Chris Preuss on Telematics

After running GM’s OnStar telematics business for a year as CEO, Chris Preuss recently founded TRUSTrategies, a communications consultancy near Detroit. Mr. Preuss has had a distinguished career in public relations. Before heading OnStar he was GM’s global vice president of communications. While he immediately got busy with some communications projects, most clients have been asking him about telematics, also the subject of our recent conversation. Here is some of what I learned.

Mr. Preuss describes his experience running OnStar as the thrill of a lifetime, and he is still very much a booster. “OnStar is a tremendously successful and profitable business,” he said. “OnStar connected customers are much more likely than nonsubscriber customers to use GM dealers for service, and subscribers are significantly more likely than nonsubscribers to buy another GM vehicle. That creates tremendous value. More than 50% of consumers convert out of the trial into paying subscribers.” After a free trial, OnStar subscribers pay $18.95 per month or $199 per year for a plan that includes emergency assistance, diagnostics and stolen vehicle assistance.

While some experts are down on the subscription business model for the auto industry, particularly with the proliferation of free smartphone applications such as Pandora and iHeartRadio, Mr. Preuss thinks otherwise. “Subscriptions may not work for everyone, but they remain highly viable. Just look at OnStar and SiriusXM. People will pay for premium content such as Howard Stern, Oprah and the NFL on SiriusXM. That company has done a good job embedding themselves in a lot of places, setting up financial rewards for

Electronics Supply Shortages from Japan’s Earthquake

Limited Availability of Electronics Will Stunt Worldwide Car Production for Many Months.

If you can serve Toyota or Honda you can probably serve the world. That truth, coupled with Japan’s long dominance in consumer electronics, has led to a concentration of Japanese suppliers in the auto electronics industry. So when the awful earthquake and tsunami hit Japan on March 11, they damaged not only the Japanese automotive industry, they damaged the global automotive industry. Almost every car produced worldwide has some materials or parts that are made in Japan. For example, Renesas, which last year merged with NEC Electronics, is the world’s number-one automotive semiconductor supplier and owns 42% of the global market for automotive MCUs. Renesas MCUs run most of the world’s airbag systems, body control units, car audio and navigation systems, and a third of the world’s powertrain systems.

Renesas operates twelve front-end semiconductor manufacturing facilities; ten of them are located in Japan. Five of those fabs are still in trouble from the earthquake and have had to stop production each time Tokyo Electric Power Company shuts off electricity to conserve power. Electricity will be severely limited in Japan for months to come. Renesas’ worst hit facility, the Naka front-end facility in Hitachinaka-shi, Ibaraki, is still crippled and won’t even begin limited production until July. Renesas isn’t saying when its facilities will be able to resume full production. Renesas’ stock price dropped thirty percent in the days following the March 11 earthquake.

Once the pipeline of salvageable work in process and finished goods inventory is empty, some car models will not get built on time for lack of Renesas parts. Renesas’ top automotive customers include: Aisin AW, Continental, Denso, Hitachi Automotive, Pioneer, Bosch, Delphi, Fujitsu-Ten, Keihin and Panasonic Automotive.

Other automotive semiconductor suppliers operating in Japan, including Fujitsu, On Semiconductor, Texas Instruments and Rohm, are also having problems returning to full production. Freescale’s six-inch wafer fab in Sandai, which was already slated to close, was so badly hit that the company decided not to reopen it. The facility produced 8-bit microcontrollers, pressure sensors and accelerometers.

Most automotive semiconductors are highly customized and single-sourced, especially high-end 32-bit microcontrollers like those made by Renesas for much of the auto industry. They can’t be quickly reproduced by an alternate supplier, for instance, Freescale, the automotive world’s second-largest MCU supplier. “It’s easier to change an 8-bit [device], much harder to change an advanced 32-bit [device], which can take three years just for the code development,” said Reza Kazerounian, general manager of Freescale’s Microcontroller Solutions Group. The automotive qualification process is most rigorous for microcontrollers used in vehicle control systems.

The lack of semiconductors is by no means the only problem. The Japanese play dominant roles up and down the automotive electronics supply chain, from the epoxy resins and silicon wafers used to make integrated circuits, to passive components, connectors, wiring and cable, switches, clusters, displays and finally the finished electronic control units. “There will be some critical delays in vehicle production.”
Mr. Preuss, who called Ford's 2007 launch of the Sync in-vehicle connectivity system “one of the best automotive marketing plays since the Toyota Prius,” believes carmakers are moving almost universally to provide Bluetooth connections for mobile devices. “By 2014, Bluetooth as a capability will be almost ubiquitous across the industry, at least as an option,” he predicted.

