1998 FutureCar challenge

Public Information Program Report and Results

Prepared by: Groh Associates

1998 FutureCar Challenge Public Information Program Highlights

- ❑ **Front Page coverage in *USA Today* (U.S. and Int'l editions)**
- ❑ **Major media placements include: *Popular Science, Los Angeles Times, Barron's, Chicago Tribune* and *Detroit News***
- ❑ **Broadcast coverage by *CBS Newspath* (TV) and by *PRI Marketplace* (National Radio Network)**
- ❑ **Public Exhibits of FutureCar vehicles at the Detroit Grand Prix and the Henry Ford Museum**
- ❑ **Newspaper coverage in 11 states**
- ❑ **Total audience of more than 42 million people reached by media coverage**

Table of Contents

1

1998 *FUTURECAR CHALLENGE*
PUBLIC INFORMATION PROGRAM REPORT

OVERVIEW

The 1998 ***FutureCar Challenge*** public information campaign reached an enormous audience - equal in size to one-sixth of the population of the United States. Just as important as its size, was the demographic makeup of that audience. This year's campaign was designed to reach those considered key audiences by the sponsors and organizers of the program. Those audiences included selected members of Congress, other government officials, decision makers in automotive and automotive-related industries, administrators and alumni of participating universities, and the general public.

Initial objectives of this campaign were

- Create public awareness of the FutureCar Challenge and its impact
- Maintain Congressional interest in Future Car Challenge activities in home districts
- Increase public awareness of sponsors' roles in the FutureCar Challenge
- Increase public awareness of U.S. DOE transportation programs and introduce new automotive technologies and the tangible value they create
- Increase public awareness of the Partnership for a New Generation of Vehicles (PNGV)
- Increase interest in the program on the part of university administrators

The specific goals set to achieve these objectives were:

- National/local television coverage
- Coverage by national news publications
- Coverage in key newspapers nationwide
- Coverage by automotive and trade media
- Media coverage in participating university areas
- Coverage by media in the Detroit area

- Radio coverage in Detroit and other key cities
- Placement of photos highlighting teams and events
- Providing sponsors with information to include in their internal and external communications
- Developing public events in the Detroit metro area
- Providing opportunities for involvement of college administrators and political leaders

All aspects of public information planning and coordination were handled by Groh Associates of Warwick, R.I. working closely with sponsors, other supporters and participating universities. Specific activities included: development of targeted media lists, preparation of a series of pre and post-event news releases (5), personal contact with key editors and reporters, development of press kits and accompanying materials, editing team profiles as needed for media use, coordination with college public information efforts, coordination of media opportunities with other sponsors, on-site coordination of media including judging, preparation of customized post-event news releases in cooperation with participating universities (10), monitoring and analysis of media coverage, coordination of media/public events, writing/editing/publication of a newsletter about the ***FutureCar Challenge***, and the planning and coordination of public displays at the Detroit Grand Prix and the Henry Ford Museum to generate media and general public interest.

MEDIA COVERAGE

More than 42 million people were reached by media coverage of the 1998 ***FutureCar Challenge***. News coverage overall was positive and accurately described the goals of the competition and its connection to the larger PNGV program. The sponsors were mentioned by name in most media coverage as well.

Coverage appeared in major newspapers nationwide including the *Los Angeles Times, Chicago Tribune, Barron's, USA Today, Sacramento Bee* and *the Detroit News*. Magazines and trade publications providing coverage included *Popular Science, U.S. Automotive Export News, New Technology Week, Energy Network Online, Spectrum Magazine, Ward's Automotive Reports, Popular Mechanics (pending)* and *Tech Center News.*

A particularly significant series of placements was made in USA Today, one of the largest circulation newspapers in the world. In cooperation with Phil Patterson, Ph.D., of the U.S. DOE's Office of Transportation Technology we designed a way to graphically represent savings in imported oil and in consumer cost in a hypothetical scenario where the average family car in America achieved the same energy efficiency as the top-placing ***FutureCar Challenge*** vehicles. This material was used to create a front page feature that ran in three separate editions of *USA Today* and, in each case, featured the names of the major sponsors.

Broadcast coverage included a feature length report on *PRI Marketplace,* one of the country's most influential network radio programs devoted to business and financial issues with an **audience of more than 1 million listeners**. An edited version of the same report aired the same day on WDET-FM, the National Public Radio affiliate station in the Detroit metro market.

The CBS television network sent a crew to shoot video and interviews at the FutureCar exhibit at the Henry Ford Museum. This video footage was made available to CBS affiliate stations - several of which aired the story. In addition, the local UPN television network station shot two stories during the Detroit Grand Prix FutureCar display and aired them later that day during the evening newscast.

Another strategy used during the 1998 competition was the use of key media editorial people as competition judges. Several media judges participated in the competition evaluations done during the Detroit Grand Prix event. This participation not only brought outside expertise to the judging of the competition but also resulted in several media placements including *Popular Science* magazine and *Automotive Industries* magazine.

Beginning in October 1997, more than eight months before the actual competition events in Michigan, we began a campaign to coordinate coverage with the public relations and communications offices of the participating universities. This campaign yielded significant results - particularly on campuses of the top finishing universities. Photographs and news media information were provided to both on-campus and off-campus (local market) media organizations. In some cases this material was made available through the college PR department while in other cases, we supplied materials directly to the media organizations.

More than two dozen media placements resulted from this university/FutureCar Challenge PR coordination. These included daily campus publications and alumni publications (some with significant national circulation) as well as placements in newspapers serving the media markets closest to the universities.

OTHER INFORMATION OUTREACH

Two additional methods of public outreach were used this year - both of them successful and both of them new to the ***FutureCar Challenge*** program. A special newsletter was designed, written, published and mailed to a list of nearly 300 key contacts. This list included members of Congress and appropriate staff who represent districts where FutureCar Challenge universities are located, university administrators and public information officers from the participating colleges, industry and sponsor contacts and key media editors and writers nationwide. Copies of this newsletter were mailed out a month before the judging in Auburn Hills and were also made available in press kits and on-site during judging events.

Another unique public information strategy used for the 1998 ***FutureCar Challenge*** was the creation of a special web site designed for media use. This web address (http://members.aol.com/futurcar) was made available only to participating colleges and to members of the media. In dozens of instances, direct media inquiries were answered by referring editors and writers to the web site for updates, photos, background material, and lists of sponsors and participating universities. This proved to be a very efficient way to provide automotive, technical and general media with information. During the competition and for the three weeks immediately following the competition, that web site registered more than 700 "hits."

Another benefit of establishing this dedicated web site was the ability to provide scanned photographs almost instantly to publications requesting them. Several newspapers and technical magazines took advantage of this capability and received printable quality photographs via the web site. We also used this web site to build "foot traffic" and recognition for major FutureCar Challenge sponsors. Links were provided from the FutureCar Challenge Media Information site to appropriate web pages at the U.S. Department of Energy, the United States Council for Automotive Research, Argonne National Laboratory and the Aluminum Association.

SPECIAL PROMOTIONAL EVENTS

In order to provide high visibility for the FutureCar Challenge in the Detroit area, we created two special events this year. The first was an exhibit at the Detroit Grand Prix on Belle Isle in Detroit. For one day during this highly-publicized automotive racing event, all of the competing FutureCar vehicles were displayed in a large tented area adjacent to the Grand Prix race track. This location was in the center of the Detroit Grand Prix exhibit area and generated a large number of spectators during the event.

While the vehicles were on display, judging for the Engineering Design Competition was also taking place affording the general public a rare opportunity to see these vehicles being evaluated by a panel of media and industry experts. In addition, members of the public were able to wander among the vehicles and speak with the engineering students and team advisers about their vehicles.

Our second event, run in cooperation with the Henry Ford Museum and Greenfield Village, was a half-day, outdoor public display in front of the Henry Ford Museum. This exhibit attracted more than 500 attendees, many of them youngsters on field trips from Detroit area schools. Entitled "Past, Present & FutureCars," this exhibit included more than two dozen vehicles representing alternative vehicle technologies from the past, present and future. Vintage vehicles from the Museum collection were joined by current vehicles and prototypes from Chrysler, Ford and General Motors. Advanced vehicle technologies were represented by the 13 entrants in the 1998 ***FutureCar Challenge***.

Immediately following the morning exhibit, the awards ceremony was held for the 1998 competition. This ceremony took place at a luncheon inside Lovett Hall, one of the historic buildings that form the Henry Ford Museum and Greenfield Village complex. Attendees included many VIPs from the auto industry, the Federal government and other sponsoring organizations.

CONCLUSION

The public information program for the 1998 ***FutureCar Challenge*** was successful in reaching its stated goals and, therefore, in promoting the objectives of the competition. We reached much of our targeted audience through media coverage and, by working closely with editors and reporters and providing them with necessary interviews and appropriate background material. The quality of that coverage was high. References to program activities and goals and to sponsor organizations were accurate. The key messages of ***FutureCar Challenge*** and PNGV reached large and influential audiences.

Through other methods including public displays and direct-mailing of newsletters, we brought our message to important audiences who are not as easily reached through media coverage. These included automotive industry officials, political and academic leaders, and even hundreds of school-age children in the Detroit area – some of them destined to be the engineers and decision makers of tomorrow.

Hybrid automotive technologies are new and not well-understood by many even though this type of powertrain has already gone into production and is being marketed in Japan right now. There is an immediate need for public understanding of these technologies – from the car-buying public all the way up to key decision makers in government and industry whose support is needed in order to continue this type of research and development. A successful campaign such as this is an important element in bringing information directly to these key audiences. This allows them to become better informed about and more comfortable with these new technologies which have the potential to effectively address important issues of transportation, energy efficiency and global economic competitiveness.

1998 *FUTURECAR CHALLENGE* NEWS MEDIA COVERAGE

SUMMARY REPORT

TOTAL AUDIENCE (Reached by media coverage): **42,700,681**(*)

(*) Does not include radio audience.

TOTAL NUMBER OF NEWSPAPER/MAGAZINE ARTICLES REPORTED: **82**

TOTAL NUMBER OF VERIFIED BROADCAST REPORTS: **15**

TOTAL REPORTED NEWSPAPER AND MAGAZINE AUDIENCE: **40,896,081**

TOTAL ESTIMATED BROADCAST AUDIENCE: **1,804,600**

NUMBER OF NATIONAL PLACEMENTS (PRINT/BROADCAST): **26**

NUMBER OF STATES REPRESENTED (NEWSPAPER): **10**

NUMBER OF ARTICLES PER STATE (NEWSPAPER):

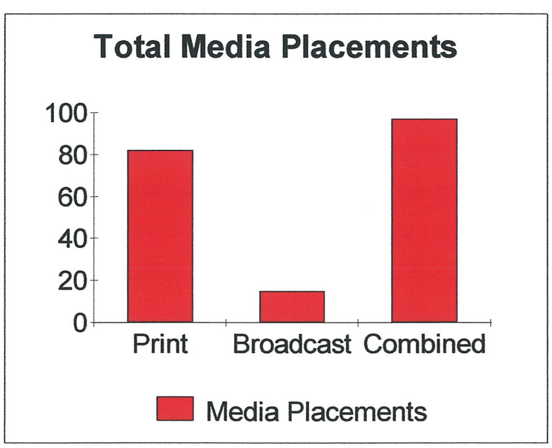
MI (10)	CA (6)	OH (3)	VA (6)	WI (6)
NY(1)	IL (3)	IN (1)	TX (2)	WV (1)

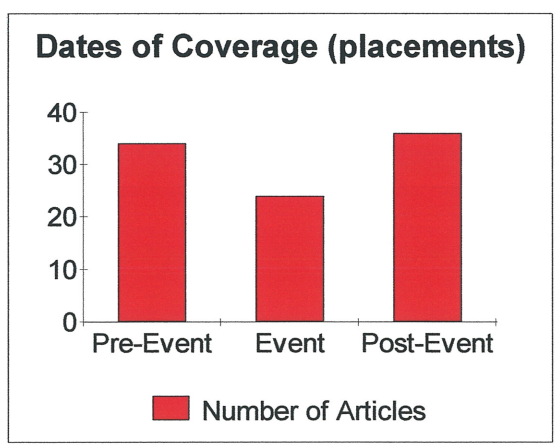
NUMBER OF ARTICLES CONTAINING PHOTO(S): **31**

PERCENTAGE OF ARTICLES WITH PHOTO(S): **38%**

NUMBER OF FRONT PAGE ARTICLES: **11**

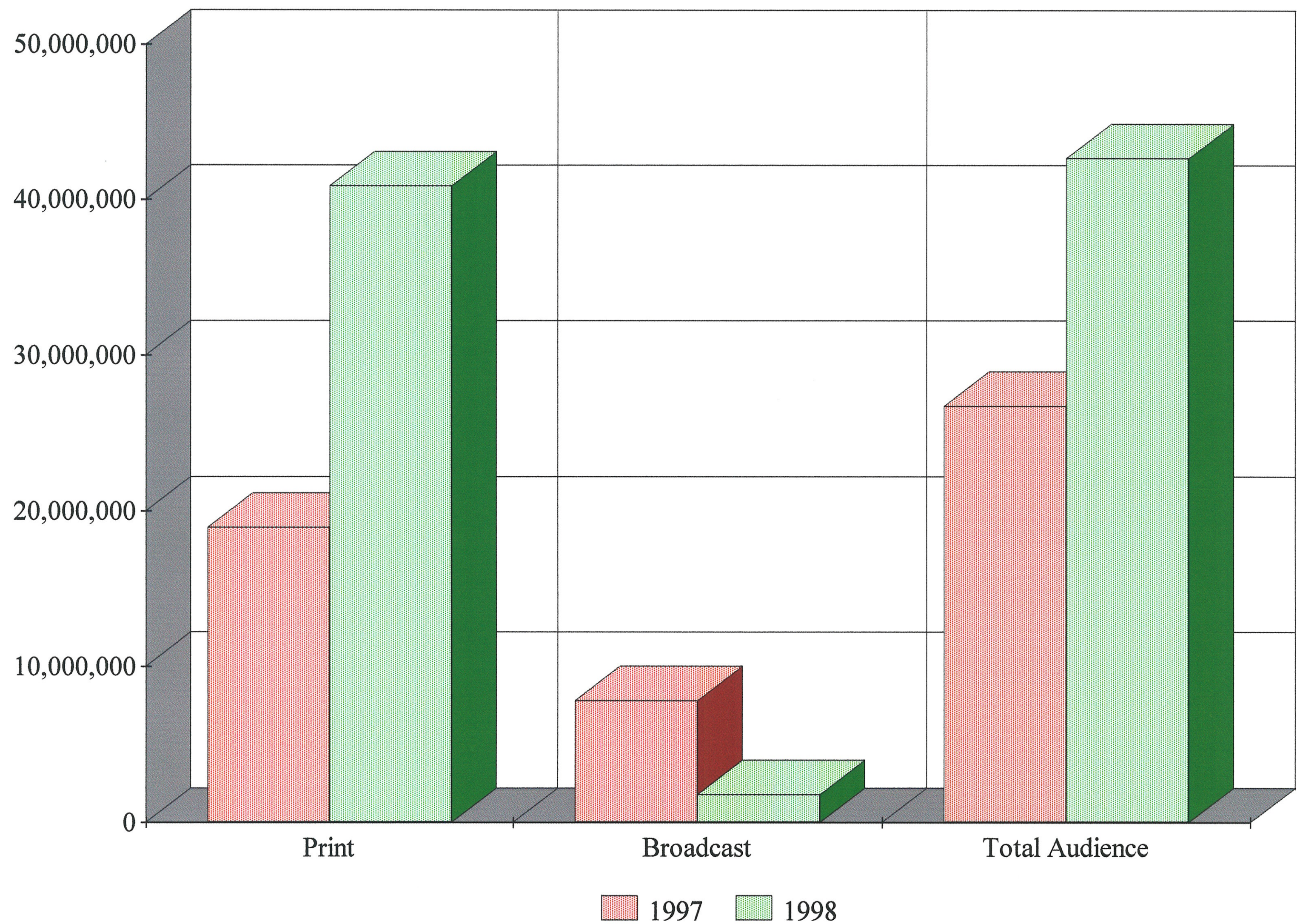
PERCENTAGE OF ARTICLES ON FRONT PAGE: **13%**





FutureCar Challenge

Media Coverage Comparison 1997-1998



1998 FutureCar Challenge
Media Placements

Print Media:

Engineering News	Roanoke	VA	4/1/98	40,000
Engineering Now	Roanoke	VA	9/1/98	5,000
Engineering Today	Champaign	IL	8/1/98	10,000
Ingenuity	Champaign	IL	2/1/98	3,500
Ingenuity	Champaign	IL	5/1/98	3,500
MTU Alumnus Magazine	Houghton	MI	7/1/98	6,000
Spectrum Magazine	Roanoke	VA	8/1/98	5,000
Tech Topics	Houghton	MI	6/19/98	2,000
U Michigan Undergrad Brochure	Dearborn	MI	6/1/98	12,500
UIUC Alumni News	Champaign	IL	7/1/98	5,000
UM Daily	Dearborn	MI	6/16/98	33,000
UM Engineering Handbook	Dearborn	MI	6/1/98	5,000
University Daily	Lubbock	TX	6/9/98	15,000
Virginia Tech Magazine	Roanoke	VA	9/1/98	100,000
Discovery Channel On-Line			6/6/98	10,075
Energy Network Online			3/31/98	n/a
EV World			6/9/98	n/a
EV World			6/14/98	n/a
Today At Michigan Tech	Houghton	MI	8/11/98	n/a
Aluminum Auto Design Review	Washington	DC	7/1/98	n/a
ASEE Prism	Washington	DC	5/1/98	11,125
Center Exchange	Detroit	MI	7/1/98	12,000
Energy Network Online			6/8/98	n/a
Future Drive	Washington	DC	8/1/97	3,000
Future Drive	Washington	DC	5/1/98	3,000
Illinois Alumni	Champaign	IL	pending	80,000
Innovator's Digest			2/3/98	n/a
Motor Magazine	Garden City	NY	8/15/98	138941
New Technology Week	Washington	DC	12/22/97	n/a
Popular Mechanics	New York	NY	pending	1,428,356
Popular Science	New York	NY	9/1/98	1,737,777
USCAR Mileposts	Southfield	MI	5/1/98	35,000
USCAR Mileposts	Southfield	MI	11/1/97	35,000
Ward's Automotive	Southfield	MI	pending	100,501
Ann Arbor News	Ann Arbor	MI	6/16/98	48,409
Barron's	New York	NY	6/1/98	300,617
Blacksburg Sentinel	Blacksburg	VA	6/13/98	3,800
Capital Times	Madison	WI	6/12/98	22,000
Chicago Tribune	Chicago	IL	12/15/97	664,586
Columbus Dispatch	Columbus	OH	6/20/98	268,670
Columbus Dispatch	Columbus	OH	5/26/98	268,670
Columbus Dispatch	Columbus	OH	6/7/98	401,612
Daily Mining Gazette	Houghton	MI	5/29/98	12,108
Daily Mining Gazette	Houghton	MI	6/15/98	12,108
Daily Republic	Fairfield	CA	5/14/98	18,310
Daily Tribune	Wisconsin Rapids	WI	8/12/98	14124
Davis Enterprise	Davis	CA	6/2/98	10,323
Detroit News	Detroit	MI	4/2/98	354,403
Detroit News	Detroit	MI	1/20/98	354,403
Flint News	Flint	MI	6/16/98	15,200
Indianapolis Star	Indianapolis	IN	7/12/98	403,956

Lubbock Avalanche Journal	Lubbock	TX	6/15/98	66,661
Mining Journal	Marquette	MI	5/30/98	18,687
News Gazette	Champaign	IL	5/31/98	51,488
News Gazette	Champaign	IL	6/13/98	51,488
News Messenger	Christiansburg	VA	5/30/98	13,000
Roanoke Times	Roanoke	VA	6/12/98	109,346
Sacramento Bee	Sacramento	CA	5/29/98	276,758
Sacramento Bee	Sacramento	CA	7/3/98	276,758
Sacramento Bee	Sacramento	CA	2/21/98	276,758
San Francisco Chronicle	San Francisco	CA	6/1/98	494,093
Tech Center News	Warren	MI	4/6/98	16,000
U.S. Auto Scene	Dearborn	MI	4/6/98	23,500
US Automotive Export News			7/1/98	40,000
USA Today (International)	Alexandria	VA	6/11/98	67,000
USA Today (Money section)	Alexandria	VA	6/11/98	2,200,000
USA Today (News section)	Alexandria	VA	6/10/98	2,200,000
Wheeling News Register	Wheeling	WV	6/7/98	53,642
Wisconsin State Journal	Madison	WI	4/9/98	86,585
Wisconsin State Journal	Madison	WI	4/23/98	86,585
Wisconsin State Journal	Madison	WI	6/12/98	86,585
Wisconsin State Journal	Madison	WI	6/19/98	86,585
Auto Press Association Calendar	Detroit	MI	5/19/98	35,934
Clean Air Today	Alexandria	VA	6/16/98	500
Hybrid Vehicle Bulletin	Alexandria	VA	6/16/98	500
Knight Ridder Tribune Business News			6/12/98	n/a
PR Newswire			6/11/98	n/a
PR Newswire			8/4/98	n/a
PR Newswire			6/10/98	n/a
PR Newswire			6/9/98	n/a
PR Newswire			5/19/98	n/a
PR Newswire			4/7/98	n/a

Total Print Media Audience: **40,896,081**

Broadcast Media:

Marketplace - PRI	Los Angeles	CA	6/4/98	1,000,000
WDET-FM (NPR)	Detroit	MI	6/4/98	90,000
CBS Newspath	Detroit	MI	6/10/98	n/a
FCN News	Dearborn	MI	6/10/98	175,000
KLBK-TV	Lubbock	TX	6/10/98	10,000
UPN-50	Detroit	MI	6/6/98	122,000
WCIA-TV	Champaign	IL	6/10/98	81,300
WCIA-TV	Champaign	IL	6/11/98	81,300
WISC-TV	Madison	WI	6/10/98	43,000
WMTV-TV	Madison	WI	6/12/98	24,000
WMTV-TV	Madison	WI	6/11/98	36,000
WMTV-TV	Madison	WI	6/12/98	36,000
WMTV-TV	Madison	WI	6/11/98	45,000
WMTV-TV	Madison	WI	6/12/98	45,000
WVLT-TV	Knoxville	TN	6/10/98	16,000

Total Broadcast Media Audience: **1,804,600**

Total Print & Broadcast Audience: 42,700,681

2

1998 FutureCar Challenge Media Announcement Dearborn, Michigan October 27, 1997

MEDIA ADVISORY

DATE OF EVENT:
Monday, October 27, 1997

CONTACT: Jack Groh, FutureCar (401)732-1551
pager: (800)609-3488

WHAT: **Kickoff of *1998 FutureCar Challenge***, National Competition, sponsored by the U.S. Department of Energy and the United States Council on Automotive Research (USCAR), an umbrella organization created by Chrysler, Ford and General Motors to do pre-competitive research in a variety of advanced automotive technologies. Fourteen major universities are using unique, cutting-edge, space-age technology to build a vehicle that comes close to the PNGV (Partnership for a New Generation of Vehicles) goal of increasing fuel efficiency to as much as 80 miles per gallon.. Each participating university will be presented with a ten thousand dollar grant from the auto industry. In addition, presentations will be made of new vehicles including aluminum body vehicles and fuel cells for use in the 1998 competition.

WHERE: **Ritz Carlton Hotel** (outside the ballroom entrance, horseshoe area)
300 Town Center Drive
Dearborn, MI,

WHO: **Elizabeth Brueckner,** Executive Director of USCAR;
Tom Gross, Deputy Asst. Secretary, Transportation Technologies, U.S. Dept. of Energy
Dr. Frano Barbir, Energy Partners

WHEN: **Monday, October 27, 1997, 1:15 p.m.**

SIGNIFICANCE: These fourteen teams of engineering students in the ***FutureCar Challenge*** are part of the larger Partnership for a New Generation of Vehicles (PNGV), a massive venture undertaken by government, the auto industry and others to solve the most difficult technical challenge since the days of the "space race" - the global competition to build super fuel-efficient vehicles and, in so doing, protect the environment and reduce the United States' vulnerable and expensive dependence on foreign oil supplies.

PHOTO OPPORTUNITIES: Members of all fourteen teams will be on location and available for interviews and photos. Also available will be samples of the vehicles being donated by Chrysler, Ford and General Motors. In addition, the FutureCar created by West Virginia University students will be on site.

PARTICIPATING UNIVERSITIES: California State University -Northridge, Concordia University, Lawrence Technological University, Michigan Technological University, Ohio State University, Texas Tech University, University of California-Davis, University of Illinois-Urbana, University of Maryland, University of Michigan, University of Tennessee, University of Wisconsin, Virginia Tech, and West Virginia University.

NEWS RELEASE

FOR IMMEDIATE RELEASE
October 27, 1997

CONTACT: Jack Groh, FutureCar Challenge
(401)732-1551

STUDENTS TO USE FUEL CELLS, ALUMINUM BODIES IN THE 1998 *FUTURECAR CHALLENGE* TO DESIGN SUPER-EFFICIENT FAMILY SEDANS

DEARBORN, Mich. -- More students than ever will be revving their engines at the third annual ***FutureCar Challenge***. One of the toughest challenges in North America, student teams compete to modify a family sedan to achieve up to 80 miles per gallon without sacrificing the performance, utility and safety of today's vehicles. Student teams in Texas and Virginia will use fuel cells, one of the most cutting-edge auto technologies available.

Three new schools will participate in the upcoming 1998 competition - the University of Illinois-Urbana, Texas Tech University and the University of Tennessee. Students from more than a dozen schools will work to create super-efficient cars in time for the final judging beginning in June of 1998.

Competitors start with today's conventional family sedans and convert them into super-efficient cars of the future using cutting-edge automotive technologies including fuel cells and other advanced propulsion systems, space-age materials and alternative fuels like natural gas. The competition is sponsored by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), with assistance from the National Science Foundation, Environmental Protection Agency and Natural Resources Canada.

"The ***FutureCar*** program taps top engineering minds from schools around the country to work on a national challenge - creating a super-fuel-efficient car that meets our standards for performance and safety. Achieving this goal will make our auto industry more competitive and preserve our environment as we reduce a key source of air pollution," said Energy Secretary Federico Peña.

The Department of Energy plans to purchase two fuel cells built by Energy Partners of West Palm Beach, Florida for use in the 1998 FutureCar Challenge. Virginia Tech and Texas Tech were selected to receive the fuel cells based on proposals they submitted on how they would use the new technology in their vehicles. Ford Motor Co. is donating aluminum-bodied Tauruses. General Motors Corp., is donating 1997 Chevrolet Luminas and Chrysler is donating 1997 Dodge

Intrepids for the competition. Ten thousand dollars is also being awarded to each team from the three car companies to help modify the cars.

"There are many technical and affordability challenges to overcome between the students' unique experimental designs and actual production vehicles, but we are hoping the national PNGV effort will help move those obstacles aside," said Elizabeth Brueckner, Executive Director of USCAR.

Twelve top engineering schools competed in the 1997 ***FutureCar Challenge***. The University of California at Davis team placed first with a converted hybrid-electric (HEV) Ford Taurus and also won a special award for the most energy-efficient vehicle (49 miles per gallon combined city/highway). Complete results from the '97 Challenge are on the Internet (http://www.uscar.org/futurecar/index.htm).

The ***FutureCar Challenge*** is part of the larger Partnership for a New Generation of Vehicles (PNGV), a cooperative research and development program started in late 1993 between the federal government and U.S. auto industry to develop highly fuel-efficient vehicles. This collaborative effort is making progress in many technical areas, including advanced materials, manufacturing processes, and energy conversion and storage devices.

Other participating schools include:

California State University -Northridge
Concordia University
Lawrence Technological University
Michigan Technological University
Ohio State University
University of California-Davis
University of Maryland
University of Michigan
University of Wisconsin
Virginia Tech
West Virginia University

For more information about the ***FutureCar Challenge***, contact Shelley Launey, Manager of Vehicle Competitions, U.S. Department of Energy, 1000 Independence Ave., SW, Washington, D.C. 20585 (Fax: 202/586-1600; E-mail: shelley.launey@hq.doe.gov).

Concordia University • Lawrence Technological University • Michigan Technological University
Texas Tech University • The Ohio State University • The University of Tennessee, Knoxville
University of California, Davis • University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan • University of Wisconsin
Virginia Polytechnic Institute & State University • West Virginia University

NEWS RELEASE

FOR IMMEDIATE RELEASE
April 2, 1998

CONTACT: Jack Groh, FutureCar Challenge
(401)732-1551

THIRTEEN TEAMS COMPETE TO BUILD "SUPERCAR": GOVERNMENT AND INDUSTRY SUPPORT *FutureCar Challenge*

WASHINGTON -- As international competition intensifies to develop and bring to market "greener" transportation technologies, thirteen engineering teams from across North America are designing and testing prototypes of the cars we may be driving in the 21st century. Known as the ***FutureCar Challenge***, this is a competition among thirteen North American universities, each trying to create a "super" fuel-efficient vehicle that will be safe, consumer acceptable and affordable to buy and drive.

Sponsored by the United States Department of Energy (DOE) and Chrysler, Ford and General Motors through the United States Council on Automotive Research (USCAR), the ***FutureCar Challenge***, now entering its third year, has already shown impressive results. Last year's top finisher demonstrated better than 60 miles per gallon fuel economy in a mid-size family car using a "hybrid" powertrain powered by both gasoline and electricity.

In the first two years of competition, the ***FutureCar Challenge*** resulted in a tremendous variety of technologies being applied to the challenge of increasing efficiency. Different fuels, including compressed natural gas, diesel, methanol and gasoline, were combined with a variety of advanced materials, engineering strategies, powertrains and design innovations to create mostly hybrid-powered vehicles.

This year, among the innovations added to the competition are several "aluminum-intensive" bodies supplied by Ford Motor Company and hydrogen-powered fuel cells built by Energy Partners for the U.S. DOE. Teams from two schools will receive the fuel cell stacks. These teams will have particularly daunting challenges as they attempt to integrate the fuel cell system into their vehicles.

One of the major challenges all ***FutureCar Challenge*** teams face is to make their final product a "realistic" prototype. Unlike some student competitions, FutureCar requires that vehicles be re-engineered without sacrificing the performance, safety and affordability that consumers demand in a family sedan.

The base vehicles, as well as "seed money," are donated by U.S. automakers. Vehicles used in the competition include Chevrolet Luminas, Dodge Intrepids, and Ford Tauruses or Mercury Sables. Consumer conveniences such as luggage space, heat and air conditioning, and passenger room must be maintained. Performance and safety characteristics, including handling, acceleration, braking and emissions, must also be up to industry standards. These requirements make the ***FutureCar Challenge*** a real-world competition.

"The ***FutureCar Challenge*** is one part of the broader Partnership for a New Generation of Vehicles (PNGV) program," said Elizabeth Brueckner, executive director of USCAR. "PNGV has among its goals the development of new automotive technologies that can be brought to market in a way that maintains America's competitive edge in the global marketplace and preserves employment for American workers."

The DOE also looks at the ***FutureCar Challenge*** and its goal of "super" fuel-efficient vehicles as part of a broader agenda. "Fuel requirements for our transportation vehicles continue to grow," said Tom Gross, Deputy Assistant Secretary for Transportation Technologies at the U.S. Department of Energy. "These new technologies hold the promise of more efficient transportation, a healthier economy, a cleaner environment, and less dependence on imported oil."

Three new universities have joined the FutureCar Challenge this year. They are: Texas Technological University, the University of Tennessee at Knoxville and the University of Illinois at Urbana-Champaign. While new to this competition, all three colleges have a successful record of competing in automotive engineering events.

Ten other universities are returning to the FutureCar competition this year including last year's top finisher, the University of California at Davis and the 1996 winner, Virginia Tech. Other teams include: the University of Maryland, Concordia University, the University of Michigan at Ann Arbor, Michigan Technological University, Ohio State University, Lawrence Technological University, West Virginia University and the University of Wisconsin.

The competition is sponsored by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), with assistance from the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency and Natural Resources Canada.

A weeklong series of competitive events and evaluations will be held at Oakland Community College and at the Chrysler Technology Center in Auburn Hills, Michigan from June 4-11. All vehicles will be tested and judged on criteria such as handling, acceleration, fuel economy, exhaust emissions, design and consumer acceptability. Judging panels are composed of experts from the auto industry, government agencies and the automotive press.

The ***FutureCar Challenge*** is part of the larger Partnership for a New Generation of Vehicles (PNGV), a cooperative research and development program started in late 1993 between the federal government and the U.S. auto industry to develop highly fuel-efficient vehicles. This collaborative effort is making progress in many technical areas, including advanced materials, manufacturing processes, and energy conversion and storage devices.

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Concordia University • Lawrence Technological University • Michigan Technological University
Texas Tech University • The Ohio State University • The University of Tennessee, Knoxville
University of California, Davis • University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan • University of Wisconsin
Virginia Polytechnic Institute & State University • West Virginia University

NEWS RELEASE

FOR IMMEDIATE RELEASE
May 29, 1998

CONTACT: Jack Groh
(401)732-1551

MORE MILES ON LESS FUEL: THIRTEEN ENGINEERING TEAMS RACING TO BUILD *FutureCar*

WASHINGTON -- It has been described as a more difficult engineering challenge than putting man on the moon. But thirteen universities from across North America think they can do it.

