

NACAT NEWS



VOL. 36

February 2022

NO. 1

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SEPTEMBER 1
THROUGH
AUGUST 31

TIME FOR CHANGE

-EDITORIAL-

Time for change. Why did I use that title for this section rather than something more poetically forward like, "Don't Stop Me Now"? It is not personal preference. Both would be accurate given the momentum NACAT is achieving. Yet, as the organization moves forward it keeps evolving. It does not stop either. The organization continues to strive to reach the potential its founders saw for it while not being rooted to original intent. It is melding ideas, both old and new, to further become a mosaic education-centered corporation. NACAT has entered a new cycle and spring has come early. Change abounds and further excellence is on the horizon.

What change?

While I won't reference everything the board is doing to enhance your experience and training opportunities, one evolutionary step is the change to the new business managers and office: From Bill Haas in Tyler, Texas (thanks for all the hard work, Bill) to Sheri Hamilton and Heather Sebben of Hamilton and Associates in Gladstone, Missouri.

Other changes involve NACAT News:

- NACAT News increased to 6 issues per year.
- NACAT News is only 20 pages rather than 40 pages per issue.
- Where I previously had space to include entire journal articles, I now will include what I am calling "Journal Journey" entries. These will provide a short description of the journal article as well as its title, authors, and abstract. As NACAT News is interactive, the entries will be linked to the full journal article if you wish to read them.

"Time For Change" is a song by the American heavy metal/glam metal band Mötley Crüe. It was released as the last song on their 1989 album "Dr. Feelgood." The chorus has the following lyrics:

*Change
Now it's time for change
Nothing stays the same
Now it's time for change*

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NACAT News is Now Published SIX Times per Year!

DEADLINE DATES

February 2023 issue - January 10, 2023

August 2022 issue - July 10, 2022

April 2022 issue - March 10, 2022

October 2022 issue - September 10, 2022

June 2022 issue - May 10, 2022

December 2022 issue - November 10, 2022

The latest advertising size and rate information can be found at www.nacat.org.

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WHAT DO INDUSTRY PROFESSIONALS SAY ABOUT AUTOMOTIVE CAREER DESIRABILITY?

[The Women Automotive Network](#) used last year's "Winter Meetup" as a prime opportunity to find out what industry professionals think and feel about automotive career desirability. The results were surprising to say the least. Here's what they said:

Whilst diversity in the automotive sector has certainly improved this past couple of years, it's quite apparent that we've still got a long way to go. Surprisingly, 67.0% of attendees could only name 1-5 inspiring women in the automotive sector.

And with 58.0% believing that the responsibility to support and promote Diversity, Equity, and Inclusion (DE&I) starts at management level, does this send a strong message out to automotive managers and executives? And how can automotive managers and executives do more to promote DE&I within their organisations?

What's clear is that more needs to be done to promote automotive careers from a young age. Only 3.9% of participants desired a career in the automotive sector from their childhood, onwards. For most, that desire came much later, suggesting that the automotive sector isn't a hugely desirable sector to work in.

As part of this key discovery, the Women Automotive Network has put together five key takeaways to drive awareness, inspire change, and address these numbers head on:

1. Automotive career awareness should start at school.

With "only 3.9% of participants [desiring] a career in the automotive sector from their childhood, onwards," it's obvious what needs to change: automotive career awareness should start at school. This could mean including automotive initiatives during lessons or during work experience, or reaching out to get local Governments and local automotive organisations involved in school-led outreach programs.

2. Career diversity should start at school.

Does the education system promote diversity and inclusion in a career context enough? Are schools doing enough? Should schools teach diversity and inclusion in a career context during lessons at school, and mentor young children on how best to navigate this situation when they enter the workforce?

3. More awareness needs to be driven through marketing and publicity.

If more automotive organisations and local governments invested in better, larger scale marketing and publicity programs to drive awareness amongst new audiences, and change the reputation of automotive as a career field, this would improve career desirability from a younger age.

4. Clever marketing needs to be used to improve sector desirability.

Again, if more automotive organisations and local governments invested in better, larger scale marketing and publicity programs to drive diversity awareness in the automotive industry, more organisations would jump on the diversity bandwagon and create new diversity programs from within.

5. "Promoted from within" will create more diverse role models to inspire.

