



A Ford test vehicle is put through its "pothole paces" at the Lommel Proving Ground in Belgium, proving that the pothole problem sure isn't limited to just the Southfield Freeway.

## Ford Scores Highest In 2010 Polk Loyalty Survey

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2010, while Acura increased loyalty rates by 7.5 percentage points and Cadillac was up 7.1 percentage points over 2009 loyalty rates. These gains can be primarily attributed to double digit gains in lease loyalty for all three brands.

Model loyalty rates improved in 2010 as well, up 2.3 percentage points compared to 2009. Overall, Mercedes-Benz E-Class led model loyalty for 2010, with Ford F-Series and Lincoln MKZ following close behind.

Meanwhile, Polk's Loyalty Management Practice aids manufacturers and retailers in effectively managing owner loyalty through the in-depth analysis of automotive shopping behaviors and related market influencers.

Polk's analyses cover the entire U.S. market, and can identify likely defectors, before they leave, providing the

opportunity to re-win their business prior to defection actually taking place.

The practice is solely focused on helping manufacturers and dealers in retaining their owners through our diagnostic, predictive and advisory services.

Polk's solutions identify the key areas and potential causal factors influencing owner loyalty and are applied in the sales, service, finance and marketing functions within the automotive industry. Polk recognizes automotive manufacturers and brands for loyalty annually with the Polk Automotive Loyalty Awards, which are based on analysis of automotive loyalty by model year.

The 2010 year-end loyalty analysis is part of a series of ongoing reports from Polk on loyalty and buyer behavior. Polk's headquarters facility and employee teams are located in Southfield.

## Edmunds Says Ford Hybrids are 'Class Leaders'

DEARBORN – With gas prices on the rise, the interest around fuel efficiency and hybrid vehicle options is top of mind for potential car buyers. But are all hybrids created equal? Recent industry studies show that certain hybrid models provide car buyers with much more bang for their buck, and the Ford Fusion Hybrid and Ford Escape Hybrid are at the top of those lists, demonstrating the best return on investment compared to competitors.

Edmunds.com lists the Ford Escape Hybrid and Ford Fusion Hybrid as class leaders for best monthly fuel cost in the publication's annual best and worst monthly fuel cost estimates analysis. The hybrid versions of both vehicles led the pack for best monthly fuel costs, with consumers paying over \$100 less for fuel per month, compared to competing vehicles.

Further building Ford's reputation as a leader in hybrid vehicles, CarGurus.com re-

cently named Escape Hybrid one of the best vehicles for hybrid investment. According to the site, the Escape Hybrid is one of the few hybrid vehicles consumers can justify paying a premium for, compared to the gas-only version, as the Escape Hybrid pays for its own premium once gas prices and savings are factored in.

"In less than 10 years, Ford has become a leader in hybrid technologies that are both advanced and innovative for the market," said Sherif Marakby, Ford's director of Electrification Programs and Engineering. "True to our electrification strategy, we continue to invest in hybrids and improve on technologies every year."

Building on 10 years of experience with hybrid technologies, current Ford hybrids use the company's second-generation full hybrid system, with battery technology that provides 20 percent more power than the first-generation system.

To achieve this fuel econ-

## Ford Engineers Even Tackling 'Pothole Challenge'

DEARBORN – Ford engineers know that not all roads are created equal. Some are pockmarked with potholes. Others simply consist of merciless off-road-like tracks. Only a blessed few roads around the world are kind to the vehicles driving over them.

Engineers know that too many drivers speed over four-inch-deep potholes or take turns too fast on cobblestone roads.

To ensure its vehicles can withstand such driving behavior, engineers at Ford's Lommel Proving Ground in Belgium and Michigan Proving Ground in the United States test vehicles for all global markets.

Several types of road conditions are simulated including moderately rough roads such as those in Europe and North America and severely rough roads like those in emerging markets, taking into account that weather conditions can make these roads even worse.

With much of Europe having been gripped by two bitterly cold winters in succession and public spending cuts leaving little money for surface repairs there and in the U.S., motorists on both continents are driving into spring on roads scarred by potholes and damaged surfaces.

Yet Ford drivers can rest assured their vehicles are built to cope, thanks to the rigorous testing and development processes established for chassis and suspension systems.

All new Ford models are put through a tough testing and development process to ensure they not only offer class-leading levels of ride comfort for occupants but are easily capable of withstanding the loads placed upon components by damaged road surfaces.

Ford's Lommel Proving Ground subjects new vehicles to a variety of highly demanding road surfaces and features some 50 miles of test track, many of which are designed specifically to put suspension systems to the ultimate test.

