

Advocating for STEM, GM VP Calabrese Says Engineers Are Just People Doing Cool Things

(EDITOR'S NOTE: John Calabrese, vice president of Global Vehicle Engineering at GM, began his career with the company as an intern in 1979 and now serves as one of the leading advocates for GM's science, technology, engineering and math, or STEM, educational outreach.

With responsibility for global vehicle engineering and global technology operations, he said he takes personally the pursuit of the best and brightest of tomorrow's technology leaders.

Calabrese reports to GM Executive Vice President of Global Product Development and Global Purchasing and Supply Chain Mary Barra, who shares his passion for educating future generations.

Calabrese is the key GM executive for Virginia Tech University and serves on the Advisory Board to Virginia Tech's College of Engineering.

He chaired the Leadership Committee for the 2013 SAE Foundation STEM Celebration and is a board member for the Engineering Society of Detroit and the Michigan Science Center.

After speaking recently to the Midwest Automotive Media Association about STEM, he was interviewed by GM spokesperson Jennifer Ecclestone about the importance of STEM education. Here are his comments.)

Q. You've spent most of your

career in vehicle engineering. Why is advocating for the development of future engineers so important? What is the biggest challenge the industry is facing?

A. Advocating for future engineers is not only vital to GM and the automotive industry, but also the entire global business platform. Nearly 80 percent of future jobs have some component of STEM education such as problem-solving, problem-posing and design.

The biggest challenge the industry is facing is stopping the leaky pipeline of talent we have, particularly in the U.S., by developing a pool of highly skilled and creative innovators to carry it into the rapidly evolving future.

To achieve this, we need to give students experiences, not just equations, and show them how exciting engineering and math-based science can be when you apply basic principles.

Q. What is the goal of your STEM education outreach advocacy?

A. My goal is to ignite the interest and advocacy of the entire ecosystem of support, which consists of government officials, educators, communities, parents and industry members. This issue is not fiscal, it is focus- and alignment-based. If we could combine the energy and interest in making positive strides in STEM education,

we could truly make a difference.

GM is more than just a consumer of STEM. We are responsible for communicating our needs for the future generations. We are doing our part in contributing to talent development because we are involved in outreach programming from nearly cradle to professional and also with developing STEM educators through various corporate and industry partnerships.

Q. Michigan Gov. Rick Snyder recently declared October STEM month in the state. What role does government leadership play in improving the STEM education outlook?

A. We need more government leaders and government bodies to take these types of stands to encourage the majority to support local initiatives. What Governor Snyder did was help us raise the awareness level, and we need to take the efforts surrounding these subjects seriously.

Because the government helps dictate our educational programs, we need them to want to provide more experiential learning opportunities, not just equations and theories. In turn, these officials encourage other members of the ecosystem to take collaborative action.

Q. You've made it clear that you and other OEMs need to be



John Calabrese with 2014 Corvette Stingray Coupe

involved with STEM education to make a difference. What outreach programs is GM currently involved with?

A. GM and the GM Foundation, have helped multiple STEM programs including SAE Foundation's A World in Motion and the FIRST, or For Inspiration and Recognition of Science and Technology, robotics competition, which reach students from kindergarten through secondary school. We have a number of corporate partnerships in collegiate programs such as EcoCAR2 and target our secondary school educators with training through Project Lead the Way.

In 2011, the GM Foundation began funding the Buick Achiever's Scholarship, focused on high school and college students planning to study engineering, technology, design and some busi-

ness curriculum. Counting this year's scholarships, Buick Achievers has awarded nearly \$16.5 million to about 3,300 students since the program began.

Q. What message do you have for current or future science, technology, engineering and math students?

A. I want students to know that engineers are just people doing cool things. We are problem-solvers, problem-solvers, designers and future innovators. We get to predict what customers will want in the future and provide solutions for socio-economic issues that we can see developing 20 to 30 years into the future.

Technology is rapidly changing and you must constantly evolve your skill set and continue learning, but there couldn't be a more exciting time to become an engineer.

Impact of Analytics Help Ford Improve Environment, Boost Profits

Not too far from where factory workers assemble Ford cars and trucks, analytics experts in the Dearborn automaker's Research and Innovation Center are building something entirely different but equally important – complex mathematical models to help Ford sharpen its competitive edge while limiting its environmental impact.

Launched 15 years ago as a small cadre of researchers, the group's size and impact on Ford has grown considerably while its mission is unchanged – chart a path for the company to a cleaner, brighter, better world and stronger business, said Ford spokesman Todd Nissen.

"I don't think it's a coincidence that Ford now ranks among the greenest brands in the world," said John Viera, global director of Sustainability and Vehicle Environmental matters. "The company's investments in the field of big data analytics have continually increased during the last 15 years."

Viera outlined Ford's use of analytics and big data as part of a panel discussion in late October at the 2013 Net Impact conference in San Jose, Calif.

The group, consisting of scientists, mathematicians, computer modelers and other researchers, uses the latest in analytics and big data to discover ways to min-

imize Ford's environmental impact and bolster its bottom line by identifying potential risks and opportunities, Nissen said.

Here are some examples of the work the group has accomplished:

- Fuel economy – The group developed a science-based model that projects CO2 emissions generated by the fleet of vehicles on roads worldwide for the next 50 years. This information helps Ford set aggressive fuel economy targets, yet remain eco-conscious;
- Power of choice – Used science and math to show that one particular form of alternative en-

gine power is unlikely to emerge above all others, which has helped to make a better case for a diversified portfolio of powertrains ranging from EcoBoost engines, hybrid and plug-in hybrid technologies, flex-fuel, all-electric, biodiesel, CNG and LPG;

- New features – Created sophisticated mathematical models that optimize millions of possible vehicle combinations to give decision-makers the tools to construct an eco-conscious and cost-effective global technology road map, resulting in green products such as Ford Auto Start-Stop;

- Customer value – Developed specific tools, such as the Ford Fleet Purchase Planner, an analytical system that helps fleet customers match their vehicle choices to their needs while helping save money and the planet.

Ford considers analytics and big data – in and out of vehicles – the next frontier for innovation, competition and productivity.

The company continues to expand its use of big data as more and better technologies, methodologies and datasets emerge.

Consider the plug-in hybrid

Ford Fusion Energi, Nissen said. The vehicle generates about 25 gigabytes of data every hour. Those data are useful for further improvements in fuel economy and the reduction of vehicle emissions.

Yet, Ford researchers are already experimenting with vehicles that generate 10 times that much data – 250 gigabytes – per hour.

"There are so many amazing possibilities to consider for the future impact of data," said Viera, expounding on the critical effects of analytics. "The possibilities are not only exciting, they are, in fact, almost endless."



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