Not only will carmakers take advantage of the cell phone in the driver's pocket, but they will also make greater use of the one-way data connection to the vehicle from satellites. More and more carmakers will also use embedded modems.

“The embedded modem is critical because you can use it to remotely control vehicular functions and to update infotainment software. The embedded modem will be especially useful in electric vehicles so recharging can be programmed remotely,” Mr. Preuss said.

Figuring out exactly what telematics capability to embed in the vehicle is one of the industry's biggest challenges. “Whatever you embed in the vehicle has to adapt to what consumers are using. Three years ago, for example, we knew very little about the iPad. Second, you have to choose a chipset that is both affordable and forward looking. What happens if the chips are obsoleted by a big change in the communications network during the ten-year service life? Third is the issue of security. How much of the vehicle can be exposed to the network? And fourth—and what I would argue will be the most compelling determinant of how automotive telematics becomes a profit center for OEMs—is what regulations will be put in place to answer the concerns about distracted driving.”

Regarding driver distraction, Mr. Preuss was quick to point out that the number of deaths per miles traveled continues to decline in the United States and elsewhere, despite the proliferation of handheld devices.

“While texting and driving is unequivocally a bad thing, there have been distractions in the car since there have been cars: food, pets, billboards, radios, CDs, screaming kids,” he said.

I asked Mr. Preuss why Europe has lagged the United States in telematics applications. He believes there are at least three reasons: “There is the language problem, which makes it difficult to provide call center services. I lived for a couple of years in Switzerland, where three languages are used—Italian, French and German—and within those you have several different local dialects. Another limiting factor, and this is getting better than it was three years ago, is provisioning cellular capability so you can freely roam in multiple cellular jurisdictions across borders. Also, the embedded telematics idea has been slowed down by the fact that people in Europe were already reliant on their mobile devices, which had Bluetooth connections and navigation applications. That is changing now as BMW, Audi and Renault are moving aggressively into telematics.”

Mr. Preuss sees very big opportunities in telematics but warned against the view that somehow the carmaker owns most of the marbles. “Some people somehow think the car is going to be a particularly unique point on the network. I would argue it probably won’t be, because the mobile device will always get most of people’s face time and attention. The carmakers who will win will be those who create the right partnerships and alignments. The OEMs who try to own it all and lock everyone else out are going to find themselves on the short end of the stick.”

Chris Preuss can be reached at chris.preuss@tru-strategies.com. ◆

Earthquake... Continued from page 1

duction in the short term; having 99% of the parts is no good,” said Chris Webber, who runs Strategy Analytics’ automotive practice.

In the long term the automotive industry will consider what it can do to make itself less vulnerable to Japanese earthquakes. Since March 11, Japan has experienced 61 aftershocks with a magnitude of 6.0 or higher, according to the Wall Street Journal. Renesas and others will rely more on foundries outside the country. In the coming months, carmakers and tier-one suppliers will be more inclined to qualify second-source suppliers, a process made simpler by Autosar and Genivi software, which use standard interfaces to the microcontroller. ◆
**Roundup 2010: Conti, Magneti Marelli, Valeo, Visteon**

The outlooks for 2011 sales were given by these companies prior to the March 11 earthquake in Japan, which will negatively affect the automotive supply chain globally.

**Continental Corp.**

2010 Sales: €26,047 million
Change from 2009: up 29.6%
EBIT: €1,935.2 million, or 7.4% of sales
Net Margin: 2.2%

Outlook for 2011: Continental expects sales to increase by 10% to more than €28.5 billion. At the end of 2010, Continental’s net debt was €7.3 billion. The company reduced its net debt to equity ratio from 2.19 to 1.18 in 2010 and could reduce it to below 1.0 by the end of 2011.

**Continental Automotive Group**

2010 Sales: €15,917 million
Change from 2009: up 32.2%
2010 EBIT: €567.9 million, compared with €1,561.6 million the prior year

Outlook for 2011: Based on projections of global car production at 75 million units, Continental expects 10% growth in sales, to approximately €17.5 billion.