"We have created some of the worst potholes in Europe

on our own test track. If our cars can pass these tests, then they can cope with almost anything they encounter on public roads," said Eric-Jan Scharlee, technical specialist for Durability Testing at Lommel Proving Ground. "You name the road surface, we have it at our proving ground."

Both Lommel and Michigan Proving Ground feature replicated real-life road surfaces from around the world. Visitors to the facility in Belgium, for instance, may be surprised to find road signs indicating they have traveled to France, the U.K. and U.S., all within less than half a mile, but it is through such painstaking recreation of real road surfaces from across the globe that Ford is able to deliver the products that meet and exceed the requirements of real-world drivers.

However, alongside these simulated real-world surfaces are artificial testing potholes designed to place controlled loads on Ford vehicle suspension components and allow Ford engineers to measure the forces and demands placed on cars as they pass through them.

"We use two types of test tracks at Ford to re-create the loads customers are seeing on public roads," said Scharlee. "One type simulates actual public roads, such as Lower Dunton Road in Essex, U.K., while the other comprises a variety of potholes that have been artificially constructed to mimic different driving conditions."

The standard is repeated at Michigan Proving Ground: "We go over gravel. We go over cobblestone. We go full-throttle. We shake things up," said Dan Coleman, manager of Global Durability Process in Dearborn.

To re-create realistic road conditions, Ford engineers survey drivers of every vehicle segment in different parts of the world asking them to rate the roads they drive on and how they use their vehicles.

Then they create a statistical profile of the driver, the type of roads the driver uses, and his or her driving habits –

and apply it to a durability test cycle at the respective proving ground.

Using this data, engineers can extrapolate how much load is likely to be placed on the vehicle over the course of its lifetime, which tells them how much the vehicle needs to be able to withstand.

"The challenge for a suspension system is when it exits the pothole," said Simon Mooney, test engineer for Road Load Data at Dunton Technical Centre in Essex. "The impact can be like hitting a curb. We test all the wheel and tire sizes that we produce for our vehicles to their limit, so we're confident they can cope."

With Ford dedicated to producing global vehicles, testing procedures and requirements at proving grounds around the world are commonized.

Rigorous testing using high-

tech equipment

Chassis and suspension testing for passenger cars is conducted in two phases, with the first phase designed to simulate the extreme demands placed on the vehicle's suspension and major structures over the course of its lifetime. During the second phase the emphasis shifts to the entire vehicle, including high speed and rural road driving simulations.

During these tests, high-tech equipment is used to record the loads and strains placed upon suspension components. "We use specially instrumented wheels on the car that measure the force and corresponding moments in three directions," says Mooney. "On some vehicles, there are various sensors totaling some 200 channels through which to get the data."

## General Dynamics Hosts Big Supplier Open House

General Dynamics Land Systems' Maneuver Collaboration Center (mc2) will host an industrial and supplier open house on Wednesday, April 13, for providers of innovative solutions and technologies from 1-5 p.m. at its Sterling Heights headquarters at 38500 Mound Road.

The event offers the local business community, academia and the U.S. government an opportunity to introduce their respective capabilities. It is also designed to foster interaction with General Dynamics' engineers and suppliers.

The mc2 creates a collaborative environment to foster innovative solutions and to address the armed forces' immediate needs.

Meanwhile, the mc2 virtual and physical environments facilitate and wide access to General Dynamics, providing an enhanced experience and interface to the company's traditional suppliers, as well as the opportunity to attract and engage small businesses and innovators (nontraditional suppliers) with technology solutions.

Also, General Dynamics Land Systems has appointed

Joanne F. Cavanaugh director of its Maneuver Collaboration Center, or mc2, effective back on February 28.

She is responsible for all aspects of mc2 management and operations to accelerate product improvement through collaboration and innovation. She will act as General Dynamics Land Systems' lead interface and key advocate for the mc2 community.

Cavanaugh has worked at General Dynamics Land Systems for six years, during which she has held positions in its Engineering, Design and Technology and the Ground Combat Systems organizations. In her most recent position, she served as program manager for the Stryker Production 8 Programs. She holds a bachelor's degree in Mechanical Engineering from the United States Military Academy at West Point.

"Joanne's experience as an Army officer, West Point engineer and program manager make her an outstanding choice to lead the Maneuver Collaboration Center," said Sonya F. Sepahban, senior vice president of Engineering, Design and Technology, General Dynamics Land Systems.

## Jack Roush to Speak at Chrysler-Sponsored Gala

by Gerald Scott  
Editor  
U.S. Auto Scene

Mr. Motorsports himself – Jack Roush – will be the featured speaker at the Detroit Science Center's big fund-raising gala in May.

Roush's appearance and the May 13 gala itself also continue a collaborative education-centric sponsorship that began in 1999.