As mentioned earlier, "67.0% of attendees could only name 1-5 inspiring women in the automotive sector." The solution is simple: promote more diverse leaders within your organisation. This would "create" more inspiring women in the automotive sector, and those numbers would quickly change.



STEVE GIBSON

RIVERSIDE, CALIFORNIA

Greetings all! I hope your Spring semester has been off to a good start. Things have been busy at NACAT in preparations for our upcoming 2022 Conference and Expo. It feels so good to inform you that we are GO for an in-person event! I can't wait to see our members, friends, and new faces in just a few short months.

A large part of our conference planning work is being handled by our new association management agency, Hamilton and Associates (H+A). H+A has been selected by the NACAT Board to fill the shoes of our previous Business Manager, Bill Haas. In Bill's 6 years with NACAT, he stabilized our organization's foundation and with H&A we are ready to begin building NACAT into a strong powerhouse for instructor-led training. Some of you may know Sheri Hamilton through VISION Hi-Tech Training and Expo and Midwest Auto Care Alliance, formerly ASA-Midwest; H+A is Sheri's company which specializes in association and event management. I am excited to welcome Sheri, Heather Sebben, and all H&A staff to our NACAT family.

All NACAT communications, correspondence, and the business address have been relocated to the H+A address in Gladstone, MO. Operationally for our members, nothing will change. Our place of business has simply changed locations, as it has many times in the past (as our older members will remember). No, NACAT is not merging or associating with VISION, we remain an independent entity with all our same officers and board members directing the organization. What we gain is an entire office full of people to tend to the day-to-day tasks of running a business. As they say "a high tide raises all ships", as our efficiency in the office has increased, so it will in the rest of the organization.

H+A has hit the ground running with finalizing trainers, recruitment with exhibitors and sponsors, and putting the final details on conference registration which should be opening soon! Remember, our conference dates have changed for 2022, **moving to August 7-11**. [Register online at nacat.org](https://nacat.org) or call or [email](mailto:info@nacat.org) the office with any event-related questions.

See you in person soon!

"That's been one of my mantras—focus and simplicity. Simple can be harder than complex; you have to work hard to get your thinking clean to make it simple."