What they're all racing to create is a super fuel-efficient car. Not some stripped-down, impractical, one-seater but, rather, a mid-size, family sedan with all the safety, performance and convenience of a showroom model but without the thirst for fuel.

Sponsored by the United States Department of Energy (DOE) and Chrysler, Ford and General Motors through the United States Council for Automotive Research (USCAR), the ***FutureCar Challenge***, now in its third year, has already shown impressive results. Last year's top finisher demonstrated better than 60 miles per gallon fuel economy in a mid-size family car using a "hybrid" powertrain powered by both gasoline and electricity. The ***FutureCar Challenge*** is a student competition within the Partnership for a New Generation of Vehicles, the joint industry-government effort to address a wide range of transportation, manufacturing and global competition issues.

Each of the thirteen prestigious engineering schools chosen to participate receives a brand new mid-size car and seed money from either Chrysler, Ford or General Motors. Student teams then have a year to re-engineer the vehicle to boost fuel efficiency. The catch is that vehicles cannot be stripped down. The final product has to maintain consumer acceptable standards for performance (for example, braking, handling, acceleration), safety (for example, crash performance, seatbelts, airbags) and convenience (for example, trunk space, heating/air conditioning, passenger comfort). In other words, they need to live up to the expectations consumers have for a mid-size, family sedan.

And exactly how do you do all this and still get increased mileage? There are as many answers as there are competitors. Most teams have chosen to install some type of hybrid powertrain - using both electric power and an internal combustion engine to power the car. The choice of fuels varies widely. While some cars rely on readily-available gasoline (U.C.-Davis), others have opted for alcohol-based fuels (Maryland), compressed natural gas (W. Virginia), or diesel (Concordia, Lawrence Tech, Ohio State, Wisconsin and Michigan).

In some vehicles, the car runs directly on either the electric motor or internal combustion engine while still others use the engine only as a generator to provide additional electricity - thereby extending the vehicle's range (distance driven without recharging).

(more)

Among the newest additions to these 21st century power plants are a pair of hydrogen fuel cells being installed by teams from Texas Tech University and Virginia Tech. These fuel cells are similar in operation to the power sources used on spacecraft. However, adapting them to run in a down-to-earth family car is an engineering challenge of astronomical proportions.

"One of the most gratifying results of this project is the tremendous ingenuity exhibited by these students as they tackle one of our country's most significant technological challenges," said Tom Gross, deputy assistant secretary at the U.S. Department of Energy. "The United States is in the middle of a furious global competition to develop the energy-efficient transportation technologies needed in a world with many more cars and trucks."

Other technological innovations new this year include three aluminum-intensive bodies supplied by Ford Motor Company. Teams from U.C.-Davis, the University of Wisconsin and West Virginia University are adapting these lighter-weight bodies in their vehicle design as a way to decrease overall weight and improve mileage.

Three new universities have joined the ***FutureCar Challenge*** this year. They are: Texas Technological University, the University of Tennessee at Knoxville and the University of Illinois at Urbana-Champaign. While new to this competition, all three colleges have a successful record of competing in automotive engineering events.

Ten other universities are returning to the FutureCar competition this year including last year's top finisher, the University of California at Davis, and the 1996 winner, Virginia Tech. Other teams include: the University of Maryland, Concordia University, the University of Michigan at Ann Arbor, Michigan Technological University, Ohio State University, Lawrence Technological University, West Virginia University and the University of Wisconsin.

In addition to major sponsorship by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), additional support is provided by the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency, Natural Resources Canada and the Aluminum Association.

A weeklong series of competitive events and evaluations will be held at Oakland Community College and at the Chrysler Technology Center in Auburn Hills, Michigan from June 3-10. All vehicles will be tested and judged on criteria such as handling, acceleration, fuel economy, exhaust emissions, design and consumer acceptability. Judging panels are composed of experts from the auto industry, government agencies and the automotive press.

All ***FutureCar Challenge*** vehicles will be on public display twice during competition. On Saturday, June 6, they will be exhibited at the Detroit Grand Prix on Belle Isle in Detroit. On Wednesday, June 10, the FutureCars will be the centerpiece of an exhibit entitled *Past, Present and FutureCars* at the Henry Ford Museum in Dearborn, Michigan.

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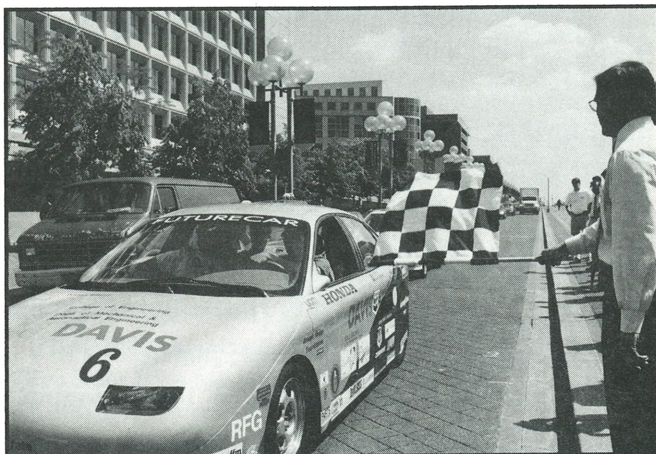
1998 FutureCar challenge

FutureCar Update

Spring 1998

1998 FutureCar Challenge Adds More Cutting Edge Technology



U.S. Energy Secretary Federico Peña waves the checkered flag as 1997 winner U.C.-Davis crosses the finish line in Washington, D.C.

As international competition intensifies to develop and bring to market "greener" transportation technologies, thirteen engineering teams from across North America are designing and testing prototypes of the cars we may be driving in the 21st century, as part of the ***FutureCar Challenge***.

What's New For 1998?

- Three new universities are competing: Texas Technological University, University of Illinois at Urbana-Champaign and University of Tennessee at Knoxville (see new team profiles inside)
- Two teams (Texas Tech and Virginia Tech) are using hydrogen-powered fuel cells built by Energy Partners for the U.S. Department of Energy
- Three teams (University of California at Davis, University of Wisconsin and West Virginia University) are using "aluminum-intensive" bodies donated by Ford
- Two public displays have been added to the schedule: at the Detroit Grand Prix and the Henry Ford Museum & Greenfield Village
- Top finishers in 1998 will travel to the World Energy Congress in Houston to demonstrate their award-winning performance.

About the Competition

The competing universities are using cutting-edge automotive technology to design "super" fuel-efficient vehicles - capable of double existing fuel economy. Most vehicles are using hybrid powertrains - combining electric motors with some type of fossil fuel engine.

A major challenge these teams face is making their final product a realistic prototype. The ***FutureCar Challenge*** requires that vehicles be re-engineered without sacrificing the safety and performance that consumers demand in a family sedan.

Now in its third year, the competition has shown impressive results. Last year's top finisher demonstrated better than 60 miles per gallon fuel economy using a hybrid gasoline-electric powertrain.

1998 FutureCar Challenge Participants

Concordia University • Lawrence Technological University
Michigan Technological University • Ohio State University
Texas Technological University • University of California-Davis
University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan
University of Tennessee • University of Wisconsin
Virginia Tech • West Virginia University

FutureCar 1998 Calendar

June 3-10 — ***FutureCar Challenge*** **Competition** at Oakland Community College and the Chrysler Technical Center in Auburn Hills, MI

June 6 — **FutureCar Display** at the *Detroit Grand Prix* on Belle Isle, Detroit

June 10 — **"Past, Present & FutureCar"** Ex hibit at the Henry Ford Museum & Greenfield Village in Dearborn, MI

A Team Effort: University of Illinois Urbana-Champaign

If you need more team members, do what University of Illinois Urbana-Champaign (UIUC) did: make ***FutureCar Challenge*** participation a technical elective for credit. As many as 65 engineering students come to meetings, and student project leader Jeremy Cellarius says at least 40 are active. Cellarius says the team may also soon include business students for fundraising.

UIUC has been in alternative fuel vehicle (AFV) competitions since 1993, earning a first place in engineering design in the 1993 and 1994 HEV (hybrid electric vehicle) Challenge. UIUC competed in the Sunrayce 1995 and 1997. However, just one member of the current ***FutureCar Challenge*** team was personally involved in previous HEV events.

Cellarius says although team members are relatively new to hybrids, they're not rookies anymore. That was *last* semester. "Now," he says, "everyone's feeling a little more comfortable and we expect to have everything ready for the competition in June."

The "Intrepid EMF" (Electro-Motive Force) is a series hybrid using a "tracking APU (auxiliary power unit)" strategy - similar to UIUC's past HEV Challenge cars - that closely monitors the battery state of charge. Its one-liter diesel will run most of the time. Cellarius says this allows them to carry fewer batteries with the expectation that weight savings will improve mileage.

Texas Technological University: Fuel Cell a Mixed Blessing

If you think being in line for a fuel cell moves a team to the head of the class in the ***FutureCar Challenge,*** you may want to think again when you consider the reality of working with fuel cells. Texas Tech advisor, Dr. Tim Maxwell, says this cutting-edge technology ***adds*** to the challenge of getting their Chevrolet Lumina ready for competition.

"All we're getting is the fuel cell core," he explains. "We've got to build all the peripheral parts to go with it. So that's the challenge." As if that weren't daunting enough, the fuel cell may not arrive in Lubbock in time for the 1998 competition.

There is a backup plan. "Since the fuel cell doesn't have to operate constantly to charge the batteries, we can set the car up for the fuel cell, then run on the batteries," says Dr. Maxwell. "Our range will be severely limited, but everything else should work as designed, and we can demonstrate our vehicle setup. When the fuel cell arrives, we'll get ready for next year."

Although new to the ***FutureCar Challenge***, Texas Tech has been involved in other competitions since 1988. Their impressive record has already benefited the school. Dr. Maxwell says it has helped attract research grants and it might also help land working space: The university is negotiating now with the federal government to use a building at the defunct Reese Air Force Base as a project lab.

Competition Veterans: University of Tennessee at Knoxville

The University of Tennessee is new to the ***FutureCar Challenge,*** but their record in advanced vehicle competitions is older than most FCC participants. Their Dodge Intrepid-based ***FutureCar*** is distinguished by the 1.9-liter Saturn engine (converted to natural gas). It is one of the few American-built internal-combustion engines

(Continued on page 3)

(Continued from page 2)

(ICE) used in a ***FutureCar*** .

Tennessee competed in the 1972 Urban Vehicle Design Competition and, since 1989, has participated in DOE-sponsored events, including the Methanol Marathon, NESEA American Tour de Sol, HEV, and Propane and Natural Gas Vehicle Challenges. They have a strong record, including many class or category first-place finishes.

Dr. Jeff Hodgson, team advisor, says the ***FutureCar Challenge*** gives students a unique opportunity. "How many times does an individual engineer get to be a member of a small design group that takes something all the way to implementation? I guess some - like the team that put together the (Plymouth) Prowler - but not many. You get an espirit de corps, a sense of accomplishment."

The UT Intrepid will be run as a "dual" hybrid - sometimes series, sometimes parallel.

FutureCar Team Updates

Concordia University

Sometimes life is simpler when all your plans *don't* work out. Concordia advisor, Dr. Henry Hong, says plans to convert the VW turbodiesel in their Dodge Intrepid-based parallel hybrid to run on DME (dimethyl ether) turned out to be too ambitious. Sticking with diesel power moved the team a month ahead of schedule.

The Concordia team is working on weight savings with an eye toward manufacturability. The team had considered installing composite body panels, but decided to go with aluminum, which costs less and can be stamped out for mass production.

Lawrence Technological University

Lawrence Technological University is a team to watch in 1998. Their parallel hybrid Taurus was a strong contender in 1996 but a major change last year -- automatic, hydraulic shifting of the manual transmission -- ran into mechanical problems leaving them with a disappointing finish in 1997.

Team leader Becky Steketee reports thousands of bench-test shifts prove the system is now dependable.

The special transmission is paired with a modified, 1.9 liter, direct-injected Volkswagen turbodiesel. Electric propulsion adds thrust under acceleration, with the diesel running by itself under cruising conditions.

Michigan Tech

Michigan Tech road-tested their Intrepid this past winter despite 130 inches of snowfall.

An unexpected "glitch" in an alternator pulley cost the team three precious weeks in early spring. The vehicle was reassembled - minus most of the interior to protect it from damage - in time to take part in Earth Day activities on campus.

Ohio State University

Led by three returning team members, an otherwise new Ohio State team has been working on a new generation of its high efficiency engine-based hybrid. Starting with a new Chevrolet Lumina, the team is working toward a low drag body made with small scale production processes and a reliable, low cost parallel hybrid electric powertrain.

Since simplified manufacturing is a prominent goal of the PNGV, the team strategy has focused on ways to get high mileage, low emission North American cars on the roads soon. The compression ignition direct injection engine provides fuel flexibility, from contemporary diesel fuel to fully renewable soy-diesel from American farms.

University of California at Davis

Last year's winner, the University of California at Davis, plans to come on strong with an all-new car. This year's UC-Davis entry is an aluminum-intensive Mercury Sable.

Despite a bigger battery pack, larger electric motor and a new, continuously-variable transmission, this year's car should weigh 600 pounds less than the previous, Taurus-based entry. The weight savings and greater efficiency are expected to boost UC Davis' already-impressive fuel mileage.

University of Maryland

The Maryland team's series hybrid Dodge Intrepid is an entrant in the NESEA American Tour de Sol in May. The NESEA Tour will provide a good "shake-down" cruise as they get ready for the ***FutureCar Challenge*** competition in June.

The car's internal-combustion engine burns E-85 - alcohol-based fuel containing 85 percent ethanol combined with gasoline.

The team has twenty students from mechanical and electrical engineering programs.

University of Michigan at Ann Arbor

The University of Michigan at Ann Arbor is confident they'll make a stronger showing this year. Team advisor, Dr. Valdis Liepa, says the original strategy used in designing the Ford Taurus-based parallel hybrid is sound, and they're focusing now on refining their execution of the concept.

If you want to see how Volkswagen's 1999 direct-injected turbodiesel is set up, look under Ann Arbor's hood:

(Continued on page 4)

(Continued from page 3)
Although they're re-using last year's block, VW provided *next-year's* controls and accessories.

University of Wisconsin

Wisconsin's 1998 FutureCar will have a new look -- and less weight -- than last year's. The successor to the 1996-97 "Future Cow," which was Dodge Intrepid-based, is an aluminum-intensive Mercury Sable.

Team leader John Ertmer says the experience in putting the old car together has made the task of fitting everything into the new one go relatively smoothly. The other major change to the diesel-electric hybrid is from lead-acid batteries to lighter weight, nickel-cadmium ones.

Virginia Tech

Virginia Tech's Chevy Lumina, "ANIMUL," ("Lumina" spelled backwards) won the 1996 ***FutureCar Challenge*** and was a strong finisher in 1997.

For this year, "ANIMUL H2" is slated to use a hydrogen fuel cell provided by Energy Partners of Florida through the United States Department of Energy. Team leader Mike Ogburn is confident the hybrid-electric vehicle team can work out the challenges of adapting a new technology into a family passenger car to produce another strong finish in the 1998 FutureCar Challenge.

West Virginia University

The West Virginia University team has parked its 1995 Chevrolet Lumina and is building a new FutureCar based on an aluminum-intensive Mercury Sable.

WVU's Lumina achieved cleaner emissions than required by pending ULEV (Ultra Low Emissions Vehicle) standards. The new car's powertrain will be compressed natural gas/electric in a parallel hybrid configuration. Team advisor, Dr. Chris Atkinson, expects better performance and efficiency than last year and even cleaner exhaust.

FutureCar Challenge Sponsors

- **U.S. Department of Energy**
- **United States Council for Automotive Research (USCAR)**
- **National Science Foundation**
- **U.S. Department of Commerce**
- **U.S. Environmental Protection Agency**
- **Natural Resources Canada**
- **Aluminum Association**
- **American Iron & Steel Institute**

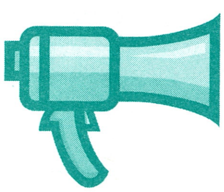
FutureCar Challenge Special Events: Here's Where To See Them

Detroit Grand Prix

On **Saturday, June 6**, FutureCar vehicles will be on display at Belle Isle in Detroit - site of the 1998 Detroit Grand Prix. A special display area - just inside the public entrance to Belle Isle has been reserved.

Henry Ford Museum & Greenfield Village

In cooperation with the Museum, a special, one-day outdoor exhibit entitled **"Past, Present & FutureCar"** is planned for **Wednesday, June 10** on the green at the main Museum entrance. Admission to this exhibit is free and open to the public.



For more information about the FutureCar Challenge, contact Shelley Launey
U.S. Department of Energy
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Please address media inquiries to:

Jack Groh
FutureCar Challenge
Public Information
(401)732-1551

Concordia University • Lawrence Technological University • Michigan Technological University
Texas Tech University • The Ohio State University • The University of Tennessee, Knoxville
University of California, Davis • University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan • University of Wisconsin
Virginia Polytechnic Institute & State University • West Virginia University

NEWS RELEASE

FOR IMMEDIATE RELEASE
June 6-10, 1998

CONTACT: Jack Groh, FutureCar Challenge
(401)952-0886 (cell)
Pager: (800)609-3488

THIRTEEN UNIVERSITIES CHASING TOP ENGINEERING AWARD:
NATIONAL COMPETITION TO DESIGN FUEL-SAVING *FutureCars*

AUBURN HILLS, Mich. -- More than 150 student-engineers are locked in fierce competition this month - vying to create the "super" cars of the next decade. Thirteen top universities are entrants in the 1998 ***FutureCar Challenge***, a grueling, yearlong contest to re-design and re-engineer a brand-new, American-made family car. The end product is required to have everything a consumer expects in a new car. Everything, that is, except the thirst for gasoline.

"These cars use some of the most advanced automotive technologies available," says Shelley Launey of the United States Department of Energy, manager of this competition. "Each vehicle is a rolling laboratory that gives us an opportunity to try out cutting-edge engineering concepts." Among the technological innovations being used are fuel cells, aluminum-intensive bodies, and a variety of hybrid-electric powertrains, most combining an internal combustion engine with an electric motor.

This is no pie-in-the-sky competition, however. University teams are working to double or even triple the fuel efficiency of the American family sedan without compromising any of the safety, comfort and convenience that car buyers demand. After a year of design and testing, all the cars go through a tough, weeklong series of evaluations that include tests of acceleration, handling, emissions, braking, fuel efficiency and consumer acceptability. Vehicles are also evaluated for their use of advanced materials and technologies.

Sponsored by the U.S. Department of Energy and Chrysler, Ford and General Motors through the United States Council for Automotive Research (USCAR), the competition judging takes place from June 3-10 in Auburn Hills, Michigan on the campus of Oakland Community College and at the nearby Chrysler Technical Center. Also included among the FutureCar events are a public display of the vehicles at the Detroit Grand Prix (Saturday, June 6) and a special outdoor exhibit at the Henry Ford Museum and Greenfield Village in Dearborn. The Henry Ford Museum exhibit includes all the ***FutureCar Challenge*** cars, vintage alternative-fuel vehicles from the Museum's collection, and cars from Chrysler, Ford and General Motors that represent current production models as well as alternative fuel models and prototypes.

- more -

There is more at stake in this competition that just collegiate bragging rights. The ***FutureCar Challenge*** is a part of the larger Partnership for a New Generation of Vehicles (PNGV), the joint industry-government effort to address a wide range of transportation, manufacturing and global competition issues. These FutureCars demonstrate many of the exciting under-the-hood changes that consumers will be seeing in showrooms in the not-too-distant future.

The results of the FutureCar Challenge, now in its third year, have already been stunning. The 1997 winner, University of California at Davis, achieved more than double the average fuel-economy of existing family cars. In fact, according to DOE figures, if all American family cars matched the U.C.-Davis fuel efficiency, American consumers would save more than 57 billion dollars a year at the gas pump.

In addition to consumer savings, there are the even more significant benefits of maintaining global competitiveness in the crucial automotive industry and the political and strategic benefits of decreasing America's dependence on foreign petroleum sources. The largest share of our country's imported oil is now used for transportation.

Each of the thirteen prestigious engineering schools chosen to participate receives a brand new mid-size car and seed money from Chrysler, Ford or General Motors. ***1998 FutureCar Challenge*** competitors include: Texas Technological University, University of Tennessee at Knoxville, University of Illinois at Urbana-Champaign, University of California at Davis, Virginia Tech, University of Maryland, Concordia University, University of Michigan at Ann Arbor, Michigan Technological University, Ohio State University, Lawrence Technological University, West Virginia University and the University of Wisconsin.

In addition to major sponsorship by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), additional support is provided by the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency, Natural Resources Canada, the Aluminum Association, Goodyear Tire & Rubber Company, and the American Iron & Steel Institute.

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Note to Editors: Additional ***FutureCar Challenge*** media information is available on the world wide web at **http://members.aol.com/futurcar**
Please note the letter "e" is dropped from the final word "futurcar" in the web address.

1998 *FutureCar Challenge*
Participating Universities

Concordia University
Lawrence Technological University
Michigan Technological University
Ohio State University
Texas Technological University *
University of California at Davis
University of Illinois at Urbana-Champaign *
University of Maryland
University of Michigan at Ann Arbor
University of Tennessee at Knoxville *
University of Wisconsin at Madison
Virginia Tech
West Virginia University

Universities marked with an (*) are new entrants for the 1998 FutureCar Challenge

FutureCar Challenge 1998

Quick Facts and Background for Editors and Writers

How the cars are Judged:

- Fuel Efficiency
- Handling
- Acceleration
- Endurance
- Consumer Acceptability
- Engineering Design
- Exhaust Emissions
- Cost/Manufacturability

Judging Targets for 1998 FutureCar Challenge Competitors:

- Fuel Efficiency: 80 mpg equivalent
- Emissions: Equivalent to California LEV (low emission vehicle) standards
- Acceleration 0-60 mph: 16 seconds
- Grade Sustainability: maintain 55 mph on 6% grade for 20 minutes
- Range: 325 miles
- Luggage Cap.: 250 liters (4 suitcases)
- Interior Climate Control (HVAC): Equal to current production standards

For further media information, contact Jack Groh at (401)732-1551, by pager at (800)609-3488, or cell phone at (401)952-0886.

About the Competition:

The ***FutureCar Challenge*** is sponsored by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), the joint research venture of Chrysler Corporation, Ford Motor Company and General Motors. The primary objectives are to provide opportunities for universities to join the national challenge to develop fuel-efficient technologies and create a valuable pool of future engineers with hands-on experience in advanced automotive technologies.

FutureCar Challenge judging for 1998 took place at Oakland Community College and the Chrysler Technology Center in Auburn Hills, Michigan. The ***FutureCar Challenge*** Engineering Design Review competition was held on Belle Isle during the Detroit Grand Prix. Awards were distributed at the Henry Ford Museum in Dearborn, Michigan following a special public display which featured vintage vehicles, current production models from Chrysler, Ford and GM as well as the FutureCar vehicles.

Relationship of FutureCar Challenge to PNGV:

The ***FutureCar Challenge*** is the student version of the same engineering task begun by government and the domestic auto industry nearly three years ago - to develop "super cars," cars that would get up to triple the mileage of today's cars and, at the same time, be attractive, affordable and safe for consumers. That challenge prompted the formation of the Partnership for a New Generation of Vehicles (PNGV), a national research program which includes all three major American car makers, seven Federal agencies and twenty government laboratories. Other participants include universities and over three hundred commercial enterprises including industrial suppliers, R&D facilities and entrepreneurs.

Milestones:

1988: Chrysler Corporation, Ford Motor Company and General Motors Corporation begin collaborative, pre-competitive research.

1992: USCAR research consortium formed by the three major U.S. automakers.

September 1993: Federal government and the U.S. auto industry announce joint effort to develop safe, affordable, attractive, super-efficient vehicles; PNGV formed to meet this challenge.

Autumn 1994: *FutureCar Challenge* proposals sought from universities.

October 1995: Universities selected, awarded cars for modification.

June 17-24, 1996: First judging of *FutureCar Challenge* entrants at Ford Motor Company, Dearborn, MI.

June 3-11,1997: *FutureCar* judging at General Motors in Warren, MI capped by over- the-road endurance event to Washington, DC.

June 3-10, 1998: *FutureCar* judging at Oakland Community College and Chrysler Technology Center, Auburn Hills, MI. Engineering Design judging at Detroit Grand Prix. Special display and awards at Henry Ford Museum.

Significance of the *FutureCar Challenge*:

Economy/Jobs:

One in seven U.S. jobs is related to the auto industry. If the U.S. industry doesn't develop a super-efficient car, its competitors will. Europe's "Eucar" is similar to the American program. The Japanese industry is also working on alternative vehicle technologies.

Balance of Payments:

Oil imports are about three-quarters of our trade deficit. The U.S. spends about $50 billion each year on imported oil and petroleum products.

Strategic Benefits:

Decreasing transportation fuel use can cut our dependence on imported energy. If future U.S. cars used one-third the energy of current autos, America would be less vulnerable to threats against foreign oil sources.

Participating Universities:

Concordia University
Lawrence Technological University
Michigan Technological University
Texas Technological University
The Ohio State University
The University of Tennessee, Knoxville
University of California - Davis
University of Illinois at Urbana-Champaign
University of Maryland
University of Michigan - Ann Arbor
University of Wisconsin at Madison
Virginia Polytechnic Institute
West Virginia University

WILLIAM F. POWERS
BIO

William F. Powers has been with the Ford Motor company since 1979. On February 1, 1996 he was elected Vice President-Research. Prior positions at Ford include: Program Manager for the Lincoln Mark VIII and Executive Director of Information Technology. Prior to joining Ford, he was a professor of Aerospace Engineering and Computer, Information and Control Engineering at the University of Michigan from 1968-80, a consultant on the NASA Space Shuttle Program from 1970-79, and an aerospace engineer on the Apollo Program with NASA from 1960-65. He received his BS in Aerospace Engineering in 1963 from the University of Florida and his Ph.D. in Engineering Mechanics in 1968 from the University of Texas at Austin. He is a member of the National Academy of Engineering, a foreign member of the Royal Swedish Academy of Engineering Sciences, an IEEE Fellow, and serves on numerous government, university and professional society committees.

11/21/97

CHRYSLER CORPORATION Ford GM General Motors

Quick Facts on the U.S. Council for Automotive Research (USCAR)

Contact: USCAR Communications 248-223-9011 Web Site: www.uscar.org

Mission: The mission of USCAR is to strengthen the technology base of the domestic auto industry by leveraging the research efforts of the companies in non-competitive areas. These R & D efforts respond to the needs of our environment and society and include the appropriate public and private stakeholders as required.

Who: USCAR members are Chrysler Corp., Ford Motor Co. and General Motors Corp.

What: The domestic automakers join forces to speed development of technologies that are considered pre-competitive—meaning there is no marketplace advantage for one company to develop the technology alone. Areas of research include advanced batteries for electric vehicles, hybrid electric vehicles, lightweight materials, "smart" air bags, vehicle recycling and the further reduction of emissions—from vehicles and production facilities.

Why: Together, the automakers can leverage resources, accelerate technical development and better respond to the needs of society and the environment while preserving jobs for American workers.

History: Laws changed in the early 1980's to allow competitors to work together in the pre-competitive arena. The first Chrysler, Ford and GM research consortium formed in 1988. The number of consortia grew and USCAR was formed in 1992 to coordinate the business and administrative functions for the collaborative research.

PNGV: In the fall of 1993, USCAR formed the Partnership for a New Generation of Vehicles with the federal government. PNGV's goal is to improve national manufacturing competitiveness, implement technologies that increase the fuel efficiency of and improve emissions from conventional vehicles, and develop technologies for a new class of vehicles with up to 80 mpg without sacrificing today's affordability, utility, safety and comfort of today's midsize family sedans.

Where: A small number of auto company engineers currently are co-located at three different research sites. Other groups work in existing company facilities and with suppliers, federal laboratories and universities as needed. USCAR also maintains a central office in Southfield, Mich. and provides meeting space for the research teams.

(over)

THE 12 USCAR CONSORTIA IN BRIEF

Automotive Composites Consortium conducts research on structural polymer composites;

Auto/Oil Air Quality Improvement Research Program initiated and developed data for use by legislators, regulators and the public on the potential improvements in vehicle emissions and air quality from reformulated gasoline, various alternative fuels and developments in automotive technology;

Electrical Wiring Component Application Partnership works to reduce the costs and complexity of electrical components while improving quality and serviceability;

Environmental Research Consortium conducts research on the environmental impact of vehicle and manufacturing emissions;

Low Emission Paint Consortium conducts joint research and development programs on paint-related technologies to reduce or eliminate solvent emissions from automotive painting systems;

Low Emissions Technologies R&D Partnership coordinates research and development efforts on emissions control technologies;

Natural Gas Vehicle Technology Partnership conducts research to reduce the cost of compressed natural gas (CNG) storage tanks by using new materials and manufacturing techniques, and is attempting to set standards on gas composition;

Occupant Safety Research Partnership develops crash-test dummies; conducts research on related areas such as modeling, instrumentation, data management and subsystem safety test development; and coordinates the companies' research on smart air bags;

Supercomputer Automotive Applications Partnership conducts research on high-performance parallel computing and communications programs applied to vehicle design and development;

United States Advanced Battery Consortium pursues the research and development of advanced energy storage systems capable of providing future generations of electric and hybrid vehicles with significantly increased range and performance – at a cost competitive with gasoline-powered vehicles;

United States Automotive Materials Partnership works to advance the development of lightweight materials for improved automotive fuel economy; and

Vehicle Recycling Partnership conducts research pertaining to the efficient and environmentally-friendly recycling, reuse and disposal of motor vehicles and vehicle components.

* * * *

The 10 PNGV Technical Teams – With support from the above consortia, industry and government researchers also pursue advanced R&D under the work of 10 teams focusing on: fuel cells, electrochemical energy storage, four-stroke direct injected engine, systems analysis, electrical & electronics, mechanical energy storage, gas turbine, materials/structures, manufacturing, and vehicle engineering.

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OFFICE OF TRANSPORTATION TECHNOLOGIES

OTT's Office of Advanced Automotive Technologies—Developing exciting new car concepts

Energy Efficiency and Renewable Energy's Office of Transportation Technologies (OTT) within the U.S. Department of Energy is charged with reducing America's dependence on petroleum, thereby bolstering the nation's energy security and improving the quality of its air. To meet that goal, OTT enters diverse, cost-shared R&D partnerships with like-minded organizations both public and private, helping develop technologies to a point where industry can commercialize them into marketable products. OTT is organized into four "sub" offices corresponding to major customer areas:

The Office of Advanced Automotive Technologies develops technologies that will lead to passenger cars with greater fuel economy and lower emissions.

The Office of Heavy Vehicle Technologies focuses on improving the efficiency and liquid fuel flexibility of the diesel cycle engine, while simultaneously reducing emissions.

The Office of Fuels Development is primarily working to reduce the cost of cleaner, domestically-sourced ethanol, a renewable and easy-to-use alternative fuel.

The Office of Technology Utilization is working to pave the way for market acceptance of new transportation technologies through educational, voluntary, and other practical efforts in partnership with industry, local, and state government.

OTT's Office of Advanced Automotive Technologies (OAAT) is working with industry to design automobiles utilizing new and different technologies, providing the potential for improvements in fuel efficiency and environmental performance without sacrificing safety, affordability, convenience, or other practical driving factors. OAAT has set goals of developing technologies that will enable a family sedan to achieve 50 mpg by 1998, and 80 mpg by 2004. OAAT is pursuing these goals through partnerships with industry that focuses on R&D programs to develop these technologies. Several of these technology areas are described below.

Advanced battery technologies

Pure electric vehicles hold the promise of allowing zero-emission performance, but current battery technologies have serious limitations, and are unable to meet practical vehicle demands for range, power and cost. OAAT has joined with all three automakers in the U.S. Advanced Battery Consortium (USABC) and the electric utilities through the Electric Power Research Institute (EPRI), together sharing resources to develop advanced battery technologies and create an advanced battery industry. The partners have improved the performance of battery types including lead-acid, nickel/metal hydride, lithium-ion and lithium/polymer, with several of these technologies being developed by USABC.

Hybrids—combining two technologies to get the best of both

A hybrid electric vehicle (HEV) combines two or more energy conversion technologies in a single vehicle. For example, a hybrid might include both a fuel-flexible internal combustion engine and an electric motor powered by a battery. OAAT is working in cost-shared programs with each of the three major American auto manufacturers to create different hybrid concepts, with a goal of creating a production-feasible prototype by 1998.

Fuel cells—a high-efficiency, fuel-flexible solution

Initially developed as a power source for the space program, highly efficient fuel cells convert hydrogen and oxygen to produce electricity, while emitting little more than water vapor. The hydrogen fuel can be derived from ethanol, methanol, natural gas, or gasoline. One recent breakthrough allows onboard conversion of gasoline to hydrogen, bypassing the need for hydrogen fueling and allowing the operation of a fuel cell vehicle within the current fueling infrastructure.

Improving the heat engine

Internal combustion heat engines are standard equipment for today's automobile, and for hybrid vehicles of the near future as well. OAAT is working to improve the efficiency and emissions performance of the Stirling engine, the gas turbine engine and the diesel engine.