**Automotive Group Sales and EBIT by Division**

**Chassis & Safety Sales:** €5.8 billion, up 32.1%

**Chassis & Safety EBIT:** €569 million, a 79% increase from the prior year

Within Chassis & Safety, sales of driver assistance systems increased by 79.5% compared with 2009.

**Powertrain Sales:** €4.7 billion, up 39.2%

**Powertrain EBIT:** €198.1 million, an improvement over last year’s €943.2 million. The division incurred substantial restructuring expenses and closed some manufacturing facilities. In November 2010, Continental ceased production at its Huntsville, Alabama, facility, which was included in the acquisition of Siemens VDO.

**Interior Sales:** €5.5 billion, up 26.5%

**Interior EBIT:** €197 million, compared with €516 million in 2009.

In the Interiors division, sales in body and security products grew 40%. Infotainment and connectivity products increased approximately 10%, with the most growth coming from Asian and North American OEMs. Instrument cluster sales increased 20%. Continental plans to increase production capacity for body controllers, instrumentation and HMI systems.

Schaeffler GmbH, which acquired Continental in 2008, recently announced it was buying more Continental shares, raising its ownership from 42.17% to 49.9% of the outstanding shares. Indirectly, Schaeffler controls 75% of Continental.

Continental is focusing on Asia, primarily China, for future growth. In 2010, 21% of automotive sales came from Asia, and the company intends to grow that percentage to 30% in the future.

**In the Electronics segment, sales increased by 24% to €623 million, mainly driven by growth in Brazil and China. Revenue from instrument panel sales increased 16% and telematics sales grew by 31%, a result of increased volume with Fiat and SAIC and production of new e-call units for PSA.**

Together with Harman International, Magneti Marelli won new business with BMW to supply next-generation entry-level infotainment systems. Magneti Marelli will supply the infotainment modules based on its open software platform for BMW in Europe; Harman will supply BMW vehicles in Asian markets.

**Other new business booked in 2010 includes an instrument panel and interior control unit for a new Chrysler model based on Fiat’s C-evo platform, a digital instrument panel for a Renault electric vehicle, and a radio navigation platform for PSA. Magneti Marelli also developed the hands free module recently introduced on 2011 Chrysler vehicles equipped with its new PowerNet electronics architecture.**

**Visteon**

2010 Sales: $7,466 million
Change from 2009: up 11.7%
2010 Operating Margin: 17.1%

Outlook for 2011: Essentially flat growth: Visteon is forecasting product

**Visteon**

2010 Sales: $7,466 million
Change from 2009: up 11.7%
2010 Operating Margin: 17.1%

Outlook for 2011: Essentially flat growth: Visteon is forecasting product

**Turn to Roundup, page 8**
TomTom N.V.

The Company Profile...

Background

TomTom was originally a trademarked brand of Palmtop, a company founded in 1991 to develop software applications for handheld computers and mobile phones. Palmtop first produced applications such as dictionaries, personal organizers, games and personal route planners. GPS technology became more widely available to commercial developers in the 1990s, and in 2000 the U.S. government lifted civilian restrictions on access to the highest quality satellite signals, greatly improving the accuracy of navigation devices available to consumers. Palmtop focused its efforts on developing portable navigation devices (PNDs) for automotive use to serve the rapidly growing consumer market. Taking advantage of the brand recognition of TomTom products, the company name was changed to TomTom in 2001.

TomTom stock was listed on the Amsterdam Stock Exchange in June 2005. “Automotive navigation requires a certain level of quality—quality of content, of navigation, of hardware design and your products have to be durable,” said Richard Piekaar, TomTom director of investor relations. “That is what consumers have come to expect from us, and that is something car manufacturers are looking for.”

Today, TomTom maps are available for 102 countries and territories. The company maintains a 48% unit share of the European PND market, and its share of the North American market has grown from 23% in 2007 to 27% in 2010, behind Garmin. The top four countries for TomTom product sales consistently are the United States, United Kingdom, France and Germany, but not always in that order. The most promising regions for future sales include South America, India, Indonesia and Thailand, according to Mr. Piekaar.

In 2010, TomTom entered into a joint venture with AutoNavi, the leading provider of digital map content in China. AutoNavi owns 51% and TomTom owns 49%. In China, TomTom’s strategy is to target automotive OEM customers for in-dash navigation systems and services rather than try to compete in the PND market, where Chinese suppliers offer devices at prices far lower than TomTom’s.