— Steve Jobs

MF400-HCTS

Hydraulic Cylinder Training System

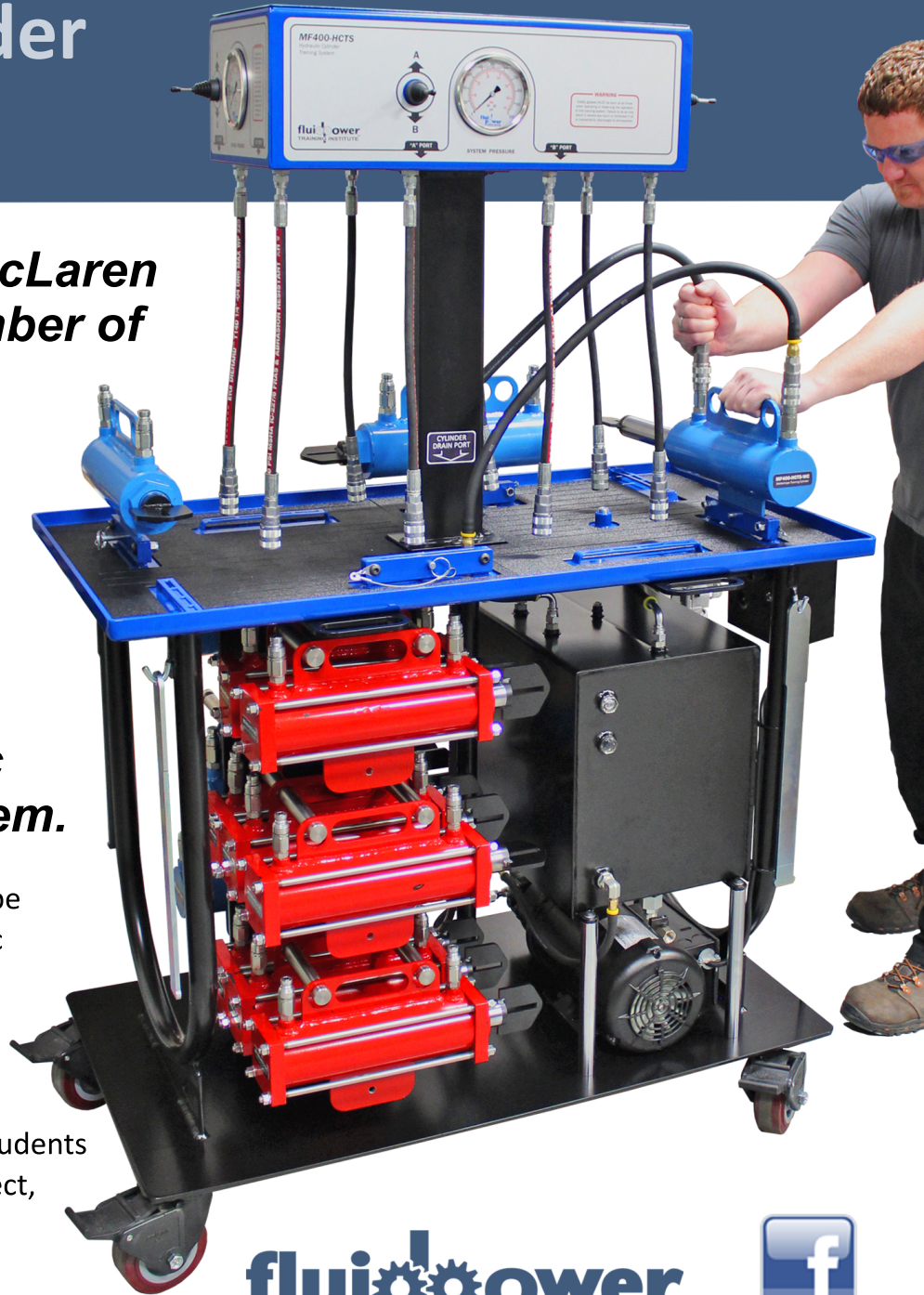
FPTI's founder, Rory McLaren has investigated a number of incidents in which technicians were seriously injured or killed while repairing hydraulic cylinders. This is what inspired him to design the MF400-HCTS Hydraulic Cylinder Training System.

Sooner or later, a technician is going to be tasked with replacing seals in a hydraulic cylinder. A job that seems simple and straightforward can quickly become a technician's worst nightmare.

The MF400-HCTS is designed to teach students how to troubleshoot, disassemble, inspect, reseal, assemble and test hydraulic cylinders - SAFELY.

The cylinders, tie-rod and welded-type, are specifically designed for educational purposes. Handles are welded to the cylinder for safe handling. A steel plate is welded to the cylinder to secure the cylinder in a vice. The MF400-HCTS holds up to eighteen (18) cylinders.

The MF400-HCTS has four (4) independent test stations, which can be fitted with transparent covers for social distancing.



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SEMA LAUNCHES NEW ONLINE EDUCATION LIBRARY FOR AUTOMOTIVE PROFESSIONALS

SEMA launched a new online education library to provide the automotive aftermarket with easy and affordable year-round access to experts and leaders.

From technical details about advanced driver-assistance systems (ADAS) and legislative and advocacy updates, to best practices and tips on common business skills and behind-the-scenes conversations with industry leaders, celebrities, and icons, the new SEMA Virtual Education website at www.sema.org/education includes a comprehensive collection of educational webinars and resources targeted to the automotive aftermarket.



SEMA's new online education library will provide the automotive aftermarket with year-round access to seminars and exclusive virtual content.

“The SEMA Virtual Education website provides the automotive aftermarket with a one-stop shop of industry-leading education and resources that will support the industry throughout the year,” said Gary Vigil, SEMA Sr. Manager of Professional Development. “The website is user-friendly and provides businesses and employees a convenient way to learn best practices and increase their knowledge in order to advance in their careers.”

Employees of SEMA member companies will have the distinct advantage of being able to access most education at no cost or at a discount, but all sessions are available to anyone in the industry – regardless of SEMA membership status.

The new website includes exclusive recordings from the 2021 SEMA Show, which will be free to everyone.