Utilizing cleaner, domestic fuels

Fuel-flexible vehicles such as those utilizing natural gas or ethanol as well as gasoline can displace significant amounts of foreign oil and reduce tailpipe emissions. OAAT and its partners are working to further the practicality of fuel-flexible vehicles and dedicated alternative fuel vehicles. They have built the most successful natural gas vehicle to date, combining a number of innovations to increase range without sacrificing driver comfort and convenience, as well as an ethanol-fueled vehicle that meets California's stringent ultra-low emission vehicle (ULEV) standards.

Taking weight out of the system

The auto industry is traditionally reliant upon heavy metals such as iron and steel, but OAAT recognizes that strategically replacing structural components with lightweight aluminum, composites and titanium provides an "instant" increase in fuel efficiency. OAAT and its partners are working to reduce the cost and improve the manufacturability of these advanced materials, and have achieved a number of breakthroughs that have led to an increase in the number of lightweight parts in production automobiles.

The Partnership for a New Generation of Vehicles (PNGV)

Initiated by President Clinton in 1993, PNGV is a cost-shared partnership bringing together nearly every area of the Federal government involved with transportation, and the entire American automotive industry in the pursuit of a specific aggressive goal: to create a production-ready 80 mpg car by 2004. With the diversity of technological expertise under the OAAT purview, the office is proud to support this goal, and has merged the PNGV time frame and goals within its own near- and intermediate-term mission. OAAT also pursues research that goes beyond even the aggressive PNGV goals.

For additional information, please contact:

Office of Transportation Technologies
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
(202) 586-8012
http://www.ott.doe.gov

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ASEE TODAY

BUILDING MORE THAN A BETTER CAR

The job anxieties that often plague graduating students did not affect many engineering seniors at Lawrence Technological University late last spring. As Charles Chambers, Lawrence Tech president, explains, "Many of our seniors already had three or four offers by March."

Such scenes are increasingly common at the 12 U.S. engineering schools participating in the FutureCar Challenge, for which ASEE provides financial administration services. The competition, cosponsored by the Department of Energy's (DOE) Office of Transportation Technologies and the U.S. Council for Automotive Research, invites student teams to design a vehicle that meets the goals of President Clinton's Partnership for a New Generation of Vehicles (PNGV). This initiative aims to produce by 2004 a working prototype of a conventional family sedan that gets 80 miles per gallon (mpg) but has the same price tag and performance as today's cars.

To date, none of the FutureCar teams has engineered a vehicle that gets 80 mpg. The University of California, Davis (UC Davis) team, which won the 1997 FutureCar Challenge where judges rank cars on the basis of their emissions, engineering design, fuel economy, and other factors, fielded a modified Ford Taurus that got 62 mpg.

The FutureCar Challenge helps participating engineering schools attract corporate recruiters, new research partners, and more.

What makes FutureCar participants such hot commodities in the job market? Educators point to the real-world engineering lessons the program teaches.

Andy Frank, advisor of the UC Davis team, says, "After designing, constructing, and discarding everything on our vehicle about three times, the students have learned to realistically estimate production times and make things happen in a controlled and limited time frame."

Alan Laub, engineering dean at UC Davis, adds, "FutureCar gives students the insight they need about teamwork to function in a modern corporate engineering environment."

And as West Virginia University team advisor Chris Atkinson points out, "The best vehicle at FutureCar is not the one that's theoretically superior but the one that performs the best on the day of the competition. That's a tremendous lesson for students."

Their grasp of these and other work-related lessons brings student participants multiple rewards. Graduates with FutureCar experience rank high on top companies' recruitment lists: Chrysler and Honda recently hired West Virginia FutureCar participants, while Hewlett-Packard and other microprocessor powerhouses have scouted team members at UC Davis. Doug Nelson, Virginia Tech team advisor, says several major organizations recruiting on his campus "have stated plainly that they

Secretary of Energy Federico Peña waves the flag for Michigan Tech at the 1997 FutureCar Challenge finish line.

will only interview students with hands-on team design experience like FutureCar."

The students are not the only ones who benefit, however. The program's high visibility helps engineering educators compete for new on- and off-campus resources.

FutureCar's success and popularity played a large part in Michigan Tech's decision to purchase and renovate a nearby warehouse to headquarter hands-on student automotive engineering efforts. Virginia Tech is currently refurbishing a building specially to house efforts like FutureCar.

Meanwhile, at Lawrence Tech and other universities, important new contracts with major corporations underwrite research to advance innovative technologies developed as part of the schools' ongoing work with FutureCar.

Chrysler recently awarded Lawrence Tech a $200,000 grant to investigate manufacturing carbon fiber vehicle drive shafts because of the university's expertise with lightweight, high-strength carbon fiber composite materials. A $350,000 contract from Ford to Lawrence Tech supports research on fastening lighterweight aluminum panels to traditional ferrous metal panels.

A Japanese firm has approached UC Davis about the possibility of funding research on new transmission concepts. One top U.S. automaker is negotiating with the university to finance the construction of two prototype cars that apply a new concept of energy utilization developed by students and researchers.

The Cooperative Automotive Research for Advanced Technology (CARAT) program launched by DOE last October provides additional funding to universities and small businesses working to surmount the technical barriers to producing an 80 mpg vehicle. If you would like to participate in either the CARAT program or the FutureCar Challenge, contact Shelley Launey, DOE's manager of vehicle competitions, at (202) 586-1573 for more information.

—GREG SEIGEL

1998 FutureCar challenge

Concordia University • Lawrence Technological University • Michigan Technological University
Texas Tech University • The Ohio State University • The University of Tennessee, Knoxville
University of California, Davis • University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan • University of Wisconsin
Virginia Polytechnic Institute & State University • West Virginia University

NEWS RELEASE

FOR IMMEDIATE RELEASE
June 10, 1998

CONTACT: Jack Groh, FutureCar Challenge
(401)732-1551
Pager: (800)609-3488

FUTURECAR CHALLENGE DOES IT: TOP ENGINEERING SCHOOLS IN THE COUNTRY HIT DOUBLE THE FUEL EFFICIENCY

AUBURN HILLS, Mich. -- After a year of long, hard hours, sleepless nights and nerve-wracking trial-and-error, two of the top engineering universities in North America have done what some said was impossible: they've doubled the over-the-road fuel efficiency of a mid-size American car without giving up any of the safety, comfort or performance.

In a series of road tests conducted on the grounds of the Chrysler Technology Center, two teams of student engineers driving hybrid vehicles, demonstrated the equivalent of 75 miles per gallon of gasoline. Running on the same test course, a comparable gasoline-powered vehicle turned in a 37 mile per gallon performance.

These fuel-stingy teams, from the University of Wisconsin at Madison and from Lawrence Technological University in Michigan, were also among the top finishers overall in the 1998 ***FutureCar Challenge***. Wisconsin tied a team from Virginia Tech for first place while the Lawrence Tech team came in just behind them for a third place finish.

The ***FutureCar Challenge*** is a competitive "race" to re-engineer the American family car of today into the super fuel-efficient car of the 21st century.

The ***FutureCar Challenge*** is one of the toughest real-world vehicle engineering competitions in the U.S. Thirteen top engineering schools are given brand-new, mid-size vehicles by Chrysler, Ford or General Motors along with ten thousand dollars in seed money. They then have one year to re-engineer the car to get double or triple the existing fuel economy (miles per gallon). There is a catch to all this - and it's a big catch. Teams are not allowed to strip down the car. The FutureCar students need to create an end-product that still maintains all the safety, comfort and convenience that American car buyers expect.

Winning this competition means a great deal more than just winning bragging rights and prize money. ***FutureCar Challenge*** is part of the larger Partnership for a New Generation of Vehicles (PNGV), the joint industry-government effort to address a wide range of transportation, manufacturing and global competition issues. The technological advances these students are helping develop will make a difference down the road in how well the United States is able to hold its leadership position in the global marketplace.

Testing took place June 3-10 at the Chrysler Technology Center and on the campus of Oakland Community College, both located in Auburn Hills, Michigan. Cars were judged on acceleration, handling, emissions, braking, fuel efficiency and consumer acceptability. They were also evaluated for their use of advanced materials and technologies.

It is in this area of advanced technology that the FutureCars are really making their mark. All of this year's entrants used hybrid powertrains - meaning they have more than one source of energy on board. In most cases, hybrids combine an internal combustion engine with an electric motor. Entrants this year demonstrated a variety of hybrids using a wide range of fuels including gasoline, diesel and alcohol. Two of this year's entries, from Virginia Tech and Texas Tech, used hydrogen-powered fuel cells - the same type of power source being used by American spacecraft. Several other colleges incorporated aluminum-intensive bodies, one of the newest weight-reduction techniques in the auto industry.

All of these vehicles incorporate technologies that are more advanced than those we see on the road today. But that will change in the near future. Every major auto manufacturer is currently working on these advanced vehicle technologies and its only a matter of time before many of them are ready for production and marketing.

In addition to saving consumers money at the gas pump through better mileage, there are the even more significant benefits of maintaining global competitiveness in the crucial automotive industry and the political and strategic benefits of decreasing America's dependence on foreign petroleum sources. The largest share of our country's imported oil is now used for transportation. With gasoline prices low right now, there is not a huge outcry for more fuel-efficient vehicles. But, as we've seen in the past many times, the cost of gasoline is difficult to predict and even more difficult to control.

1998 ***FutureCar Challenge*** competitors include: Texas Technological University, University of Tennessee at Knoxville, University of Illinois at Urbana-Champaign, University of California at Davis, Virginia Tech, University of Maryland, Concordia University, University of Michigan at Ann Arbor, Michigan Technological University, Ohio State University, Lawrence Technological University, West Virginia University and the University of Wisconsin.

In addition to major sponsorship by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), additional support is provided by the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency, Natural Resources Canada, the Aluminum Association, Goodyear Tire & Rubber Company, and the American Iron & Steel Institute.

###

Note to Editors: **A complete list of winners is attached to this news release**. Additional ***FutureCar Challenge*** media information is available on the world wide web at http://members.aol.com/futurcar

Please note the letter "e" is dropped from the final word "futurcar" in the web address.

1998 FutureCar Challenge
Final Standings

1st Place	Virginia Tech (tie)
1st Place	University of Wisconsin at Madison (tie)
3rd Place	Lawrence Technological University
4th Place	Michigan Technological University
5th Place	University of Maryland
6th Place	Concordia University

1998 FutureCar Challenge Special Awards:

Most Energy Efficient	Ohio State University
Best Acceleration	Virginia Tech
Best Dynamic Handling	Virginia Tech
Best Overall Engineering Design	Virginia Tech
Lowest Emissions	University of Maryland
Best Consumer Acceptability	Virginia Tech
Best Use of Alternative Fuels	University of Maryland
Best Use of Advanced Materials	University of Wisconsin at Madison
Innovations in Aluminum	University of Wisconsin at Madison

1998 FutureCar Challenge
Public Relations Outline for Sponsors/Hosts

Introduction:

The 1998 FutureCar Challenge provides a large number of promotional opportunities for sponsors, host sites and entrants.

An extensive national and local public information/media relations campaign has been running since October 1997 to promote the overall objectives of the competition. This campaign, developed and implemented by Groh Associates of Rhode Island, includes development of media materials, contact with targeted media including those media who have been invited to judge Engineering Design and Consumer Acceptability events, informational mailings to interested members of Congress as well as government officials and university officials. (Automotive media judges represent a number of publications including: Popular Mechanics, Car & Driver, the Washington Post, Ward's Automotive Publications, the Detroit News, Automotive Industries, Popular Science, Automotive News, and Automotive Manufacturing & Marketing.)

There are a number of promotional tactics that are available to sponsors/hosts - in particular there are activities that are not included in the overall public information campaign.

Suggested Sponsor/Host Promotional Activities:

The promotional activities available to sponsors/hosts include, but are not limited to:

- Separate news releases to trade and industry media highlighting the sponsor/host role in the FutureCar Challenge
- Releases on PR Newswire and Business Wire targeted to regional or industry-related media (depending on the sponsor/host desired audiences)
- After-event news releases that can include photos from the competition
- On-site photos with sponsors/hosts at events/locations including Oakland Community College, Chrysler Technical Center, Detroit Grand Prix and Henry Ford Museum (display and awards ceremony)
- Distribution of informational materials at the Henry Ford Museum display
- After-event radio promotion (nationally or in regional/local markets)

What Can We Do To Help:

Groh Associates believes that promoting the interests and exposure of key event sponsors is valuable to those sponsors/hosts as well as to the overall event. While we are unable to execute the specific activities on behalf of sponsors/hosts, there are a number of ways we can assist or support those activities including:

- Provide FutureCar Challenge media materials for reference use in preparing sponsor/host news releases
- Arrange for distribution of sponsor/host media materials at Henry Ford Museum (materials would need to be delivered to the Museum prior to the Wednesday, June 10 event)
- Recommend a local radio interview placement service that can arrange for post-event radio interviews featuring sponsor/host representatives along with FutureCar officials
- Provide individual team photos after the event (photos of teams will be taken at the Detroit Grand Prix and at the Henry Ford Museum by our photographer)

NOTE: Our FutureCar photographer has a very ambitious schedule for both events. If you have special photo needs, you might consider providing your own photographer. Groh Associates can refer you to some local photographers who you can contact.

1998 FutureCar Challenge
Public Relations Outline for Participating Universities

Introduction:

The 1998 FutureCar Challenge provides a large number of promotional opportunities for sponsors, host sites and university entrants.

An extensive national and local public information/media relations campaign has been running since October 1997 to promote the overall objectives of the competition. This campaign, developed and implemented by Groh Associates of Rhode Island, includes development of media materials, contact with targeted media including those media who have been invited to judge Engineering Design and Consumer Acceptability events, informational mailings to interested members of Congress as well as government officials and university officials. (Automotive media judges represent a number of publications including: Popular Mechanics, Car & Driver, the Washington Post, Ward's Automotive Publications, the Detroit News, Automotive Industries, Popular Science, Automotive News, and Automotive Manufacturing & Marketing.)

As you may recall, photos of university teams along with news releases were provided to local media (primarily print media) last October in the various media markets where FutureCar Challenge participating universities are located. In several cases, these stories were picked up by your local media - both on and off campus.

There are a number of promotional activities available as we prepare to release competition results in the coming week. We would like to work together with you to achieve maximum promotion for the overall competition as well as for each of the participating universities.

FutureCar Challenge Results Promotional Activities:

Because the FutureCar Challenge is a multi-faceted competition, there are lots of winners. While there are overall winning universities (ranked first through sixth) there are also more than a dozen other award categories including styling, engineering design, fuel-efficiency, emissions, consumer acceptability and several others. That means each university has many chances to win a first prize and most of them will.

Here's what we (FutureCar/Groh Associates) are planning over the next few days:

- News releases are being prepared that will be sent to you and to local newspapers late on Monday. These releases contain all of the information about the competition except for the name of the awards or awards that each university received.
- Each of these news releases will be customized to highlight the achievements of your university in your local media market area.
- Photos of most teams will be mailed out Monday to local newspaper editors. Editors will receive only photos of their local university team. In most cases, photos will only show a few (representative) team members. (It is extremely difficult to gather every team member of every team in the midst of a weeklong competition.) These photos will be planned for Wednesday delivery to editors.
- Copies of the same photos will be sent to your university public relations department addressed to the same person this memo is addressed to.
- Late Tuesday evening or early Wednesday morning, the actual award results will be faxed to you and to the local newspaper and television editors to fill in the "holes" in the news release.

- We have contacted network affiliate television stations in each university media market (ABC, NBC, CBS and Fox) and have also been in touch with the network bureaus located in the Detroit area. In many cases, we have been able to get the local station and the Detroit bureaus to talk to each other about coverage. As a result, we are hoping that the Detroit bureaus shoot the final day of competition (Tuesday, June9) and make that video available via network feed to the affiliates in your market. (Please note: Although we have facilitated this relationship, there is never a guarantee that other, more important news considerations on that particular day won't push the FutureCar story right off the network bureau schedule.)
- We have contacted each team and asked them to assign one team member to be a local media market interviewee. If a local newspaper or other media organization is interested in a quote from a team member, this person is the one designated to call the media back with a comment. If you need to reach the team in a hurry, we have attached a list of team pager numbers to this memo so you can reach them. Paging them directly is likely to be much quicker than calling us first.
- An overall news release about the competition - highlighting the top three finishers - will be faxed to national media (wire services, major newspapers, television networks) late on Tuesday night. A copy of this release will also be sent nationwide via PR Newswire on Wednesday.
- The final results of FutureCar competition will be mailed in the form of a news release to a selected list of national media on Friday, June 12.

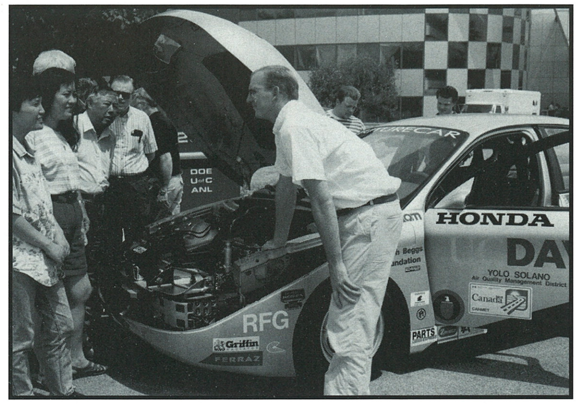
Promotional activities you may want to consider include, but are not limited to:

- Follow up calls to local television stations in your market to remind them of the availability of video feeds from Detroit network affiliates upon request. If the local station is unsure about setting this up, have them call us right away at (401)952-0886 and we can help them with information.
- Additional targeted press release in your market that contains detailed information about your team - including comments from your team members.
- Forwarding information to on-campus media for their use.

1998 FutureCar Challenge:

Showcasing Tomorrow's Advanced-Technology Vehicles Today

Someday, in the not too distant future, your car will have a fuel economy of 80 miles per gallon, and it will still be as comfortable, reliable, and safe as today's cars. That's the goal of the Partnership for a New Generation of Vehicles. And student teams from 13 of North America's finest engineering schools are working now to make that dream machine a reality.



The FutureCar Challenge presents a unique assignment: convert a conventional midsize sedan into a super-efficient vehicle without sacrificing performance, utility, and safety. To meet that goal, students apply cutting-edge automotive technologies, such as advanced propulsion systems, space-age materials, and alternative fuels like natural gas, ethanol, and hydrogen.

Each of the teams received a Taurus, or a prototype aluminum Sable, from Ford Motor Company, a Chevrolet Lumina from General Motors Corporation, or a Dodge Intrepid from Chrysler Corporation to serve as the platform. The three auto manufacturers also awarded $10,000 in seed money to each team.

The U.S. Department of Energy (DOE) has purchased two fuel cell stacks for use in the '98 Challenge. Two teams are working to adapt this technology to their competition vehicles.

The third annual FutureCar Challenge competition runs from June 4-11, 1998. It begins with a series of technical evaluations at the competition headquarters at Oakland Community College in Auburn Hills, Michigan. Industry and government engineers will measure fuel efficiency, exhaust emissions, range, acceleration, braking, handling, and drivability. The vehicles will also be judged on design, manufacturability, cost, and consumer acceptability. Awards will be given in 25 categories, and winners will share about $60,000 in prize money.

Highlights of the competition include design judging and a display at the Detroit Grand Prix; on-track testing at the Chrysler Technology Center in Auburn Hills; emissions and efficiency testing at the U.S. Environmental Protection Agency's National Vehicle and Fuel Emissions Laboratory in Ann Arbor; and a parade, display, and competition closing ceremony at Greenfield Village in Dearborn.

For more information, contact:
Shelley Launey
Manager of Vehicle Competitions
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
fax: 202-586-1600
e-mail: shelley.launey@hq.doe.gov

"The FutureCar program taps top engineering minds from schools around the country to work on a national challenge — creating a super-efficient car that meets our standards for performance and safety. Achieving this goal will make our auto industry more competitive and preserve our environment as we reduce a key source of greenhouse gases."
— Federico Peña, Secretary of Energy

"This contest challenges students to use the best advanced technologies and to build vehicles not even contemplated a few years ago. By converting conventional mid-sized production cars, the competition takes on added importance. These technologies may be a part of next-generation cars.
— Arv Mueller, Vice President, Vehicle Development and Technical Operations Group, General Motors Corporation

"...everyone involved in the FutureCar Challenge will have won. Industry and government will gain greater insight into strategies and technologies that are just now becoming available for use in the automobile in the future... [The student participants] will be a talented resource for America's future corporate and government work force."
— Vice President Al Gore

"You don't know cars until you've built, broken, rebuilt, rebroken, rebuilt, and finally put them together again — just in time. Working with a large group of students, professors, and companies is an excellent real-life experience."
— Student, University of Illinois-Chicago

SHOWCASING TOMORROW'S ADVANCED-TECHNOLOGY VEHICLES TODAY

S	M	T	W	T	F	S
Ju	1					
7	8	9	10	11	12	13

FUTURECAR

1998

Chrysler Technology Center ★ Oakland Community College

SPONSORS

- U.S. Department of Energy
- U.S. Council for Automotive Research
- Chrysler Corporation
- Ford Motor Company
- General Motors Corporation
- National Science Foundation
- U.S. Environmental Protection Agency
- Natural Resources Canada

PARTICIPATING SCHOOLS

- Concordia University
- Lawrence Technological University
- Michigan Technological University
- Ohio State University
- Texas Tech University
- University of California, Davis
- University of Illinois-Urbana
- University of Maryland
- University of Michigan
- University of Tennessee
- University of Wisconsin-Madison
- Virginia Tech
- West Virginia University

Managed by Argonne National Laboratory

3

DETROIT GRAND PRIX

JUNE 6, 1998

1998 FutureCar challenge

Concordia University • Lawrence Technological University • Michigan Technological University
Texas Tech University • The Ohio State University • The University of Tennessee, Knoxville
University of California, Davis • University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan • University of Wisconsin
Virginia Polytechnic Institute & State University • West Virginia University

MEDIA ADVISORY

DATE OF EVENT:
Saturday, June 6, 1998
Rain or shine

CONTACT: Jack Groh, FutureCar (401)732-1551
pager: (800)609-3488
cell: (401)952-0886

WHAT: **1998 *FutureCar Challenge* Competitors On Display at the Detroit Grand Prix**

An outdoor (under tent cover) display of vehicles competing in the 1998 FutureCar Challenge, a national competition among thirteen universities to re-engineer a mid-size family car to achieve super fuel-efficiency. Vehicles use a variety of advanced technologies including hybrid powertrains, aluminum-intensive bodies and fuel cells to increase mileage. Last year's winner, University of California at Davis, demonstrated better than 60 miles per gallon (highway) using an RFG-fueled hybrid configuration.

WHERE: **Belle Isle, Detroit Grand Prix, Main Entrance Exhibit Area**

WHO: **A group of industry and government officials as well as automotive editors will be on hand to judge a Design Review Competition event that will be held on-site during the display at Belle Isle.**

WHEN: **Saturday, June 6, 1998, 9 a.m. - 4:00 p.m. (exhibit)**

SIGNIFICANCE: These thirteen teams of engineering students in the ***FutureCar Challenge*** are part of the larger Partnership for a New Generation of Vehicles (PNGV), a massive venture undertaken by government, the auto industry and others to solve the most difficult technical challenge since the days of the "space race" - the global competition to build super fuel-efficient vehicles and, in so doing, protect the environment and reduce the United States' vulnerable and expensive dependence on foreign oil supplies.

PHOTO OPPORTUNITIES: All thirteen teams will be on location and available for interviews and photos. Also available are top officials from the auto industry and government working on the ***FutureCar Challenge*** and PNGV projects.

1998 *FutureCar Challenge*
Event Outline for Display at the Detroit Grand Prix
June 6, 1998

Here is a description of the midway display at the Detroit Grand Prix on Belle Isle that took place on Saturday, June 6, 1998:

Location and Size of Display Area:

The exact location of the display began at the "Y" intersection inside the DGP grounds along the right hand side of the public pathway. This area was one of the prime spots in the exhibit area. Nearly every ticketholder crossed this exhibit area as they entered the Belle Isle park.

** *Please see the attached DGP Display Map for details on how the vehicles were arranged on-site during the display.*

Our tent covered an area of 40 feet by 60 feet. The long side ran along the public pathway from the main entrance to the Detroit Grand Prix (DGP) grounds. This gave us a total of 70 feet of frontage along that pathway.

Media Contact/Coordination:

We issued an advisory to local (Detroit area) media as well as national automotive media telling them about the FutureCar exhibit on the DGP grounds. We also made available press materials on site, located at a press table in the display tent.

Several of the judges represented media organizations (*Popular Science* Magazine, *Automotive Engineering* Magazine) and their participation resulted in follow-up stories after the ***FutureCar Challenge*** 1998 competition ended. In addition, a local television crew (*UPN 50*) filmed two separate feature stories - both of which focused on the ***FutureCar Challenge*** vehicles.

On-Site Design Review Competition:

The Engineering Design Review competition was held on site at the Detroit Grand Prix. A team of judges representing the auto industry, government agencies and automotive media spent all day at Belle Isle evaluating vehicles one at a time.

Signage, Sponsor Logos:

Signage provided by Argonne National Laboratory was used to mark a media information table.

Other signage, including FutureCar banners with sponsor logos, was brought from the testing site and rehung at the DGP display site.

(more)

Transportation/Detroit Police Escort:

The Detroit Police Department provided the ***FutureCar Challenge*** with a motorcycle escort to and from the Belle Isle facility. While this escort proved unnecessary during the afternoon it did create an exciting spectacle as we proceeded through the streets of downtown Detroit.

Audience:

During the day-long exhibit, several thousand Grand Prix attendees passed through the area where our display was held. Many of them stopped to look at vehicles both inside and outside the display tent. Despite the ear-splitting noise level from the nearby race track, FutureCar team members did an excellent job both in making their oral presentations to the Engineering Design judges and in answering questions form event attendees about the FutureCar vehicles.

Detroit Grand Prix Display
Assigned Display Spaces

FutureCar vehicles on display at Belle Isle have been assigned spaces inside the tent. The spaces have been lined and marked. Please try to keep vehicles as close to the outside of tent as possible so that there will be adequate room for judges and spectators to circulate around the vehicles.

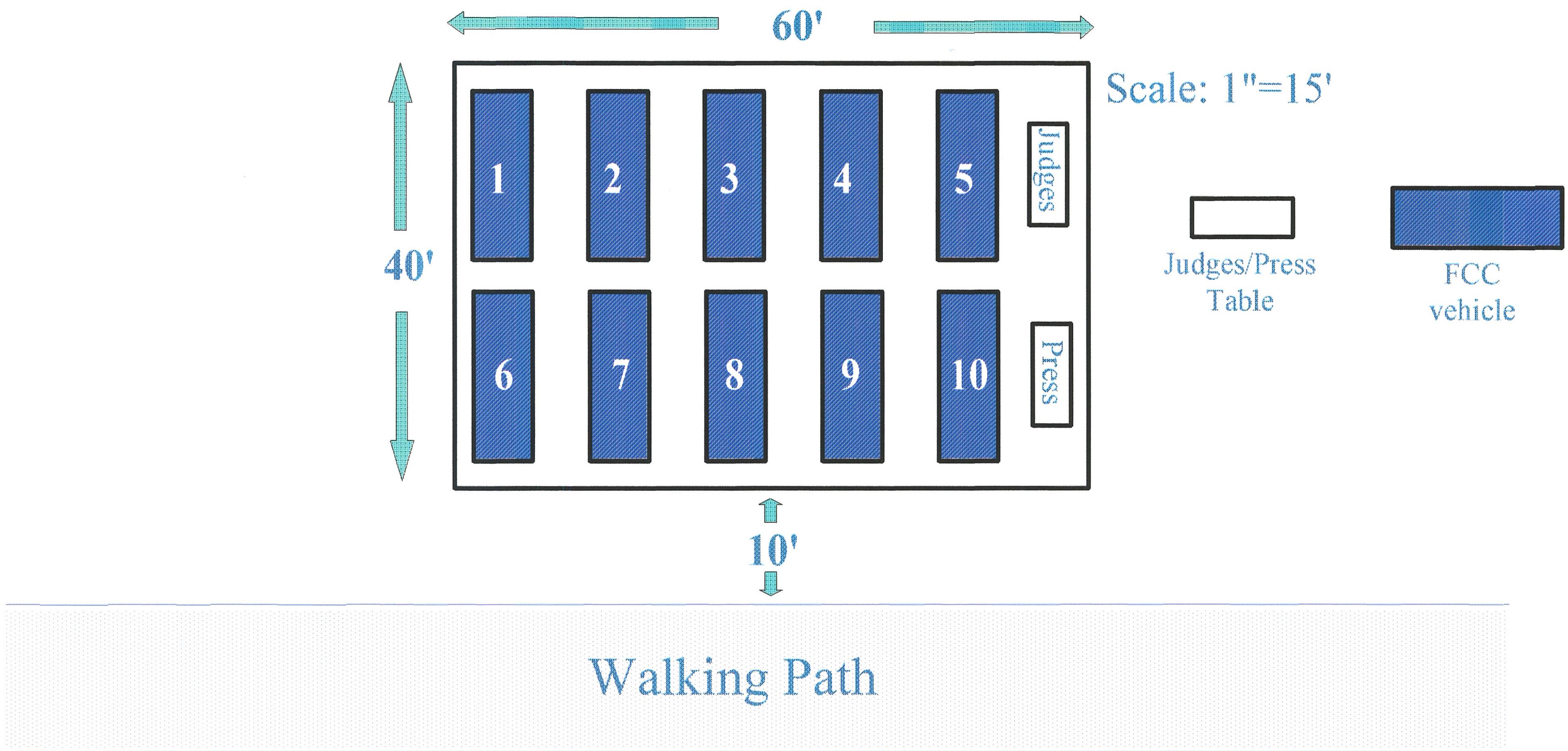
Assigned Display Spaces:

Team	Assigned Space Number
Wisconsin	1
Lawrence Tech	2
Virginia Tech	3
Concordia University	4
Maryland	5
Ohio State	6
Michigan Tech	7
West Virginia	8
Texas Tech	9
(TBD)	10

If there are 11 vehicles on Belle Isle, one vehicle will take the spot vacated by Lawrence Tech and remain there. When Lawrence Tech goes under the tent, they will take space number 7 (filling in for Michigan Tech while that school is on display outside).

Outside Display Times (in front of tent by walking path):

Lawrence Tech	8:30 - 11:00 a.m.
University of Michigan	11:00 a.m. - 1:30 p.m.
Michigan Tech	1:30 p.m. - 4:00 p.m.



Site Plan for Diplay at Detroit Grand Prix on Saturday, June 6, 1998

4

Henry Ford Museum

June 10 1998

1998 FutureCar challenge

Concordia University • Lawrence Technological University • Michigan Technological University
Texas Tech University • The Ohio State University • The University of Tennessee, Knoxville
University of California, Davis • University of Illinois at Urbana-Champaign
University of Maryland • University of Michigan • University of Wisconsin
Virginia Polytechnic Institute & State University • West Virginia University

MEDIA ADVISORY

DATE OF EVENT:
Wednesday, June 10, 1998
Rain or shine

CONTACT: Jack Groh, FutureCar (401)732-1551
pager: (800)609-3488
Andrew Johnson, Henry Ford Museum
(313)982-6126

WHAT: **"Past, Present & FutureCars" Exhibit at Henry Ford Museum Including the 1998 *FutureCar Challenge* Competitors**
An outdoor (under tent cover) display of two dozen vehicles representing alternative vehicle technologies from the past, present and future. Vintage vehicles from the Museum collection will be joined by current vehicles and prototypes form Chrysler, Ford and General Motors. Advanced vehicle technologies will be represented by the 13 entrants in the 1998 FutureCar Challenge, a national competition by universities to re-engineer mid-size vehicles to achieve super fuel-efficiency.

WHERE: **Henry Ford Museum, Village Road, Dearborn, Michigan**

WHO: **A large contingent of industry and government officials will be on hand to participate in the FutureCar Challenge awards ceremony at 1:00 p.m. in Lovett Hall (adjacent to the Museum).**

WHEN: **Wednesday, June 10, 1998, 9 a.m. - 1:00 p.m. (exhibit)**
Wednesday, June 10, 1998, 1:00 - 2:30 p.m. (awards)

SIGNIFICANCE: These thirteen teams of engineering students in the ***FutureCar Challenge*** are part of the larger Partnership for a New Generation of Vehicles (PNGV), a massive venture undertaken by government, the auto industry and others to solve the most difficult technical challenge since the days of the "space race" - the global competition to build super fuel-efficient vehicles and, in so doing, protect the environment and reduce the United States' vulnerable and expensive dependence on foreign oil supplies.

PHOTO OPPORTUNITIES: All thirteen teams will be on location and available for interviews and photos. Also available are top officials from the auto industry and government working on the ***FutureCar Challenge*** and PNGV projects.

USCAR   CHRYSLER CORPORATION   Ford   GM® General Motors   U.S. Department of Energy

CALENDAR LISTING

DATE OF EVENT:
Wednesday, June 10, 1998
Rain or shine
Editor: Please include with your listings of local events.

CONTACT: Andrew Johnson, Henry Ford Museum
(313)982-6126

"Past, Present & FutureCars", Outdoor Exhibit at the Henry Ford Museum, Village Road, Dearborn.

