GM Night Vision Slows—High Cost Limits Market

When the 2000 model year Cadillac DeVille with night vision was first launched, infrared camera system-maker Raytheon (Dallas, Texas) couldn’t keep up with the demand. But now in its third year, Cadillac DeVille’s night-vision system sales have turned down. A according to GM, approximately 5,000 night-vision systems were sold in the 2000 model year, an 18% to 19% penetration rate for the DHS and DTS DeVille models on which it was offered. In the 2001 model year the take rate had declined to roughly 15% to 18%, with a total of about 4,500 night vision units sold. So far, about halfway through the 2003 model year, only 700, or so, night-vision systems have been sold, a penetration rate of just 6% to 7% of DHS and DTS DeVilles.

One problem is price. If you could buy the Cadillac night vision as a clean option, it would be priced at about $2,250. That’s plenty enough, but in order to get the night vision option on the DHS, you must also buy a safety and security option package for $895. DTS buyers must pay $1,895 for a premium luxury package, plus $2,250 for night vision.

A nother problem is safety. GM is making no objective claims about the safety benefits of night vision, nor is system-maker Raytheon. Some studies have been done, but the value of night vision has been difficult to quantify. It is also difficult to anticipate whether or not night-vision systems pose yet another driver distraction, especially for older drivers.

The core component of the Cadillac night-vision system is the infrared camera, which can detect infrared energy up to 500 yards ahead of the vehicle. The camera senses temperature distinctions of just 0.25 degrees C, which is sufficient to...

Telematics Players Scramble to Find Right Business Model

New Ford, Renault, PSA Telematics JV

Many key players in the telematics market, especially the Europeans, are giving up on the OnStar subscription model; they are realizing that it will take much longer than expected to recoup telematics investments. Ford ran into major roadblocks as it tried to establish Wingcast both in Europe and the United States. Wingcast, an alliance between Ford and Qualcomm was intended to be Ford’s answer to OnStar in the States, but the Wingcast rollout has been held up as Ford ran short of investment capital at a time when the industry as a whole has grown wary of huge telematics investments. One sure sign that the industry is troubled is the consolidation that is taking place worldwide as companies realize they can’t make the necessary investments to build the infrastructure on their own.

On March 5, 2002, a new European joint venture was established when the participants signed an agreement to cooperate in delivering telematics services. The partners include Renault and Nissan Europe, PSA Peugeot-Citroën, and the Ford Motor Company, representing Ford of Europe and Ford’s Premier Automotive Group comprising Jaguar, Volvo, Aston Martin, Land Rover and Lincoln.

W hile the JV will be headed by Dr. Lars Kreul, president of Wingcast Europe, the Wingcast brand name will not be used because the JV partners want to use their own brands. The joint venture will focus on providing vehicle integrated services directly to carmakers. The new company says it will partner with best-in-class providers for everything from basic technology to content. It will further focus on car-centric applications deeply embedded into the vehicle.

A ccording to industry players close to the deal, the new company’s business model will be quite different from the OnStar business model, which intends to make most of its money from customers willing to spend at least $16.95 per month for emergency services, concierge services and limited diagnostics. Since Europeans aren’t at all keen to pay monthly subscription fees, the new company will instead focus on content and services that save carmakers’ money. For example, the new company’s number-one focus will be remote diagnostics, which will help carmakers fix customer problems quickly while collecting a rich data bank. Should that data reveal a pattern of problems, carmakers could quickly issue engineering changes. The JV is also likely to stress customer relationship product opportunities. Still, European customers definitely want safety and security services and will likely pay for them, perhaps on a per-use basis, unless the car’s brand manager chooses to provide such features free of charge, as a way to distinguish its brand from others.

The OnStar Model

The world is watching OnStar. With two million subscribers, OnStar is by multiples the world’s largest telematics service provider. Despite OnStar’s claims that it will soon turn a profit, no one is providing solid details. OnStar and GM have been telling GM investors and the public that OnStar is definitely viable, but it has provided little evidence to support that conclusion.

