, 2010 2:41 Micky Bly

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2:42

[Comment From Aditya Pappu Aditya Pappu :]

Are any test vehicles or simulation software being deployed to help consumers get accustomed to this new technology?

Monday October 4, 2010 2:42 Aditya Pappu

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2:45

Micky Bly:

The Volt will be going on a 12 city, 6 week cross country tour - called Volt Unplugged, where consumers will get the opportunity to test drive the vehicle and talk with engineers, designers and participate in other activities (visit www.chevroletvoltage.com)

In addition, we have announced that GM is launching demo fleets of pure battery electric vehicles (BEVs) in Korea and Europe to understand how these vehicles will be accepted in urban environments.

Monday October 4, 2010 2:45 Micky Bly

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2:46

[Comment From Guest Guest :]

Hi, Are there any higher efficiency batteries on the horizon

Monday October 4, 2010 2:46 Guest

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2:48

Micky Bly:

The answer is Yes! There are many battery technologies that are being developed around the world in production and research environments. Many of these will never see the light of day, but we are working to understand where these technologies will lead with our R&D efforts including with U of M - specifically the advanced materials and advanced manufacturing GM research labs. We are also looking at next gen of solid state batteries, but that's all I can say at this time.

Monday October 4, 2010 2:48 Micky Bly

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2:48

Micky Bly:

Guys...we've got 10 more minutes.

Monday October 4, 2010 2:48 Micky Bly

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2:49

[Comment From Mike Mike :]

Is GM viewing the Volt as a catalyst for creating the infrastructure (i.e. commercial charging stations in parking lots or garages) required for all electric vehicles to become feasible?

Monday October 4, 2010 2:49 Mike

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2:50

Micky Bly:

Yes, we do see it as a catalyst for change. And we are already seeing many companies, governments, municipalities coming to GM with projects and collaborations, where we can collectively provide creative solutions to infrastructure and customer acceptance.

Monday October 4, 2010 2:50 Micky Bly

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2:50

[Comment From Kyle M Kyle M :]

Was lighter weight a primary driver for the Volt's fuel efficiency? Are lightweight alloys or carbon fiber used anywhere?

Monday October 4, 2010 2:50 Kyle M

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2:51

Micky Bly:

Mass efficiency was important, but the key for the vehicle was to intro the technology on a short timeline with high quality, so we reused many vehicle components and optimized what we could.

Monday October 4, 2010 2:51 Micky Bly

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2:51

[Comment From Dean Dean :]

Hi Micky - Can you talk a little more about ABCD or other ways the U of M is helping engineer the Volt?

Monday October 4, 2010 2:51 Dean

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2:54

Micky Bly:

ABCD started a few years ago as a research collaboration between GM and UM. It has since grown to include other universities and GM's global operations to understand and model the fundamental cell chemistry effects of life and degradation in a manner to include it in our control algorithms to further optimize the batteries performance and life. We've learned a lot and we continue to grow our understanding every day in this area.

Monday October 4, 2010 2:54 Micky Bly

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2:54

[Comment From Guest Guest :]

Mickey, is it possible to get hired onto the volt team after graduating from U of M's ESE program

Monday October 4, 2010 2:54 Guest

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2:57

Micky Bly:

Absolutely! Yes! In fact, we have hired over 200 engineers into our electrification efforts over the past year and we will continue to grow at a similar pace in 2011! For UM, make sure you contact the GM recruiting team through the ECRC. The GM team was just there last Tuesday and will visit again. Or you can go to gm.com/careers and look for the on-campus recruiting tab and specifics related to UM.

Monday October 4, 2010 2:57 Micky Bly

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2:57

Micky Bly:

. . . and by the way, the ESE program at UM is seen as the leading sustainability program in the country and we actively recruit grads from that program.

Monday October 4, 2010 2:57 Micky Bly

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2:58

Micky Bly:

2 minutes with over 20 questions left....so I try to pick a few.

Monday October 4, 2010 2:58 Micky Bly

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2:58

[Comment From Paul B Paul B :]

Micky, Can we get ideas how current U of M ESE students can help with projects related to the next generation Volt?

Monday October 4, 2010 2:58 Paul B

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2:59

Micky Bly:

We hire a number of interns out of the ESE program and assign them real world projects that the solutions have direct impact on our electrification programs. So if you are interested, talk to the recruiting team about an internship next year.

Monday October 4, 2010 2:59 Micky Bly

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3:03

Micky Bly:

Thanks for all the great questions and I know there were many, many more than I had time for . . . or fast enough fingers....but I hope this webchat gave you some insight to what we are doing at GM and how the industry and academia are moving together into vehicle electrification. None of us can do it by ourselves. We need great research, we need great companies, we need great solutions and we need great people from diverse backgrounds to help solve the problems ahead of us - like dependency on fossil fuels . . . I hope you can tell that I have a personal passion for this technology and GM will lead the transformation of the automobile into our second century.

Monday October 4, 2010 3:03 Micky Bly

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3:03

Micky Bly:

This was fun. Maybe I'll do it again soon. And congrats to UM (and Georgia Tech) football teams! See ya.

Monday October 4, 2010 3:03 Micky Bly

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3:05