

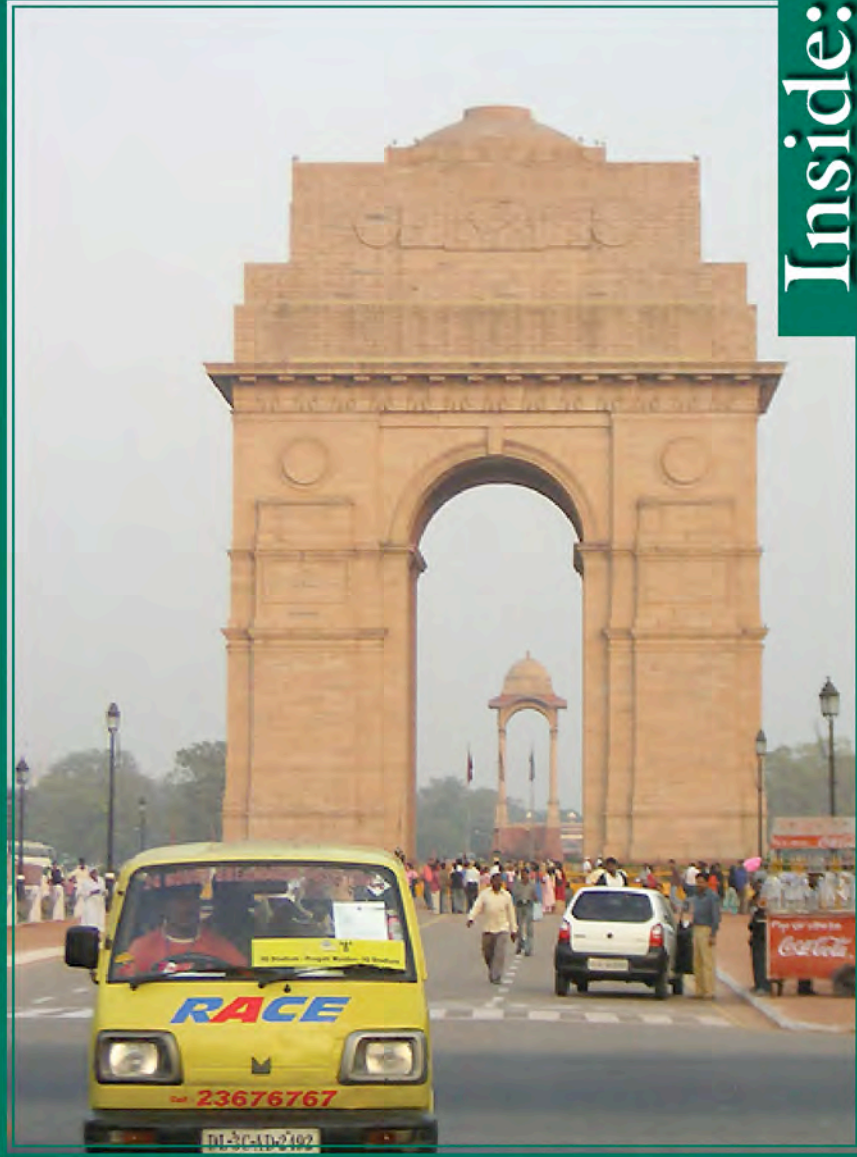
UMTRI

RESEARCH REVIEW

• UNIVERSITY OF MICHIGAN TRANSPORTATION RESEARCH INSTITUTE • OCTOBER–DECEMBER 2007 • VOLUME 38, NUMBER 4 •

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on page 1:
**Inside
India:**

*How Indians View
Their Automotive
Future*

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UMTRI's Strategic Intent

To be the leader in transportation systems research integrating vehicles, people, and infrastructure to achieve a highway transportation system where:

- Fatalities and injuries are eliminated
- People and goods flow efficiently
- Reliance on nonrenewable energy is reduced