Through www.sema.org/education, users will find:

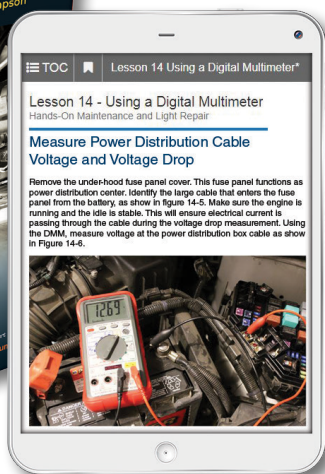
- Recordings of 2021 SEMA Show Education seminars (to be added in the coming months)
- Live and simu-live virtual sessions that allow participants to connect with speakers in real-time
- Recommended sessions, based on individual profiles
- Easy-to-find sessions sorted by categories, topics, and industry segments
- A personal dashboard of purchased or registered items

“We collaborate with leading subject-matter experts and the most dynamic speakers to bring the industry the best experience possible,” added Vigil. “Participants of the education program can expect comprehensive presentations, insightful discussions, and entertaining videos that teach, inform, and inspire.”

Over 50 on-demand sessions are already housed on the SEMA Virtual Education website. Searchable categories include but are not limited to marketing and sales, small business strategies, legislative and regulatory, trends and research, vehicle technology, and professional development. New content will be added weekly.

Users can access the program and create a personal profile at www.sema.org/education.

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Virtual Reality in Automotive Lab Training?

A recent paper in the journal [Sustainability](#) explores the coronavirus pandemic enforced development of a virtual reality system utilized to learn about the operation of the four-stroke engine through animation and the assembly and disassembly of its main pieces. The application provides an opportunity for students to experience an immersive learning environment in situations where shop time may be limited or where spaces may not be equitably outfitted. Student gains are achieved as they are allowed the opportunity for virtual practice in advance of any potential face-to-face shop experience. The development and use of immersive virtual education (teaching-learning) tools align with the future roles some students may find in professional careers working in design, autonomous cars, training, or other related occupations.

Development of Virtual Reality Automotive Lab for Training in Engineering Students

By: Macaria Hernández-Chávez, José M. Cortés-Caballero,
Ángel A. Pérez-Martínez, Luis F. Hernández-Quintanar, Karen Roa-Tort,
Josué D. Rivera-Fernández, and Diego A. Fabila-Bustos

[Please turn to page 14 for the abstract.](#)



TOM MILLARD

WARREN TECH

Greetings to all NACAT members.

I am hoping this finds you and your family safe and well. These are hard times for our NACAT family and friends. Hopefully you are able to get back to in shop, and hands on training. Covid has caused a major change as to what we call "Normal". I'm hoping it won't take us too much longer to get back to travelling for training.

The Board and I have been discussing the future of NACAT. One of the best activities we offer is our annual training conference. This has been on our minds as to how we can help get the members training you deserve. We are still encouraged with the awesome participation of our Virtual Classes as well as the Instructor Roundtables. We are always looking at ways to help you get the best training available. We honestly believe that the education NACAT supplies to instructors from instructors is the best training available.

We are going thru some processing and reviews as to the best ways to serve you, the members to get you the best latest, and greatest trainings, available. Our commitment to you is to always be available to discuss the best ways to keep you updated and aware of how to improve your educator's toolbox. We are hoping to continue the process of making mentoring and communication as a priority to you. [I look forward to hearing from all of my fellow educators on topics that you feel would keep us all involved in the process of changing the life of the curious, and eager students we tirelessly work with every day.](#)

Other changes are upcoming including the delivery of NACAT News. It will now be an online ENews to help save the environment and ensure you get the latest information as efficiently as possible.

[We are also needing volunteers to apply for election to the NACAT board. We are always looking for young fresh instructors to join, and bring new ideas to your board.](#) It is the start of election season. Please keep an eye on the website for upcoming information be posted there soon.

We are in the finalization of events for the NACAT Conference to be held **August 7-11, 2022** in Covington KY at the Cincinnati Marriott River Center. Registration and class descriptions will be added to the website in the next few weeks.

The secret to success is to do the common things uncommonly well.