One key ratio to watch is the renewal rate, defined as the percentage of OnStar subscribers who choose to renew the service once the free period ends. OnStar’s president, Chet Huber, maintains that OnStar’s renewal rate is “north of 50%.”
### Mandatory DRLs in the U.S.? Don’t Hold Your Breath

In response to requests from General Motors, the National Highway Traffic Safety Administration (NHTSA) approved voluntary use of daytime running lights (DRLs) in 1992, and in 1995 GM began installing them in some models. In 1997, GM made daytime running lights standard on all their vehicles sold in the U.S. and Canada. Now other carmakers are adopting DRLs. According to the Insurance Institute for Highway Safety, DRLs are standard on all Lexus, Saab, Suzuki, Volkswagen and Volvo models, as well as some Toyotas.

Daytime running lights make vehicles easier to notice even from far away; they are particularly helpful when daylight is low, under dark clouds, during rain, fog and snow. GM firmly believes that DRLs reduce the risk of crashes, and in December 2001, GM petitioned NHTSA to require daytime running lights on all vehicles sold in the U.S. NHTSA must respond to GM’s request in 120 days.

Before it can mandate, NHTSA must show that a proposed safety feature passes these three tests: (1) Does the feature improve safety? (2) Does the public get more value than the feature costs? (3) Can the feature be implemented, is it practicable? Obviously, daytime running lights can be implemented, but NHTSA must first determine if the feature will pass tests one and two.

NHTSA has studied DRLs several times, beginning in 1985. A letter carefully considering the evidence, NHTSA has, in the past, concluded that the safety benefits of DRLs don’t outweigh the cost to society of implementing them. A top lighting expert at NHTSA told us, “Two years ago when we last considered this, there was no data that showed daytime running lights have any value. ... We had numerous studies from different countries in Scandinavia and from fleets, but most of them were not scientific, so they weren’t helpful. Even those that were more reliable were done in countries at high latitudes, where ambient light levels are markedly different from those in the United States.”

### Safety Benefits

In 1999 GM hired Failure Analysis Associates to compare the accident rates of certain GM, Volvo, Saab and Volkswagen cars prior to and immediately after the introduction of daytime running lights. That study, based on police-reported traffic accidents from 12 states, concluded with a 95% confidence interval that the feature led to a 5% reduction in accident rates, except in rural areas. NHTSA has not yet critiqued the 1999 GM study.

NHTSA’s own study done during roughly the same time period, compared vehicles with DRLs to those without them. NHTSA found no statistically significant reduction in vehicle-to-vehicle crashes. It did, however, find a 28% reduction in vehicle-to-pedestrian crashes. But the NHTSA official cautioned, “These results were extremely preliminary, because the study was very small, compared to the U.S. fleet.” GM says its studies suggest a 9% improvement in vehicle-to-pedestrian crashes.

Last year, the European Automobile Manufacturers’ Association (ACEA) pro-

Continued on page 3

### Daytime Running Lights—Pros and Cons

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<tr>
<th><strong>Pros</strong></th>
<th><strong>Cons</strong></th>
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<tr>
<td>◆ While not perfectly reliable predictors of what the results would be in the States, a number of studies, from several countries, have concluded that daytime running lights do reduce the odds of daytime collisions. For example, a 1999 study of twelve states in the U.S., done for GM by Failure Analysis Associates, concluded with a 95% confidence level that DRLs reduced the number of vehicle collisions in those states by 5%.</td>
<td>◆ Carmakers would have to make substantial investments to convert their entire U.S. product line over to daytime running lights. Among the fixed costs are new specs and tools to change the wiring on both the headlights and the front-end harness. Carmakers would also have to conduct tests to be sure their solutions are safe and robust. Some vehicle designers don’t like daytime running lights because of the way they change the look of the vehicle on the road.</td>
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<td>◆ GM says that DRLs have led to a 9% reduction of vehicle-to-pedestrian crashes.</td>
<td>◆ Daytime running lights do shorten bulb life and lower fuel economy. A Canadian study cited by the Insurance Institute for Highway Safety estimates the extra fuel and bulb replacement cost to be $3 to $15 per year for systems using reduced-intensity headlights.</td>
</tr>
<tr>
<td>◆ DRLs can be easily implemented with some additional cut leads and possibly a relay or two, depending on whether existing signal or parking lights are used, or if the high beams are switched to half-intensity to create the DRL. Unique daytime lights are not required. A GM safety expert on lighting estimates the variable cost of implementation to be considerably less than a dollar.</td>
<td>◆ NHTSA has received approximately 400 complaints from people who say they don’t want DRLs because they reduce fuel economy; they are unsafe due to glare or because they don’t believe DRLs improve safety. According to Paul Thompson, senior project engineer with GM’s safety office, “We scoured those 400 complaints and found only 100 original complaints. Many people sent form letters over and over again.”</td>
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DRL...