Inside India: How Indians View Their Automotive Future



COURTESY OF BRUCE BELZOWSKI



UMTRI / SHEKHAR ERINGTON

India is expected to be one of the top ten countries in vehicle sales by 2015, but it must overcome major obstacles to continue its rapid growth in the automotive industry, according to a recent study by UMTRI and the IBM Institute for Business Value. The world's second-most populous country, with more than 1.3 billion people, India faces such challenges as the need for a better transportation infrastructure, improved product quality, more skilled workers, changes in labor and tax regulations, and the need to increase the scale of their domestic companies to meet the demands of the global auto industry.

an important destination for automotive production and sales," Belzowski says. "We believe this optimism stems from the contrast between India's past economy and its present state, particularly from the government's increasing encouragement of the automotive industry."

Belzowski and IBM colleagues Allan Henderson and Penny Koppinger surveyed Indian auto executives and experts from government, industry, and academia on a wide range of issues, including India's future market and industry structure, relationships between domestic auto companies and their foreign joint venture partners, and

Bruce Belzowski, associate director of UMTRI's Automotive Analysis Division, says that India's path to automotive success requires a strong partnership between industry and government. "Despite these obstacles, India's executives and experts are optimistic about their ability to overcome these challenges and make India

challenges in the areas of infrastructure, air quality, and oil security.

The number of vehicles sold in India during the 2006–2007 fiscal year was about 1.4 million, but industry executives expect sales to double to 2.8 million by 2010 and triple to 4.2 million by 2015. India is expected to be one of the top 10 countries in terms of vehicle sales by 2015.

"Compared to domestic sales numbers in the rest of the world, especially China, which has a similarly sized population, India sells a low number of four-wheeled vehicles," Belzowski says. "And the gap between China and India is not expected to close in the near future. But while China's financial institutions are still in the process of modernizing, India's are already mature. India has a financial loan system for purchasing vehicles that can serve as the basis for the development of India's automotive industry for years to come."

The study examined the Indian automotive industry in three major areas: the automotive market, India's production capabilities, and challenges that impact India's automotive industry.

continued...

India's Automotive Market

The overall findings in studying India's automotive market include the following:

- The small car (especially the inexpensive "1 lakh car" at about \$2,500) is a key growth strategy. Indians view design, development, and manufacturing of small, inexpensive cars as their country's global niche and also as a way to fulfill the needs of India's domestic buyers. India, however, will likely be challenged by other global manufacturers who can leverage economies of scale in global small-car development.
- The impact of infrastructure on the domestic market is significant. Government needs to address the overarching future needs of India's automotive infrastructure to support the industry's development in the short and long term.
- India's financial system provides an important building block for a developing industry, and each company's ability to provide superior after-sales service may determine their competitive sustainability in the domestic market.

India's Production Capabilities

The major findings related to India's production capabilities include the following:

- India must strengthen its research and development capability. To be a global player, it must be considered

an innovative designer of vehicles and components. India's protection of intellectual property makes the country an attractive destination for R&D investment.

- The entire supplier base needs to become stronger. While India has world-class suppliers, it needs to develop the capabilities of its entire supplier base to support improved quality and low-cost delivery throughout the supply chain.
- Costs need to be contained. India's path to the world stage has been through low-cost production. Wages and infrastructure costs, such as electricity and shipping, are starting to rise.
- Labor and skills could be a surprise constraint. The Indian automotive industry is starting to suffer from an undersupply of skilled labor. Labor laws and regulations also seem to be hampering business.

Challenges Impacting India's Automotive Industry

The study identified the following major challenges facing the Indian automotive industry:

- Infrastructure is the most urgent challenge to the automotive industry. Acceleration of road construction and traffic law enforcement are key areas for improvement because of the impact of traffic congestion on consumer purchasing patterns. Port capacity for exporting vehicles needs to be improved as well.