The exhibit contains two dozen vehicles and demonstrates alternative-powered cars from the past, present and future. Future automotive technologies are represented by vehicles from the 1998 FutureCar Challenge, a national competition among thirteen universities to re-engineer cars for super fuel-efficiency. The exhibit is free and runs from 9 a.m. until 1 p.m. outside the main entrance to the Henry Ford Museum.

For further information, call the Henry Ford Museum at (313)982-6126.

1998 FutureCar Challenge Special Events
Exhibit and Awards Ceremony
at Henry Ford Museum & Greenfield Village
June 10, 1998

Introduction/Overview:

In partnership with the Henry Ford Museum and Greenfield Village, we are planning a free, outdoor public display of ***FutureCar Challenge*** vehicles and Henry Ford Museum vehicles on June 10, 1998 at the Museum's location. Also on display will be several current model vehicles from Chrysler, Ford and GM including alternative fuel vehicles available on the market or in development. The theme and title of the exhibit will be "Past, Present and FutureCars."

The exhibit will be open to school children, the media and the general public. Invited guests will include representatives from the sponsoring organizations: the U.S. Department of Energy and USCAR representing Chrysler, Ford and General Motors.

Immediately following the public display, there will be a luncheon and awards ceremony held at Lovett Hall, located right next to the Museum.

Exhibits/Displays:

In addition to the thirteen FutureCars, we will be joined by two vehicles, a Stanley Steamer and a Riker Electric, from the Museum's collection of vintage automobiles.

Also on exhibit will be six vehicles from Ford, GM and Chrysler. Each manufacturer plans to display two vehicles - a current gasoline-powered production model and either an on-the-market alternative fuel vehicle or a prototype vehicle.

The exhibit will be ready and open to the public at 9 a.m. Displays would be available until approximately 1:00 p.m. at which time participants would be asked to move to Lovett Hall for the reception and awards ceremony. Vehicles should begin arriving at the Museum between 7:30 and 8:00 a.m. for setup.

Group Tours:

During the display times, we will have FutureCar staff members available to do a brief orientation presentation about FutureCar and about advanced vehicle technologies as demonstrated by these vehicles. The presentation will take place under a small, 20' x 20' tent in front of the main Museum entrance. A public address system will be set up inside the tent for use by the presenter.

The presentation itself will take about 3-4 minutes following which a FutureCar team member will lead a walking tour of the vehicles displayed under a separate tent (40' x 140') set up on the green in front of the Museum entrance. (See separate tour map attached to this event plan.) As students and others exit the walking tour, they will move to the open grassy area past the tent and can ask the tour guide any questions they want about the vehicles or the competition.

Students will not be able to stop for long during the walking tour and ask questions. This is the only way we anticipate we can get a large number of students through the display without huge delays.

Museum staff will greet tour groups as they approach the Museum and lead them to the presentation area.

Reception/Awards Ceremony:

Beginning at approximately 1:00 p.m., we will hold a luncheon at Lovett Hall at the Museum and Greenfield Village complex. The awards ceremony will be held there also, immediately following the luncheon.

Display Audience:

The display will be free and open to the general public. In addition , local media will be invited to attend. A particular audience will be local school students on field trips. As of April 1, there are approximately 500 students scheduled to tour the facility on that day. In addition to school groups, the Museum is expecting more than 4,000 regular attendees based on past attendance figures.

1998 FutureCar Challenge
University Schedule
for Henry Ford Museum & Greenfield Village
June 10, 1998

University Schedule:

7:30 a.m.	Arrival at Henry Ford Museum, Set up Vehicles in Large Display Tent (see attached display location chart)
9:00 a.m.	Exhibit opens to School Tour Groups and General Public, Group and individual tours of exhibit begin
1:00 p.m.	Exhibit officially closes (NOTE: we have hired a Museum security staff member to keep an eye on our exhibit area while we are all in the awards ceremony at Lovett Hall next door.)
3:30 p.m.	Break down exhibit at end of awards ceremony.

University Responsibilities:

Each University needs to provide one volunteer to help lead tour groups through the "Past, Present & FutureCar" exhibit tent. We suggest that you provide two students to work different shifts: one from 9 - 11 a.m. and another to work from 11 a.m. until 1 p.m. FutureCar students who are not busy with other duties are free to tour the Museum and the Greenfield Village exhibit areas.

Also during the exhibit, we would like to have at least one student with the vehicle at all times to answer any questions from the general public. You may rotate this assignment on any schedule you want as long as the car si not left unattended during the exhibition hours (9 a.m. - 1:00 p.m.)

Credentials:

In order to have access to the Museum and to the Greenfield Village exhibit area, you will need to wear your FutureCar Challenge credentials/pass. Please have them with you the day of the exhibit.

Tour Procedures:

The Tour of the exhibit is in two parts:

Tour groups will gather under the smaller tent (20X20) and receive a brief orientation talk from one of the FutureCar staff members. they will be told about the new technologies that are in use and in development. they will also be told a bit about the objectives of the FutureCar Challenge and the larger PNGV program. This orientation will take about 3-5 minutes.

Tour groups will then be turned over to a FutureCar university student who will lead the group through the exhibit area and answer any quick questions they may have about the vehicles. In order to get a large number of students through the exhibit in a limited amount of time, the tour group should proceed through the tent without too much of a delay.

Once outside the tent, the FutureCar student tour guide should move their group away from the exit and onto the grassy area in front of the Museum. There the students can ask any other questions they have before they leave the exhibit area and head into he Museum itself.

Try to be helpful to the students and communicate to them the wonders of engineering.

Breakdown:

We will break down the exhibit at approximately 3:30 p.m.

1998 FutureCar Challenge
Tour Group Presentation Outline
for
"Past, Present & FutureCars" Exhibit
at
The Henry Ford Museum & Greenfield Village, Dearborn, Michigan
June 10, 1998

Each presentation should run 3-5 minutes. Once the orientation speech is finished, students from FutureCar teams will act as tour guides and escort the tour groups through the exhibit tent. Students may stop to ask questions in the tent but try to keep them moving along during the tour as much as possible. this will allow us to let more groups experience the exhibit.
Speaking Points for Presenters
Here are some key points you should address in preparing student sand other spectators for their tour of the exhibit:

<u>Why is it called FutureCar Challenge?</u>

- "Future" in this context means new, advanced technologies. Things that are more advanced than current vehicles but that we may all see in the future.
- "Car" in this case refers to the mid-size American family car that we all use to go to soccer practice, school, vacations trips, shopping, etc. Specifically, the cars used as the basis for FutureCar are Ford Taurus and Mercury Sable, Chevrolet Lumina, and the Dodge Intrepid.
- "Challenge" refers to the fierce competition going on around the world to create fuel-efficient cars. From an engineering viewpoint, creating super fuel-efficient cars is even tougher than putting a man on the moon.

<u>Why is fuel efficiency important?</u>

- Lots of reasons: First of all, it saves us lots of money at the gas pump. If every family car in the country got the same mileage that last year's winning FutureCar got (U.C. Davis) we would spend 57 billion dollars less at the gas pump each year.
- Even more important is the need to compete with other countries trying to build super cars. To remain a leader in the auto industry, the United States needs to develop and make available the best and most advanced cars we can. Other wise, everyone will buy those cars from some other country and the jobs will be lost here.
- Decreasing our use of gasoline also is important for our national security. right now, the United States imports most of its oil form foreign countries. That makes us vulnerable to interruptions of that oil supply caused by wars or natural disasters or political problems. Because so much of our imported oil is used in transportation - more than half - cutting our transportation need for gasoline cuts down our need to buy so much oil overseas.

<u>What is different about these cars?</u>

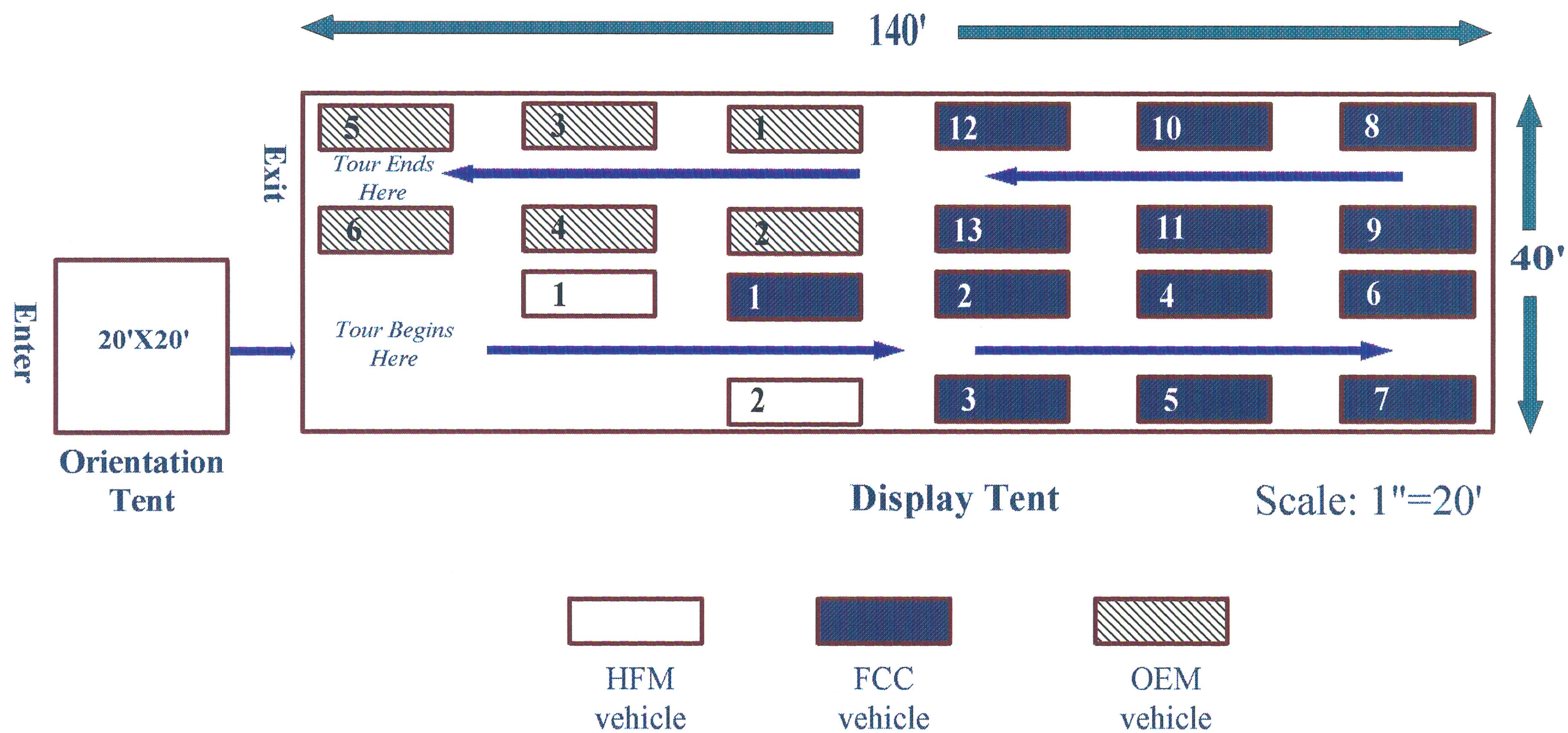
Most of them have a hybrid drive train which means having more than one source of energy. Most hybrids use an internal combustion engine along with an electric motor. Some cars in the

FutureCar Challenge use hydrogen fuel cells - similar to the ones that provide power in spacecraft and in space stations like Mir.

Some of the FutureCars use aluminum bodies that cut down on weight and, since the car weighs less, the engine works less and the car saves energy that way.

<u>Cars you will see inside include:</u>

Riker Electric
Stanley Steamer
Wisconsin: aluminum intensive Mercury Sable, diesel electric hybrid
Lawrence Tech: Ford Taurus, diesel electric hybrid
Virginia Tech: fuel cell electric hybrid Chevy Lumina, winner two years ago, name "Animul"
Concordia: Dodge Intrepid, diesel-electric hybrid
Maryland: Dodge Intrepid, that runs on E85 (mostly alcohol mixed with some gasoline)
Ohio State: Chevy Lumina, diesel-electric hybrid
Michigan Tech: Dodge Intrepid, diesel-electric hybrid
West Virginia: aluminum intensive Mercury Sable, CNG-electric hybrid
Texas Tech: Chevy Lumina, fuel cell electric hybrid, new entrant
Illinois: Dodge Intrepid, bio-diesel-electric hybrid, more than 60 students worked on
Univ of California, Davis: aluminum intensive Sable, gasoline-electric hybrid, last year winner
Tennessee: Dodge Intrepid, CNG-electric hybrid, has competed in events since 1972
Univ of Michigan: Ford Taurus, diesel-electric hybrid
General Motors (check on vehicles)
Ford (check on vehicles)
Chrysler (check on vehicles)



Site Plan for "Past, Present & FutureCars" Exhibit at Henry Ford Museum, June 10, 1998

The Aluminum Association
Incorporated

900 19th Street, N.W.
Washington, D.C. 20006

NEWS

June 6, 1998

Contact:
Rob Krebs/John Bagwell
202-289-2001

Top Automotive Engineering Students Demonstrate Innovations in Aluminum Technology

New Award Highlights Aluminum's Growing Importance in Automotive Design

What:

- **FutureCar Challenge** – Vehicle safety and design issues lead today's headlines. How will tomorrow's cars continue the improvements in safety and fuel efficiency while maintaining performance and affordability? The FutureCar Challenge will display innovative performance-tested designs that reduce weight to improve fuel efficiency - developed by top university design and engineer teams.

- **Innovations in Aluminum Award** – Because aluminum is one of the most important materials to reach these goals, a new category prize was created this year in the FutureCar Challenge – ***Innovations in Aluminum*** – an award recognizing the innovation, feasibility, weight-reduction, recyclability and craftsmanship of a team's use of aluminum.

Who:

- Three hundred participants and top engineering students on teams representing the following colleges and universities: California-Davis, Concordia, Illinois, Lawrence Tech, Maryland, Michigan-Ann Arbor, Michigan Tech, Ohio St., Tennessee, Texas Tech, Virginia PolyTech, Wisconsin, West Virginia U.
- J. Stephen Larkin, President of the Aluminum Association will present the **Innovations in Aluminum Award**.

Why:

- Aluminum has a crucial role to play in meeting the Partnership for a New Generation of Vehicle (PNGV) challenge. Each major car manufacturer has an aluminum-intensive vehicle program currently underway.
- From 1991 to 1996 use of aluminum in North American cars and trucks has increased more than 80 percent.
- Aluminum provides the body stiffness and crashworthiness equal to that of traditional auto body materials.

Where:

Henry Ford Museum & Greenfield Village
20900 Oakwood Blvd. (Front Lawn of the Museum outside front entrance)
Located at Oakwood Blvd. and Village Road in Dearborn just west of the Southfield Freeway (M39) and south of Michigan Ave. (U.S. 12).

When:

- **Wednesday, June 10**
- Open exhibition of vehicles from 9:00 AM to 1:00 PM
- Lunch 1:00 to 2:00 PM (Please RSVP – Judy Abraham 703-754-0066)
- **Innovations in Aluminum** presentation 2:00 PM – Inside the Museum

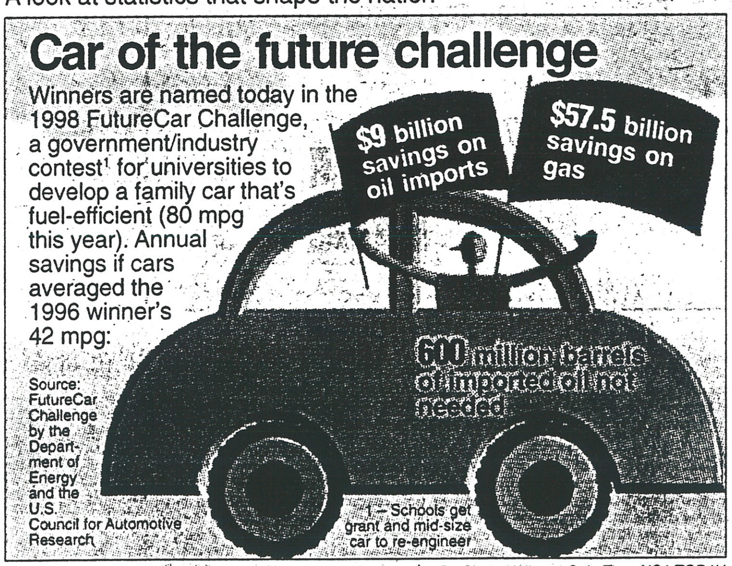
5

USA TODAY®

NO. 1 IN THE USA . . . FIRST IN DAILY READERS

USA SNAPSHOTS®

A look at statistics that shape the nation



By Cindy Hall and Quin Tian, USA TODAY

FOR USA

USA TODAY

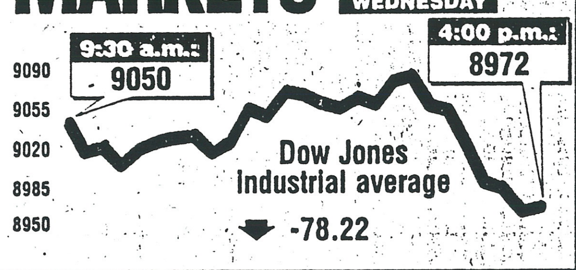
NO. 1 IN THE USA . . . FIRST IN DAILY READERS

MONEYLINE

A QUICK READ ON THE TOP MONEY NEWS OF THE DAY

MARKETS

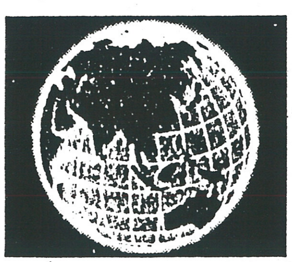
WEDNESDAY



Index	Close	Chng.
Nasdaq composite	1773.25	↓ 27.51
S&P 500	1112.28	↓ 6.13
T-bond, 30-year yield	5.70%	↓ 0.08
T-bill, 3-mo. discount rate	5.13%	↑ 0.01
Gold, oz. Comex	$292.90	↓ $0.30

Market Scoreboard, 3B; currencies, 5B

TODAY'S ASIA MARKETS UPDATE



Today's Tokyo market in first half hour:

NIKKEI

225-share average:
15,127.67 ↓ 1.38%

YEN

Yen per dollar: **141.53**

FUTURE CAR: Students from University of Wisconsin at Madison and Virginia Tech tied for first place in the FutureCar Challenge to design fuel-efficient cars.

Written by Sara Nathan from staff and wire reports

31 C2

NEWSBREAK

John Lypen

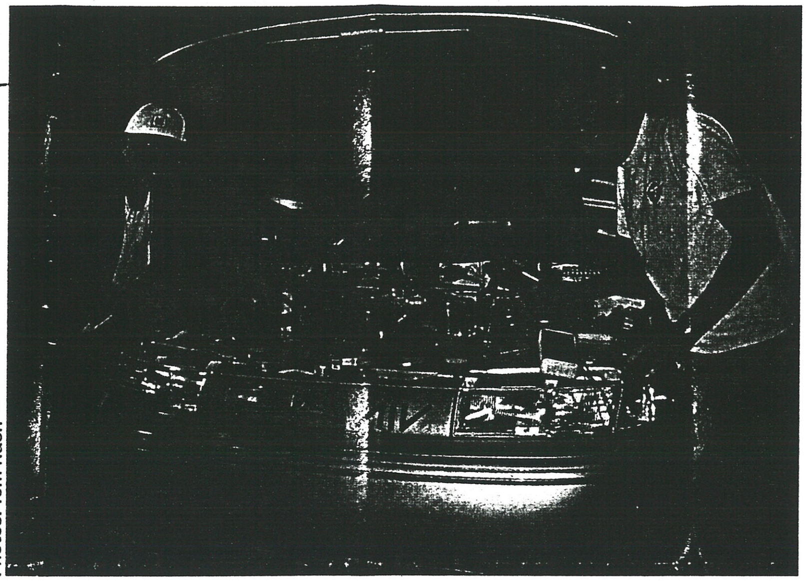
1998 FutureCar Challenge

The third annual FutureCar Challenge was held recently at Oakland Community College in Auburn Hills, Michigan, and hosted by Chrysler Corp.

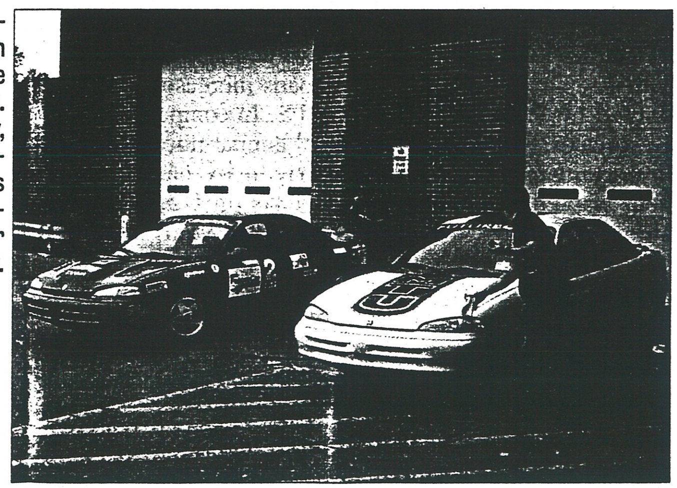
The competition is sponsored by the Partnership for a New Generation of Vehicles (PNGV), a consortium of Chrysler, Ford, General Motors and the U.S. government. The ultimate goal of PNGV is to significantly improve U.S. competitiveness in manufacturing, to apply commercially viable innovations to conventional vehicles and to develop technologies for vehicles that will achieve up to 80 miles per gallon while maintaining performance, safety and affordability. Other sponsors include the U.S. Dept. of Energy, the EPA, the Aluminum Association, the American Iron and Steel Institute, Goodyear, Detroit Edison and the National Science Foundation.

Thirteen of North America's top engineering schools competed for honors by each creating a marketable, practical vehicle that could be produced using current technologies. Each school was given a Chevy Lumina, Ford Taurus, Mercury Sable or Dodge Intrepid to modify, along with $10,000 seed money. The students applied cutting-edge technology to meet the tough guidelines of the competition, including advanced propulsion systems, space-age materials and alternative fuels such as natural gas, ethanol and hydrogen.

Photos: Tom Nash



Faculty Advisor Dr. Andrew Frank, left, and Brian Johnston with the University of California-Davis entry in the 1998 FutureCar Challenge. UCD won last year, but Virginia Tech and the University of Wisconsin tied for first place this year.



FutureCar vehicles from Concordia University and Michigan Technological University are readied for their run-through. After judging for fuel efficiency, emissions, driveability and other technical factors, the judges considered design, manufacturability, cost and consumer acceptability.

University of California-Davis, last year's winner, entered a new vehicle this year, which had been constructed in only two months. It's powered by a parallel, charge-depletion hybrid system that uses a large nickel-metal hydride battery pack mated to a custom-designed 75kW Unique Mobility electric motor. A 660cc Subaru gasoline engine is on board to extend range.

The motor and engine drive the wheels through a computer-controlled Nissan Continuously Variable Transmission (CVT), which transfers power via a steel-plate belt and variable-width pulleys.

continued on page 56

The chassis and body is an aluminum-intensive Mercury Sable, which tops out at about 2800 pounds, providing increased performance and an extended operating range.

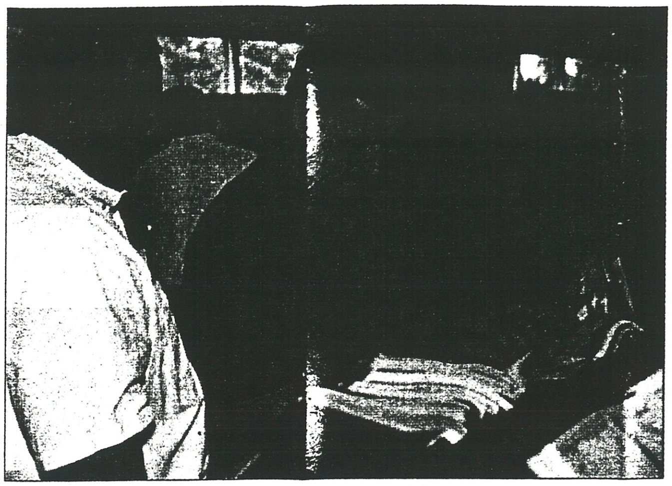
According to UCD's Faculty Advisor, Dr. Andrew Frank, "This vehicle has fewer moving parts than a Model T and still has all the amenities for comfortable driving. And, with 100 horsepower and a 1000-mile highway range, it surpasses the efficiency of today's vehicles."

After several days of testing and judging on fuel efficiency, exhaust emissions, range, acceleration, braking, handling and driveability, the vehicles were judged for design, manufacturability, cost and consumer acceptability. This year, there was a tie for first place between Virginia Tech and the University of Wisconsin, with each school taking honors in several categories.

Aftermarket Statistics

Three separate studies conducted by Lang Marketing Resources, Inc., focus on important trends that will help shape the future of the aftermarket.

According to one report, as of Jan. 1, 1998, the age of domestic cars on U.S. roads averaged 9.6 years—a post-World War II record high for cars in operation. According to James A. Lang, president of the research firm, "Domestic car average age skyrocketed during the 1990s, increasing 1.5 years between 1990 and 1998. This significant increase...has been fueled by two factors—the shrinking car share of new light vehicle sales and the continued sales growth of foreign cars in the U.S."



Robert Pressley (right), driver of the No. 77 Jasper Engines/Federal-Mogul Ford Taurus, and members of his pit crew recently had a chance to man the lines on Federal-Mogul's technical hotline. It was a hectic afternoon.

In the second report, Lang found that the average annual mileage of light vehicles increased approximately 10% in the last ten years, from 10,800 to 11,900 miles. The survey also revealed that during the same period (1987-1997), the number of cars and light trucks on U.S. roads increased more than 21%. In comparison, the total annual number of miles driven by cars and light trucks on U.S. roads over this ten-year period increased nearly one-third.

"The changing mix of light vehicles in operation, their advancing average age, as well as the greater number of miles the average car and light truck is driven each year, all will have important implications for the mix of aftermarket products sold, as well as where these products are purchased and installed," predicted Lang.

Finally, Lang's analysis of jobber stores has determined that the number of jobber locations in the U.S. dropped nearly one-quarter during the past ten years. Jobber store population peaked at 31,000 in 1981. By midyear 1997, the jobber population fell to 21,245 stores.

"Growing aftermarket competition, in both the retail and wholesale sectors, is the most important factor determining the rate of jobber store decline by geographic region. Of particular significance is the growth of retail auto parts stores and their entry into the wholesale market, as well as the increase in two-step distribution across a broad-range of product categories," observed Lang, who predicts the number of jobber stores will decline to 19,700 by the year 2000.

Tech Line Goes Racing

Federal-Mogul, an automotive parts manufacturing giant, recently turned its technical support line over to a NASCAR Winston Cup driver and his crew for an afternoon. Sort of.

During a recent visit to the company's world headquarters in Southfield, Michigan, Robert Pressley, driver of the No. 77 Jasper Engines/Federal-Mogul Ford Taurus and members of his pit crew had a chance to man the lines on Federal-Mogul's busy tech hotline. After their brief stint in the hectic world of technical hot potatoes, No. 77's crew couldn't wait to get back to the relatively tranquil world of Winston Cup racing!

When not in the hands of NASCAR professionals, the Tech Line is composed of about ten full-time staffers with a combined total of over 170 years of automotive experience.

Most of the Tech Line specialists are ASE-certified, and they're responsible for providing assistance to virtually anyone handling a Federal-Mogul part—from WDs to jobbers to the end user. There's even a special line dedicated to certified engine rebuilders. The service is offered 12 hours a day and typically handles 10,000 calls a month! On-line access to electronic parts catalogs, specifications and service information makes it possible for Tech Line personnel to provide immediate answers to most questions.

Lost in Space?

IVS, Inc., a developer of interactive voice technology-based products for the automotive industry, is marketing Avstar, a new navigational system. The device is 100% voice interactive, allowing for hands-free, eyes-free operation. The system uses no screen to display route maps, and all routing is done by voice command. Weighing only about 5 pounds, Avstar is easily portable to any vehicle, or it can be permanently mounted.

FutureCar Challenge

FUTURECAR TEAM LOOKS TOWARD 1999

Seasoned Illini engineers continue College tradition of automotive team projects.

About six years ago, two faculty members and a handful of students from the Electrical and Computer Engineering and Mechanical and Industrial Engineering departments entered the Hybrid Electric Vehicle Challenge, sponsored by the Department of Energy and Ford Motor Company. Two years later, a 60-student multidisciplinary College of Engineering team won many awards, including Best Engineering Design, for their entry in the competition to see which university team could design and build the best multi-powered, low-emission, high-efficiency, commercially viable car.

The HEV project was a success, and it paved the way for similar student projects. Following the HEV came the Sunracyer competition entries, the Sun Chief in 1995 and the Photon Torpedo in 1997, which also were multiyear, multidepartment efforts involving scores of students organized into subteams, with funding coming largely from external sources. This past year students have been at work on a fourth collegewide project, the FutureCar, which is the most technologically sophisticated yet.

"We have the same goal as all the earlier student projects," said M&IE senior Jeremy Cellarius, who leads the FutureCar team. "We take the ideas you learn in the classroom and see how they are implemented in practice."

This has been the first year that a University of Illinois team has entered the FutureCar Challenge, but it's the third year for the competition, which is sponsored by the U.S. Department of Energy and the U.S. Council for Automotive Research (USCAR), a cooperative effort of the Big Three automakers. Thirteen teams participated in the 1997-98 challenge.

"The FutureCar program taps top engineering minds from schools around the country to work on a national challenge — creating a super–fuel-efficient car that meets our standards for performance and safety," said Energy Secretary Federico Peña. Each team received a standard 1997 sedan (UIUC's is a Dodge Intrepid), a set of standards, and $10,000 seed money. The rest is up to the students.

It's no easy task. The FutureCar objective is "a mid-sized car having up to three times the fuel efficiency while maintaining the performance, safety, and affordability of today's production vehicles," according to the rulebook. The

Above: Pictured at the FutureCar competition with the 1998 UIUC car are Bryan Urteaga, John Epple, Mike Kukovec, and Greg Hasen.

78A – 2290 MAGAZINE
POPULAR SCIENCE
New York, NY

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Monthly

SEPTEMBER 1998

Bacon's

AUTOMOTIVE

3182

FUTURE CARS

Students Tackle Fuel Economy

AN AFFORDABLE full-size car that gets 80 miles per gallon? That's the goal student engineers pursued in the Future Car Challenge, a competition among major U.S. engineering schools sponsored by the Department of Energy and the U.S. Council for Automotive Research. The winning designs roughly doubled the range of a conventional gasoline-powered production car but fell short of the 80-mpg objective.

Entries had to be based on production cars, although schools could use an experimental aluminum body donated by Ford. Co-winner University of Wisconsin used the Ford body, a diesel-electric hybrid drive system, and additional lightweight components. In the hybrid system, electric power stabilizes the diesel power in an efficient range and braking energy is captured.

The design from the other co-winner, Virginia Tech, featured a fuel cell that produced electricity from compressed hydrogen. The school's fuel cell wasn't actually operational, but the car's innovative packaging and performance on batteries alone were enough to draw the attention of the judges.

The students tackled the same issues facing carmakers as they attempt to develop a high-mileage supercar that would retain the utility and convenience features of a midsize sedan while tripling average fuel economy.—*D.M.*

DAILY NEWSPAPER
THE COLUMBUS DISPATCH
Columbus, OH

Circ-(M) 268,670 (S) 401,612

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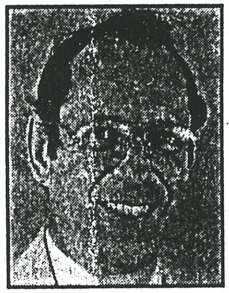
Drivers of gas misers await eventual vindication



DAVID LORE

Engineering students from 13 campuses gathered last week in Detroit for the Third Annual FutureCar Challenge only to find that American motorists aren't much interested in change or challenge.

FutureCar is a government- and industry-sponsored college competition to find ways to triple fuel economy in typical, midsize family sedans. The students, including a team from Ohio State University, gather each June near Detroit to put their prototype cars through competitions and tests.

Nearly all the experimental cars are hybrids, pairing an electric motor with an internal-combustion engine powered by diesel, gasoline, alcohol or compressed natural gas. Students can reduce vehicle weight, but the car must retain the features Americans want (air conditioning, acceleration, air bags) at a cost they can afford.

But what exactly do American motorists want? Power, size and an endless river of cheap gas, according to a poll released last week by AutoPacific of Santa Ana, Calif. In other words, the highway of the '90s.

With the average price of gasoline just above a dollar a gallon, motorist concerns about fuel economy have disappeared beneath a thundering herd of gas-gulping vans, pickup trucks and sport-utility vehicles.

Seventy percent of those polled by AutoPacific said they wouldn't switch to smaller, lighter, fuel-efficient models unless gasoline prices topped $2 a gallon. The rest said they wouldn't downsize regardless.

So it seems American motorists aren't looking for FutureCar as much as they are for Back-to-the-FutureCar.