 posing a voluntary commitment by the member carmakers to DRLs, in response to the EU Commission’s directive to improve pedestrian safety. The ACEA committed to installing DRLs as a standard feature on 90% of all new cars in 2002, and 100% of all new cars in 2003. Mandatory DRLs were opposed by motorcycle and bicycle groups and were not included in the final agreement reached by the ACEA and the EU Commission. Regulating DRLs was left to the member countries. Today, Denmark, Finland, Hungary, Iceland, Norway and Sweden, require motorists to turn their headlamps on— if their vehicles do not have automatic daytime running lights. DRLs are mandatory in Canada.

Costs of Implementation

DRLs do come with some significant costs, including the extra cost of parts (less than $1 per car) and the greater fixed cost to develop, test and install daytime running lights in all vehicles sold in the United States.

A nother cost, that relating to the extra fuel needed to power daytime running lights is a difficult one for carmakers to swallow, particularly as they face the possibility of higher CAFE (Corporate Average Fuel Economy), and as we become more conscious of the relationship between global warming and fuel usage, which is directly proportional to CO2 emissions. Further, the Bush administration has been keen lately to reduce U.S. dependence on foreign oil. GM estimates the cost of extra fuel and bulb replacement to be at least $3, possibly as much as $15 per year for the average vehicle. Even at $3, that cost multiplied by the 230 million U.S. registered vehicles suggests a total annual cost to consumers for extra fuel and light bulbs to be roughly $690 million per year. A II but a small fraction of that total is due to the increased fuel usage necessary to power the lights during the day.

Also, there is potentially a negative aspect to daytime running light un-wanted daytime glare, which could compromise safety and comfort. Drivers have complained of glare from not only oncoming traffic, but from the vehicle behind. As well, unrelated to GM’s request to mandate DRLs, NHTSA has already proposed lowering light intensity of DRLs from 7,000 candels to 1,500 candels. One candela is equivalent to the light intensity from one standard candle. A final ruling on DRL intensity is due this summer.

What’s Motivating GM?

It’s hard to be certain what motivated GM to ask NHTSA to force all carmakers to install daytime running lights in new vehicles sold in the United States. GM people have suggested they are doing it because “GM is very serious about safety.” GM must be pleased that its well-publicized campaign has led to so many public messages that portray GM as an advocate for safety. While GM may be truly serious about safety, it is also serious about competing with Chrysler and Ford, who would be forced by the mandate to expend substantial resources to install daytime running lights in every vehicle sold in the U.S. market.

Mandatory DRLs? Not Before MY 2006

Even the Insurance Institute for Highway Safety, which joined GM in the 1992 request that NHTSA permit the use of daytime running lights in the United States, isn’t very proactive about making them mandatory. IIHS spokesman Russ Rader told us, “We would be supportive of GM’s petition to mandate DRLs, but it’s not something we think would offer enormous safety benefits. … Greater benefits would come instead from improving crash worthiness, from tougher enforcement of traffic laws and from wider use of safety restraints (seatbelts).”

While the NHTSA official acknowledged he had not yet seen a study that is both reliable and compelling, he also said that, “It is hard to deny the weight of all of the studies on DRLs taken together. There may be problems with these studies, but the fact that almost every one of them has been positive about DRLs, makes it difficult to say they have no value. NHTSA will now spend six to eight months weighing the pros and cons of daytime running lights. After that work, if NHTSA were to decide in favor of requiring DRLs, it would take another six months, or so, to write the proposed rulemaking, followed by a three-month comment period and another six to eight months to issue a final rule for mandatory implementation, phased in over a two-year period. That would bring us to the 2006 model year.◆

Night Vision...