- Combating air quality, oil dependency, and congestion issues should be a coordinated effort between government and industry.
- The government's efforts to augment public transportation and port capacity, enforce traffic laws, and support alternative fuels will allow it to address multiple problems.

Key Findings

- Indians view design, development, and manufacturing of small, inexpensive cars as their country's global niche and also as a way to fulfill the needs of India's domestic buyers.
- Acceleration of road construction and traffic law enforcement are key areas for improvement.
- India must strengthen its research and development capability to become a global player.
- Each company's ability to provide superior after-sales service may determine its competitive sustainability in the domestic market.
- While India has world-class suppliers, it must develop the capabilities of its entire supplier base to support improved quality and low-cost delivery.
- Costs must be contained despite rising wage and infrastructure costs.
- The Indian auto industry is starting to suffer from a shortage of skilled labor. Labor laws and regulations appear to be hampering how companies manage their business.
- Combating air quality, oil dependency, and congestion issues should be a coordinated effort between government and industry.



COVER ART: COURTESY OF UNIR/AAO AND IBM

- It is vital that the government continues to recognize the auto industry as a crucial part of India's growth and success. The Indian government has a large and crucial role to play.

Steps for India's Success

Overall, Belzowski says that recent growth in the Indian auto industry has been impressive. "Some manufacturers and suppliers are already reaching global levels of quality, and the government seems committed to supporting the industry," he says. "However, India's domestic market is still relatively small, and some of India's manufacturers and suppliers are not yet universally recognized as strong global players. Even so, the recent industry growth and development, along with the government's commitment of support, are strong reasons for optimism about India's future automotive success."

To become major players in the world market, India's manufacturers need to accelerate the perception that quality comes from India, find their market niche in the world vehicle market, and manage their businesses on a worldwide scale, including manufacturing, global logistics, sales, and distribution. India's government needs to accelerate port capabilities, and work in tandem with industry to boost skilled labor availability and strengthen its research and development capabilities.

To read the report in PDF form, go to <http://tinyurl.com/2fnvt5>.

For a related article on the Chinese automotive industry, see "China's Automotive Future" in the October–December 2005 edition of *UMTRI Research Review*, www.umtri.umich.edu/content/rr36_4.pdf. 



The study found that in order for India to successfully build its domestic vehicle market, India's government needs to build more and better roads and hasten the vehicle friendliness of India's cities. Manufacturers and suppliers need to understand and capture the small-car segment and continue to raise supplier quality levels while keeping costs low.



PHOTOS THIS PAGE: COURTESY OF BRUCE BELZOWSKI

M-CASTL Moves Forward



The inaugural reception for the Michigan Center for Advancing Safe Transportation throughout the Lifespan (M-CASTL) was held at the University of Michigan (U-M) on November 5. UMTRI director Peter Sweatman provided introductory remarks and M-CASTL director David W. Eby provided an overview of the program. He also introduced M-CASTL team members as well as members of the M-CASTL executive committee and advisory board. Reception guests included UMTRI staff, U-M and industry collaborators, Sarah Curmi, legal assistant for Michigan representative Rebekah Warren, and Andy LaBarre, field representative for U.S. representative John Dingell.

M-CASTL has also issued its first request for proposals (RFP) for research projects for the period of April 15, 2008, through April 14, 2009. The total funding available under this RFP is \$300,000, with a maximum award of \$100,000 per project. Proposals are due February 22, 2008, and can be sent to M-CASTL@umich.edu. For more information, go to <http://m-castl.org>.

In another M-CASTL project, Eby and assistant director Lisa J. Molnar recently served as project managers for the AAA Foundation for Traffic Safety's License Policies Workshop for Older Drivers. The work was performed as part of M-CASTL as the AAA project is closely related to the M-CASTL theme of safety and mobility throughout the lifespan.