John D. Rockefeller

ELECTROMAGNETISM TRAINER CL-1902



PRODUCT SPECS



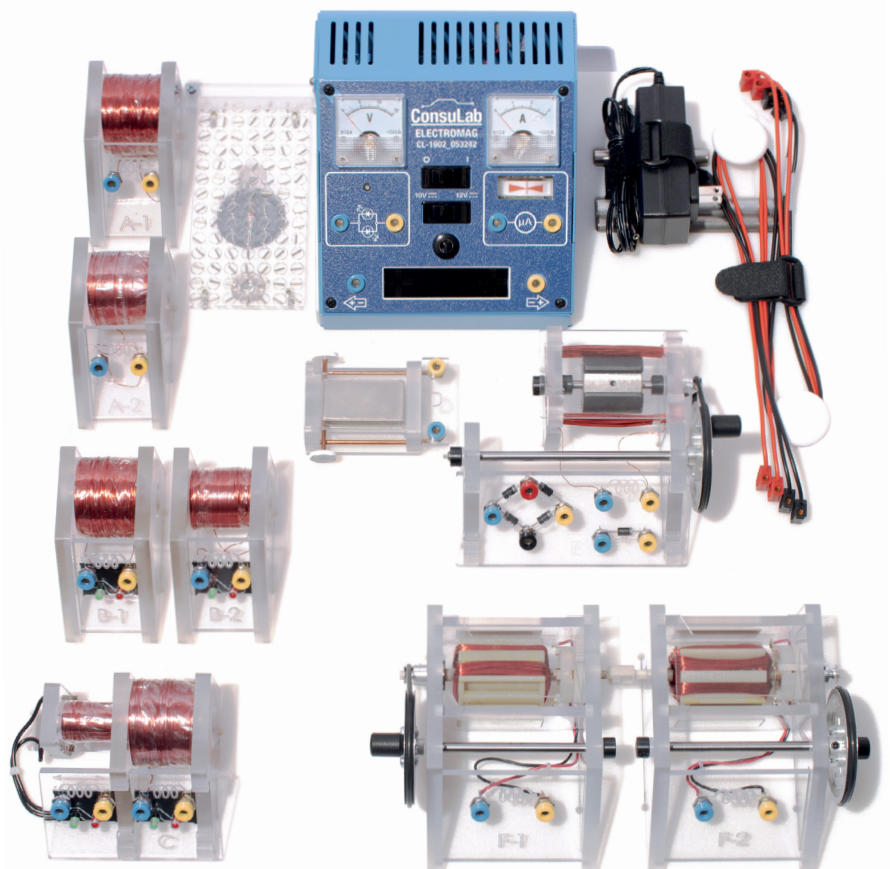
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HYBRID AND ELECTRIC VEHICLE CORNER

Written By: Curt Ward, Professor at Joliet Junior College

HEATING AND COOLING THE HYBRID AND ELECTRIC VEHICLE

As I compose this article, the spring semester is upon us. Many programs teach heating and air conditioning (HVAC) in the spring term. The addition of many new hybrid and electric vehicles in the last couple of years has really changed the look of heating and cooling systems. When was the last time you updated your HVAC curriculum? In this article we will explore some of the changes in HVAC systems as it relates to hybrid and electric vehicles.

We cannot talk about HVAC systems on hybrid and electric vehicles without first discussing high voltage safety. At a minimum, the air conditioning compressor is part of the high voltage system and in some applications so is the high-voltage battery heating. It is important to understand the hazards of the high voltage system and know what procedures and personal protective equipment is needed to safely diagnose and repair the systems.

One of the first changes you will notice on hybrid electric vehicles is the disappearance of the serpentine belt driven water pump. Most manufactures are relying on the electric water pump(s) 100% of the time. In many cases the water pump was the only component being driven by the serpentine belt. The removal of the belt reduces the power loss when the internal combustion engine is operating. Fully electric vehicles use on electric water pumps (**FIGURE 1**).

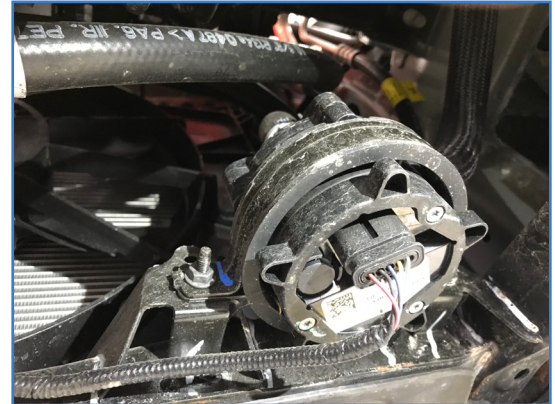


Figure 1: Electric water pump from a Chevrolet Bolt

Many hybrid and electric vehicles are using the electrical system to boost cabin temperatures when coolant temperatures are low. One of the most common applications is the use of positive temperature coefficient (PTC) heater elements in the ductwork. PTC heaters convert electrical energy into heat that this used to warm the passenger compartment. High voltage heaters may also be used to warm the coolant (**FIGURE 2**).