Continued from page 1

make out pedestrians, deer or small animals, even inanimate objects in the road ahead, things you would not otherwise see, despite good headlamps. Also included is a head-up display, which projects the thermal image onto the windshield. Conventional high beam headlamps illuminate about 150 yards in front of the vehicle.

Despite its high cost, most major carmakers around the world have been exploring night vision systems. Raytheon developed an updated version of the Cadillac system, which was demonstrated this past January at the Detroit Auto Show. The Raytheon system will be available on Volvo’s new SUV, the XC90, available in the fall of 2002. Volvo has not yet announced if night vision will be a standard or optional feature.

A key difference in the Volvo application is the head-up display. While both systems use head-up displays, the Cadillac system projects the thermal image onto the windshield, but the unit demonstrated on the Volvo projects the image onto a mirror that pops up from the dashboard. The thermal image is sharper when projected on the aspheric mirror.

DaimlerChrysler developed a night vision system in 2000, but it is an active system where the roadway is illuminated as far as 500 feet by a pair of infrared headlamps. Theoretically, active systems are likely to be safer than passive systems such as Cadillac’s, because the active system can see objects that the thermal system might miss. But the IR illumination adds significant costs to night vision. And there will be questions about glare problems or potential eye damage associated with the IR illumination.◆
Yazaki Group

The Company Profile...

**Yazaki Group Sales by Sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Japan</th>
<th>No. &amp; So. America</th>
<th>Europe</th>
<th>Asia &amp; Oceania</th>
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<td>11,103</td>
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</table>

**FY 2000 Sales:** ¥742,450 million ($5,546 million); approximately 52% of sales (including non-automotive) are in Japan and 48% overseas.

**Products:** Electrical and electronic distribution systems are Yazaki's main focus; 86.4% of all products are shipped to automotive customers and 90.6% of those shipments are wiring harnesses.

**Market Share:** 29% of the worldwide market for automotive wiring harnesses, according to Yazaki.


**Strategy**

The growing number of electronic devices in new models has caused the number of cut leads per vehicle to more than double in the last ten years. The increased bundle diameter and weight has come at the expense of vehicle weight, fuel economy, interior space and ease of assembly. Yazaki has responded by reducing wiring harness weight and girth, and by adding compact multifunction junction blocks, connectors, switches, instrument clusters and sensors, as well as multiplexed communications networks.

Even though the EDS business is a mature and labor-intensive industry, Yazaki believes it can add value to its electrical distribution systems and make a profit. The company considers its narrow focus on EEDS a strategy that distinguishes it from competitors like Delphi, which makes a broad range of products. Moreover, Yazaki's narrow focus will allow the company to remain vertically integrated. The company intends to continue to expand globally with wire harnesses and new EEDS. M. Tsuji elaborated on the benefit to the customer: "A's a noncaptive, vertically-integrated, global

**Background**

Yazaki produced its first wiring harness in 1929. In addition to automotive products, which make up 86% of all products, the company also makes solar equipment, gas equipment and energy-conservation equipment. Yazaki Group companies market some 30,000 items: "Our products are unobtrusive, but they accomplish their purposes thoroughly and economically," notes Yazaki Group's web site. The Group comprises 73 companies and 132 manufacturing subsidiaries. Capable of delivering products anywhere in the world, the company operates from 35 countries, 20 of which have manufacturing facilities and 10 of which have R&D centers.

With its new marketing slogan, appropriately, "Yazaki—All Systems Go," the automotive sector supplies wiring harnesses to all the world's major carmakers, giving it the largest share of the market, about 29%. Yazaki is the largest wire harness manufacturer in the world.

Eighty percent of Yazaki Group sales come from automotive wiring harnesses, also known as EDS (electrical distribution systems), which over the last decade, have evolved into EEDS (electronic and electrical distribution systems). An independent supplier, Yazaki is vertically integrated from start to finish—indeed, the company is the world's largest producer of automated wiring harness manufacturing equipment.

Yazaki's automotive strategy focuses on each customer's global operations. Where the customer makes its key purchasing decisions determines the region where that customer's strategy is coordinated. For example, because Chrysler does more volume with Yazaki than Mercedes does, Yazaki coordinates its strategy for DaimlerChrysler in North America, but works closely with Yazaki Europe, since DaimlerChrysler headquarters is located in Germany.