The Chrysler Foundation will be the 2011 Lead Founding Sponsor of the Detroit Science Center's 10th annual gala, taking place the evening of Friday, May 13, in Detroit.

"We are thrilled to continue our longtime partnership with Chrysler through their support of the 2011 Detroit Science Gala," said Francois J. Castaing, chairman of the Detroit Science Center.

"This year's gala will be the highest attended in the 10-year history of the event, a great testament to Chrysler's commitment, and that of the auto industry and our community, to support engineering, technology and science learning opportunities for children."

Over the past decade, the annual gala has had a variety of speakers ranging from inventor Dean Kamen to then-Chrysler CEO Robert Nardelli a few years ago.

Otherwise, "Engineers in Motorsports" is the theme of this year's event with Roush, CEO of Roush Fenway Racing and Chairman of the Board of Roush Enterprises.

The Chrysler Foundation is a longtime supporter of the Detroit Science Center, donating more than \$4 million over the years for various exhibitions and operations.

Chrysler was the first sponsor to contribute \$1.5 million toward the Science Center's modernization capital campaign in 1999 and was the first automaker to sponsor the De-

troit Science Center Gala back in 2001.

In 2008, The Chrysler Foundation provided funding for the renovation of the then newly named Chrysler IMAX Dome Theatre.

"The hands-on experience the Detroit Science Center provides is invaluable in keeping young people interested in science, technology and engineering, and in helping build the workforce of tomorrow," said Scott Kunselman, senior vice president – Engineering, Chrysler Group LLC and Trustee – The Chrysler Foundation.

"Chrysler remains committed to doing what we can to support this educational gem, as it is a true source of pride for the entire region. Investing in the Science Center is also an investment in the future of Michigan and our industry."

In addition to supporting the Detroit Science Center, Chrysler has a proud history of furthering science, engineering and technology education. Center Chairman Castaing is a former Chrysler engineering executive.



PHOTO: ROUSH INDUSTRIES

**Motorsports race team mogul Jack Roush will be the keynote speaker at the Detroit Science Center's fund-raising Gala in May.**

## SAE Publishes Book on Pregnant Occupant Safety

WARRENDALE, Pa. – Automotive crashes are the single largest causes of death for pregnant females in the United States, as well as the leading cause of traumatic fetal injury mortality. Each year, approximately 160,000 pregnant women are involved in motor vehicle accidents, which lead to the death of 160 women and an additional 865 fetal losses.

Unfortunately, up to this point, safety engineers did not have sufficient data on how to prevent injuries and deaths in car accidents involving pregnant women.

Meanwhile, a new book released by SAE International changes that by providing readers with substantial analysis of pregnant occupant biomechanics.

Understanding that the best way to protect the fetus is to protect the mother, given that maternal death has a near-100 percent fetal loss rate, the book gives safety engineers the ability to better

protect pregnant female occupants.

The book will be available in both hardcover and e-book editions that are available in a suite of formats that are also saved in a personalized e-library hosted by SAE International.

Given the relative frequency of accidents involving pregnant women, research is vital to safety engineers.

The vast majority of fetal losses from car accidents result from separation of the placenta from the uterus, or placental abruption, which accounts for nearly 80 percent of fetal losses in automobile crashes. Through detailed case studies as well as advanced dummy and computer model developments, progress is being made to design safer occupant restraints for pregnant women.

The book "Pregnant Occupant Biomechanics – Advances in Automobile Safety Research," provides substantial new analysis and summa-

ry data about pregnant-occupant biomechanics and serves as a complete resource for issues relating to the pregnant occupant.

The book is divided into six chapters that are co-authored individually by topic experts. This book, filled with precise and original information, is the most up-to-date and complete resource for safety engineers in its field, SAE says.

The first three chapters cover female anatomy, injury incidence and case studies. The latter three chapters build on this information by presenting possible solutions in the form of pregnant dummies, tissue testing and computational models.

This book is applicable for anyone in the broad field of automobile safety, including engineers, physicians and others who are dedicated to advancing automobile safety. It will also be of specific interest to safety design engineers, trauma physicians, OEM engineers, accident reconstruc-

tion specialists, occupant restraint suppliers, law enforcement officials, impact biomechanics researchers and human factor specialists.

Industry professionals from all fields will appreciate the detailed analysis and groundbreaking foundational research in the field.

The new book's editor, Stefan Duma, is the department head and professor of biomedical engineering at Virginia Polytechnic Institute and State University (Virginia Tech).

The joint program between Virginia Tech and Wake Forest University is called the School of Biomedical Engineering and Sciences.

Duma is responsible for 51 tenure and tenure-track faculty with more than \$25 million in expenditures.

For details on acquiring the 304-page hardbound book, which retails for \$119.95 list (with a discount for SAE members), visit the SAE International Web site.