Figure 2: High voltage heater used on a 2017 Chevrolet Bolt

With an increased emphasis on electric vehicle range many electric vehicle manufactures have switched to a strategy of heated seats and heated steering wheels instead of trying to warm the air in entire passenger compartment. Typically, these components use less electricity than the HVAC system. Heated seats are calibrated to operate at approximately 100°F and the steering wheel is calibrated to operate at approximately 90°F.

An additional strategy to heat the passenger compartment is the heat pump. A heat pump scavenges the heat from the power electronics, the inverter, the electric motors, and the battery and uses it to heat the passenger compartment. Conceptually, a heat pump is a reversible air conditioning system that provides both cabin heating and cabin cooling.

CONTINUED ON PAGE 18

MF500-HTTS

Hydrostatic Transmission Training System

(MF500-HTTS shown with optional front-end MF500-IS Implement System)



The MF500 is arguably the most advanced off-road vehicle training system in the world. Here's why:

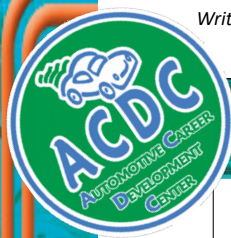
- Unlike a skid-steer loader in a lab, the MF500-HTTS drives in real-time even though the wheels don't touch the ground.
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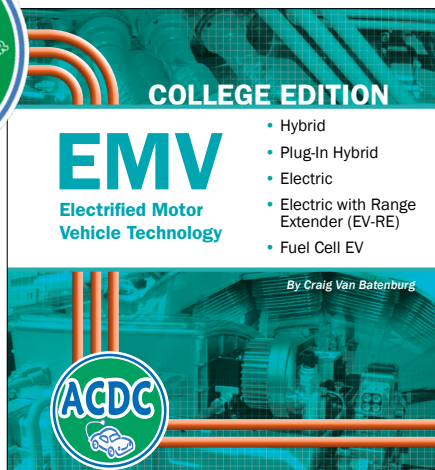
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Written by Craig Van Batenburg with other contributing writers.



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Journal: Virtual

Continued from Page 9

Abstract

A Virtual Reality application was developed to be used as an immersive virtual learning strategy for Oculus Rift S Virtual Reality glasses and through Leap Motion Controller™ infrared sensors, focused on students of the Automotive Systems Engineering academic program, as a practical teaching-learning tool in the context of Education 4.0 and the pandemic caused by COVID-19 that has kept schools closed since March 2020. The technological pillars of Industry 4.0 were used to profile students so that they can meet the demands of their professional performance at the industrial level. Virtual Reality (VR) plays a very important role for the production-engineering sector in areas such as design and autonomous cars, as well as in training and driving courses. The VR application provides the student with a more immersive and interactive experience, supported by 3D models of both the main parts that make up the four-stroke combustion engine and the mechanical workshop scenario; it allows the student to manipulate the main parts of the four-stroke combustion engine through the Oculus Rift S controls and the Leap Motion Controller™ infrared sensors, and relate them to the operation of the engine, through the animation of its operation and the additional information shown for each part that makes it up in the application.

This article belongs to the:

[Special Issue Virtual and Augmented Reality Learning Environments for Sustainable Development](#)

POLIMOVE WINS THE AUTONOMOUS CHALLENGE AT CES®, MAKING HISTORY AS THE FIRST HEAD-TO-HEAD AUTONOMOUS RACECAR COMPETITION CHAMPION

Missed the live stream? Watch the full broadcast [here](#).

The Indy Autonomous Challenge (IAC) team PoliMOVE from Politecnico di Milano (Italy) and the University of Alabama won the Autonomous Challenge @ CES, making history as the first head-to-head autonomous racecar competition champion. PoliMOVE competed at the Las Vegas Motor Speedway in a field of 5 teams from 5 countries representing 7 universities to win the \$150,000 grand prize. TUM Autonomous Motorsport from the [Technische Universität München](#) (Germany) took home second place with \$50,000.