The objectives of the workshop, which took place December 6-7 in Washington, D.C., were to:

- *Synthesize the present state of knowledge* regarding older driver safety as it relates to the ability of aging drivers to continue to drive safely, methods or criteria for screening or assessing drivers, and interventions (including but not limited to licensing actions) appropriate for drivers identified as high risk.
- *Develop a consensus-based set of recommendations* that could be used by policymakers and stakeholders to inform the development of licensing policies based upon the best available science. As envisioned, these recommendations would focus on specific criteria that

M-CASTL team members enjoy a light moment during the inaugural reception. *Left to right: Jonathon Vivoda, project coordinator, David W. Eby, director, Sarah Curmi, legal assistant for Michigan representative Rebekah Warren, Andy LaBarre, field representative for U.S. representative John Dingell, and Lisa Molnar, assistant director.*



could be used to identify high-risk drivers and appropriate measures or interventions for such drivers.

- **Identify the most important knowledge gaps and research needs** related to older driver safety—particularly with regard to questions of licensing—and recommend specific research that the AAA Foundation could pursue to address them.

Eby and Molnar worked with AAA Foundation personnel to select topics for the workshop, select authors to write background papers, review and edit background papers, recruit participants, facilitate the workshop, and document workshop activities and outcomes. The proceedings are currently under review by the AAA Foundation for Traffic Safety.

Moon Phases Related to Pedestrian Fatalities



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In a recent study published in the journal *Leukos*, UMTRI researchers Michael Sivak, Brandon Schoettle, and Omer Tsimhoni found that more pedestrians are killed in traffic on nights with a new moon—when the moon is not illuminated—than during those with a full moon.

“The overall nighttime road fatality rate per distance traveled in the United States is about three times the daytime rate, due mostly to lower

ambient illumination and higher frequencies of fatigued, intoxicated, and younger drivers,” said Sivak, research professor and head of UMTRI’s Human Factors Division. “In this study, we found that pedestrian crashes are sensitive to differences within low levels of ambient illumination, which can vary in nighttime conditions.”

The UMTRI researchers looked at 10 years of nighttime crashes and lunar phase data (from 1996 to 2005), examining fatalities during a seven-hour period from 10:00 p.m. to 5:00 a.m. They found that the mean number of pedestrian fatalities during this time was 22 percent higher on nights with a new moon compared with nights with a full moon.

The researchers report that during the study period, there were 612 pedestrian deaths during new moons, while 497 pedestrian fatalities occurred during full moons. Because the number of nights with full and new moons was not necessarily the same in each year, the

data was summarized in terms of the fatalities for the seven-hour period per each night.

“The differences in the ambient illuminance for nights with a full moon versus a new moon are unlikely to be correlated with any other factors that are known to influence the likelihood of nighttime pedestrian crashes—alcohol intoxication of drivers or pedestrians, driver fatigue and driver age,” Sivak said.

“Consequently, the results imply that the amount of moonlight has substantial influence on pedestrian crashes.”

The study, “Moon Phases and Nighttime Road Crashes Involving Pedestrians,” is published in *Leukos* volume 4, number 2 (October, 2007) on pages 129–131. **RR**

Larry Schneider Receives Research and Neubacher Awards

Larry Schneider, research professor and head of UMTRI's Biosciences Division, received the 2007 Research Faculty Achievement Award from the University of Michigan Office of the Vice President for Research. The award recognizes outstanding scholarly achievements, as represented by significant contributions to an academic field of study over time, a specific outstanding discovery, or the development of innovative technology. One award is given University-wide each year.

Schneider also received a Certificate of Appreciation from the University's James T. Neubacher Award Committee for his efforts on behalf of individuals with special needs. He received the certificate at the annual Neubacher Award Ceremony on October 26.

Schneider's research focuses on biomechanics in the automotive environment and the study of human impact response and injury tolerance related to improving occupant protection in crash environments through crash investigations and laboratory testing.