One goal for Yazaki North America is to increase its instrumentation business with North American carmakers, and thus, worldwide, given that each of the Big Three are active worldwide. Yazaki intends to be among the last wiring-harness makers standing and among the last instrumentation makers standing.

**Number of Cut Leads Will Not Decrease**

Ten years ago, there were discussions in the industry about whether wiring would decline as multiplexing and integration increased, but today Yazaki believes that the number of cut leads is increasing as new features are added to the vehicle, for instance, multimedia information and entertainment. While multiplexing can take care of data requirements, every new device still needs power, so more wiring is still needed. Today, there are almost 2,000 cut leads or circuits in each luxury vehicle and around 1,000 in each midsize vehicle. "As the architecture changes with, say, MOST and CAN networks, the number of wires might decrease but at the same time, the number of systems is increasing faster," explained Yoshihiro Tsuji, general manager of overseas R&D and general manager of engineering administration.

**Strategy**

The growing number of electronic devices in new models has caused the number of cut leads per vehicle to more than double in the last ten years. The increased bundle diameter and weight has come at the expense of vehicle weight, fuel economy, interior space and ease of assembly. Yazaki has responded by reducing wiring harness weight and girth, and by adding compact multifunction junction blocks, connectors, switches, instrument clusters and sensors, as well as multiplexed communications networks.

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company, Yazaki can supply quickly any customer anywhere with quality products.”

While it is fair to say that there is not much new in conventional wiring, as integration increases, Yazaki is on the lookout for new ways to enhance EEDS that can give the company a competitive advantage. “When we start moving toward a network infrastructure that includes fiber optics, we will have plenty of work ahead of us in our core business, but meanwhile, we are open to new products that help our customers satisfy the consumer,” suggested George R. Perry, Yazaki North America president and COO. Two promising new products are Yazaki’s SNAP (scalable nodal active power) 42-volt architecture, described below, and a MOST distributed multimedia network architecture that addresses higher bandwidth networking, also described below.

EEDS Architecture

The average cost of each EDS (electrical distribution system) is currently about $250 to $300 on small cars and up to $500 or $600 on larger cars. The EDS part of a basic EEDS today makes up the lion’s share of the value, about 70% or 80%. A company goal is to add value to the basic wire harness by advancing power and signal distribution, for example, by integrating the wiring harness with electronic system features such as gateways and computing functions for CAN and MOST networks.

One way to implement that goal is to work closely with OEMs to develop EEDS architecture options that accommodate new electronic features, options and model introductions. If an OEM’s architecture can’t easily accommodate new features, it will ultimately take more time and money to get it right. “Yazaki can help OEM’s seamlessly and transparently integrate new technology into the mainstream system—not all technologies everywhere, but a serious look at the options and at what position the vehicle is in compared with the competition,” elaborated Mr. Perry. “Whether the direction is fiber optics and copper wire or wireless technologies or handling bandwidth issues, our job is to provide the connectivity to allow all technologies to coexist.”

While keen to deepen its relationships with all the carmakers, Yazaki is particularly interested in growing its EEDS business in Japan, with General Motors in the United States, and with the transplants in Europe. Although efforts to develop EEDS architecture with carmakers is in its early stages, Yazaki and Ford are working together very closely, and in time, Yazaki may be given responsibility for the bulk of Ford’s EEDS architecture.

SiemensVDO and Yazaki JVs

SiemensVDO and Yazaki set up three joint ventures in 2001, two of which address systems level development. The third JV manufactures wire harnesses. Siemens exited the wire harness business in 2001 and put most of its wire harness manufacturing into the JV with Yazaki. Called S-Y Wiring Technologies GmbH, Yazaki has a 75% share and Siemens, 25%, in the manufacturing JV. A total of 4,600 people will be employed worldwide. S-Y Wiring Technologies will sell wire harnesses to the other two JVs.