TomTom does no manufacturing in house. As a result, sales per employee in 2010 were €436,192, quite high compared to other automotive electronics companies. Most TomTom hardware is made in China by two contract manufacturers: Inventec Appliances Corporation and Quanta.

TomTom invested €65 million in capital expenses in 2010 aimed chiefly at its map databases, data centers and navigation capabilities. Capital expenditures in 2009 totaled €90 million.
Consumer Business Unit

More than three-fourths of TomTom’s revenue comes from retail sales of PNDs, but that market has been declining in recent years, especially in Europe. TomTom’s Consumer business unit’s sales have fallen 13% per year since 2008. PND sales have suffered with the explosion in popularity of smartphones with navigation apps and more recently, tablet computers. Not only have unit sales declined, but average selling prices (ASPs) have also been falling: by 40% in 2007, by 30% in 2008, and by 21% in 2009. The rate of ASP decline slowed considerably in 2010, however, to roughly 5%.

According to Mr. Piekars, much of the price pressure came as a result of second tier competitors entering the market with products priced far lower than Garmin’s and TomTom’s, forcing the market leaders to reduce prices in order to maintain their market shares.

Despite the challenges, TomTom sees opportunity in the PND market. First, there is plenty of room for increased penetration of navigation in the global vehicle fleet. Of the nearly 600 million cars on the road in North America and Europe, only about 30% are currently equipped with navigation, according to TomTom. In India and Brazil, penetration is less than 5%.

Second, TomTom is confident it can draw consumers away from smartphone and iPad solutions by leveraging its expertise in software development, its experience in automotive navigation and the content and services it can provide in a single-purpose device to provide a superior user experience. TomTom’s market research has shown that consumers prefer a larger screen for navigation. More than half of its PNDs are now sold with 4.3-inch screens and an increasing amount with 5-inch displays, but still smaller than tablets.

TomTom’s newest high-end GO LIVE connected PNDs feature a 5-inch capacitive touchscreen, Bluetooth hands-free calling (with a compatible phone), voice recognition, spoken street names and a trial subscription to LIVE Services including HD Traffic (real time traffic information), local search, fuel prices and weather information. The suggested retail price for the U.S. market is $349.

At present, approximately 20% of TomTom PNDs have embedded modems and are capable of delivering LIVE Services via subscription. TomTom is expanding the capability down into some mid-range PNDs and is introducing LIVE Services in more countries. To address the problems with cellular roaming in Europe, TomTom recently contracted with Vodafone, a pan-European network operator that will allow it to deliver services across multiple borders.

Automotive Business Unit

TomTom’s automotive business unit was formed in June 2007 with the acquisition of the 90-person, Eindhoven-based navigation development business of Siemens VDO, which laid the foundation for TomTom’s in-dash navigation systems business, according to the company. Presently, 300 people are dedicated to TomTom’s automotive business. The business unit also relies on hardware, software, content and services developed for TomTom’s other business segments. Software developed for TomTom PNDs is used in TomTom’s embedded automotive applications. The cloud- and server-based product infrastructure is also shared with the Consumer business unit.

TomTom supplies connected navigation products to Renault, Fiat and Mazda, and unconnected navigation products to Toyota. The Renault units are installed at the factory, whereas the Fiat, Mazda and Toyota units are installed either at the dealer or at the port of entry. Additionally, TomTom provides content (Tele Atlas maps mostly) to many of the world’s major carmakers, including BMW, Daimler, Honda, Ford, GM, and Lexus, among others, and to the major tier-one infotainment suppliers.

At the end of 2010, Toyota awarded TomTom the status of first-tier infotainment supplier so it will now regularly receive quote requests from Toyota. Prior to that it was a tier-two supplier. Fifty percent of the Toyota Aygos sold in Europe...
come with a TomTom navigation unit.

TomTom produces the PNDs that Fiat uses with its Blue&Me connectivity system. The PND, with its 4.3-inch display, connects via a dashboard mounting bracket to the Microsoft Auto-based telematics module, which handles the Bluetooth hands-free, USB and iPod connections.

Among the many new products in the works, TomTom is investing heavily in broadening its lineup of connected services. While TomTom will use some outside service providers such as Google, it is building in-house competence around providing the driver with location-based services that are useful before and during his trip. Today the vast majority of the navigation devices supplied by TomTom still navigate using onboard hardware and software. Users can update their maps by plugging the navigation unit’s SD card into an Internet-connected computer.