Schneider also holds an appointment in the University of Michigan Department of Biomedical Engineering. He earned a B.S. in mechanical engineering, an M.S. in mechanical engineering and bioengineering, and Ph.D. in bioengineering from the University of Michigan.

Larry Schneider was presented the University of Michigan (U-M) Research Faculty Achievement Award by U-M President Mary Sue Coleman (right) and Provost and Executive Vice President for Academic Affairs Terry Sullivan.



Steve Karamihas Appointed RPUG Vice President



UMTRI / SHERNAH ERINGTON

Steve Karamihas, senior research associate in UMTRI's Engineering Research Division, was appointed first vice president of the Road Profiler User's Group (RPUG) at its annual meeting in Danville, Virginia, on October 16. He also presented two talks at this meeting: "Reference Profiler Benchmarking" and "FHWA Sampling and Footprint Study Update."

RPUG serves as a forum for the exchange of information among end users, data collectors, vendors, construction and design engineers, and researchers with an interest in road profiles, road roughness, and pavement smoothness.

Karamihas' research deals primarily with the interaction of vehicles and roads. A major research project involved the coupling of vehicle dynamic loading and pavement response to predict the effect of truck characteristics on pavement life. Karamihas is also heavily involved in the measurement and interpretation of longitudinal road profiles. He conducted a two-year research study of the effect of road roughness on automotive ride quality, user perception of pavement performance, and truck dynamic wheel loads. He was instrumental in developing an algorithm for estimating automotive ride comfort from measured longitudinal road profile, which became the latest version of the Ride Number. He has also conducted numerous studies of the factors that affect accuracy and repeatability of longitudinal road profile measurement.

Karamihas disseminates research findings on the measurement and interpretation of longitudinal road profile. With Mike Sayers, he developed the *Little Book of Profiling* and RoadRuf, specialized software for analyzing road profiles, for a pilot National Highway Institute short course. Specialized versions of the course have been delivered several times for state and federal working groups.

Karamihas earned bachelor's and master's degrees in mechanical engineering from the University of Michigan.

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First Patricia Waller Scholarship Awarded



The first Patricia F. Waller Scholarship was recently awarded to Nancy Ambrose (“Amby”) Gallagher, R.N. and Ph.D. student in the University of Michigan School of Nursing. The scholarship fund honors the late Patricia Waller’s tenure as director of UMTRI (1989 to 1999) and her contributions to the field of transportation safety and injury control. The scholarship funds U-M graduate students who elect a curriculum, thesis, or special project that addresses the human impact of transportation practice.

Gallagher will apply the scholarship to her dissertation, “Environmental Influences on Walking in Older, Urban, African American Adults.” Her UMTRI faculty mentor is Lidia Kostyniuk, Ph.D., research scientist in UMTRI’s Social and Behavioral Analysis Division. The research aims to identify the neighborhood environmental determinants of walking in older African American adults living in urban settings. Despite the benefits of regular physical activity, most adults over age 65 do not participate in any leisure-time physical activity. Those who are physically active most often choose walking as their preferred physical activity. However, certain environmental factors may affect seniors’ walking, such as:

- Neighborhood surroundings (buildings, greenery, parks)
- Presence of other people in area (crowds, families)
- Safety from crime (personal victimization, neighborhood crime)
- Presence of public walking tracks or trails (access, attractiveness)
- Presence of animals/wildlife (loose dogs)

- Sidewalks and traffic (sidewalk maintenance, overgrowth)
- Weather (rain, snow, ice)

To date, Gallagher has completed focus group interviews to gather information on environmental influences on walking. The focus groups consisted of twenty-one African Americans age 60 or older, recruited from a Detroit church and senior center. In addition to being interviewed in focus groups, the participants photographed neighborhood characteristics that encouraged or discouraged their walking.