The two SiemensVDO/Yazaki systems joint ventures will provide design, development, program management and sales of integrated vehicle electronic and electrical distribution systems. The two JVs are called S-Y Systems Technologies Europe GmbH (Regensburg, Germany), which serves BMW’s and Renault’s global programs and Ford’s European programs; and S-Y Systems Technologies America LLC (Dearborn, Michigan), which supports Ford’s global programs. The European JV will have about 200 employees; the Dearborn JV, about 260.

Primarily an electronics supplier, Siemens left the wire harness business to focus on its core strengths. SiemensVDO’s core strength as an electronics company obviously plays into system integration for EEDS. Siemens looked at partnering with several wire-harness companies before joining with Yazaki to set up the three joint ventures.

For several years, Renault, one of Siemens’ largest customers, had been interested in outsourcing EEDS architecture. Yazaki was already serving Nissan, so when Renault combined forces with Nissan, it was natural for Yazaki and Siemens to look at supplying EEDS architecture to Renault. The European JV was initially set up for Renault, and BMW soon followed as a customer. Ford has

continued on following page
Yazaki Group

Yazaki believes it can add value on the systems level because it “really has the tools and the wherewithal to look very quickly at what the options are and what the payback is on the option.” But, cautioned Mr. Perry, “In terms of the marketplace, systems JV’s are a big experiment because the key question is whether the customer is willing to pay for systems expertise … and whether Yazaki can add enough value in the marketplace to make the customer, either the carmaker or top-tier supplier, more competitive.”

SNAP and 42-Volt Architecture

While there is not currently a pressing, critical need for 42-volt implementations in production vehicles—Ford has pushed out some of its 42-volt programs—nevertheless, Yazaki is ready with SNAP (scalable nodal active power). Yazaki and Johnson Controls collaborated to demonstrate a 42-volt vehicle at Convergence 2000. The SNAP architecture for the 42-volt vehicle used a source module that integrated Johnson Controls’ 36V AGM (absorbent glass mat) battery along with Yazaki’s dual-voltage power distribution box and electrical frame system that connected all the components. A long with the module, two Yazaki SNAP gateways enabled modular implementation of power and load management.

Yazaki’s SNAP architecture solves a major problem in transitioning to a 42-volt standard. The obstacle has been that 42-volt lighting would need new lamps with filaments that are much longer and thinner. Not only is breakage and outage a problem, but the entire lighting industry would need to evolve from 14-volt products. Yet a dual-voltage vehicle would be prohibitively expensive, since the number of wires to accommodate existing lighting systems would increase enormously. The SNAP gateway provides an intelligent, scalable architecture that controls 14-volt devices, such as lamps and small DC motors, from a 42-volt bus using pulse width modulation, which provides the equivalent of 14-volts. When the driver switches on the lights in Yazaki’s nodal architecture, the active power and load management system sends 42 volts to the gateway, Fet’s (field-effect transistors) switch on and off rapidly, providing a pulse-width modulated 14-volt power source, which is connected to the lamps. The intelligent gateway provides capabilities such as active voltage regulation, bulb-outage compensation, multiple functions from a single filament, driver diagnostics and soft start.

Standards: CAN and MOST (Media Oriented Systems Transport)

A company goal is to be the leading “total vehicle multimedia network system integrator” for automotive manufacturers. Yazaki is developing optical connectors and plastic optical fiber for MOST. The company offers a family of network gateways including a MOST/CAN gateway, which can be used as a “firewall” between the vehicle bus and the multimedia bus and is scalable to include functions like network management, computing and wireless connectivity. Software applications in development include high-performance Dolby AC-3 digital audio and streaming video through the multimedia network.

Yazaki uses CAN A, B or C in areas like body networking, engine or transmission control, and MOST for multimedia and information networks; IEEE 1394 is a candidate for future high-speed networks. “We can handle any type of protocol, from J1850 to MOST,” Mr. Tsuji told us. “The majority of Yazaki’s projects involve CAN or MOST. CAN will be used more widely from now on. … In the U.S., Daimler Chrysler and GM are very interested in MOST. A M i C (Automotive Multimedia Interface Collaboration) and the MOST Cooperation agreed to work together to develop common specifications for multimedia and telematics applications.

In 2000, Harman International and Yazaki North America made a strategic alliance to cooperate on the application of MOST and developed a complete digital rear entertainment system, which used Yazaki network components and multimedia gateways.