The rules of the IAC competition required each team to qualify in a high-speed autonomous racecar time trial competition determining their seed in the head-to-head passing competition. The IAC teams raced the Dallara AV-21, the most advanced autonomous racecar. PoliMOVE competed against TUM Autonomous Motorsport in the final round of the competition. In addition, PoliMOVE set the fastest speed record on an oval with a top speed of 173 mph.

“Today was the real birth of autonomous racing,” said Prof. Sergio Savaresi, team lead of Politecnico di Milano. “The real high-speed multi-agent racing was pushed to its very limits. The research on autonomous cars will certainly benefit from this historic milestone.”

Organized by [Energy Systems Network](#), the primary goal of the IAC is to solve real world problems by advancing technology that will speed the commercialization of fully autonomous vehicles and deployments of advanced driver-assistance systems (ADAS). Pushing limits for the entire autonomous community and helping to increase safety and performance is of critical importance, not only in motorsports, but across all modes of commercial transportation.

“We came to CES this week, the world’s most influential technology innovation event, to showcase to the world how this competition is catapulting autonomous technologies forward,” said Paul Mitchell, president and CEO, Energy Systems Network. “We’re harnessing the power of prize competitions to attract the best and the brightest minds from around the globe to further the state-of-the art technology in safety and performance of automated vehicles and the teams did just that today with another historic competition.”

Karen Chupka, EVP of CES, Consumer Technology Association officially started the competition with the call, “Ladies and gentlemen, start your software.” [Halo](#), a remote-piloted driverless car service operating on T-Mobile’s 5G network served as the official pace car, leading each set of IAC teams off of pit lane and completing a warmup lap at speeds of 65-80 mph before the start of each round. Bridgette Foster, from Las Vegas, sang the national anthem.

[Luminar](#) (NASDAQ: LAZR) and the [Technology Innovation Institute \(TII\)](#) served as premier sponsors for today’s competition. The Dallara AV-21 features three Luminar Hydra LiDAR sensors to provide 360-degree long-range sensing, which enables safe autonomy at high speeds. And TII is providing its global expertise in automation and robotics as partner in [TII EuroRacing](#), one of the teams competing in today’s Autonomous Challenge @ CES.



PoliMOVE wins 1st Place at the Autonomous Challenge @ CES. Credit: Indy Autonomous Challenge.

CONTINUED ON PAGE 16

The call to action for this competition has been remarkable, with 41 university teams initially signing up to compete more than 2 years ago, representing top engineering and technology programs from 14 U.S. states and 11 countries. The IAC first made history on October 23, 2021, when it held the Indy Autonomous Challenge Powered by Cisco, the first high-speed autonomous racecar competition at the Indianapolis Motor Speedway (IMS).

9 teams from 8 countries, representing 19 universities went to Las Vegas to compete.

- [AI Racing Tech*](#) - [University of Hawai'i](#) (Hawai'i), [University of California San Diego](#) (California)
- [Autonomous Tiger Racing](#) - [Auburn University](#) (Alabama)
- [Black & Gold Autonomous Racing*](#) - [Purdue University](#) (Indiana) and [United States Military Academy at West Point](#) (New York)
- [Cavalier Autonomous Racing*](#) - [University of Virginia](#) (Virginia)
- [KAIST](#) - [Korea Advanced Institute of Science and Technology](#) (South Korea)
- [MIT-PITT-RW*](#) - [Massachusetts Institute of Technology](#) (Massachusetts), [University of Pittsburgh](#) (Pennsylvania), [Rochester Institute of Technology](#) (New York), [University of Waterloo](#) (Canada)
- [PoliMOVE](#) - [Politecnico di Milano](#) (Italy), [University of Alabama](#) (Alabama)
- [TII EuroRacing](#) - [University of Modena and Reggio Emilia](#) (Italy), [Technology Innovation Institute](#) (United Arab Emirates)
- [TUM Autonomous Motorsport](#) - [Technische Universität München](#) (Germany)

*Did not advance to Friday's final competition.