Based on initial data analysis of focus group findings, and review by experts in physical activity, environment, and aging minority populations, Gallagher has modified the questionnaire and pilot-tested a modified version at the recruitment site. For reliability and validity testing, themes identified in the new questionnaire will be added to the Neighborhood Environment Walkability Survey, which will be administered to thirty to forty participants in a study of physical activity and neighborhood environment conducted with U-M postdoctoral fellow Jennifer Robinson (principal investigator). The final survey will then be administered as part of Gallagher’s dissertation research, along with surveys measuring physical activity and psychosocial determinants of physical activity, to 280 older adults with varying levels of functional ability.

The next steps are to examine the salient determinants and identify effective intervention strategies that promote walking in urban neighborhoods.

Gallagher is a research assistant at the U-M School of Nursing and as a registered adult nurse practitioner at Ann Arbor Family Practice. She holds master degrees in clinical research training from the U-M School of Public Health and in community health nursing from the U-M School of Nursing, as well as a bachelor degree from the University of Wisconsin School of Nursing. She is a member of the American College of Sports Medicine, the American Nurses Association, the Midwest Nursing Research Society, the American Diabetes Association, and the Sigma Theta Tau International Honor Society. **RR**

UMTRI NAMES & FACES

CONFERENCES & EVENTS

National Asphalt Pavement Association Convention
January 27–30, Phoenix, Arizona
www.hotmix.org/08MCON.php

Crash Data Retrieval User's Conference
January 28–30, Houston, Texas
www.crashconferences.com

Sixth World Mobility Forum
January 29, Stuttgart, Germany
www.worldmobilityforum.com

National Biodiesel Conference
February 3–6, Orlando, Florida
www.biodieselconference.org

American Trucking Association Technology and Maintenance Council's Annual Meeting
February 4–7, Orlando, Florida
www.truckline.com

Designing Sustainable Mobility Summit
February 5–7, Pasadena, California
www.artcenter.edu/summit

ATSSA Convention and Traffic Expo
February 8–12, New Orleans, Louisiana
www.atssa.com/cs/atssa-2008-traffic-expo

Hybrid Vehicle Technologies Symposium
February 13–14, San Diego, California
www.sae.org/events/training/symposia/hybrid

Winter Road Congress
February 13–14, Jyväskylä, Finland
www.tieyhdistys.fi/inenglish

TransITech Information Technology Conference
February 20–22, Anaheim, California
www.apta.com/conferences_calendar/trantech/

Clean Heavy Duty Vehicle Conference
February 20–22, San Diego, California
www.calstart.org/programs

Road Safety Congress 2008
February 25–27, Glasgow, Scotland
www.rosipa.org.uk/road

Transportation and Highway Engineering Conference
February 26–27, Urbana, Illinois
www.theconf.com

Fourth UITP European Conference
February 27, Brussels, Belgium
www.uitp.com/events/2007/euconference/en

World of Asphalt
March 9–12, Orlando, Florida
www.worldofasphalt.com

Intelligent Vehicle Safety Summit
March 11–12, Frankfurt, Germany
www.telematicsupdate.com/ivseurope

Annual Michigan Traffic Safety Summit
March 11–13, E. Lansing, Michigan
www.michigan.gov

World Conference on Injury Prevention and Safety Promotion
March 15–17, Merida, Mexico
www.safety2008mx.info/ing

Transportation Research Forum Annual Meeting
March 17–19, Fort Worth, Texas
www.trforum.org/forum

GIS-T 08: GIS for Transportation Symposium
March 17–19, Houston, Texas
www.gis-t.org

Fourth International Workshop on Intelligent Transportation
March 18–19, Hamburg, Germany
wit.tu-harburg.de

Purdue University Road School
March 25–27, West Lafayette, Indiana
rebar.ecn.purdue.edu/JTRP/Road_School/roadschool.htm

ITE 2008 Technical Conference and Exhibit
March 30–April 2, Miami, Florida
www.ite.org/conference

U.K. Ergonomics Society Annual Conference
April 1–3, Nottingham, England
www.ergonomics.org.uk

Transportation and University Communities Conference
April 5–8, Reno, Nevada
www.apta.com/conferences_calendar/univRR

Please contact the UMTRI library at 734-764-2171 or umtridocs@umich.edu to inquire about the availability of the publications listed here.