**Embedded Navigation**

Giles Shrimpton, managing director of TomTom’s Automotive business unit, noted, “The embedded navigation market is increasing, affecting all parts of our business. Not only does an integrated system look better in the vehicle than a PND, with our price under €500, it’s only a little more expensive than the PND. Even at that price, carmakers favor integrated navigation because they can profit from it,” noted Mr. Shrimpton.

Mr. Shrimpton asserts that integrated navigation works better than PNDs or smartphones because it has access to the vehicle’s sensors. Because it is connected with the vehicle’s CAN bus, the navigation system can access as much of the vehicle systems data as the carmaker chooses to allow. With access to speed and fuel consumption information, for example, Mr. Piekaaër expects navigation systems will contribute even more to fuel efficiency and safer driving. “But the first step,” he said, “is more integration of the multimedia and navigation. In the end the car manufacturer wants just one screen in the car and it needs to be a seamless experience for the driver.”

**Renault**

TomTom’s Automotive business unit’s biggest customer by far is Renault, which purchased more than 500,000 in-dash Carminat TomTom navigation systems from TomTom in 2010. As a tier-one supplier, TomTom not only supplies the navigation software and hardware—consisting of a 5.8-inch color display with the electronics attached and central or remote control—but is an active partner with Renault in the marketing and sales effort, providing dealer training and customer support. Customer calls to Renault about navigation are routed directly to TomTom. And Renault emphasizes the TomTom brand in its promotions of the navigation feature. In 2010, the Renault business accounted for nearly half of the Automotive business unit’s annual sales of €179 million. TomTom began shipments to Renault in mid-2009.

TomTom supplies only the navigation/information portion of the Renault infotainment system. Renault’s high-end audio system comes from Bosch; the entry-level audio system comes from Continental. The TomTom display, used also for the audio system and back-up camera, is mounted atop the dashboard above the center stack, separate from the audio head unit so it is easier to see while driving.

Probably the most appealing thing about Renault’s TomTom navigation system is the €490 retail selling price, quite low compared with rival offerings. Currently 40% of Renault vehicles are sold with TomTom navigation systems. That’s more than twice Europe’s average navigation penetration rate of 18% to 20%.

“TomTom supplies only the navigation/information portion of the Renault infotainment system. Renault’s high-end audio system comes from Bosch; the entry-level audio system comes from Continental. The TomTom display, used also for the audio system and back-up camera, is mounted atop the dashboard above the center stack, separate from the audio head unit so it is easier to see while driving. Probably the most appealing thing about Renault’s TomTom navigation system is the €490 retail selling price, quite low compared with rival offerings. Currently 40% of Renault vehicles are sold with TomTom navigation systems. That’s more than twice Europe’s average navigation penetration rate of 18% to 20%.”

**Toyota**

The Aygo and the Yaris have optional TomTom navigation systems.

**Mazda**

Recently announced the introduction of a TomTom integrated system on the Mazda 5 in Europe.

**Subaru**

TomTom navigation is optional for some Subaru Forester and Impreza models in the U.S.

---

**Top Automotive Device Customers**

| #1 | Renault* |
| #2 | Fiat |
| #3 | Mazda |

*N*Navigation units sold to Renault are factory installed.

---

**TomTom’s Major Automotive OEM Business**

**Renault**: TomTom’s largest relationship covers a co-branded, connected, in-dash solution, the Carminat TomTom LIVE, which is an option for nearly the entire Renault model range including a 100% fit-out of the Espace. The Carminat TomTom LIVE is a tailor-made solution for Renault and is fully connected to TomTom’s LIVE Services such as HD Traffic, local search and weather.

**Fiat**: The Blue&Me TomTom infotainment solution is currently available on the Doblo, Punto EVO, Qubo, Fiorino, Fiat 500 and other models, and on the Lancia Ypsilon. Blue&Me TomTom is currently available for the Alfa Romeo Giulietta and the Mito in Europe.

**Iveco**: The Blue&Me TomTom is available for the Iveco ECODAILY.

**Toyota**: The Aygo and the Yaris have optional TomTom navigation systems.

**Mazda**: Recently announced the introduction of a TomTom integrated system on the Mazda 5 in Europe.

---

**Embedded Navigation**

Giles Shrimpton, managing director of TomTom’s Automotive business unit, noted, “The embedded navigation market is increasing, affecting all parts of our business. Not only does an integrated system look better in the vehicle than a PND, with our price under €500, it’s only a little more expensive than the PND. Even at that price, carmakers favor integrated navigation because they can profit from it,” noted Mr. Shrimpton.