Back, that is, to the 1950s and '60s, when gas cost a few dimes a gallon and mighty metal monsters ruled the road. I'm thinking of such cars as the bright red Chevrolet Impala I bought from my father-in-law when I moved to Columbus in 1965, an ocean liner of a car that required tugboats to park.

My next car was a more sensible Volkswagen, and so was the next, and the next, and the next.

Suddenly, in the '90s, I feel like one of those muskrat-sized mammals in the Jurassic, constantly dodging dinosaurs.

FutureCar spokesman Jack Groh is confident, however, that we vehicular muskrats someday will inherit the road.

"I don't think the hybrids or electrics will push gasoline vehicles off the road in our lifetime, but you will see various niches filled by different power trains, hybrid vehicles, fuel types," he said.

"People like these SUVs, but when you look at the numbers, this is not sustainable. The bubble is going to pop sooner or later. We can't send troops into the Middle East every time there's a threat to our supply of oil."

FutureCar is a small part of a government-industry program called the Partnership for a New Generation of Vehicles. It seeks to develop prototype sedans by 2004 that can get 80 miles per gallon.

In April, however, a review by the National Academy of Sciences concluded that the hybrid, diesel-electric cars promoted under the Partnership program won't appeal to motorists or regulators.

An 80-mpg hybrid would be too expensive to buy, too complex to maintain and too polluting to license. A better goal would be a cleaner, lighter, diesel-powered sedan capable of 60 mpg, reviewers said.

Giorgio Rizzoni, however, doesn't want to abandon the 80-mpg goal prematurely.

Rizzoni, an OSU professor of mechanical engineering, said he thinks the Big Three automakers soon will switch to hybrid-electric power trains in some larger models so they can keep selling trucks, vans and SUVs without running afoul of federal fuel-economy standards.

Acceptance is all in the marketing, he said. You might have to pay more for these hybrids, but the benefits would be touted in terms of enhanced performance, not fuel economy.

The professor sees the FutureCar and Partnership programs sowing seeds of change. Tomorrow's auto engineers are learning there are alternatives to the gasoline engine, he said.

These alternative systems won't be built unless they sell, but market demand can change — and U.S. automakers have learned the hard way that they'd better be prepared to change with it.

So all you dinosaurs out there on the road, enjoy the good times while they roll. We muskrats will just bide our time, nibbling along and trying to stay out of your way.

David Lore is science reporter for The Dispatch. *He is online at:*
dlore@dispatch.com

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3 STAR EDITION
JUNE 1, 1998

Bacon's

3182

Students Ready To Roll Hybrid Car Into Future

By Glen Martin
Chronicle Staff Writer

Davis, Yolo County

Spread out in pieces on the floor of an engineering department workshop at the University of California at Davis, the car of the future doesn't look particularly futuristic. Nor will that impression change this morning, when the car is assembled and heading east on Interstate 80.

In fact, it will bear a striking resemblance to a Ford Taurus.

And that's because — well, it is. On the outside, anyway.

Under the hood, it's another beast entirely: A unique hybrid engine drives this Taurus, one that

UC DAVIS: *Page A15 Col. 1*

3182a

UC Davis Team Ready to Roll Futuristic Hybrid Car to Competition

From Page A13

utilizes both gasoline and electricity. It gets close to 70 miles per gallon on the freeway, and its batteries need to be recharged once every 1,000 miles. It can accelerate as fast as a regular car, and it discharges 90 percent fewer emissions than a stock Taurus.

The car was built by U.C. Davis students from a concept developed by engineering professor Andrew A. Frank. It will face 12 competitors Wednesday in Detroit at the third annual FutureCar Challenge, a contest sponsored by the U.S. Department of Energy that is designed to encourage the development of fuel-efficient cars.

Frank, a couple of other instructors and a pit crew of 25 students have been working around the clock to get their car ready for Detroit. As the hours ticked by yesterday, the kids worked in shifts. While some put the almost completely disassembled vehicle together, others slept on car seats or munched fast food. All were exhausted.

"Par for the course," said Frank. "Everything seems to come together at deadline time."

U.C. Davis won the contest last year, and Frank thinks his students have a pretty good shot at retaining their championship with their newest entry.

"There are a lot of improvements over last year's car, and we have even higher hopes for the 1999 competition," he said. "We work on a two-year schedule for our major redesigns, and we have some pretty big things planned."

Still, the basic concept behind all the vehicles — a gas/electricity hybrid power plant — remains the same. Frank's students are true believers in hybrid power trains, and many hope to work on the commercial production of cars that use them — an industry that doesn't yet exist.

"We're pushing to make California the center for alternative fuels and hybrid power train designs," said Eric Chattot, who has worked with Frank for five years. "Completely electric cars aren't viable for long trips — they just don't have the range."

The power plant for the U.C. Davis car consists of a very small gas engine and an extremely large electric motor.

"Under typical driving conditions, about 97 percent of the energy used by the power train comes from electricity," said Frank. "But the gas engine makes everything far more versatile and practical."

An on-board computer automatically determines the best operating parameters for the car. For short distances or stop-and-go driving, the car runs completely on electricity. For longer runs, the gasoline engine automatically kicks in, augmented by the electric motor. It takes about 6.5 hours to recharge the batteries that power the electric motor.

"The gas engine is adjusted to run only at optimum efficiency — it has a narrow throttle range," said Frank. "Acceleration is handled by the electric motor, and it does a good job. You can lay rubber in this car."

Frank said there has been considerable resistance to hybrid cars from Detroit executives.

"Let's just say they want to keep doing things as they've been doing them," he said. "But I think the adoption of this technology is inevitable. It's the only way we'll meet emission standards and fuel economy without sacrificing performance."

Besides, said Frank, the automobile industry wouldn't have to retool to produce hybrid cars.

"They could start making them immediately, using the production lines they already have," he said. "Hybrid power train cars wouldn't cost any more than regular cars."

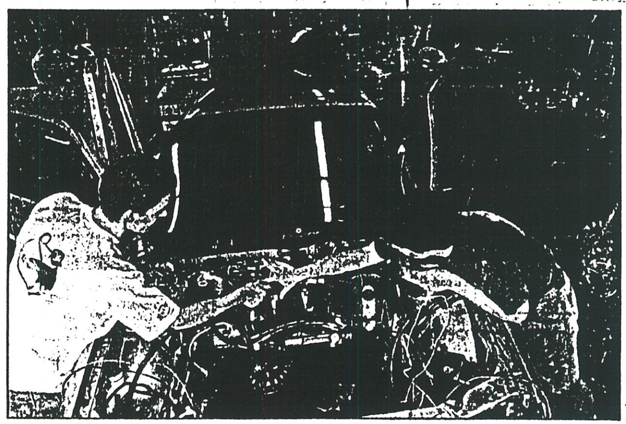
But while Detroit may have adopted a policy of not-so-benign neglect with hybrid cars, international car manufacturers have thrown big bucks behind hybrid automobile research.

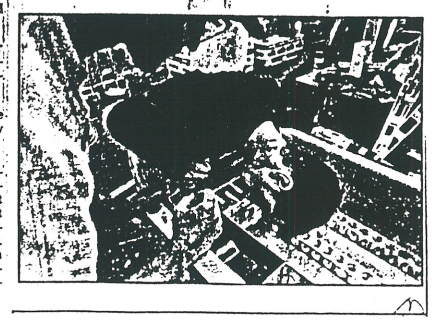
"The Japanese are right on our heels," Frank said. "Sooner or later, someone is going to start making these cars."

Chattot thinks hybrid cars are at the point the Internet was a few years ago.

"When Internet access first became available, it was exotic, unusual," he said. "Now it's almost considered essential, because it has disseminated widely in people's homes. It's commonplace. The same thing will happen when people start driving these cars — the advantages will become obvious."

PHOTOS BY TIM KAO/THE CHRONICLE





While graduate student Brian Johnston napped (top photo), other students, including Nich Struven (at left, in photo at left) and Eric Chattot worked on the engine-less engine compartment of the FutureCar. Ivan Menjak (in bottom photo) of Ovonics, the battery manufacturer for the car, checked the handmade casing as Brian Huff looked on.

"We're pushing to make California the center for alternative fuels and hybrid power train designs. Completely electric cars aren't viable for long trips — they just don't have the range."

ERIC CHATTOT
Member of FutureCar Crew

The Gate www.sfgate.com Return to regular view

Students Ready To Roll Hybrid Car Into Future

Glen Martin, Chronicle Staff Writer
Monday, June 1, 1998

URL: http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/1998/06/01/MNH80599.DTL

Spread out in pieces on the floor of an engineering department workshop at the University of California at Davis, the car of the future doesn't look particularly futuristic. Nor will that impression change this morning, when the car is assembled, secured to a trailer and headed east on Interstate 80.

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MAY 29, 1998

AUTO NOTES 3182
By Bruce Grant

UC Davis team to defend title

Professor Andrew Frank and his team of University of California, Davis, engineering students will be in Michigan June 3-10 to defend their title in the 1998 Future Car Challenge.

Last year, the UC Davis team averaged better than 60 miles per gallon fuel economy in a Ford Taurus using a "hybrid" power train fueled by gasoline and electricity.

Thirteen universities from throughout the United States have been building super fuel-efficient cars for the challenge. Not stripped-down, impractical one-seater, but rather a midsize family sedan with all the safety, performance and convenience of a showroom model but without the thirst for fuel.

Chrysler Corp., Ford Motor Co. and General Motors Corp. are providing a midsize car and seed money to each of the participating schools.

Teams from UC Davis, the University of Wisconsin and West Virginia University are using vehicles with aluminum-intensive bodies as a way to decrease overall weight and improve fuel mileage.

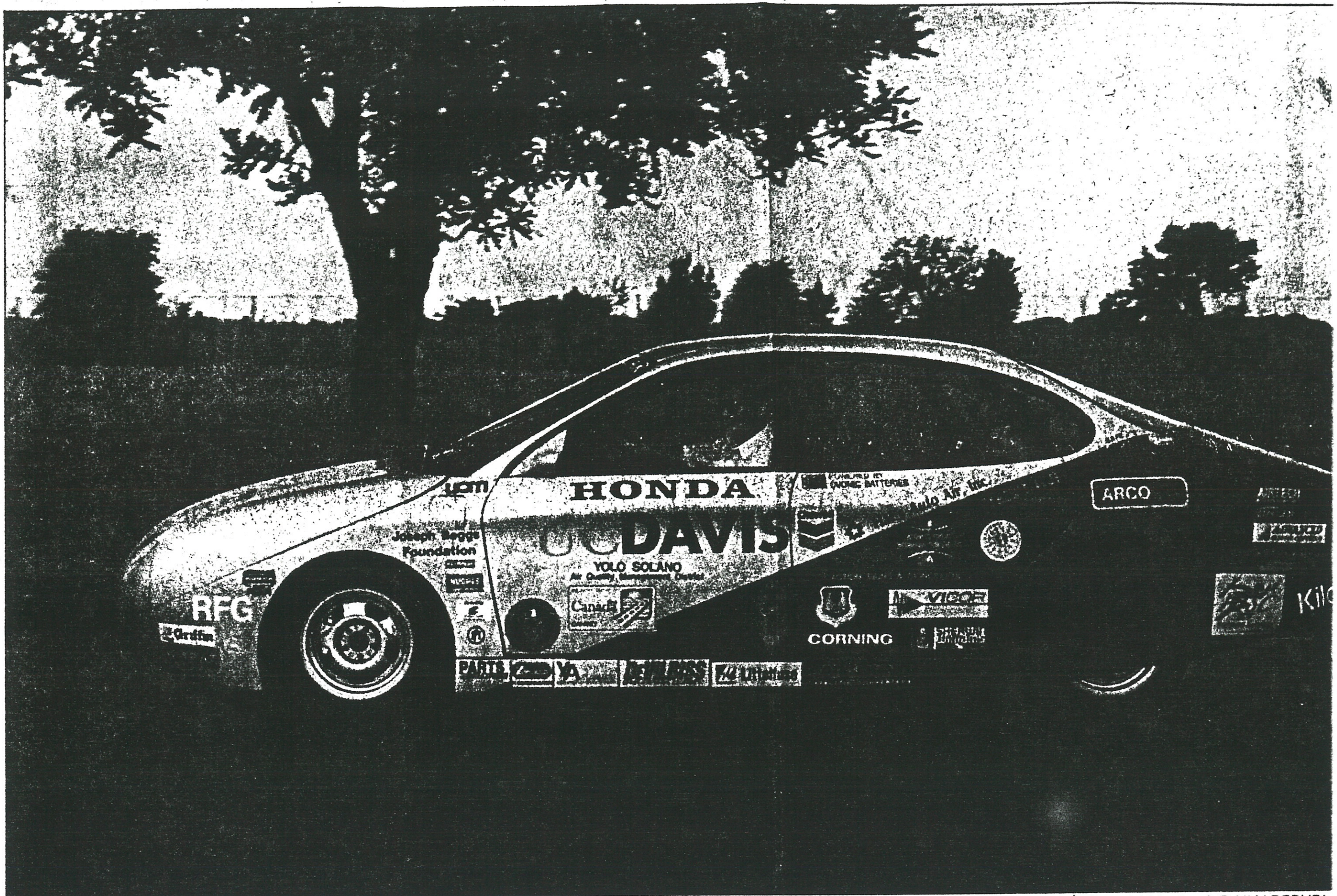
The other participants are Concordia, Lawrence Technological University, Michigan Technological University, Texas Tech, Ohio State, University of Tennessee-Knoxville, University of Illinois, University of Maryland, University of Michigan and Virginia Polytechnic Institute.

All Future Car Challenge vehicles will be on display at the Detroit Grand Prix on Belle Isle on June 6 and the Henry Ford Museum in Dearborn, Mich. on June 10.

AUTO NOTES information should be sent to Bruce Grant, Auto Editor, Sacramento Bee, P.O. Box 15779, Sacramento, 95852. The telephone number is (916) 321-1053. The fax number is (916) 321-1009. The deadline is noon Tuesday for publication on Friday of that week.

3182

More miles to the gallon



Charlotte Schmid-Maybach/DAILY REPUBL

UC Davis professor Andy Frank drives the 1997 version of the hybrid car, a converted 1996 Ford Taurus.

The best of both worlds

Hybrid vehicle uses gas and electricity for power

By Charles Levin
DAILY REPUBLIC

DAVIS — Imagine driving from Fairfield to Los Angeles and back on six gallons of gas.

This is no science-fiction fantasy. It's Joule, the brainchild of Dr. Andy Frank, a University of California, Davis, professor and his enterprising students at the school's FutureCar Project.

Joule is the school's third-generation model of cars known as "hybrids" because they combine electric and gasoline power. The result is a car that gets 62.8 miles per gallon on the freeway and 41.7 mpg in town.

The silver and blue, decal-festooned car took first place in the 1997 FutureCar Challenge, an annual event where college teams compete to build a car that gets 80 mpg and meets government and industry standards. A previous incarnation, Aftershock, won awards in 1994 and 1995 contests for hybrid cars.

In fact, the converted 1996 Taurus, donated by Ford, meets the performance and safety standards of a stock Taurus from the factory, Frank said. And, he said, Joule exceeds federal fuel economy standards and uses just 3 percent of the fuel required to run a gas-only Taurus.

For now the car doesn't qualify for California's upcoming "zero emission vehicle" standards, effective in 2003. But state Air Resource Board officials may alter the law this November so hybrids can partially qualify, said Allan Hirsch, spokesman.

Still, unlike electric cars and

See **Hybrid**, Back Page

Zero to 60: 14.4 seconds ■ Top speed: 115 mph

Range
Highway: 400 miles / City: 250 miles

Energy economy
Highway: 62.8 mpg / City: 41.7 mpg
Gasoline capacity: 6.1 gallons
Internal combustion engine: Honda Today, 3 cylinder, 48 hp

Electric motor power
Continuous: 43 hp @ 2500 rpm
Peak: 64 hp @ 3200 rpm
Source: UC Davis FutureCar Project

Sales of alternative fuel vehicles since 1992
Ford: 32,909
Chrysler: 16,717
General Motors: 1,273
Source: R.L. Polk

Kim Durbin/DAILY REPUBL

3182 ct

Hybrid From Page One

trucks, which are finding a niche with business and government fleets, hybrids present a great opportunity for major auto companies because they would not have to retool their assembly lines to mass-produce the cars, said Larry Greene, executive director of Yolo-Solano Air Quality Management District.

This is important to Frank, who urges people to recognize that society is depleting fossil fuels and forests at an alarming rate. Yet he says the world can solve its energy problems without giving up its oil-addicted ways — simply by using less oil.

"We must improve efficiency of energy uses and invent new ways to reduce energy consumption exponentially," Frank said two weeks ago, speaking to a noontime gathering at the air district's Davis office. But in creating a "cleaner and greener society, we can't throw away what we have."

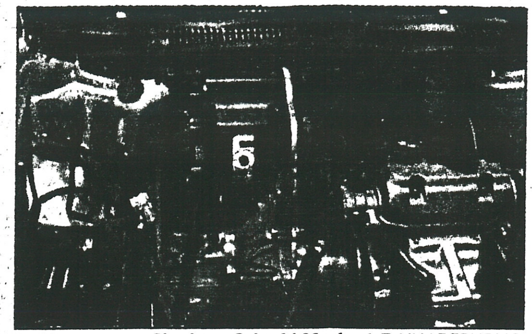
According to Frank, most people now rely on two sources of power — gas and electricity, with the latter being easier to use. With this convenience, any consumer with a 6-kilowatt outlet for a drier or electric stove can recharge Joule's batteries overnight for about 80 cents, he said.

It works like this: When you hit the ... er, gas pedal, a 75 horsepower electric motor runs the car with the near-silent whir of a golf cart. But at a pre-determined speed (or gear shift), it switches over to its noisier 48 horsepower, three-cylinder, internal-combustion engine.

On longer trips, the gas engine takes over as the battery begins losing its charge. This extends the car's normal range from 250 miles (city) to 1,000 miles without using up all its electricity.

Joule's battery recharges overnight, meaning "you could get up in the morning, drive to Los Angeles and (come) back on one charge," Frank said.

This is a far cry from today's current electric cars and trucks that run about 50 or 60 miles on lead acid batteries and up to 160 miles on the newer nickel metal hydride batteries found in Joule.



Charlotte Schmid-Maybach/DAILY REPUBLIC

A closer look at the hybrid's engine.

Frank credits the car's success, in part, to stripping off outside appendages that improve its aerodynamic ability.

Door handles were replaced by tiny red buttons that barely jut from below the window. Small video cameras replace side-view mirrors. The driver uses two, 4-inch, dashboard-mounted video screens to see, thus eliminating blind spots.

The engine takes up less space under the hood because it uses fewer moving parts than a Model T, Frank said.

Joule's parts are common to most cars, "but we're putting it together in a different way," Frank said. "There's really nothing fancy in here except the control system, which involves a small computer."

Frank and his students are customizing an aluminum Mercury Sable for their next project. That car will feature an automatic transmission and an automatic recharging system that connects to the car when the driver parks.

"So the only thing a person has to do is put gas in (the) car, and it's only six or seven gallons every couple of months," Frank said.

Joule's price tag remains something of a mystery, Frank conceded. For one thing, he doesn't know how much the battery system costs because General Motors Ovonics donated it. A GM spokesman declined to say how much it cost.

But Frank seems sure that mass-producing Joule should not exceed a factory built Taurus (about $20,000) because Joule uses fewer parts.

Environmentalists like the hybrid because they promise greater fuel economy and reduced carbon dioxide emissions which are partially responsible for global warming.

But while nearly all major auto manufacturers make some type of alternative fuel vehicle — electric, compressed natural gas, propane, methanol — company officials are cautious about predicting a future without gas-powered engines.

In January, GM unveiled several prototypes of various hybrid vehicles. The company promises a factory production hybrid car by 2001, said Dick Thompson, spokesman for GM's Advanced Vehicle Technologies.

But Thompson and a Ford spokesman are uncertain whether consumers will warm up to these options.

Affordability is a critical issue. For instance, Chevy's new electric S10 pickup truck retails for about $33,000, though the company offers a $4,500 rebate.

"Hybrids are do-able. The problem with hybrids is that they're expensive" to produce, said Brendan Prebo, a Ford spokesman, of the task of combining two different engines.

"Regardless of how good it is for the environment, you can't reap the benefits unless lots of people are driving it," Prebo said.

But environmentalists blame the problem equally on companies and consumers, locked in a Catch-22.

Big auto makers sponsor cars like Joule for good public relations but focus on selling gas guzzlers, said Bill Walker, California director of the Environmental Working Group.

On the other hand, consumers still drive the market demand for gasoline-powered, internal combustion engines, Walker added.

Collegiate Engineers Vie for Fuel Miser Title

FutureCar Challenge Entrants Look to Break 60-mpg Barrier

By Phil Foley
Staff Writer

A baker's dozen of collegiate engineering teams are headed for Auburn Hills this June to face off in the third FutureCar Challenge to see who can break the 60-mpg barrier.

The 1997 winner, University of California-Davis, seems to be the odds-on favorite again this year with its aluminum-intensive Mercury Sable, the latest generation of nickel-hydride batteries and a continuous variable transmission.

The Challenge will be held at Oakland Community College and the Chrysler Technology Center in Auburn Hills June 4 -11.

Despite UC-Davis' presence, the field should be wide open, according to Bob Larsen, director of the FutureCar Challenge and manager, fuels and vehicle system section, for the Center for Transportation Research at the University of Chicago's Argonne National Laboratory energy systems division.

"There's a much higher degree of uncertainty this year," Larsen said, adding that 10 of the competing schools are running new cars.

"It's going to be a question of who has done the most testing and is the best prepared," suggested Larsen. "There's a wide range of technologies in competition, but the front-runner until proven wrong is UC-Davis. They have all the pieces. The question is, can they get it all together?"

Collegiate engineering teams competing in FutureCar have to re-engineer a Chevrolet Lumina, Dodge Intrepid, Ford Taurus or Mercury Sable, without sacrificing any of the attributes of a family sedan.

UC-Davis will be coming back with the same pre-jelly bean Ford body, that "misered" its way through the competition last year at 60 mpg.

Locally, Lawrence Technological University in Southfield seems to be the leading contender. Last year, the Lawrence Tech team abandoned an almost guaranteed winner to go with an automatic shifting manual transmission in an attempt to push the fuel economy envelope.

"It was a disaster," said Shelley Launey at the U.S. Department of Energy's Office of Transportation Technology in Washington, D.C. "If they had given out an award for guts, these guys should have gotten it."

Larsen noted that a couple of original equipment manufacturers have been working on a similar idea for their EV products, "and it's not been easy for them." In 1996, Lawrence Tech had a "well-thought out, well-running vehicle," Larsen said, but in '97 opted for an automatic/manual five-speed.

He described the engineering challenge facing the Techies as "hairy," but added, "They could well be a sleeper."

Michigan Technological University, out of Houghton in the Upper Peninsula, could be very good this year, perhaps in the top five, according to Larsen. The Huskies have dropped the advanced two-stroke Mercury Marine they used last year in favor of a conventional diesel for their Dodge Intrepid.

"They've got a great program," offered Larsen. "They've been the most improved over the years."

Michigan's biggest school in the competition, the University of Michigan, has had a less than stellar record in the competition. According to Larsen, the Wolverines "should be doing really, really good and they're not doing much. We're most perplexed by this."

WILFREDO PEREZ and Walt Pierce, two research technicans with Energy Partners in West Palm Beach, Fl., along with test coordinator Bob Wynne show off the company's 2.5 kilowatt fuel-cell stack. The 20kW version the 9-year old company is supplying to FutureCar is 20 inches longer than this 11.5-by-6.75-by-6-inch long device.

—Energy Partners photo

U.S. SECRETARY of Energy Frederico Pena waves the checkered flag for the University of Wisconsin team as it waves back the Holstein as the FutureCar Challenge caravan rolls into Washington, D.C., last summer. Wisconsin is the competition's perennial bridesmaid.

—U.S. Department of Energy photo

Big Blue is expected to bring a Volkswagen diesel-powered aluminum-intensive Taurus to the competition.

The aluminum-intensive Taurus seems to be favored by Midwestern schools, Larsen said. Ford Motor Co. built about 200 of them to prove out mass assembly techniques, and even though their aluminum panels were stamped out of the same dies as the steel version, they tip the scales about 300 to 400 pounds lighter than the conventional 1994 -95 Taurus/Sable.

Ohio State's Buckeyes are said to be operating on the KISS principle as usual — Keep it Simple, Stupid. Larsen noted that while OSU's past efforts have "not exactly been cutting edge," they did finish second in the inaugural race.

"There's something to be said for showing up and working," observed Larsen.

While other schools have gone far out, high-tech, OSU has gone simple, cheap, practical. It's an approach, said Larsen, that is not only "very elemental, very elegant," it's also produced one of the competition's faster cars.

The University of Wisconsin will show off one of Ford's 1.8-liter European-built diesels for the first time in the United States. The Badgers are hoping their hybrid vehicle will finally put them in the winner's circle.

"They've always had a big team approach and done things sophisticated on a certain level," Larsen said. "But then they use industrial elevator motors with heavy iron casings. If they put their heads together, they could nail this thing."

Two schools expected to have very interesting, if not necessarily highly successful entries this year are Texas Tech University and Virginia Polytechnic Institute & State University.

Virginia Polytechnic, the FutureCar's '96 winner, and Texas Tech, an old hand at electric vehicle competitions, are expected to take delivery of fuel-cell stacks from Energy Partners. The big question is will either school have a race-ready vehicle come June.

"These are all scratch-built parts," noted Launey.

"The fuel cells are an uphill battle," Larsen said. "We're not sure if they'll really produce significant power."

Larsen said a key element of the FutureCar Challenge is to produce a real car for real people.

"It's got to seat four and have a real trunk. That's a tall, tall order for the fuel-cell folks," he said.

Two new schools in this year's race are the University of Illinois and the University of Tennessee.

The Fighting Illini will be coming to Auburn Hills with one of Ford's new diesels powering their electric drive.

"They have a really slick car and a good team, we just don't know how sophisticated they're going to be," said Larsen.

"Tennessee could be a real sleeper," he said. "They've got the same transmission as a Toyota Prius," which is currently being sold in Japan in limited numbers.

The Vols are using a CNG-burning 1.9-liter Saturn engine to power their electric system.

"They could shock everyone. It's very slick, very sophisticated," Larsen said.

Rounding out the competitors will be Concordia University, University of Maryland and West Virginia University.

Columbus, OH

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MAY 26, 1998

SPEED VS. FUEL EFFICIENCY

OSU car design teams follow different roads

By Doug Caruso
Dispatch Staff Reporter

There's no such thing as a day off at Ohio State University's Center for Automotive Research — not with two national car-design competitions days away and parts spread all over the floor.

In one garage yesterday, OSU's Formula SAE race team checked every nut and bolt on the sleek, open-wheeled race car they've spent the past year building from the ground up. They'll face about 100 other college race teams in Detroit starting Wednesday.

In another building, student engineers in gray jumpsuits were up to their elbows in the engine compartment of a Chevrolet Lumina that OSU will enter in the FutureCar Challenge — a contest among 13 schools to create a commercial sedan that sips fuel. OSU's Lumina gets 50 miles per gallon and will be taken to Michigan for a contest June 3.

There is a "sibling rivalry" between the teams, said Alan Holmes, team leader of the FutureCar project, but more often than not the team members end up consulting each other.

"We have an interest in lightweight parts and they have an interest in lightweight parts," he said. "They have to look at costs and we have to look at costs."

Each contest looks at both performance and a business presentation. The big three automakers — Chrysler, Ford and General Motors — are sponsors of each. The Society of Automotive Engineers also is a Formula SAE contest sponsor, while the U.S. Department of Energy is a partner in the FutureCar Challenge.

The automakers look to both contests for recruits, said Jim Foley, team manager for OSU's Formula SAE team, and most professional racing outfits won't even look at a resume if a student didn't participate in Formula SAE.

In the Formula races, a student drives the car on a winding sports-car course at speeds up to 90 mph, said Foley, a senior majoring in mechanical engineering.

OSU's Formula team took sixth last year out of 77 schools, Foley said, and track tests this past week-

Lorrie Cecil / Dispatch

Senior Mike Goebelbecker works on the nose of the Formula SAE race car he and other OSU students built.

Marysville, Ohio, showed lap times three seconds ahead of the 1997 car.

For Holmes' team, it's not about speed; it's about efficiency.

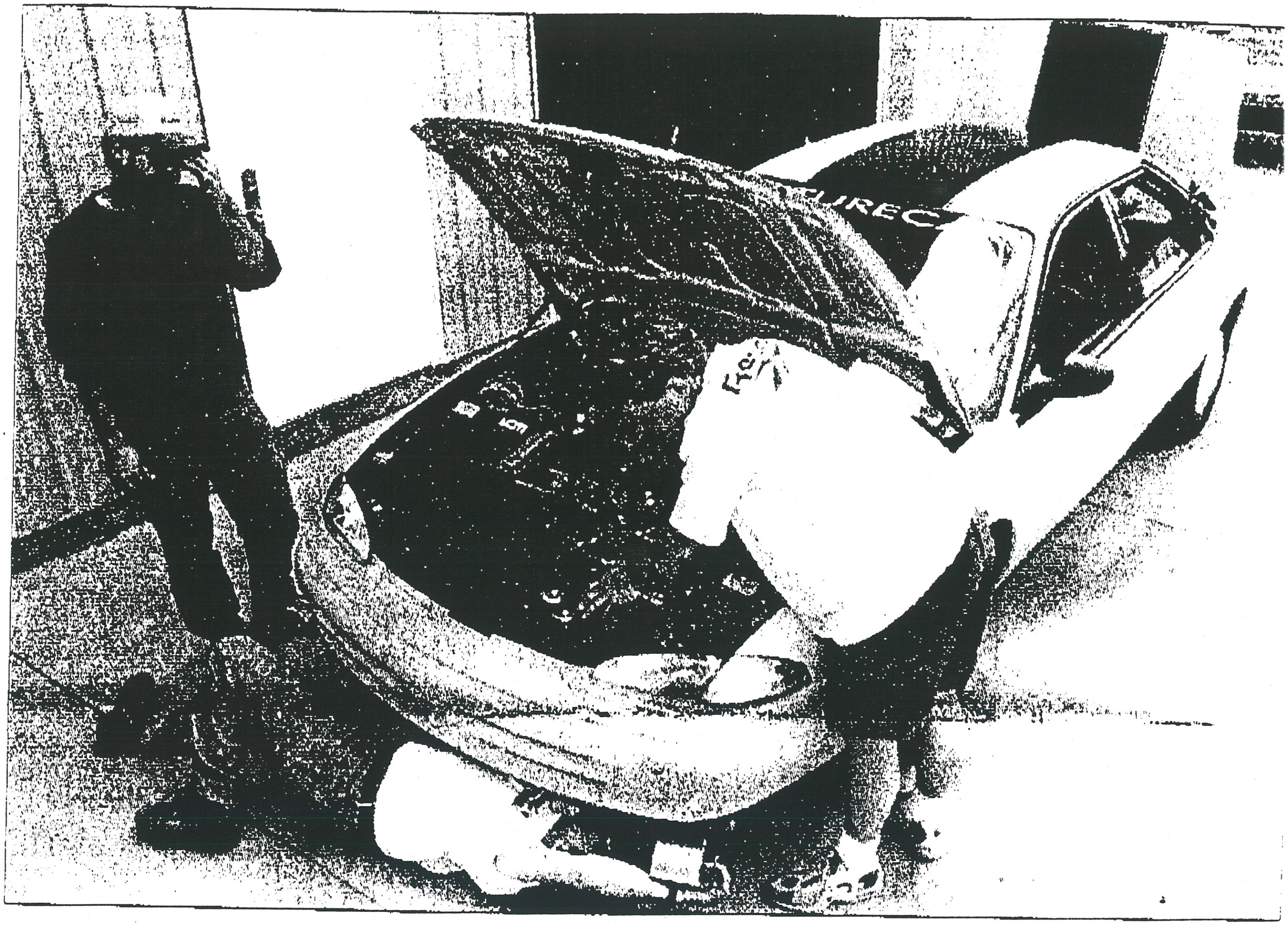
The mechanical engineering graduate student and his crew ripped out the Lumina's engine and replaced it with a four-cylinder Volkswagen diesel linked to an electric motor. They added a new drive train and built a more aerodynamic nose and trunk lid out of Fiberglas.

For normal cruising, Holmes said, the small diesel is plenty powerful. But for quick acceleration, the electric motor kicks in for a smooth boost. While the car idles, the batteries — 336 of the sort used in radio-controlled cars — recharge.

The Lumina has all the leg room and amenities of a normal family sedan with twice the fuel economy. It can even run on pure soybean oil or a mixture of soybean oil and diesel,

Daily Mining Gazette 5-29-8

Northwind ready to roll



George A. Leinonen/*Daily Mining Gazette*

Michigan Tech engineering graduate student Matt Hortop, left, watches Tom Przybylski try to fit a power transmission belt cover under the motor of the MTU's entry in next month's FutureCar Challenge. Fellow student Clyde Bulloch assists in the operation.

Tech team set for FutureCar Challenge

By PAUL MARCOTTE
Gazette Writer

HOUGHTON — The race is on once again to create a super fuel-efficient car that is affordable and appeals to consumers.