Conference Papers

Flanagan, M.J. "Vision in Night Driving: The Roles of Rod and Cone Photoreceptors." In *Driving Assessment, 2007: Proceedings of the 4th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design*. pp. 25–31.

Sayer, J.R.; LeBlanc, D.J.; Mefford, M.L.; Devonshire, J. 2007. "Field Test Results of a Road Departure Crash Warning System: Driver Acceptance, Perceived Utility and Willingness to Purchase." In *Driving Assessment, 2007: Proceedings of the 4th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design*. pp. 77–83.

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Sivak, M.; Schoettle, B.; Tsimhoni, O. 2007. "Moon Phases and Nighttime Road Crashes Involving Pedestrians." *Leukas*, vol. 4, no. 2 (Oct. 2007), pp. 129–131.

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Technical Reports

McManus, W. 2007. *The Economics of Road Safety: An International Perspective*. Report No. UMTRI-2007-23.

The research documented in this report was sponsored by UMTRI's Strategic Worldwide Transportation 2020.

Takenobu, N.; Schoettle, B.; Sivak, M. 2007. *Availability and Implementation Trends of Daytime Running Lights in the U.S.* Report No. UMTRI-2007-33.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Flanagan, C.A.; Flanagan, M.J. 2007. *UTMOST: A Tool for Comprehensive Assessment of Safety Benefits*. Report No. UMTRI-2007-22.

The research documented in this report was sponsored by UMTRI's Strategic Worldwide Transportation 2020.

Blower, D.; Takenobu, N. 2007. *Truck Mirrors, Fields of View, and Serious Truck Crashes*. Report No. UMTRI-2007-25.

The research documented in this report was sponsored by UMTRI's Industry Affiliation Program for Human Factors in Transportation Safety.

Belzowski, B.M.; Henderson, A.; Koppinger, P.; 2007. *Inside India: Indians View Their Automotive Future*. Report No. UMTRI-2007-32.

The research documented in this report was sponsored by IBM Global Services, Inc. 

RECENT UMTRI PUBLICATIONS

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T R A N S P O R T A T I O N T I D B I T S

- The first car advertisement to appear in a national magazine was published on March 31, 1900, in the *Saturday Evening Post*. The W.E. Roach Company of Philadelphia advertised its cars with the tagline “Automobiles That Give Satisfaction.”
 - On February 29, 1908, a standardization test of three random Cadillacs took place at the Brooklands Track in Weybridge, England, in association with the Royal Automobile Club. This test was the first step toward a heightened reputation for American cars. Proving the validity of interchangeable parts paved the way for mass production and ease of car repair.
 - On February 4, 1913, Louis Henry Perlman of New York received a patent for the first demountable tire-carrying rim. Prior to this invention, changing a tire also involved changing the wheel.
 - Edsel Ford succeeded his father, Henry Ford, as president of Ford Motor Company on January 1, 1919, at age twenty-five.
- The same day, the company announced a minimum wage increase to \$6.00 per day, which was generous for the time. Edsel was Henry’s only child.
- The first U.S. nationwide highway numbering system was instituted on March 2, 1925. The system was a joint effort of state and federal highway officials who were appointed by the secretary of agriculture. The board also developed shield-shaped highway number markers. Over time, interstate highway numbering would be improved by colored signs and the odd-even demarcation between north-south and east-west routes.
 - On January 2, 1994, Chrysler Corporation introduced the Neon. This plastic-bodied compact car was sporty and economical, and quickly became popular, especially with young drivers. **RR**

Source: This Day in Automotive History, www.historychannel.com/tdih



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