Mr. Shrimpton asserts that integrated navigation works better than PNDs or smartphones because it has access to the vehicle’s sensors. Because it is connected with the vehicle’s CAN bus, the navigation system can access as much of the vehicle systems data as the carmaker chooses to allow. With access to speed and fuel consumption information, for example, Mr. Piekaaër expects navigation systems will contribute even more to fuel efficiency and safer driving. “But the first step,” he said, “is more integration of the multimedia and navigation. In the end the car manufacturer wants just one screen in the car and it needs to be a seamless experience for the driver.”
to 70% navigation penetration,” explained Mr. Shrimpton.

TomTom LIVE Services

Carminat TomTom LIVE, Renault’s newest connected navigation system, which was announced at the end of 2010, features an embedded GPRS (General Packet Radio Service) modem for accessing off-board services including TomTom’s HD Traffic service, speed-camera alerts, local search with Google, and weather. The unit retails for the same price as the previous generation Carminat TomTom. Network coverage is provided by Vodafone. The off-board server is hosted by TomTom, as is most of the content.

The speed-camera feature alerts the driver when he is in the vicinity of roadside cameras used by police to automatically ticket speeders. The TomTom LIVE unit comes with a three-month free subscription, which can be extended for €59 per year. Or, customers can sign up for a three-year subscription for €50 per year when they purchase their vehicle. “We're putting a lot of effort into promoting and supporting this at the dealer,” said Mr. Shrimpton. “When the dealer sells the car he also sells a bundle of services. The computer systems between the dealers and our services are all integrated. When the dealer sells the service it gets automatically set up on our back end.” Going forward, 100% of the navigation units shipped to Renault will have the embedded modem.

While carmakers such as Ford in the U.S. have offered connected services that rely on the customer’s phone, Renault and TomTom decided to embed the phone in the navigation systems installed in the vehicle. “In the U.S., you need only to deal with one network operator,” said Mr. Shrimpton. “But in Europe where you may travel in different countries, handling roaming is difficult. We create a lot of value with a connected product by delivering services from the cloud. By integrating the modem into the vehicle we can guarantee that the user gets what he paid for. We couldn’t do that with a Bluetooth type solution.”

Unlike U.S. consumers, Europeans have not been very interested in making monthly payments for telematics services like OnStar, General Motors’ safety and security service. Will TomTom be successful in Europe with a subscription-based service? Giles Shrimpton believes it will: “Since we just started shipping this product it is too early to say, but we are planning for success. In Europe a new car costs between €15,000 and €45,000. Subscribing to LIVE Services will cost just €4 per month. We think that sort of price point makes it a really easy decision for the customer to just tick the box that says he’ll go for it. ... Safety and security is a more difficult sell in Europe, but we are saving customers money and time. We can prove that if you use our services in urban areas you are going to save 10% to 15% of your driving time on a yearly basis.”

TomTom says that its HD Traffic service provides the world’s most accurate traffic information. In Europe, HD Traffic uses probe data from connected PNDs, in-dash systems, and drivers’ mobile telephones to update the traffic reports every three minutes.

While the company hasn’t announced anything regarding a link between its Renault business and future business with Nissan, Mr. Shrimpton suggested that becoming an “alliance champion” to both companies would be a logical progression to TomTom’s success with Renault.
Consumer Reports on E/E Reliability

The April issue of Consumer Reports magazine is one of the best resources for new and used car shoppers in the United States. A regular feature each year is the Reliability Ratings, based on an annual survey of the magazine's subscribers about serious car repair problems they've encountered during the preceding twelve months.

Consumer Reports compares its survey results for each model against the average for a given model year. It assigns a relative reliability score in 16 potential trouble spots, illustrated with filled or partially filled circles ranging from red, denoting spots, illustrated with filled or partially filled circles ranging from red, denoting fewer problems compared with other models, to black, for higher problem rates. Because problem rates are generally very low, the “worst” rating, solid black, is not assigned unless the model's problem rate exceeds 3%. The “best” score, solid red, indicates a problem rate less than 1%. Of the sixteen potential trouble spots, audio had the highest average problem rate for 2010 vehicles overall, and that rate was fairly high at 3%. Included in the category along with audio systems are entertainment systems, navigation, backup cameras and sensors, and communications systems.