A team of Michigan Technological University students is presently preparing for the 1998 FutureCar Challenge June 3-11 in downstate Auburn Hills. Chrysler, Ford, General Motors and the United States Department of Energy are sponsoring the competition, which is in its third year.

Tech is one of 12 universities competing to create a vehicle that is fuel-efficient, safe, affordable, and provides all the comforts of a mid-size family sedan.

Each school received either a Dodge Intrepid, Ford Taurus or Chevrolet Lumina and $10,000 in start-up funds. Student teams then had a year to re-engineer the car to increase fuel economy. The winning car last year averaged 60 miles per gallon.

"One of the most gratifying results of this project is the tremendous ingenuity exhibited by these students as they tackle one of our country's most significant technological challenges," said Tom Gross, deputy assistant secretary at the United States Department of Energy.

"The United States is in the middle of a furious global competition to develop energy-efficient transportation technologies needed in a world with many more cars and trucks."

Please see page 8

P. 8 Daily Mining Gazette

Tech team prepares for FutureCar challeng

:ontinued from Page 1

MTU team captain Matt Hortop said some ix to 10 students have continued to work on ne car — dubbed the Northwind — since the chool year ended last week. The team has ut in nearly 400 man hours on the project his week alone.

Hortop said a computer glitch shut the en- ine down during a short trip Wednesday, and ne team continues to work on a solution to a iel-tank problem.

The Intrepid's gasoline engine was re- laced with a diesel engine, but the opening the fuel tank is too small for diesel pump ozzles.

Despite the problems, Hortop expects to ave a fully functioning car for next week's competitive events and evaluations at Oakland Community College and the Chrysler Technology Center.

"Generally, every year three or four of the 12 cars are not working," Hortop said.

This year's budget for the project is around $50,000, he said. About $18,000 to $25,000 is cash. The remaining portion is wrapped up in parts and supplies donated by sponsors.

Funds are raised through private sources such as corporations and alumni.

Cars will be judged based on consumer acceptability, fuel economy, emissions, testing speed, handling, acceleration, and a design presentation.

Judging panels will be composed of experts from the auto industry, government agencies and the automotive press.

This year, the MTU car features a h diesel-electric 1.5 liter Peugeot engine new control system, which, if successfu be the first of its kind, said Hortop, who h the Northwind is among the top six c the competition.

Among this year's improvements ar trunk space, seating for six, a fuel econo 40 miles per gallon, and improvements previous years in emissions and design sentations.

"I'm pretty certain we'll get into the to Hortop said.

All FutureCar Challenge vehicles w displayed Saturday June 6 at the D Grand Prix on Belle Isle in Detroit and Wednesday, June 10 at the Henry Ford M um in Dearborn.

Circ- (E) 45,158 (S) 51,488

JUNE 13, 1998

Bacon's

3182

UI shows style at FutureCar event

■ Team finishes ninth at vehicle design contest

By ANNE COOK
News-Gazette Staff Writer

URBANA — University of Illinois students' FutureCar didn't place first, but the designers came home with some triumphs under their hood.

"It's a nice-looking car," said Jeremy Cellarius of the team's two trophies for best workmanship and best vehicle styling.

"We placed ninth of the 13 competitors and highest of all the three first-year teams," said Cellarius, 21, a senior in mechanical engineering. "And we beat last year's winner, the University of California-Davis. We were pretty happy."

Cellarius and teammates Troy Shawgo, Mike Kukovec, Greg Hansen, Bryan Urteaga and John Epple — all UI seniors, left for the FutureCar Challenge at Auburn Hills, Mich., June 2, and returned Wednesday.

Photo courtesy of FutureCar Challenge

From left, students Bryan Urteaga, John Epple, Mike Kukovec and Greg Hansen were members of the 1998 FutureCar Challenge team sent by the University of Illinois at Urbana-Champaign to the competition in Auburn Hills, Mich., last week. Students Jeremy Cellarius and Troy Shawgo and faculty advisers Robert White and Robert Turnbull also participated on the team.

UI faculty advisers Robert White and Robert Turnbull went along to help them solve last-minute problems.

They faced a big challenge — to build and operate a fuel-efficient masterpiece that's a mid-size family sedan with all the safety, performance and convenience of a showroom model — without the thirst for fuel.

The UI students' entry, a modified Dodge Intrepid, runs on both diesel fuel and battery-powered electricity.

The FutureCar Challenge is an annual design contest sponsored by the U.S. Department of Energy and the Big Three automakers — Chrysler, Ford and General Motors, through the U.S. Council for Automotive Research.

Last year's top finisher managed more than 60 miles per gallon.

Cellarius said this year's similar top performance inspired the UI team to shoot for a goal of 80 miles per gallon — with almost no emissions.

"We're guessing we're at 45 miles per gallon now," he said.

The team ran into early trouble, and the Illini car had to skip dyno, fuel economy and emissions testing.

"We toasted some power electronics and couldn't control the generator," Cellarius said. "It was an electric car only."

A highlight of the event was Saturday's trip into Detroit's Belle Isle, the Grand Prix track, where the cars were displayed and the UI team nailed down a lot of points for workmanship and styling.

"We got away from the environmental fuel economy atmosphere and got into racing," Cellarius said. "It was a big day."

The students went into the event deprived of sleep, and the situation didn't get any better in Michigan.

"We celebrated by going home to sleep," Cellarius said. "It was a long week. We worked from 5 a.m. to 10 p.m. every day."

They also got some good ideas about how to improve the car, and Cellarius is spending the summer getting them organized so the team will have a head start on the return match next summer.

"Our goals for the summer are to raise money," he said. "We're a few dollars in debt. We need to get the car up and running, and we need to get good, solid data about fuel economy in relation to the other schools."

They're also planning some changes to the vehicle's power train that would improve fuel economy and reduce emissions but increase the car's cost, a concern to the debt-ridden student engineers.

The entire project cost \$130,000. Chrysler donated \$10,000 in seed money, plus the \$20,000 car, and the team collected about \$50,000 worth of donated parts, plus other contributions. They're still about \$30,000 short.

Cellarius said no team emerged this year as the one to beat, but he expects next year's competition to be very intense, especially because UC-Davis' car will likely be up and running.

"They're the team to watch out for," he said. "This year, they couldn't get everything implemented in time."

The UI's car ran on a biodiesel blend of 20 percent soybean oil and 80 percent diesel.

"The soybean oil lowers emissions, and it's a 100 percent renewable fuel," Cellarius said.

OH-D210 DAILY NEWSPAPER
THE COLUMBUS DISPATCH
Columbus, OH

Circ-(M) 268,670 (S) 401,612

JUNE 20, 1998

3182

Despite breakdown, OSU takes 8th place in FutureCar Challenge

By David Lore
Dispatch Science Reporter

The good news was the Buckeye car that broke down this month during the FutureCar Challenge was the support car brought along to pull the trailer.

The bad news was, sans trailer, Ohio State University student engineers had to drive their entry car extra miles to get to competition events, thus reducing their recorded miles-per-gallon under competition rules. That, said team leader Alan Holmes, helps explain why OSU's car finished first in terms of energy efficiency but 8th overall among 13 university teams that competed June 3-10 at Auburn Hills, Mich.

"We were kind of puzzled by the results," said Holmes, a graduate student in mechanical engineering. "They measured us based on the amount of fuel put into the vehicle.

"They never made any provision for a car being driven around, and we drove this car all over the place up there. But by the rules, it was supposed to be trailered over."

The FutureCar Challenge is held annually near Detroit as part of a government-industry program seeking ways to triple average gas mileage in family-size sedans.

In this year's competition, the University of Wisconsin and Virginia Polytechnic Institute shared first place. Rankings were based on factors such as fuel efficiency, performance and consumer appeal.

Two cars, from Wisconsin and Lawrence Technological University in Michigan, achieved 75 mpg, doubling the fuel efficiency one would expect from a standard, gasoline-powered mid-size sedan.

The competition cars were mostly hybrids, pairing an electric motor with an internal combustion engine, which burns gasoline, diesel or alcohol, to achieve maximum efficiency at various speeds.

OSU's vehicle, a Chevrolet Lumina equipped with an electric motor and a "bio-diesel" combustion engine, achieved 36 mpg in city driving and 53 mpg on the highway, Holmes said. But the extra miles driven as a result of the support car breakdown aren't included in those calculations.

The 20 students participating on the team were not disappointed by the outcome, he said.

"Winning is good, but mostly this is about learning about fuel-efficient technologies, and OSU students are leaders in that," he said.

TX-D580 DAILY NEWSPAPER
LUBBOCK AVALANCHE-JOURNAL
Lubbock, TX

Circ-(M) 66,661 (S) 78,061

JUNE 15, 1998

3182

Students define the future of engineering

By KARA ALTENBAUMER
Avalanche-Journal

Working on Texas Tech's alternative-power car has taught students and professors that the shade-tree mechanic is all but gone. That's why seven students have signed up for a new Tech master's program – advanced vehicle engineering.

All seven of those students spent hours of their undergraduate career working on the school's "Future Car." The car just returned from its latest competi-tion in Michigan this weekend.

Though the car didn't come out on top, it did win safety honors. Student competitors were also recognized for their sportsmanship due to their efforts in helping out students from other schools.

More important to many of the student competitors is the interest the car sparked in them.

"Cars today are so complicated," said Richard Howlett, who is graduating with a master's degree in electrical engineering in August. "You become very versed in everything (in the program)." Though Howlett is not graduating with the new AVE degree, much of his coursework was a tryout for the program.

Howlett wrote his thesis on alternative fuels – one of the areas that future car competitors are focusing on.

Mark Shuck, one of the students beginning the master's program this summer, said there is no other program exactly like it in the country. "I don't know of any with both electrical and mechanical engineering."

The 36-hour program combines courses from both engineering disciplines, said Tim Maxwell, a mechanical engineering professor. Students also take management classes and have the option of substituting research projects – like the Future Car – for a thesis.

"The (mechanical engineers) can't work on the electrical parts, and the (electrical engineers) can't work on mechanical parts," Maxwell said. "You have all these specialists who only know about their individual parts."

This program would eliminate that problem.

Chris Machucha, another student in the program, said he came to college for a program like this one.

Big Three automakers are excited about the program, Maxwell said. The plan is for the program's advisory panel to be made up of industry representatives. Maxwell said he has already lined up one from General Motors Corp. and another from Chrysler Corp.

An eventual program goal is for automakers to send employees to Tech for a year to study. The employees would return to their own plants to complete research. "That could be someone who works for Ford who wants a master's degree," Maxwell said.

The Big Three's interest in the program is a big plus for Tech, said Chris Larson, another student in the program.

"I chose it because the Big Three want something like this – something multidisciplinary," he said. "Everyone I've talked to from the Big Three likes the idea."

The AVE degree picks up on the work that Tech has been doing on the Future Car for 10 years, said Darrell Vines, an electrical engineering professor.

The seven who've begun master's work this summer will be working on developing a fuel cell for the Future Car. By next year's competition, professors envision a car powered by the fuel cell instead of electricity like this year's vehicle.

"At least eight or 10 students could work on the car and not overlap each other," Maxwell said.

Program advisers said the majority of the funding for the program will likely come from the automobile industry. They are working on a proposal to the Department of Energy to fund a similar doctoral program.

The Future Car and many of the AVE classes are expected to move out to the Reese Center by the end of the summer. Students will use the former air base's vehicle facilities.

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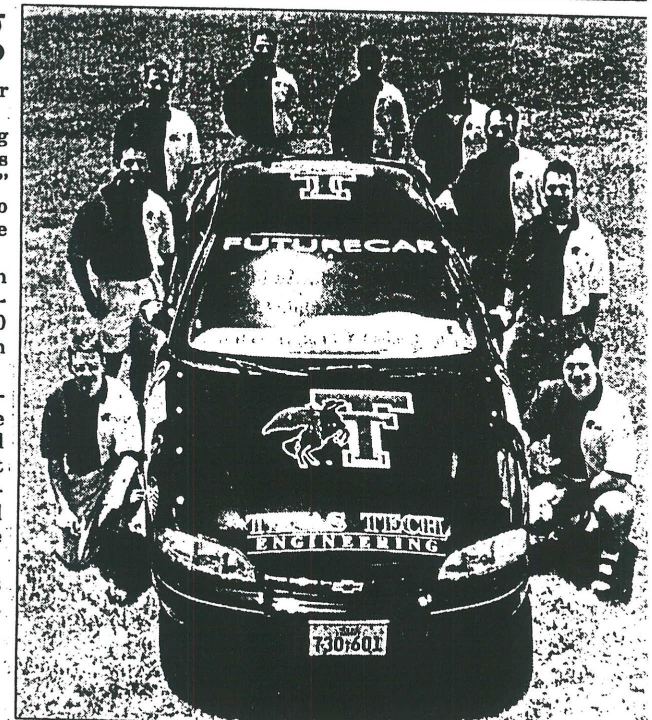


A-J Photo/Lance Mo

Members of the Texas Tech Future Car team are, clockwise from left, Chris Larson, Chris Machuca, Mark Shuck, Ryan Montgomery, Wallace Turner, Erle Rawlins, Gre Lawford, Jason Harris and team leader Richard Howlett.

The Wisconsin State Journal

Daily
Madison Wisconsin
Circulation: 86,000
June 12, 1998

Student engineers have drive to win

UW-Madison scores firsts in car contest

By Roger A. Gribble
Business reporter

A team of UW-Madison student engineers took several firsts this week in a FutureCar Challenge series of road tests, in one event doubling the over-the-road fuel efficiency of a midsize American car.

In one series of tests the team's aluminum-body Mercury Sable, dubbed "Wisconsin Cow," demonstrated the equivalent of 75 miles per gallon.

That was good for a first-place tie with a team from Lawrence Technological University in Michigan.

Thirteen teams competed in the weeklong event, sponsored by the Department of Energy and the U.S. Council for Automotive Research, representing Chrysler, Ford and General Motors. It was held at the Chrysler Technology Center and Oakland Community College, both in Auburn Hills, Mich.

Teams were given one year to re-engineer each new car given them by the three manufacturers to double or triple typical mileage.

They were not permitted to strip down the car and were required to maintain the safety, comfort and convenience buyers expect.

In addition to winning the top mileage honors, the UW-Madison team received the first-ever Innovations in Aluminum award from the Aluminum Association for creating the lightest car in the competition.

It also tied with Virginia Tech for first place overall and took top honors for lowest vehicle driving losses, best use of advanced materials and best teamwork.

Team members are Troy Nergaard, Joel Van Ess, Mark Metoki, Sean Scanlon, Jamie Pitterle, Ethan Brodsky, Mike Koplin, Chris DeSalvo, Anton Kozlovsky, Tim Roebke, Amanda Pertzborn, John Ertmer, Bich-Ty Le, Jenny Topinka, John Norquist and Matt Peterson.

The faculty adviser is Glenn Bower.

U.S. Automotive Export News
The Newspaper to the International Market

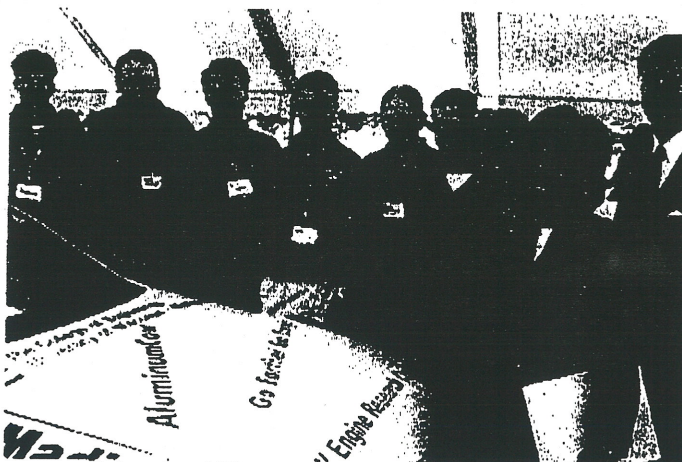
Daily
United States and International
Circulation: 40,000
July/August Issue

Wisconsin Wins *Innovations In Aluminum*

Dearborn, MI - Competing against 13 universities, a team of top engineering students from University of Wisconsin today won the first ever *Innovations in Aluminum* award as part of the FutureCar Challenge. Working from a production model vehicle they cre:'ed the lightest car in the competition, achieving a fuel efficiency rating of 75 miles per gallon.

"Our panel of judges reviewed a number of impressive designs but the University of Wisconsin's stood out by far as having the greatest appreciation of the importance that weight savings has for achieving the PNGV fuel efficiency goals," said J. Stephen Larkin, President of The Aluminum Association, which sponsored the award. "Although the aluminum parts within the car had to made by hand, the team did not lose sight of producing equivalent parts in high production volume."

Starting from an all aluminum Mercury Sable, the Wisconsin team converted over 20 additional components and systems to aluminum, including parts of the suspension system, chassis, powertrain, and electric controls. The "Aluminum Cow" as it is named, also won the Best Application of Advanced Materials award.



University of Wisconsin team at FutureCar Challenge.

The FutureCar Challenge sponsored by the Department of Energy and the United States Council for Automotive Research (USCAR) representing Chrysler, Ford and GM, calls for teams to mirror the goals of the Partnership for a new Generation of Vehicles (PNGV), a collaboration between the federal government and American automakers intended to develop technologies for a new generation of vehicles that will triple fuel efficiency without sacrificing performance, affordability or safety. *Innovations in Aluminum* was introduced to encourage a broader understanding of how aluminum features can help vehicles meet and exceed the PNGV goals.

A recent report by the National Research Council stated "aluminum is the lightweight material of choice for intensive use" On reaching the PNGV and FutureCar goal of tripling fuel efficiency. The *Innovations in Aluminum* award salutes students for their innovative use of aluminum to meet this higher fuel efficiency standard, reflecting its increasing value as an automotive engineering material.

Award entries are scored by a panel of industry experts based on a series of criteria that includes innovativeness, feasibility, lightweight, recyclability and execution/craftsmanship. This year's panel included Albert Houchenst General Motors; George Joy, PNGV Task Force, U. S. Department of Commerce, Steven D. Pasteiner, Advanced Automotive Technologies; David Moore, Tony Warren both with Alcan; and Walt Reichelt, John Shabino from Alcoa.

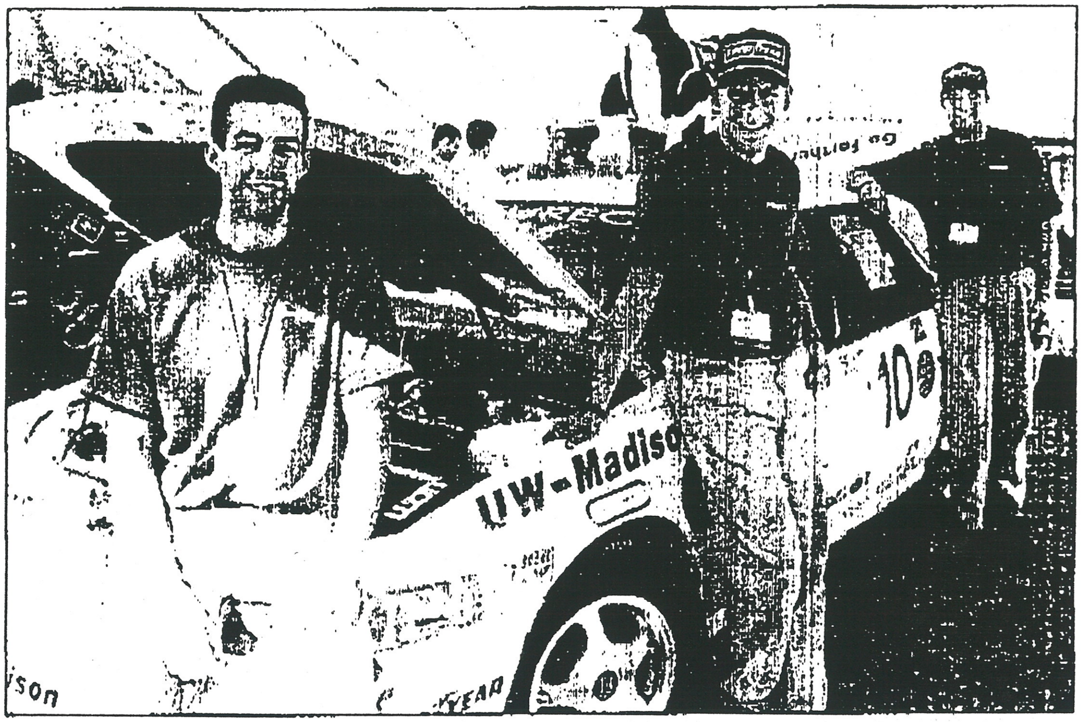
The Aluminum Association represents U S producers of primary and secondary alurminum, as well as semi-fabricated products, and is a proud sponsor of the 1998 FutureCar Challenge. Member companies operate approximately 200 plants in 35 states.

SOURCE: The Aluminum Association

** TOTAL PAGE.04 **

The Capital Times

Daily
Madison Wisconsin
Circulation: 22,000
June 12, 1998



FUTURE CAR CHALLENGE

Chris DeSalvo (left), Mike Koplin and Jon Butcher stand with their winning creation, the Wisconsin Cow, a Mercury Sable they re-engineered to travel 75 miles on a gallon of gasoline.

UW's winning car a 'Cow'

The Capital Times

A team of UW-Madison engineering students doubled the fuel efficiency of a midsize American car without giving up safety, comfort or performance — a feat that won them top honors at the 1998 Future Car Challenge.

The University of Wisconsin students tied with Virginia Tech in the competition among 13 universities.

Teams from each school are given brand new, midsize vehicles by Chrysler, Ford or General Motors along with $10,000 in seed money, according to a media release. They then have one year to re-engineer the car to get double or triple the existing fuel economy.

The competition does not allow students to strip down the cars. Competitors have to create a car that maintains all the safety, comfort and convenience that American car buyers expect.

The annual contest was held this week in Michigan.

The UW-Madison team also won awards for lowest vehicle driving losses, best use of advanced materials and innovations in aluminum.

According to a press release from the Aluminum Association, the UW's car was the lightest in the competition.

The team converted more than 20 additional components and systems to aluminum, including parts of the suspension system, chassis, powertrain and electric controls, it said.

The team's adviser is Glenn Bower. Eighteen students worked on the project: Jon Butcher, Troy Nergaard, Joel Van Ess, Mark Metoki, Sean Scanlon, Jamie Pitterle, Ethan Brodsky, Mike Koplin, Chris DeSalvo, Anton Kozlovsky, Tim Roebke, Amanda Pertzborn, Jon Ertmer, Bich-Ty Le, Jenny Topinka, John Norquist, Neel Vasavada and Matt Peterson.

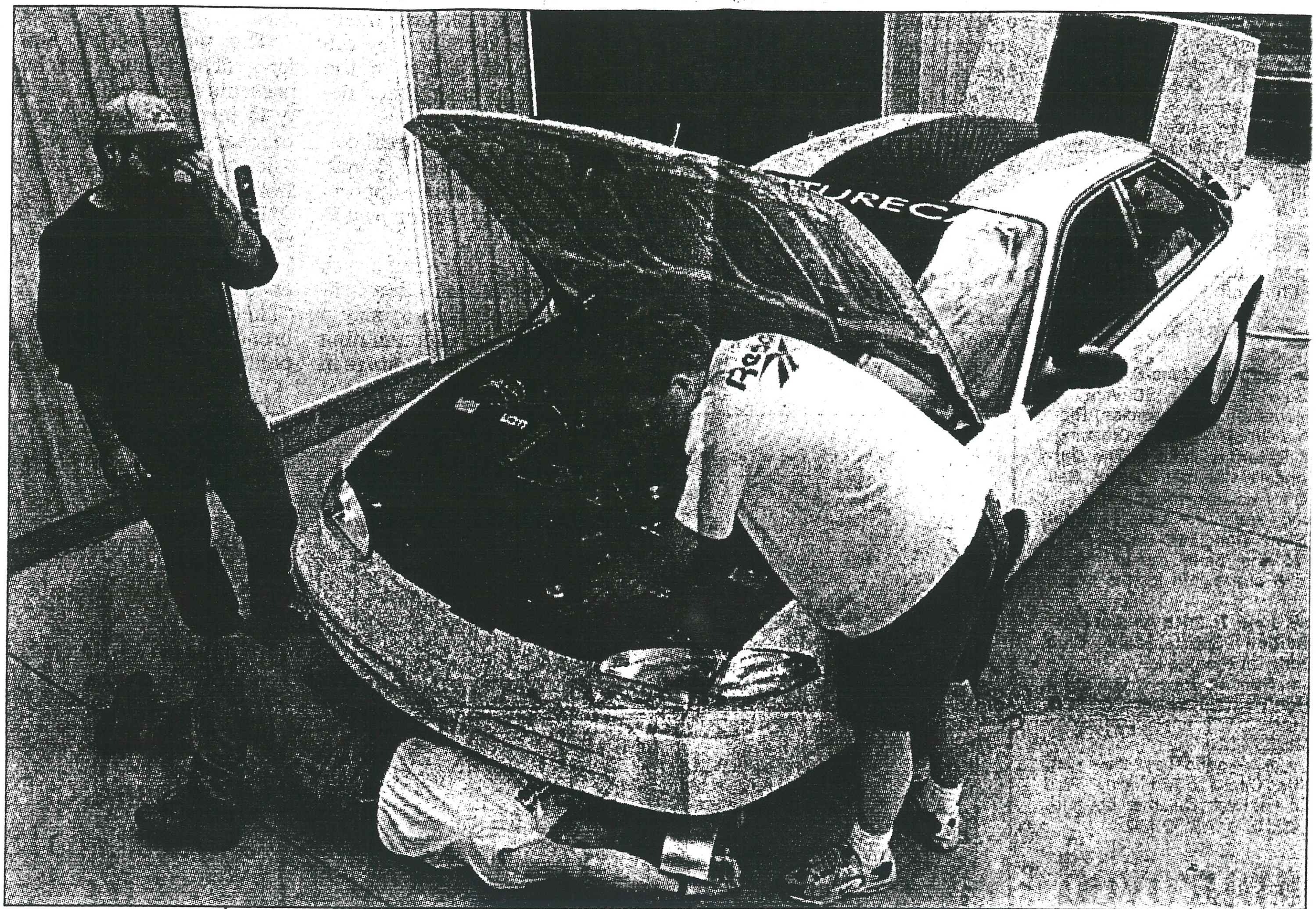
MI-D220 DAILY NEWSPAPER
THE DAILY MINING GAZETTE
Houghton, MI

Circ- (E) 12,106

MAY 29, 1998

3182

Northwind ready to roll



George A. Leinonen/*Daily Mining Gazette*

Michigan Tech engineering graduate student Matt Hortop, left, watches Tom Przybylski try to fit a power transmission belt cover under the motor of the MTU's entry in next month's FutureCar Challenge. Fellow student Clyde Bulloch assists in the operation.

Tech team set for FutureCar Challenge

By PAUL MARCOTTE
Gazette Writer

HOUGHTON — The race is on once again to create a super fuel-efficient car that is affordable and appeals to consumers.

A team of Michigan Technological University students is presently preparing for the 1998 FutureCar Challenge June 3-11 in downstate Auburn Hills. Chrysler, Ford, General Motors and the United States Department of Energy are sponsoring the competition, which is in its third year.

Tech is one of 12 universities competing to create a vehicle that is fuel-efficient, safe, affordable, and provides all the comforts of a mid-size family sedan.

Each school received either a Dodge Intrepid, Ford Taurus or Chevrolet Lumina and $10,000 in start-up funds. Student teams then had a year to re-engineer the car to increase fuel economy. The winning car last year averaged 60 miles per gallon.

"One of the most gratifying results of this project is the tremendous ingenuity exhibited by these students as they tackle one of our country's most significant technological challenges," said Tom Gross, deputy assistant secretary at the United States Department of Energy.

"The United States is in the middle of a furious global competition to develop energy-efficient transportation technologies needed in a world with many more cars and trucks."

Please see page 8

Tech team prepares for FutureCar challenge

Continued from Page 1

MTU team captain Matt Hortop said some six to 10 students have continued to work on the car — dubbed the Northwind — since the school year ended last week. The team has put in nearly 400 man hours on the project this week alone.

Hortop said a computer glitch shut the engine down during a short trip Wednesday, and the team continues to work on a solution to a fuel-tank problem.

The Intrepid's gasoline engine was replaced with a diesel engine, but the opening to the fuel tank is too small for diesel pump nozzles.

Despite the problems, Hortop expects to have a fully functioning car for next week's competitive events and evaluations at Oakland Community College and the Chrysler Technology Center.

"Generally, every year three or four of the 12 cars are not working," Hortop said.

This year's budget for the project is around $50,000, he said. About $18,000 to $25,000 is cash. The remaining portion is wrapped up in parts and supplies donated by sponsors.

Funds are raised through private sources such as corporations and alumni.

Cars will be judged based on consumer acceptability, fuel economy, emissions, testing speed, handling, acceleration, and a design presentation.

Judging panels will be composed of experts from the auto industry, government agencies and the automotive press.

This year, the MTU car features a hybric diesel-electric 1.5 liter Peugeot engine and a new control system, which, if successful, wil be the first of its kind, said Hortop, who hopes the Northwind is among the top six cars in the competition.

Among this year's improvements are ful trunk space, seating for six, a fuel economy o 40 miles per gallon, and improvements over previous years in emissions and design presentations.

"I'm pretty certain we'll get into the top six," Hortop said.

All FutureCar Challenge vehicles will be displayed Saturday June 6 at the Detroit Grand Prix on Belle Isle in Detroit and again Wednesday, June 10 at the Henry Ford Museum in Dearborn.

WI-D360 DAILY NEWSPAPER
THE DAILY TRIBUNE
Wisconsin Rapids, WI

Circ- (E) 14,124

AUGUST 12, 1998

Bacon's

3182

Wisconsin wins car competition

The University of Wisconsin-Madison was first among 13 top engineering schools in the June 1998 Future Car competition in Detroit.

The competition was sponsored by government and industry with the primary objective to design a consumer acceptable vehicle achieving 80 miles per gallon. The mechanical group leader for the team was Wisconsin Rapids native Jonathan Butcher, a 1995 graduate of Lincoln High (third from the right in the picture).

This 3,000 pound car, affectionately dubbed "The Aluminum Cow," turned in an 80 mile-per-gallon performance on the Chrysler test track to win the best fuel economy award. The team garnered other individual awards including the best use of advanced materials, the first Innovations in Aluminum award, and the best teamwork.

Winners of first and second places will exhibit their cars at the 17th Congress of the World Energy Council in Houston, Texas, in September. President Clinton and presidents of several Middle Eastern, oil producing countries will be in attendance.

The team's winning strategy was a parallel, hybrid vehicle composed of an all-aluminum Mercury Sable powered by a high efficiency, prototype diesel engine donated by Ford Motor Co. in tandem with a compact, water-cooled electric motor.

Innovative engineering included a transmission designed to accept power from two engines simultaneously and a regenerative braking system designed to capture energy normally lost in braking for recharging batteries. The team designed a 240 volt, light weight, rechargeable battery pack fashioned from 60 Milwaukee brand cordless tool power packs. A combination of sensors and computer programs coordinated the power plants for the optimum balance of acceleration, fuel economy, and battery life.

MI-D220 DAILY NEWSPAPER
THE DAILY MINING GAZETTE
Houghton, MI

Circ- (E) 12,106

JUNE 15, 1998

3182

FutureCar snags 4th place

HOUGHTON — The Michigan Technological University FutureCar team took fourth place in the 1998 FutureCar Challenge, climbing up two slots from last year's sixth-place finish.

The MTU team again received a special award for sportsmanship. Among their nice-guy accomplishments, they were seen helping the Ohio State team stick the decals on their vehicle.

The 13 universities chosen to compete in FutureCar tested their vehicles June 3-10 at the Chrysler Technology Center and Oakland Community College, in Auburn Hills. Each team had been given a new mid-size vehicle from GM, Ford or Chrysler, plus $10,000, and one year to re-engineer the car. The goal was to double or triple existing fuel economy without sacrificing the safety, comfort or convenience most consumers expect.

MTU's FutureCar, the Northwind, is a Dodge Intrepid. Like all of the top finishers, it is a hybrid electric vehicle — the Northwind paired diesel and electric power.

MTU's FutureCar team advisor is Mechanical Engineering Associate Professor John Beard. Matt Hortop, an electrical engineering graduate student, served as team leader.

FutureCar is sponsored by the Partnership for a New Generation of Vehicles, an industry-government collaboration to address a variety of transportation, manufacturing, and global competition issues.

Tying for first place were Virginia Tech and the University of Wisconsin at Madison. Lawrence Tech was third, with the University of Maryland finishing fifth and Concordia University taking sixth place.

Other competitors were Texas Tech, University of Tennessee at Knoxville, University of Illinois at Urbana-Champaign, University of California at Davis, University of Michigan at Ann Arbor, Ohio State, and West Virginia University.

Photo courtesy Michigan Technological University

Michigan Tech's FutureCar team poses with its entry in the national FutureCar competition. The team, with advisor Dr. John Beard, second from right, took fourth place in the annual contest.

MI-D310 DAILY NEWSPAPER
THE MINING JOURNAL
Marquette, MI

Circ- (E) 18,687 (S) 20,548

MAY 30, 1998

REGIONAL BRIEFING

Tech team preps for 'FutureCar' contest

HOUGHTON, Mich. (AP) — A team of Michigan Technological University students is preparing for the 1998 FutureCar Challenge, a race aimed at creating a super fuel-efficient car that is affordable and appeals to consumers.