Some in the industry believe that IDB is “floundering at best” and may not have enough support to be accepted. A spirations for what it can do are too big at unrealistically low prices. Some would say IEEE 1394 has similar problems. More standardization would be welcomed in the industry and perhaps an industry-wide board could mandate specs and protocols. “Standardization is the biggest opportunity..."
to drive down costs in the industry,” stated Mr. Perry.

A major challenge for Yazaki today is its production operations. Yazaki wants to be as lean as it can and still provide its customers with full service support. Striving to keep manufacturing costs low, Yazaki has opened three new plants in the last year in lower cost regions of the world, and that number may need to go up to four plants per year in the future.

Cutting costs need not be that painful, according to Mr. Perry, as Yazaki’s recent experience with DaimlerChrysler’s mandated price cuts bore out: “They have been very cooperative ... a whole lot of give and take on both sides. Purchase orders do not include everything they once did, but if they ask for certain items, we will do them for a price. We have done extremely well with DaimlerChrysler.”

Yazaki has expended great efforts in protecting the environment, including the use of non-halogen cables, which utilize polyolefine or polypropylene as an alternative insulation material to PVC. It is expected that this material will be utilized in MY2003 vehicles. Additionally, Yazaki introduced lead-free cables in 1998 and switched all wire to lead-free by the year 2000.

FFCs (Flexible Flat Circuits)

“FFCs are a solution to a specific problem and only in a limited application,” said Mr. Tsuji, explaining why FFCs aren’t used so much these days. They cost more than conventional wiring, have more reliability problems and are expensive to fix, he added. FFCs are particularly expensive to fix when they are integrated with components like switches and electronic parts. To fix a failed component, the entire wiring unit must be replaced. Another problem is that FFC connectors are difficult to seal and offer less installation flexibility than conventional wiring. Still, FFCs might make sense in small interior compartments where there is no chance that water can degrade connections, for example, behind the crowded instrument panel to wire the radio or CD unit.

CAVS Wire (Compressed conductor Automotive Vinyl insulated Reduced insulation)

Though it was brought to the automotive market nearly ten years ago, sales of Yazaki CAVS wire are still growing. Lighter and smaller in diameter than conventional wire, CAVS can accommodate insulation displacement connections, so it doesn’t need to be stripped. When it is wrapped, the insulation compresses, which makes a thinner wire that still handles as much current as conventional wiring.

CAVS (Ultra Slim insulator) has 40%-reduced insulation thickness, which further reduces the overall size of the wire harness bundles.

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Yazaki Automotive Products Timeline

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<th>Year</th>
<th>Product</th>
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<td>Power distribution boxes</td>
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<tr>
<td>1980</td>
<td>Electronic control units</td>
</tr>
<tr>
<td>1990</td>
<td>Multiplexing</td>
</tr>
<tr>
<td>1995</td>
<td>Integrated junction blocks</td>
</tr>
<tr>
<td>1998</td>
<td>Integrated junction blocks</td>
</tr>
</tbody>
</table>

1940: Wiring harness
- Instrumentation
- Automotive cables
- Terminals
- Tooling

1950: Connectors
- PVC tapes and tubes

1960: Power distribution boxes
- Junction blocks
- Electronic control units

1970: Multiplexing
- Integrated junction blocks
- Virtual image meter

Yazaki has expended great efforts in protecting the environment, including the use of non-halogen cables, which utilize polyolefine or polypropylene as an alternative insulation material to PVC. It is expected that this material will be utilized in MY2003 vehicles. Additionally, Yazaki introduced lead-free cables in 1998 and switched all wire to lead-free by the year 2000.
GM CEO Rick Wagoner was quoted as saying the renewal rate is actually 60%. We studied a slew of OnStar comments made over the past couple years and calculated the 2001 renewal rate to be just 42%, based on OnStar’s own pronouncements.

Trying to understand why GM and OnStar announced different renewal rates, we asked OnStar exactly how it defines renewal rate. In other words, did the 60% rate relate only to a particularly good, short period of time, or was it for some 12-month period? Did it count all un-renewed subscribers, including those who activated OnStar but stopped using the service before the first year ended? Unfortunately, OnStar guards its definition of renewal as closely as it guards the actual renewal rate. Mr. Huber maintains that revealing OnStar’s renewal rate gives too much information to his competitors.