The Hansen Report took a closer look at how the major carmakers compared in the categories of electrical systems, power equipment and audio systems in 2010 models.

To reach our rankings, we assign a numerical value to Consumer Reports’ scores and weight those values with U.S. sales of each model, using sales data from Automotive News, Edmunds.com, the U.S. Department of Energy or the carmakers themselves. Of the 146 models included in our calculations, only six: Chevrolet Camaro, Dodge RAM 1500 (2WD), Toyota Matrix, Toyota Tundra (4WD) pickup, Lexus IS 250, and the Mini Cooper, had the best score in all three trouble spots we analyzed. But new car reliability is generally outstanding and our final scoring is extremely close.

### Problem Ratings for MY 2010 Vehicle Electrical Systems, Power Equipment and Audio Systems

In the rankings below, the best-performing carmaker is listed at the top of the graph. In cases where two or more carmakers have the same score, they are listed alphabetically.

<table>
<thead>
<tr>
<th>Electrical Systems</th>
<th>Power Equipment</th>
<th>Audio Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chrysler</td>
<td>Subaru</td>
<td>1.45</td>
</tr>
<tr>
<td>Mercedes</td>
<td>Toyota</td>
<td>1.52</td>
</tr>
<tr>
<td>Subaru</td>
<td>Ford</td>
<td>1.72</td>
</tr>
<tr>
<td>Toyota</td>
<td>Hyundai/Kia</td>
<td>1.86</td>
</tr>
<tr>
<td>Honda</td>
<td>Honda</td>
<td>1.93</td>
</tr>
<tr>
<td>Ford</td>
<td>Volkswagen</td>
<td>2.03</td>
</tr>
<tr>
<td>Mazda</td>
<td>Mazda</td>
<td>2.08</td>
</tr>
<tr>
<td>BMW</td>
<td>BMW</td>
<td>2.08</td>
</tr>
<tr>
<td>GM</td>
<td>Nissan</td>
<td>2.12</td>
</tr>
<tr>
<td>Hyundai/Kia</td>
<td>Mercedes</td>
<td>2.42</td>
</tr>
<tr>
<td>Volkswagen</td>
<td>GM</td>
<td>2.43</td>
</tr>
<tr>
<td>Chrysler</td>
<td>Chrysler</td>
<td>2.47</td>
</tr>
<tr>
<td>Nisan</td>
<td>Audio Systems</td>
<td>3.36</td>
</tr>
</tbody>
</table>

Included are serious problems with alternator, starter, hybrid battery and related systems, regular battery, cables, engine harness, coil, ignition switch, electronic ignition, distributor or rotor, spark plugs and wires. Included are serious problems with cruise control, clock, warning lights, body control module, keyless entry, wiper motor or washer, tire pressure monitor, interior or exterior lights, horn, gauges, 12V power plug, alarm and security. Included are serious problems with the audio system, entertainment system, navigation system, backup camera/sensors and communication system.

### Roundup...

sales in the range of $7.3 billion to $7.5 billion.
*Visteon was in bankruptcy from May 28, 2009, until October 1, 2010, and adopted “fresh start” accounting. The figures here are the combined results from the predecessor (bankrupt) company for the first nine months and the successor company for the last three months of the year.

Because of the accounting adjustments, the 2010 results can’t be accurately compared with 2009 figures.

For the first time since Visteon was spun off from Ford in 2000, Ford was not Visteon’s largest customer in 2010. Hyundai-Kia accounted for 29% of sales; Ford accounted for 25%. Approximately 14% of sales were to Renault-Nissan and FSA combined. Forty percent of Visteon’s sales were in Asia, primarily Korea. Europe accounted for 36% and North America, 18%.

Product sales increased for the year in each of Visteon’s three main business segments: Climate, Electronics and Interiors. In Electronics, the closure of Visteon’s Lansdale, Pennsylvania, plant in 2010 reduced sales by $70 million. Electronics sales for the combined predecessor and successor companies were $2.14 billion, which is 9% higher than Electronics sales in 2009. Climate sales were up 30%; Interiors grew just 2.1%, partly due to Visteon exiting the interiors business in North America.

Continued from page 2