Chrysler, Ford, General Motors and the United States Department of Energy are sponsoring the competition next week, which is in its third year.

Tech is one of 12 universities competing. Each school received either a Dodge Intrepid, Ford Taurus or Chevrolet Lumina and $10,000 in start-up funds. Student teams then had a year to re-engineer the car to increase fuel economy. The winning car last year averaged 60 miles per gallon.

Va. Tech students join in competition in June

They are helping to develop super fuel-efficient cars

BLACKSBURG – It has been described as a more difficult engineering challenge than putting man on the moon. But 13 universities from across North America, including Virginia Tech, think they can do it.

What they're all racing to create is a super fuel-efficient car. Not some stripped-down, impractical, one-seater but, rather, a mid-size, family sedan with all the safety, performance and convenience of a showroom model but without the thirst for fuel.

Sponsored by the United States Department of Energy (DOE) and Chrysler, Ford, and General Motors through the United States Council for Automotive Research (USCAR), the FutureCar Challenge, now in its third year, has already shown impressive results. Last year's top finisher demonstrated better than 60 miles per gallon fuel economy in a mid-size family car using a "hybrid" powertrain powered by both gasoline and electricity. The FutureCar Challenge is a student competition within the Partnership for a New Generation of Vehicles, the joint industry-government effort to address a wide range of transportation, manufacturing and global competition issues.

Each of the 13 prestigious engineering schools chosen to participate receives a brand new mid-size car and seed money from either Chrysler, Ford or General Motors. Student teams then have a year to re-engineer the vehicle to boost fuel efficiency. The catch is that vehicles cannot be stripped down. The final product has to maintain consumer acceptable standards for performance (for example, braking, handling, acceleration), safety (for example, crash performance, seatbelts, airbags) and convenience (for example, trunk space, heating/air conditioning, passenger comfort). In other works, they need to live up to the expectations consumers have for a mid-size, family sedan.

And exactly how do you do all this and still get increased mileage? There are as many answers as there are competitors. Most teams have chosen to install some type of hybrid powertrain – using both electric power and an internal combustion engine to power the car. The choice of fuels varies widely. While some cars rely on readily-available gasoline (U.C.-Davis), others have opted for alcohol-based fuels (Maryland), compressed natural gas (West Va.), or diesel (Concordia, Lawrence Tech, Ohio State, Wisconsin and Michigan).

In some vehicles, the car runs directly on either the electric motor or internal combustion engine while still others use the engine only as a generator to provide additional electricity – thereby extending the vehicle's range (distance driven without recharging).

Among the newest additions to these 21st century power plants are a pair of hydrogen fuel cells being installed by teams from Texas Tech University and Virginia Tech. These fuel cells are similar in operation to the power sources used on spacecraft. However, adapting them to run in a down-to-earth family car is an engineering challenge of astronomical proportions.

"One of the most gratifying results of this project is the tremendous ingenuity exhibited by these students as they tackle one of our country's most significant technological challenges," said Tom Gross, deputy assistant secretary at the U.S. Department of Energy. "The United States is in the middle of a furious global competition to develop the energy-efficient transportation technologies needed in a world with many more cars and trucks."

Other technological innovations new this year include three aluminum-intensive bodies supplied by Ford Motor Company. Teams from U.C.-Davis, the University of Wisconsin and West Virginia University are adapting these lighter-weight bodies in their vehicle design as a way to decrease overall weight and improve mileage.

Three new universities have joined the FutureCar Challenge this year. They are Texas Technological University, the University of Tennessee at Knoxville and the University of Illinois at Urbana-Champaign. While new to this competition, all three colleges have a successful record of competing in automotive engineering events.

Ten other universities are returning to the FutureCar competition this year including last year's top finisher, the University of California at Davis, and the 1996 winner, Virginia Tech. Other teams include: the University of Maryland, Concordia University, the University of Michigan at Ann Arbor, Michigan Technological University, Ohio State University, Lawrence Technological University, West Virginia University, and the University of Wisconsin.

In addition to major sponsorship by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), additional support is provided by the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency, Natural Resources Canada and the Aluminum Association.

A weeklong series of competitive events and evaluations will be held at Oakland Community College and at the Chrysler Technology Center in Auburn Hills, Michigan, from June 3-10. All vehicles will be tested and judged on criteria such as handling, acceleration, fuel economy, exhaust emissions, design and consumer acceptability. Judging panels are composed of experts from the auto industry, government agencies and the automotive press.

All FutureCar Challenge vehicles will be on public display twice during competition. On Saturday, June 6, they will be exhibited at the Detroit Grand Prix on Belle Isle in Detroit. On Wednesday, June 10, the FutureCars will be the centerpiece of an exhibit entitled, Past, Present and FutureCars at the Henry Ford Museum in Dearborn, Mich.

Davis, CA

Circ – (E) 10,323 (S) 10,648

JUNE 2, 1998

Tired but optimistic team heads to FutureCar event

By MELANIE TURNER
Enterprise staff writer

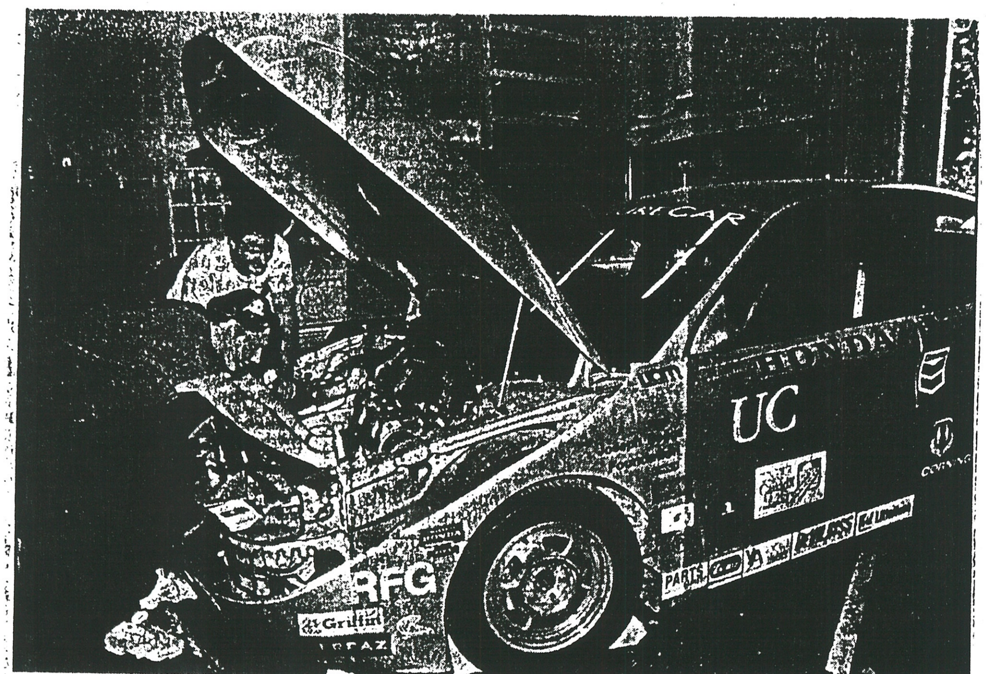
Students in this class have been pulling all-nighters — save a few hours sleep here and there — for about 10 days in a row now.

Surrounded by battery boxes, wiring and other car parts spread out on the floor of a UC Davis engineering department workshop, they have begun to show the ultimate signs of overworked students with bloodshot, watery eyes and occasional incoherent speech. Some hadn't showered in a couple days.

But on Monday each one had no doubt that their project — a hybrid electric vehicle — would be driveable by this morning, just in time to put the car on a trailer and set out for the FutureCar Challenge, a university competition sponsored by the U.S. auto industry and the U.S. Department of Energy, held this year in Detroit.

By now, they're already on the final leg of their mission, to develop a super fuel-efficient fami-

See FUTURECAR, Page A-5



Courtesy of Luis Galvez

Marcus Alexander and Peter Kucera, back, both seniors majoring in mechanical engineering at UC Davis, fine-tune the engine in UC Davis' entry in this year's FutureCar National Challenge.

FUTURECAR

Continued from Page A-1

ly car that Americans will want to own and drive. The students, headed by Professor Andrew A. Frank, were expected to leave for Detroit at 8 a.m. today.

"We've been working around the clock, non-stop since Thursday," said student Chris Nitta, who explained that work on this year's vehicle actually began three months ago. "We just sleep here and there."

"If we can get it running, we have a very good chance," added senior Peter Kucera.

Students have taken naps on a couple of couches set up in a laboratory where Nitta has been working on the car's computer — a single-board Pentium 133 — which controls the transmission. If all goes as planned, the computer will ensure that the car always runs at the most efficient gear, a more fuel-efficient design than today's automatic and manual transmissions, Nitta said.

"You have a smooth curve (of gears), instead of these steps," he said.

The computer also allows the driver to control the vehicle's interior climate using a touch screen, which utilizes a Windows 95 operating system.

Better fuel economy is also achieved with the car's unique hybrid engine, which uses both gasoline and electricity. The computer will determine the best operating parameters for the car.

At short distances, or around town, the car runs completely on electricity. On the highway, the gas engine kicks on automatically.

This year's car, made using the aluminum body of a Mercury Sable, will be able to travel nearly 70 miles per hour on the highway, students anticipate.

The car is expected to have better acceleration than a stock Mercury Sable, as well.

"We expect to burn rubber with it," said Dave Funston, who is working on the project full-time as staff.

The car will feature a 100-horsepower electric motor, plus a .66-liter Subaru engine (roughly another 47 horsepower). The batteries will need to be charged only once every 1,000 miles under optimum driving conditions. The car battery, if fully depleted, takes about six hours to charge back up.

Besides offering better fuel economy, students are keeping the price of the car down by using fewer moving parts.

The car, if mass produced, also could help meet California's tough emissions law, which mandates that 10 percent of cars sold meet zero emissions standards by 2003.

The car discharges from 80 to 90 percent fewer emissions than a stock Sable.

The basic concept for the car was developed by Frank.

Now in its third year, the FutureCar Challenge is also sponsored by the United States Council for Automotive Research, the joint research venture of Chrysler Corporation, Ford Motor Company and General Motors. The idea is to provide opportunities for engineering students to join the national challenge to develop fuel-efficient technologies while at the same time creating a valuable pool of future engineers with hands-on experience in advanced automotive technologies.

Judging at the event runs June 3-10. There are 13 entrants this year.

UCD students won the contest last year and on Monday they expressed optimism not only about their chances in Detroit, but about the future of hybrid vehicles.

At UCD, a core group of about 20 students worked on the car in shifts, plus about seven full-time employees made possible with increased funding for the project, according to Funston.

Funding has come from the California Air Resources Board, a contract with General Motors to build a hybrid electric vehicle, and from Chevron, Arco, the Yolo-Solano Air Quality Management District and Z-World Engineering.

THE ROANOKE TIMES
VIRGINIA
FRIDAY, JUNE 12, 1998

Virginia Tech team ties for top honor at FutureCar Challenge

With a Chevrolet Lumina and $10,000, students from Virginia Tech created an award-winning modified vehicle.

BLACKSBURG — The mission: About 50 university engineering students take $10,000 and one year to make a mid-sized American car more fuel efficient but no less safe, comfortable or convenient.

After eight days of testing, a group of Virginia Tech students was named co-champion Wednesday of the 1998 FutureCar Challenge, held in Auburn Hills, Mich., a suburb of Detroit. A group from Tech placed second last year and won in 1996. This year's competitors included Texas Tech, the University of Tennessee, the University of Illinois, the University of California at Davis, the University of Maryland, Concordia University, the University of Michigan, Michigan Tech, Ohio State University, Lawrence Tech, West Virginia University and the University of Wisconsin.

Tech and the University of Wisconsin tied for first place. Tech's team, which worked with a Chevrolet Lumina, also won five special awards for best acceleration, dynamic handling, overall engineering design, vehicle design inspection, consumer acceptability and best solo.

The competition is part of the Partnership for a New Generation of Vehicles, an industry and government collaboration looking at transportation, manufacturing and global competition issues.

The Tech team was returning to Blacksburg on Thursday and could not be reached for comment.

— MARK CLOTHIER

A Clipping From
Virginia Press Services
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New River Pub.
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Date JUN 13 1998

Tech team ties for first place in competition

NRN Staff Reports

BLACKSBURG – After a year of long, hard hours, sleepless nights and nerve-wracking trial-and-error, two of the top engineering universities in North America have done what some said was impossible: they've doubled the over-the-road fuel efficiency of a mid-size American car without giving up any of the safety, comfort or performance.

In a series of road tests conducted on the grounds of the Chrysler Technology Center, two teams of student engineers driving hybrid vehicles, demonstrated the equivalent of 75 miles per gallon of gasoline. Running on the same test course, a comparable gasoline-powered vehicle turned in a 37

See TIES, Page A11

mile per gallon performance.

These fuel-stingy teams, from the University of Wisconsin at Madison and from Lawrence Technological University in Michigan, were also among the top finishers overall in the 1998 FutureCar Challenge.

Wisconsin tied a team from Virginia Tech for first place while the Lawrence Tech team came in just behind them for a third place finish.

The FutureCar Challenge is a competitive "race" to re-engineer the American family car of today into the super fuel-efficient car of the 21st century.

The FutureCar Challenge is one of the toughest real-world vehicle engineering competitions in the U.S. Thirteen top engineering schools are given brand-new, mid-size vehicles by Chrysler, Ford or General Motors along with $10,000 in seed money. They then have one year to re-engineer the car to get double or triple the existing fuel economy (miles per gallon). There is a catch to all this – and it's a big catch. Teams are not allowed to strip down the car. The FutureCar students need to create an end product that still maintains all the safety, comfort and convenience that American car buyers expect.

Winning this competition means a great deal more than just winning bragging rights and prize money. FutureCar Challenge is part of the larger Partnership for a New Generation of Vehicles (PNGV), the joint industry-government effort to address a wide range of transportation, manufacturing and global competition issues. The technological advances these students are helping develop will make a difference down the road in how well the United States is able to hold its leadership position in the global marketplace.

Testing took place June 3-10 at the Chrysler Technology Center and on the campus of Oakland Community College, both located in Auburn Hills, Mich. Cars were judged on acceleration, handling, emissions, braking, fuel efficiency and consumer acceptability. They were also evaluated for their use of advanced materials and technologies.

It is in this area of advanced technology that the FutureCars are really making their mark. All of this year's entrants used hybrid powertrains – meaning they have more than one source of energy on board. In most cases, hydrids combine an internal combustion engine with an electric motor. Entrants this year demonstrated a variety of hybrids using a wide range of fuels including gasoline, diesel and alcohol.

Two of this year's entries, from Virginia Tech and Texas Tech, used hydrogen-powered fuel cells – the same type of power source being used by American spacecraft. Several other colleges incorporated aluminum-intensive bodies, one of the newest weight-reduction techniques in the auto industry.

All of these vehicles incorporate technologies that are more advanced than those we see on the road today. But that will change in the near future. Every major auto manufacturer is currently working on these advanced vehicle technologies, and it's only a matter of time before many of them are ready for production and marketing.

In addition to saving consumers money at the gas pump through better mileage, there are the even more significant benefits of maintaining global competitiveness in the crucial automotive industry and the political and strategic benefits of decreasing America's dependence on foreign petroleum sources. The largest share of this country's imported oil is now used for transportation. With gasoline prices low right now, there is not a huge outcry for more fuel-efficient vehicles. But as we've seen in the past many times, the cost of gasoline is difficult to predict and even more difficult to control.

The 1998 FutureCar Challenge competitors include: Texas Technological University, University of Tennessee at Knoxville, University of Illinois at Urbana-Champaign, University of California at Davis, Virginia Tech, University of Maryland, Concordia University, University of Michigan at Ann Arbor, Michigan Technological University, Ohio State University, Lawrence Technological University, West Virginia University, and the University of Wisconsin.

In addition to major sponsorship by the U.S. Department of Energy and the United States Council for Automotive Research (USCAR), additional support is provided by the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency, Natural Resources Canada, the Aluminum Association, Goodyear Tire & Rubber Company, and the American Iron & Steel Institute.

The 1998 FutureCar Challenge final standings were:

First place (tie): Virginia Tech, University of Wisconsin at Madison.

Third place: Lawrence Technological University.

Fourth place: Michigan Technological University.

Fifth place: University of Maryland.

Sixth place: Concordia University.

The 1998 FutureCar Challenge special awards included:

Most energy efficient: Ohio State University.

Best acceleration: Virginia Tech.

Best dynamic handling: Virginia Tech.

Best over-the-road fuel efficiency (tie): Lawrence Technological University, University of Wisconsin.

Best overall engineering design: Virginia Tech.

Lowest emissions: University of Maryland.

Best technical report: University of Maryland.

Best vehicle design inspection: Virginia Tech.

Best oral design presentation: Lawrence Technological University.

Best consumer acceptability: Virginia Tech.

Best appearance: University of Illinois, Urbana-Champaign.

Lowest vehicle driving losses: University of Wisconsin at Madison.

Best safety: Texas Technological University.

Best use of alternative fuels: University of Maryland.

Best use of advanced materials: University of Wisconsin at Madison.

Innovations in aluminum: University of Wisconsin at Madison.

Best workmanship: University of Illinois, Urbana-Champaign.

Best teamwork: University of Wisconsin at Madison.

Sportsmanship: Michigan Technological University.

Spirit of the challenge: Texas Technological University.

Best solo: Virginia Tech.

Roanoke Times & World News

VIRGINIA TECH TEAM TIES FOR TOP HONOR IN FUTURECAR CHALLENGE

BY MARK CLOTHIER

06/12/98

After eight days of testing, a group of Virginia Tech students was named co-champion Wednesday of the 1998 FutureCar Challenge, held in Auburn Hills, Mich., a suburb of Detroit. A group from Tech placed second last year and won in 1996. This year's competitors included Texas Tech, the University of Tennessee, the University of Illinois, the University of California at Davis, the University of Maryland, Concordia University, the University of Michigan, Michigan Tech, Ohio State University, Lawrence Tech, West Virginia University and the University of Wisconsin.

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The Tech team was returning to Blacksburg on Thursday and could not be reached for comment.

KRTBN Knight-Ridder Tribune Business News: Wisconsin State Journal

Wisconsin College Students Double Fuel Efficiency in 'Future Car' Test

BY Roger A. Gribble

06/12/98

Jun. 11--A team of UW-Madison student engineers took several firsts this week in a FutureCar Challenge series of road tests, in one event doubling the over-the-road fuel efficiency of a midsize American car.

In one series of tests the team's aluminum-body Mercury Sable, dubbed "Wisconsin Cow," demonstrated the equivalent of 75 miles per gallon.

That was good for a first-place tie with a team from Lawrence Technological University in Michigan.

Thirteen teams competed in the event, sponsored by the Department of Energy and the U.S. Council for Automotive Research, representing Chrysler, Ford and General Motors.

The weeklong event was at the Chrysler Technology Center and Oakland Community College, both in Auburn Hills, Mich.

Teams were given one year to re-engineer each new car given them by the three manufacturers to double or triple typical mileage.

They were not permitted to strip down the car and were required to maintain the safety, comfort and convenience buyers expect.

In addition to winning the top mileage honors, the UW-Madison team received the first-ever Innovations in Aluminum award from the Aluminum Association for creating the lightest car in the competition.

It also tied with Virginia Tech for first place overall and took top honors for lowest vehicle driving losses, best use of advanced materials and best teamwork.

Team members are Troy Nergaard, Joel Van Ess, Mark Metoki, Sean Scanlon, Jamie Pitterle, Ethan Brodsky, Mike Koplin, Chris DeSalvo, Anton Kozlovsky, Tim Roebke, Amanda Pertzborn, John Ertmer, Bich-Ty Le, Jenny Topinka, John Norquist and Matt Peterson.

The faculty adviser is Glenn Bower.

FutureDrive

Volume 4, Number 2 DOE/Industry Competitions Advancing Automotive Technology Spring 1998

TECHNOLOGY FEATURE

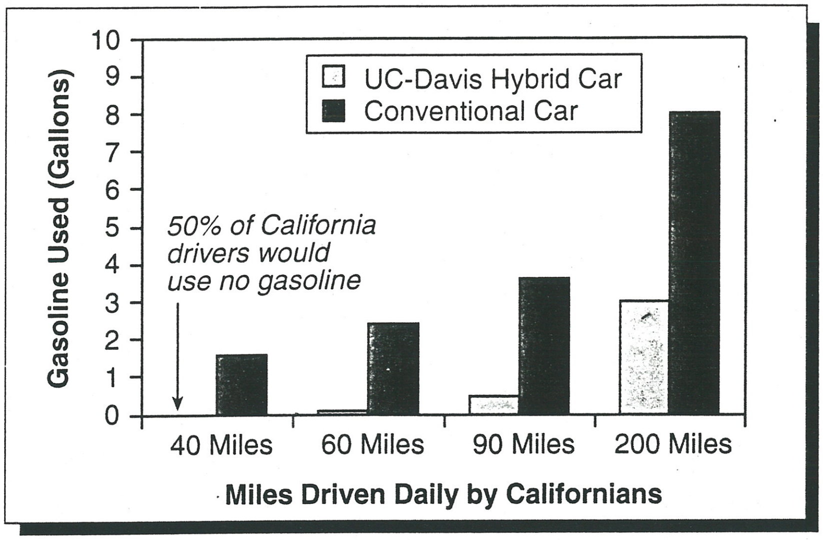
Sixty Miles on a Teacup of Gas

Not all things in California are big. A hybrid electric vehicle built in Davis is a big car with a *tiny* thirst. Driving it, a typical commuter could go 60 miles in the city on just a teacupful of gas—and 1,000 miles on the highway on a single charge. Meet "Joule," a fully equipped Taurus modified by students at the University of California-Davis.

In the 1997 FutureCar Challenge, Joule won first place overall, first place for energy efficiency, and five other top awards. The Davis team used a charge-depletion parallel hybrid configuration with an advanced nickel-metal hydride battery.

UC-Davis is pushing its hybrid design even farther for the 1998 FutureCar Challenge. And an ultra-light all-aluminum chassis makes this year's UC-Davis FutureCar 600 pounds lighter than last year's.

The as-yet-unnamed Davis entry has an 18-kilowatt-hour nickel-metal hydride battery that is smaller, lighter, and more powerful than any prototype hydride system before it. It could, by itself, carry the car 80 miles.



The 3-cylinder, 660-cubic-centimeter engine (about 40 cubic inches, or one-quarter the size of a conventional Taurus engine) has a peak horsepower of 40 but operates mostly at 12-14 horsepower, its most efficient range. The computer control program to manage the power flow uses a conventional engine processor, which contributes to the relative inexpensiveness of the design.

The UC-Davis control strategy reflects a shift in perspective from individual vehicles to *fleet* performance in emissions and efficiency. The team learned that half of all Californians drive 40 miles or less a day, while only 5% drive more than 100 miles a day.

(continued on page 4)

"Joule" at a Partnership for a New Generation of Vehicles Symposium in July 1997. Joining the UC-Davis team is Shelley Launey, Manager of Vehicle Competitions for the U.S. Department of Energy.

IN THIS ISSUE

(continued from page 1)
"We designed our car so the average person can do all their driving on battery power," says UC-Davis faculty advisor Andrew Frank. Thus, for the first 40 miles the car runs only on its Ovonics nickel-metal hydride battery pack.

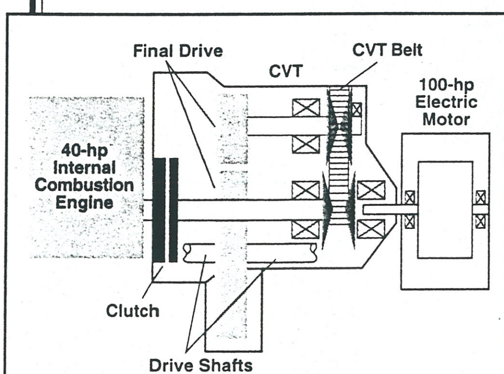
Beyond 40 miles, it begins to draw gradually on its motorcycle-sized three-cylinder gasoline engine. With this scheme, even the 200-miles-a-day marathon commuter could still get cleaner operation and much higher fuel efficiency than in a conventional vehicle. Major car companies have shown interest in the concept.

"We start to bring in the gasoline a little at a time," says Frank. "So if you go 40 miles a day in the city, you use no gas at all. If you go 60 miles a day, you use maybe a cupful of gas; 90 miles, you might use half a gallon; 200 miles, 3 gallons."

Because only a small percentage of drivers would routinely go far enough to use gallons of gasoline, the net result would be vastly lower emissions and fuel use overall, across the driving population.

"Assume a fleet of vehicles with driving patterns representative of California as a whole," says Frank. "A fleet of 1,000 Tauruses using our design and control strategy would use only 3% of the gas used by a conventional fleet."

Jane Andrew



The UC-Davis Parallel Hybrid Powertrain

EPA Meets FutureCar "Test" Challenge

1997 FutureCar challenge

Twelve student teams at the 1997 FutureCar Challenge used advanced automotive technologies to convert either Ford Tauruses, Chevrolet Luminas, or Dodge Intrepids, while striving to triple the vehicle's fuel efficiency without sacrificing performance or boosting emissions. The converted vehicles also had to be safe and affordable.

The June 3–11 competition opened with events at the General Motors Technical Center in Warren, Michigan, and ended with a two-day, over-the-road endurance run from Detroit to Washington, DC. (See results on p. 7.) The FutureCar Challenge is sponsored by the U.S. Department of Energy (DOE), with help from the United States Council for Automotive Research (USCAR) and the National Science Foundation. USCAR is an umbrella organization created by Chrysler, Ford and General Motors to do pre-competitive research in a variety of advanced automotive technologies.

During the competition, FutureCars were tested for emissions, handling, consumer acceptability, and use of advanced technologies and materials. The U.S. Environmental Protection Agency's (EPA's) National Vehicle and Fuels Emission Laboratory (NVFEL) conducted the emissions testing. In the past, the Lab has supported other student vehicle competitions such as the Methanol Vehicle Challenge and the Natural Gas Vehicle Challenge.

At the outset, the FutureCar Challenge presented EPA with some unique challenges:

- The FutureCar hybrid-electric vehicles required city and highway tests at both high and low states of charge and zero emission vehicle mode—two to three times the number of tests needed for standard vehicles.
- The vehicles burned many types of fuel, including diesel, biodiesel, liquid propane gas (LPG), compressed natural gas (CNG), reformulated gasoline (RFG), and ethanol (E85). The diverse fuels required three different test cells, a filter balance room, and chemistry lab support.
- The tight schedule of events gave EPA only two days to complete all of the tests and deliver processed results.

"We were beginning to think this would be the *EPA Challenge* as well as the *FutureCar Challenge*," jokes David Van Amburg, EPA Mechanical Engineering Technician.

To meet the equipment demands of the competition, EPA provided the following:

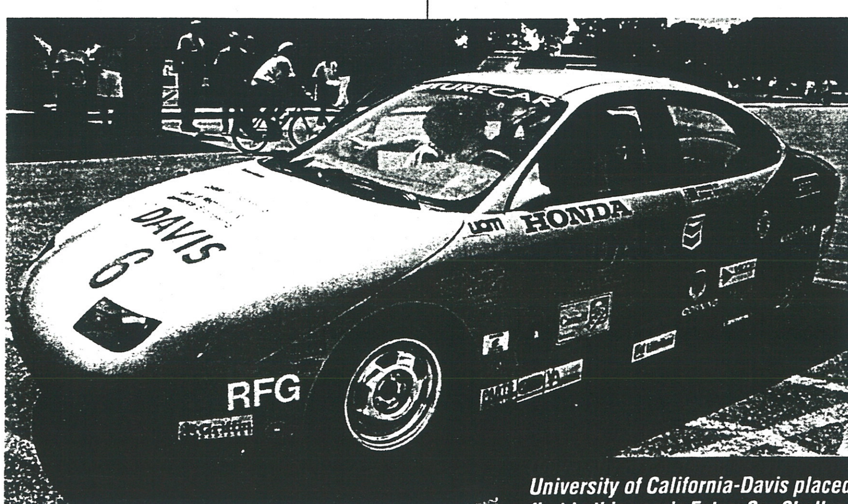
- A diesel test cell with particulate sampling, rebuilt specifically for the competition;
- An impinger bench sampling system for collecting "wet samples" and "cartridge samples" from the ethanol-fueled car;
- A test cell and soak area with proper gas detection safety equipment for gaseous-fueled (LPG and CNG) vehicles;
- Battery recharging area with safety equipment; and
- Stand-alone test processing to provide immediate test results. This processing program was designed specifically to meet the testing needs of the FutureCar Challenge and required many development hours from EPA's computer support staff.

Furthermore, to ensure safety, EPA conducted specialized training for its technical staff: safety training for gaseous-fueled vehicles, familiarization training on the rebuilt diesel cell, and cross-training of key technicians for smooth test flow.

Despite the considerable challenges, EPA's entire vehicle testing group—plus computer and maintenance staff and volunteers from other groups—successfully completed the two-day test plan. NVFEL committed 1,200 person-hours to prepare and perform the vehicle testing for the 1996 competition alone and devoted about another 600 person-hours to the 1997 event.

The FutureCar Challenge provided EPA with a hands-on opportunity for learning how to test hybrid-electric vehicles, while also teaching the students who participated how to design an advanced alternative-fuel vehicle.

David Van Amburg
Mechanical Engineering Technician
U.S. Environmental Protection Agency



University of California-Davis placed first in this year's FutureCar Challenge.

FUTUREDRIVE
Volume 3, Number 2, Summer/Fall 1997

Purpose
To inform past, present, and potential sponsors, participants, organizers, volunteers, and others interested in DOE-sponsored vehicle competitions about the plans for and results from the competitions.

We welcome submissions but reserve the right to edit them. Information in FutureDrive may be reproduced for publication with acknowledgment to FutureDrive, Argonne National Laboratory. Address correspondence, subscription requests, and changes of address to:

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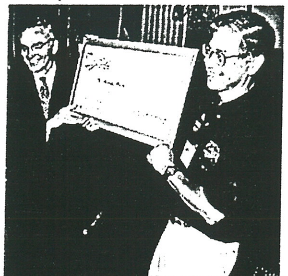
UC-Davis Faculty Advisor Honored at FutureCar Challenge



Joe Bordogna from the National Science Foundation presents award to Dr. Andrew Frank (right).

The faculty advisor's role in advanced vehicle competitions can make the difference between a mediocre team and a winning team. The advisors spend hundreds of hours in the automotive shop and lab testing ideas, concepts, and approaches with their students. They often abandon a chance to research and publish. They spend a week or two each year on the road eating fast food and living in economy lodging. For their extraordinary effort, the faculty advisors receive a handshake and a chicken dinner at the end of each competition while organizers pick their brains for ways to improve the competitions.

But this year, at the 1997 FutureCar Challenge, the reward was much more substantive. Thanks to a generous grant from the National Science Foundation, we offered a $20,000 bonus to the faculty advisor who did the best job of integrating the FutureCar project into his/her engineering curriculum.

Clearly, several faculty members deserve the recognition that such an award brings. However, organizers chose Dr. Andrew Frank from the University of California-Davis (UC-Davis). Dr. Frank has devoted the last 25 years to optimizing vehicle fuel economy, emissions, and performance—precisely the FutureCar Challenge goals. At the same time, he created undergraduate courses to teach innovative automotive design and construction. Students in these classes receive credit for their work on FutureCar. All of the courses teach students to be creative while still relying on sound engineering principles. It is obvious when seeing and driving the UC-Davis FutureCar that this concept works. Only by applying innovative concepts to the powertrain configuration, the powertrain control concept, and the body design, and by using new materials, could the team get 63 mpg (federal highway test cycle) from a vehicle that originated as a Ford Taurus.

Although competition peformance goes a long way to validate the teaching approach, the students are the real judges. Listen to what Dr. Frank's students have to say about his role as teacher and faculty advisor:

"Dr. Frank is an exceptionally rare professor who treats his students as peers. He has welcomed us into his project, his knowledge, and his home as friends." ▸ "Dr. Frank taught me not to underestimate the importance of thinking three times, measuring twice, and doing once." ▸ "He has made a huge impact on my life, both professionally and personally." ▸ "I have yet to meet another professor who provides the balance of theory and application that Dr. Frank does." ▸ "Dr. Frank is sometimes forceful, sometimes passive, but he always allows us to make the final decision and our own mistakes and victories." ▸ "Dr. Frank has been an inspiration from his hybrid work dating back 20 years. His experience in efficiency is unmatched. I learn more from him every month than I could in all my classes combined."

I couldn't have said it better. Congratulations, Dr. Frank!

Shelley Launey
Shelley Launey
Manager of Vehicle Competitions
DOE Office of Transportation Technologies

HYBRID VEHICLE BULLETIN

A Daily News Summary Covering Hybrid Electric Vehicles

Editorials, Reviews & Asides

FutureCar Challenge Yields Efficient Vehicles

Student engineering teams from colleges and universities around the U.S. recently completed year-long efforts to design the super fuel-efficient car of the 21st century as part of the FutureCar Challenge, sponsored by the Department of Energy and the Big Three automakers through the United States Council for Automotive Research (USCAR).