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CONTINUED FROM PAGE 12

When we begin to discuss the air conditioning system, it is important to remember the compressor oil is different in a system that uses a high-voltage electric compressor. The oil is a POE (polyol ester) rather than the PAG (polyalkylene glycol) which is used in a non-electric compressor. PAG oil is slightly conductive and can cause the insulation to breakdown on the windings of the compressor. If the system is being leak checked using dye, it is important to make sure the dye is compatible with POE oil.

Increasingly, many manufactures of electric vehicles have created a “pet mode” as part of their climate control system. As long as there is sufficient battery capacity, the vehicle will maintain a desired set cabin temperature while the owner is away and keep the animals safe and comfortable until they return.

Want to know more? [Reach out to Pearson](#) and ask for a review copy of the all new “Electric and Hybrid Electric Vehicles” textbook that Jim Halderman and myself co-authored. It is a comprehensive text covering all the latest information on the subject.

Yale School of the Environment Looks At Electric Vehicle Carbon Emissions Through Additional Channels

A recent [study](#) from the Yale School of the Environment, published in [Nature Communications](#), examined the total indirect emissions from electric vehicles against fossil fueled vehicles. The examination also included direct emissions from combusting fossil fuels, either from the tailpipe in vehicles or smokestacks at powerplants from the electricity generation process. They conclude that electric vehicles have a definite emissions advantage over conventional, fossil fuel powered vehicles.

Pricing Indirect Emissions Accelerates Low—Carbon Transition of US Light Vehicle Sector

By: Paul Wolfram, Stephanie Weber, Kenneth Gillingham, and Edgar G. Hertwich

Abstract

Large-scale electric vehicle adoption can greatly reduce emissions from vehicle tailpipes. However, analysts have cautioned that it can come with increased indirect emissions from electricity and battery production that are not commonly regulated by transport policies. We combine integrated energy modeling and life cycle assessment to compare optimal policy scenarios that price emissions at the tailpipe only, versus both tailpipe and indirect emissions. Surprisingly, scenarios that also price indirect emissions exhibit higher, rather than reduced, sales of electric vehicles, while yielding lower cumulative tailpipe and indirect emissions. Expected technological change ensures that emissions from electricity and battery production are more than offset by reduced emissions of gasoline production. Given continued decarbonization of electricity supply, results show that a large-scale adoption of electric vehicles is able to reduce CO2 emissions through more channels than previously expected. Further, carbon pricing of stationary sources will also favor electric vehicles.

SOUTHERN MAINE COMMUNITY COLLEGE LAUNCHES ELECTRIC VEHICLE REPAIR CERTIFICATION PROGRAM

Southern Maine Community College has launched the first electric vehicle program in Maine that trains vehicle repair technicians to diagnose and service electric and hybrid vehicles.

The class is designed for technicians who work at auto repair shops, auto dealers and other vehicle-related businesses. For the class, students take a hands-on weeklong course in SMCC's Automotive Technology Center after first completing 32 hours of online instruction.

The first class, which is full, is being offered this month. Additional classes will be scheduled in 2022.

"The lack of trained technicians is about to become an international crisis," said Ruth Morrison, SMCC's Automotive Technology program chair who will teach future classes. "There are a lot of electric and hybrid vehicles being produced, and we don't have enough people who know how to work on them."



SMCC Automotive Technology Chair Ruth Morrison with a hybrid electric Lexus.

The short-term training course is being offered through SMCC Workforce Training for companies and organizations that need employees trained in electric vehicle repair. The course teaches students to perform hands-on work and prepares them to take the ASE (National Institute for Automotive Service Excellence) Light Duty Hybrid/Electric Vehicle Specialist Certification Test.

Among the students in the first electric vehicle repair class are automotive master technicians from VIP Tires & Service, an automotive service provider and tire dealer based in Auburn with 65 locations in New England. With electric vehicle sales growing fast in Maine, the U.S. and globally, VIP needs certified workers for electric vehicles, said Tim Winkeler, VIP's President and CEO.

"Electric vehicles are clearly the wave of the future, and until now there haven't been any training options available in Maine," Winkeler said. "Having our automotive technicians trained and certified will allow VIP the ability to offer local electric vehicle repair to Maine residents."

SMCC Workforce Training offers short-term training opportunities in a number of fields ranging from computers, welding and construction to hospitality, medical assisting and manufacturing. On-campus housing may also be available for those attending these programs, making training for those from across the state more accessible.

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