Volkswagen Telematics

The new European alliance might have joined forces with Volkswagen, which wanted to participate. However, Ford nixed the idea, at least for now, suggesting it would be too complicated to bring VW aboard, given how close they were to the JV deal that now has been signed. VW was interested in investing in the new JV with Ford because it could market telematics under its own Volkswagen brand name. OnStar had asked VW to make an alliance with them, but the OnStar deal was less attractive to VW — OnStar insisted that services be marketed under the OnStar brand.

Like many other telematics players, Volkswagen has become much more realistic about the prospects of investing in telematics. Said one top VW official who has carefully studied telematics business prospects, “OnStar’s business model won’t work because the investment required is too great. ... We still believe in telematics long term and think we should continue to invest, but we need also to understand that any investments won’t pay off for many years. Volkswagen had been relying on gedas, a wholly-owned subsidiary, to be its telematics service provider but stopped working with gedas, which will now focus only on some market niches involving trucks.

For much more on the state of the global telematics industry, please watch for our new study, due this spring, focusing on telematics service providers. Detailed information about the study will be soon be available on our web site, www.hansenreport.com, or call us at 1-603-431-5859.

2002 J.D. Power Study on Emerging Automotive Technologies

Safety enhancement tops the list of features European consumers want, according to 2002 European Automotive Emerging Technologies Study by J.D. Power and Associates (Agoura Hills, California). In France, Germany, the Netherlands and the U.K., 6,200 consumers chose from 17 emerging-technology automotive features.

Comparing European results with a similar U.S. study, consumers in Europe and the United States desire similar features on their next vehicles, but interest drops in both regions for all features when a realistic price is attached to the technology. Safety features are no exception. European interest in night vision, blind-spot warning and navigation systems drops about 50 percentage points when realistic prices are assigned to the feature.

Consumers in both regions are not wild about personal assistance services, such as OnStar and TeleAid. The European study showed that personal assistance services attracted two-thirds of consumers when paired with a navigation system, but when offered alone, interest declined to 46%. In the U.S., interest in stand-alone personal assistance services was 49%. This is, however, before assigning a realistic price.

A automotive OEM’s and telematics service providers should take note also that among the seventeen features listed, consumers in both regions showed the least interest in in-vehicle Internet and email capability. On average, 42% percent of respondents from the four European countries showed interest in Internet and email, and 24% of U.S. respondents were interested. When a realistic price was attached to these features, interest dropped—to 30% in Europe and to 21% in the United States.

Top 7 Auto Features by Consumer Interest*

<table>
<thead>
<tr>
<th>Feature</th>
<th>European Average**</th>
<th>U.S. With a Realistic Price</th>
<th>U.S.</th>
<th>With a Realistic Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heated Windshield Glass</td>
<td>89%</td>
<td>54%</td>
<td>73%</td>
<td>44%</td>
</tr>
<tr>
<td>Night Vision System</td>
<td>84%</td>
<td>30%</td>
<td>79%</td>
<td>25%</td>
</tr>
<tr>
<td>Run-Flat Tires</td>
<td>84%</td>
<td>62%</td>
<td>85%</td>
<td>68%</td>
</tr>
<tr>
<td>Electronic Stability System</td>
<td>82%</td>
<td>64%</td>
<td>72%</td>
<td>61%</td>
</tr>
<tr>
<td>Advanced Windshield Cleaning System</td>
<td>79%</td>
<td>58%</td>
<td>72%</td>
<td>60%</td>
</tr>
<tr>
<td>Navigation System</td>
<td>77%</td>
<td>31%</td>
<td>61%</td>
<td>26%</td>
</tr>
<tr>
<td>Blind-Spot Warning</td>
<td>76%</td>
<td>29%</td>
<td>79%</td>
<td>60%</td>
</tr>
</tbody>
</table>

*Definitely/Probably interested
**France, Germany, the Netherlands and the UK

Source: J.D. Power and Associates, 2002 European Automotive Emerging Technologies Study; For more information, or to order call 818-889-6330, fax 818-889-3719, www.jdpa.com