Teams from the University of Wisconsin at Madison and Lawrence Technological University designed hybrid vehicles that are capable of achieving a fuel economy of 75 miles-per-gallon (mpg) in demonstration runs. A comparable gasoline-powered vehicle achieved 37 mpg.

Wisconsin and Virginia Tech tied for first place overall for the event, while Lawrence Tech came in second and Michigan Technological University finished third. The Virginia Tech vehicle also received awards for best acceleration, best dynamic handling, best overall engineering design and best consumer acceptability. Contact: Jack Groh, FutureCar Challenge, phone 401-732-1551.

(FUTURECAR CHALLENGE RELEASE: 6/10)

Engineering The Future

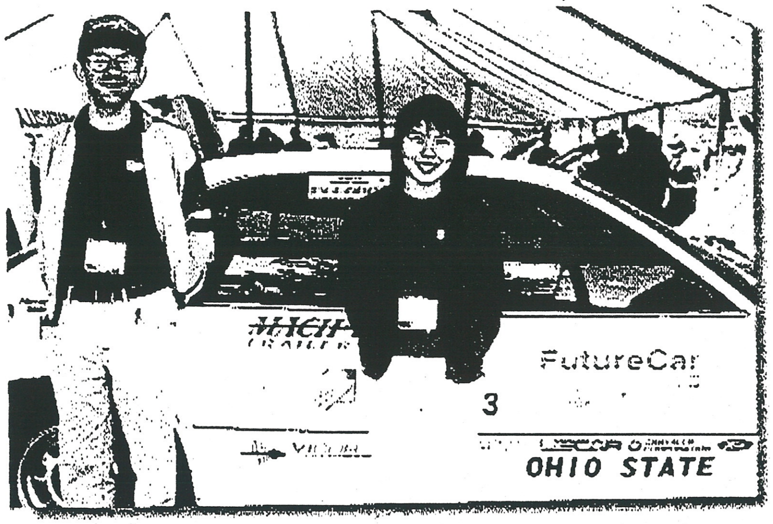
The challenge: build a car that gets up to triple the mileage of today's vehicles. Oh, and don't forget to make it attractive, affordable, and safe for consumers, too.

Students from thirteen prestigious universities faced that very challenge as they competed recently in the third annual FutureCar Challenge at Oakland Community College and the Chrysler Technology Center in Auburn Hills, Mich.

Sponsored by the U.S. Department of Energy (DOE) and the United States Council for Automotive Research (USCAR)—the joint research venture of GM, Ford, and Chrysler—the FutureCar Challenge provides opportunities for universities and engineering students to join the national challenge to develop fuel-efficient technologies.

The FutureCar Challenge is the student version of the same engineering task begun by government and the domestic auto industry nearly three years ago that led to the formation of the Partnership for a New Generation of Vehicles (PNGV). This national research program includes all three major U.S. domestic car makers, seven federal agencies, and twenty government laboratories.

"One of the most gratifying results of this project is the tremendous ingenuity exhibited by these students as they tackle one of our country's most significant technological challenges," explains Tom Gross, deputy assistant secretary at the DOE. "The United States is in the middle of a furious global competition to develop the energy-efficient transportation technologies needed in a world with many more cars and trucks."



Two members of the Ohio State team show off their hybrid Chevrolet Lumina at the FutureCar Challenge display at the Detroit Grand Prix.

1998 FutureCar Challenge Final Standings

1st Place	Virginia Tech and University of Wisconsin at Madison (tie)
3rd Place	Lawrence Technological University
4th Place	Michigan Technological University

1998 FutureCar Challenge Special Awards:

Most Energy Efficient:	Ohio State University
Best Acceleration:	Virginia Tech
Best Dynamic Handling:	Virginia Tech
Best Overall Engineering Design:	Virginia Tech
Lowest Emissions:	University of Maryland
Best Consumer Acceptability:	Virginia Tech
Innovations in Aluminum:	University of Wisconsin at Madison

FutureCars are judged on:

- Fuel Efficiency
- Handling
- Acceleration
- Endurance
- Consumer Acceptability
- Engineering Design
- Exhaust Emissions
- Cost/Manufacturability

ALUMINUM
AutoDesign Review

The Aluminum Association

For Automotive and Light Truck Engineers

July 1998 • Volume 6 • Number 2

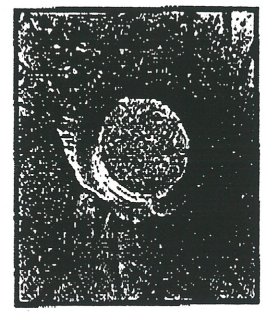
Wisconsin Team Takes Aluminum Award

From left-to-right are the Wisconsin winning team members: Troy Nergaard, John Norquist, Faculty Advisor Glenn Bower, Jamie Pitterle, Anton Kozlousky, Jon Ertmer, Bich-Ty Le, Jenny Topinka, and Aluminum Association Automotive Director Jane P. Lichter, and Association President Steve Larkin.

Competing against 13 universities, a team of top engineering students from the University of Wisconsin won the first ever Innovations in Aluminum award as part of the FutureCar Challenge. They created the lightest car in the competition, achieving a fuel efficiency rating of 75 miles per gallon. Starting with an all aluminum Mercury Sable, the Wisconsin team converted over 20 additional components and systems to aluminum, including parts of the suspension system, chassis, powertrain, and electronic controls.

Spot Welding Aluminum— Yes It's Being Done

Aluminum can and is being successfully spot welded today and there are some important new developments that promise to make it even easier to implement. A new generation of intelligent weld controls and monitors will minimize the variability in the process. By monitoring signals from the welding system as the weld is made, and then applying algorithms to interpret the data in real time, weld quality will be available on-line, with much reduced need for destructive testing. Additionally, with this new intelligence built into the weld controls, the process will be able to take corrective action by automatically adjusting the welding parameters to compensate for changing conditions. If the system needs maintenance or develops a condition that cannot be overcome by parameter adjustment, it will give the operator detailed explanations of what needs to be fixed.



Peeled spot weld prior to adhesive cure

Electrical resistance spot welding is the most commonly used joining method for steel in the auto industry because it is economical and uses few consumables. The process is now also being used successfully with aluminum, but there are some important process differences between steel and aluminum arising from differences in their physical properties. Compared with steel, the bulk electrical resistance of aluminum is about one-third and this means

Continued on page 3

19th Annual Auto Aluminum Seminar Taking Shape

The Automotive Aluminum Design & Fabrication Seminar, "Lighten Up With Aluminum" is scheduled for October 21 at Laurel Manor in Livonia, MI.

Auto industry speakers will share their experiences about aluminum's use in automotive manufacturing today, and trends on the horizon in the 21st century. Attendees will hear case studies on aluminum applications, address automotive manufacturing challenges and solutions and participate in open-forum discussions with aluminum experts on the growing role of aluminum materials in auto manufacturing. *Register early to reserve your seat.*

University of Illinois at Urbana-Champaign

Ingenuity

Electrical & Computer Engineering Department

FutureCar team gears up for national collegiate competition in June

BY LAURA SCHMITT

How long does it take a team of engineers to design and develop an advanced hybrid electric vehicle (HEV) that has up to three times the fuel efficiency of today's cars, while maintaining current levels of performance, safety, and affordability? Three years? Four years? That amount of time would be a luxury for members of the Electric Illini FutureCar Challenge team, who began work on the FutureCar project in September.

In their first FutureCar competition, the Electric Illini are among 13 U.S. collegiate teams competing in the Challenge, which will culminate in a series of competitive events in Auburn Hills, MI, June 4-11. The vehicles will be judged on criteria such as fuel economy, emissions, acceleration, handling, consumer acceptance, manufacturing, and cost. In its third year, the Challenge is sponsored by the U.S. Department of Energy and the U.S. Council for Automotive Research, a cooperative effort of the Big Three automakers.

With more than 80 undergraduates from several engineering and business disciplines, the Electric Illini are converting a 1997 Dodge Intrepid, donated by Chrysler, into an HEV. The other collegiate teams in the competition received similar mid-sized sedans—Chevrolet Lumina, Ford Taurus, and Mercury Sable, for example. The U of I team decided to build a series-type HEV similar in architecture to U of I's award-winning 1993-94 Ford Escort HEV from another national competition. FutureCar teams were free to choose whether they wanted to build a series- or parallel-type HEV.

A series hybrid is powered by an engine that is connected to a generator. The power is transferred electrically from the generator to the electric motor. A series-type engine never idles, which reduces vehicle emissions and makes it more environmentally friendly than a parallel HEV.

A parallel hybrid car has an internal combustion engine and an electric motor that simultaneously supply traction power. This type of hybrid car uses the power from the internal combustion engine for highway driving, but can also use the power from the electric motor for acceleration. The parallel configuration is more complicated than the series HEV, but it is usually more efficient on the highway. In 1997, a parallel HEV from the University of California-Davis won the competition, achieving 42 miles per gallon (mpg) in the city and 62 mpg on the highway.

Electrical engineering senior Danielle Smith (standing) and general engineering senior Randy Clark are part of the FutureCar's Electrical Systems Integration Group. The two were working on the project March 17 in the Grainger Electrical Machinery Lab at Everitt Lab.

Last semester, the U of I team prepped the car for the conversion, removing many existing components and parts from the interior, under the hood, and even panels from the body of the car. "All the basic stock engine components came out, including the air conditioning compressor, alternator, engine, muffler, exhaust system, and catalyst," said Electrical Team Leader Mike Kukovec, an

FutureCar, continued on page 5

Two outstanding ECE staff win department award

BY JAMIE HUTCHINSON

Both winners of the 1998 ECE Staff Employee-of-the-Year Award agree: the recognition helps, but they would do just as good a job if there were no award incentives. "I try to go one step further than I need to in my work," said Mary Parsons, "and while it's nice to get the recognition, that's not the reason I do it."

Fellow winner Sheryle Carpenter echoed that sentiment. "It's not that I need the recognition—I do what I do because I like it—but it helps make it worthwhile to know that people appreciate what I do."

ECE Department Head Steve Kang presented the dual awards at the February 24 ECE Staff Recognition Luncheon at the Illini Union. Ten ECE staff members were nominated for the award. According to Kang, the

Electric Vehicles Energy Network Online Today

SCIENCE & TECHNOLOGY REPORT: Student Teams Prepare for FutureCar Challenge

06/08/98

The University of Illinois Urbana-Champaign (UIUC) has made the FutureCar Challenge a technical elective credit, attracting as many as 65 engineering students to meetings, with 40 active students. The UIUC team has developed a series hybrid called the "Intrepid EMF" (Electro-Motive Force) which uses a "tracking APU" (auxiliary power unit) strategy. The APU tracking closely monitors the battery state of charge. The one-liter diesel engine runs most of the time, allowing the vehicle to carry fewer batteries. The students say less weight will improve mileage. In the 1993 and 1994 HEV (hybrid electric vehicle) Challenges, UIUC earned a first place in engineering design. It also has competed in the 1995 and 1997 Sunrayce events. Though only one member of the current FutureCar Challenge team was involved in the previous HEV events, student project leader Jeremy Cellarius said the FutureCar Challenge team is prepared for the upcoming competition in June. "Now, everyone's feeling a little more comfortable and we expect to have everything ready for the competition in June," he said. At Texas Technological University, which also is planning to compete in the FutureCar Challenge, students are awaiting the arrival of their fuel cell, hoping it will make it to Lubbock in time for the 1998 competition. "All we're getting is the fuel cell core," said Tim Maxwell, Texas Tech advisor. "We've got to build all the peripheral parts to go with it. So that's the challenge." The students have devised a backup plan just in case the fuel cell doesn't make it in time. "Since the fuel cell doesn't have to operate constantly to charge the batteries, we can set the car up for the fuel cell, then run on the batteries," Maxwell explained. "Our range will be severely limited, but everything else should work as designed, and we can demonstrate our vehicle setup. When the fuel cell arrives, we'll get ready for next year." (FUTURE CAR UPDATE: SPRING 1998)

Tuesday, June 9, 1998 **Arts and Entertainment** The University Daily

Futuristic car takes Tech students to Detroit

CAREN CARNEFIX
UD Staff Writer

In the future, consumers may purchase cars that get 80 miles per gallon of gasoline.

It is possible that one of Texas Tech's engineering students will have contributed to the design.

A team of nine mechanical and electrical engineering students are competing in the FutureCar Competition in Detroit.

The students left June 1 and began competing Wednesday with teams from 13 other universities, said Tim Maxwell, associate professor of mechanical engineering. The event lasts 10 days with different levels of competition each day.

"The objective is to create normal performance for a mid-size vehicle and get 80 miles to the gallon cruising on the highway," Maxwell said.

"The students are free to do anything they want to the car."

1998 FutureCar challenge

All teams were given either a Chevrolet Lumina, a Ford Taurus or a Dodge Neon. Tech worked with a Lumina.

Sponsors for this year's competition are the U.S. Department of Energy, General Motors, Ford and Chrysler. The DOE reviews proposals from the universities and chooses the ones to participate in the competition.

The DOE chose two of the competing schools, based on proposals, to design a vehicle with a fuel cell. Tech and Virginia Tech were chosen.

But, because the manufacturer of the fuel cell did not have the cell in time for the competition, Tech and Virginia Tech both will enter an electric car that has no fuel source.

"There's no way we're going to win first place, but we will do well," Maxwell said.

"We can still win some of the events."

A faculty adviser who returned Sunday from the FutureCar event said Tech's team members were relieved to qualify for the competition.

"They've (team members) been working around the clock; it's been pretty hectic," said Jesse Jones, a mechanical engineering lecturer. "They have really come together as a team."

The teams competed in the design competition Saturday and the emissions testing Sunday, Jones said, but word of the results had not reached Tech. The duration and driveability competitions will complete the event this week, he said.

The students at Tech have worked on the project since the fall as part of a senior design class. Tech has had a team of students working on some type of car for the future since 198

The DOE and the automoti manufacturers will use info mation from the student projects to create cars like the for consumers. By participati in the competition, the studen are able to make career conne tions, Parten said.

"There's a good interplay b tween the manufacturers a the students," he said.

"The students get a lot out it. They work on a real proje that's as close as it could be industry."

Participating in the compe tion are graduate students R chard Howlett, Wallace Turn Erle Rowlins and Chr Machuca and undergradua students Chris Larson, Gr Lawford, Jason Harris, Ry Montgomery and Mark Shuc

scholarly communications project

SPECTRUM Virginia Tech

Engineering students successful in two automotive competitions

By Liz Crumbley

A team of about 60 Virginia Tech engineering students tied for first place with students from the University of Wisconsin at Madison in the 1998 FutureCar Challenge held at the Chrysler Technology Center near Detroit, Michigan. In addition, Doug Nelson, associate professor of mechanical engineering, received the 1998 FutureCar Challenge Faculty Advisor of the Year Award from the National Science Foundation (NSF).

The awards were presented to Nelson and the Virginia Tech Hybrid Electric Vehicle (HEV) Team on June 10 at the end of this year's challenge, held at Chrysler's Technology Center near Detroit.

The national competition, sponsored by the big three automakers and the U.S. Department of Energy (DOE), challenged student teams from 13 engineering schools to at least double the fuel efficiency of mid-sized cars without sacrificing safety, performance or comfort.

In addition to tying for first place overall, the Virginia Tech Hybrid Electric Vehicle (HEV) Team received "best" awards for acceleration, dynamic handling, overall engineering design, vehicle design inspection, consumer acceptability, and solo performance. The Tech team has a history of success in this competition--they placed first overall in the 1996 challenge and second in 1997.

The Tech students converted a Chevrolet Lumina donated by General Motors into an electric vehicle by replacing the original engine with a battery pack. The Tech vehicle also includes a mock-up of a fuel-cell stack, because the students will use this advanced technology for the second leg of the competition in 1999. Of the 13 teams competing in the competition, only students at Virginia Tech and Texas Technological University were selected to receive 20-kilowatt proton-exchange-membrane (PEM) fuel-cell stacks worth $250,000, supplied by the DOE and Energy Partners Inc. of Florida. The Virginia Tech students have modified their Lumina so that the battery pack will supply peak power and the fuel-cell stack will supply average power and re-charge the batteries.

Nelson, who became the founding advisor of the Tech HEV Team in 1994, received a cash award of $20,000 from NSF. The money will be used by Nelson and the team for their continuing work and research in the FutureCar Challenge.

Electric Illini compete for first time in national HEV event

Competing in the annual FutureCar Challenge for the first time, a team of U of I engineering students designed and developed an advanced hybrid electric vehicle (HEV) that earned two awards at the national collegiate competition in Auburn Hills, MI, in June. The Electric Illini picked up awards for best finish and best workmanship. Overall, the team placed ninth out of 13 teams.

"These awards recognize what we did as far as body modifications go and how neatly our components were installed in the car," said Electrical Team Leader Mike Kukovec, an electrical engineering junior. "Overall, though, we placed higher than any of the other rookie schools."

The FutureCar competition challenges teams to transform a mid-size auto into an HEV that has up to three times the fuel efficiency of today's cars, while maintaining current levels of performance, safety, and affordability. The Electric Illini converted a 1997 Dodge Intrepid—donated by Chrysler—into a series-type HEV.

The vehicles were judged on fuel economy, emissions, acceleration, handling, consumer acceptance, manufacturing, and cost. In its third year, the Challenge is sponsored by the U.S. Department of Energy and the U.S. Council for Automotive Research, a cooperative effort of the Big Three automakers.

More than 80 undergraduates from several engineering and business disciplines worked on the car beginning in September and culminating in the June competition. More than half of these students were from ECE.

PHOTO BY LAURA SCHMITT

FutureCar Electrical Team Leader Mike Kukovec, an electrical engineering junior, constructs equalizing circuits for the car's main battery pack in April. Kukovec was among the team members who traveled to Michigan in June for the FutureCar Challenge competition.

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FutureCar Finishes Fourth

Michigan Tech's team took fourth place in the 1998 FutureCar Challenge, climbing up two slots from last year's sixth-place finish.

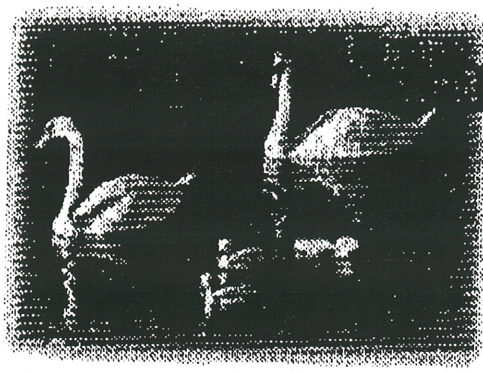
The MTU team again received a special award for sportsmanship. That may have cost them third place. Before the endurance event, Lawrence Tech's team did not have a working water pump. Michigan Tech loaned Lawrence Tech a pump and Lawrence went on to win 60 points on the event and eventually took third place, just 52 points ahead of MTU.

MTU was the only team that showed up at the competition with a running car and was the only team to leave the competition with a running car. They were the only team that did not have any problems or trouble.

The thirteen universities chosen to compete in FutureCar had been given a new mid-size vehicle from GM, Ford, or Chrysler, plus $10,000, and one year to re-engineer the car. The goal is to double or triple existing fuel economy without sacrificing the safety, comfort, or convenience most consumers expect.

Tying for first place were Virginia Tech and the University of Wisconsin at Madison. Lawrence Tech was third, MTU fourth, the University of Maryland fifth, and Concordia University took sixth place.

Other competitors were Texas Tech, University of Tennessee at Knoxville, University of Illinois at Urbana-Champaign, University of California at Davis, University of Michigan at Ann Arbor, Ohio State, and West Virginia University. For more information, see http://project.ee.mtu.edu/~fcc/



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FutureCar '98

Tech team takes 4th

The Michigan Tech FutureCar team earned fourth place in a field of thirteen, took the FutureCar sportsmanship award, and was selected to display its car at the Detroit Grand Prix recently.

EV World interviewed Shelley Launey, US Department of Energy, Office of Advanced Vehicle Technology's FutureCar Challenge, at the FutureCar Challenge in Detroit, June 3-10, 1998.

The competition is jointly funded by the DoE and corporate sponsors with DoE spending a minimum of $600,000 a year on the program. This is a fraction of the $135 million that the Department spends on advanced vehicle hardware research and Launey strongly feels it is money well spent.

The real pay-off of the Challenge isn't just the technology that evolves from it, but from the bright, talented crop of young engineers it is nurturing. Someday, when the price of gas at the pump approaches European levels, Launey hopes US car companies will have these "super cars" ready for consumers.

Complete TT story

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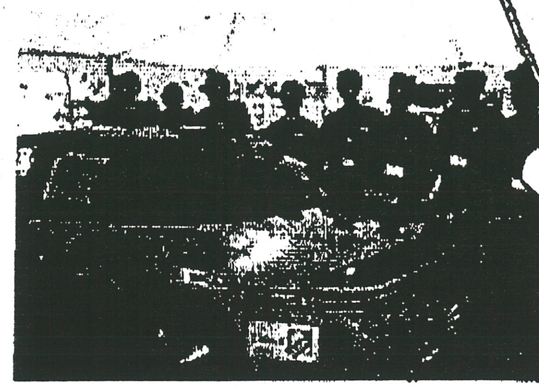
Beard: FutureCar effort "impressive"

How sweet it was.

"It was kind of like getting a silver or bronze medal in the Olympics," FutureCar advisor **John Beard** said. "It isn't the gold, but it's still awfully good."

MTU's FutureCar, the *Northwind,* breezed through the June 3–10 competition to fourth place in a field of thirteen. During this third year of competition, the Michigan Tech team again finished in the money, moving up from sixth place to fourth and taking a $3,000 prize.



Award winners in the 1998 FutureCar Challenge include Michigan Technological University team members (l–r) Brian Coutcher, Amy Boyd, Jon Schewe, Clyde Bulloch, Aaron Thul, Tom Przybylski, John Beard (faculty advisor), and Matt Hortop (team leader). Photo was taken during competition in greater Detroit.

"We were very competitive in every area," said Beard, an associate professor in the ME-EM department. "That's especially impressive in that we didn't get our engine on time: the first engine wasn't shipped, the second turned out to be bad, and on and on. The students overcame tremendous odds and built a very professional-looking car."

So professional, in fact, that it was one of two selected to display at the Detroit Grand Prix. "We got a police escort," Beard said. "That was kinda neat—we got to run all kinds of red lights." And it was among the four chosen for viewing at FutureCar Challenge opening ceremonies.

The FutureCar Challenge is a competitive race to re-engineer the American family car into the super fuel-efficient car of the twenty-first century. Major sponsors are the US Department of Energy and Chrysler, Ford and General Motors through the United States Council for Automotive Research (USCAR). Each of the thirteen participating teams received a new vehicle—Michigan Tech's team got a Dodge Intrepid—and $10,000 to work with. MTU also had the advantage of a full set of mechanic's-quality tools, courtesy of Snap-On.

Many of the other university teams were heavy on mechanical engineering students with maybe one electrical engineer on board. "We have a student from every area except forestry," Beard said. "And we have lots of freshmen, sophomores, juniors, seniors, and grad students.

"That's how it will be when you go to industry," he digressed. "You work with all kinds of people with all kinds of experience."

Michigan Tech took the FutureCar sportsmanship award for the second time, giving another top team a desperately needed water pump so they could successfully complete the competition.

"Tech teams get along with almost all the other teams," Beard said. "There's a lot of camaraderie."

They also applied some northern charm to get Miss Grand Prix to stand by the *Northwind* for a photo op. "We gave her an MTU hat," Beard said. "It made the other schools wild."

Michigan Tech's hybrid electric design, which combines diesel and electric power, logged 26.8 miles per gallon for city driving, 33.4 mpg highway, and 42.1 mpg in the endurance test, in a full-size, six-passenger vehicle. Plus, their car met two California emissions standards.

The team tried to keep industry and the consumer in mind throughout their re-engineering of the Intrepid. "They made it good-looking and manufacturable," Beard said. "They didn't try to get rid of weight and come up with a car you couldn't afford. They said, 'Let's make it fast, light, and affordable.'"

Their focus was noticed. "We had quite a few people from the auto industry come by and compliment us," Beard said.

He is optimistic about FutureCar Challenge 1999. "They did an enormously good job, and next year, there's a chance for them to do even better," Beard said. "Now they know what to fix."

Subj: EVWorld Update: June 14th – FutureCar Challenge '98 (1)
Date: 98-06-13 19:15:22 EDT
From: editor@evworld.com (Bill Moore)
CC: editor@evworld.com

(Resent due to software error)

EV WORLD UPDATE
Week of June 14th
http://evworld.com
The Vehicles of the 21st Century

WHATS NEW THIS WEEK

FutureCars, FutureBuilders
Off To See The Wizards

FutureCars, FutureBuilders
This week we feature two RealAudio interviews with participants of the just concluded 3rd Annual FutureCar Challenge. Shelley Launey runs the University and Small Business program for the DoE's Office of Advanced Vehicle Technology. Part of her responsibilities is organizing the FutureCar challenge program, this year participated in by one Canadian and 12 USA universities. DoE spends about $600,000 year seeding this program to not only develop innovative automotive technologies, but to also nuture a bright, young corps of automotive engineers.
To get a team member's perspective, we also talked with Mike Ogburn, the team leader for Virginia Polytechnical Institute's FutureCar.

Be sure to "tune in" these two informative interviews.

DIRECT URL: http://evworld.com/interviews/launey.html

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Off To See The Wizards
Tomorrow, I hop in my Honda and head cross-country some 730 miles for Ypsilanti, Michigan, site of the 1998 Environment Vehicles and Alternative Fuels conference. I hope to get in some great interviews, collect lots of useful information for EV World readers/viewers/listeners, and make invaluable contacts within the industry. I am not looking forward to the drive, but I'll go where I have to go to get a story for EV World "subscribers."

Until next time... be sure to stay "plugged in!"

Bill Moore
Editor in chief

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FutureCar Challenge Does It: Top Engineering Schools In the Country Hit Double the Fuel Efficiency

AUBURN HILLS, Mich., June 10 /PRNewswire/ -- After a year of long, hard hours, sleepless nights and nerve-wracking trial-and-error, two of the top engineering universities in North America have done what some said was impossible: they've double the over-the-road fuel efficiency of a mid-size American car without giving up any of the safety, comfort or performance.

In a series of road tests conducted on the grounds of the Chrysler Technology Center, two teams of student engineers driving hybrid vehicles, demonstrated the equivalent of 75 miles per gallon of gasoline. Running on the same test course, a comparable gasoline-powered vehicle turned in a 37 mile per gallon performance.

These fuel-stingy teams, from the University of Wisconsin at Madison and from Lawrence Technological University in Michigan, were also among the top finishers overall in the 1998 FutureCar Challenge. Wisconsin tied a team from Virginia Tech for first place while the Lawrence Tech team came in just behind them for a third place finish.

The FutureCar Challenge is a competitive "race" to re-engineer the American family car of today into the super fuel-efficient ca of the 21st century.

Major sponsors are the U.S. Department of Energy and Chrysler, Ford and General Motors through the United States Council for Automotive Research (USCAR). Additional support is provided by the National Science Foundation, the U.S. Department of Commerce, the U.S. Environmental Protection Agency, Natural Resources Canada, the Aluminum Association, Goodyear Tire & Rubber Company, and the American Iron & Steel Institute.

1998 FutureCar Challenge Final Standings

1st Place Virginia Tech and University of Wisconsin at Madison (tie)

3rd Place Lawrence Technological University

4th Place Michigan Technological University

1998 FutureCar Challenge Special Awards:

Most Energy Efficient: Ohio State University

Best Acceleration: Virginia Tech

Best Dynamic Handling: Virginia Tech

Best Overall Engineering Design: Virginia Tech

Lowest Emissions: University of Maryland

Best Consumer Acceptability: Virginia Tech

Innovations in Aluminum: University of Wisconsin at Madison

SOURCE FutureCar Challenge

Place Awards

1st	Virginia Tech
1st	University of Wisconsin
3rd	Lawrence Tech
4th	Michigan Tech
5th	University of Maryland
6th	Concordia University

Special Awards

Most Energy Efficient Vehicle	Ohio State University
Best Acceleration	Virginia Tech
Best Dynamic Handling	Virginia Tech
Best Over-the-Road Fuel Efficiency	Lawrence Tech
	University of Wisconsin
Best Overall Engineering Design	Virginia Tech
Lowest Emissions	University of Maryland
Best Technical Report	University of Maryland
Best Vehicle Design Inspection	Virginia Tech
Best Oral Design Presentation	Lawrence Tech
Best Consumer Acceptability	Virginia Tech
Best Appearance	University of Illinois
Lowest Vehicle Driving Losses	University of Wisconsin
Best Safety	Texas Tech
Best Use of Alternative Fuels	University of Maryland
Best Use of Advanced Materials	University of Wisconsin
Innovations in Aluminum	University of Wisconsin
Best Workmanship	University of Illinois
Best Teamwork	University of Wisconsin
Sportsmanship Award	Michigan Tech
Spirit of the Challenge Award	Texas Tech
Best Solo	Virginia Tech

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Monitoring Report

FUTURECAR
6/1 To 6/7

1) Marketplace
PRI Network — 6/4/98 — 9:50-10:00 AM

01.35 Environment. The third annual future car challenge will be held this weekend; I; Reporter reporting; Students will design cars that blend electricity a and gasoline; I; Bob Larcen; Talking about the trade deficit; 03.05

2) WDET News
WDET-FM (NPR) CH 101.9 Detroit — 06/04/98 — 6:00-10:00 AM

31.34 Quinn Kleinfelter, WXYZ, reports that Student Engineers from around the country for the 3rd annual Future Car Challenge to build a family car that gets 80 miles to the gallon. Students from Texas Tech and use rocket fuel I; Larson says that they are training a whole new generation of engineers He says that gasoline is cheaper than bottled water so developing a vehicle that gets 70mph is not a priority. The Vehicles will be showcased before an international crowd at the Grand Prix Motor race this weekend. The winner of the contest rolls into the Henry Ford Museum. 33.20

* * *

2.31.42 Recap Future Car Challenge. 2.33.25

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FUTURECAR
Continued....

5) 15 News Sunrise [continued...]
WMTV-TV (NBC) CH 15 Madison WI 06/12/98 5:30-7:00 AM

1.05.34 TZ; FutureCar. 15 UW Students participated in the FutureCar Challenge at the Chrylser Technology Center in Michigan. Challenge consists of reengineering the American family car into more people efficient car of the 21st century. V; UW-Madison FutureCar, FutureCar Challenge First Place trophy. UW tied with Virginia Tech for first place. I; Jon Erdmer, FutureCar Challenge, talks about project. UW Madison team plans to add more gadgets and continue to redefine the car for next years' competition. 1.06.12

6) 15 News At 5
WMTV-TV (NBC) CH 15 Madison WI 06/12/98 5:00-5:30 PM

00.01 T; Health Team Report, Future Car, Birthday, Weather. 01.21

* * *

06.06 TZ; Future Car. Future Car Competition. V; Car. I; Glenn Bower, UW Facility Advisor, talks about future car. 08.37

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Monitoring Report

FUTURECAR
6/8 To 6/14

1) Channel 3 News
WCIA-TV (CBS) CH 3 Springfield IL 06/10/98 6:00-6:30 PM
28.33 TZ; Car. The University of Illinois has a car entered in the Future Car Challenge in Michigan. V; Car. 28.55

2) Channel 3 News This Morning
WCIA-TV (CBS) CH 3 Springfield IL 06/11/98 6:00-7:00 AM
55.39 Headlines 56.56 > General Motors may face another strike in Flint. > Mitsubishi has settled their sexual harassment and will pay ten million dollars according to the Washington Post. V; Mitsubishi plant. > A local youth group raised money for the Danville church that was bombed. > The University of Illinois has a car in the Future Car Challenge.

3) 15 News At 6
WMTV-TV (NBC) CH 15 Madison WI 06/11/98 6:00-6:30 PM
11.21 FutureCar, Sports, Weather.

* * *

17.29 TZ; FutureCar. 15 UW Students participated in the FutureCar challenge at the Chrylser Technology Center in Michigan. Challenge consists of reengineering the American family car into more people efficient car of the 21st century. V; UW-Madison FutureCar, FutureCar Challenge First Place trophy. UW tied with Virginia Tech for first place. I; Jon Erdmer, FutureCar Challenge, talks about project. UW Madison team plans to add more gadgets and continue to redefine the car for next years' competition. 18.19

4) 15 News At 10
WMTV-TV (NBC) CH 15 Madison WI 06/11/98 10:00-10:35 PM
13.45 T; FutureCar, Sports, Weather.

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20.03 TZ; FutureCar. 15 UW Students participated in the FutureCar challenge at the Chrylser Technology Center in Michigan. Challenge consists of reengineering the American family car into more people efficient car of the 21st century. V; UW-Madison FutureCar, FutureCar Challenge First Place trophy. UW tied with Virginia Tech for first place. I; Jon Erdmer, FutureCar Challenge, talks about project. UW Madison team plans to add more gadgets and continue to redefine the car for next years' competition. 20.38

5) 15 News Sunrise
WMTV-TV (NBC) CH 15 Madison WI 06/12/98 5:30-7:00 AM
1.01.01 T; Madison Residents Awarded, FutureCar, Sesquicentennial Dairy Dishes. 1.01.23