Ford Sync 2 Launch Hits Difficulties

Ford's No-Tier-One Infotainment Business Model

Ford has been struggling with the launch of its second-generation Sync dashboard information and infotainment system. Sync 2 debuted in August on the model year 2011 Edge as MyFord Touch and on the Lincoln MKX as MyLincoln Touch. Not only is the system new and highly complex, but Ford has been managing its development in-house without the aid of a tier-one infotainment supplier.

Throughout the process, Ford has operated with an engineering organization described as "thin," and that has made the effort all the more challenging. There have been significant cost and delivery overruns, and several software glitches have shown up lately that require reprogramming Edge and MKX vehicles at the dealer. The revised software is to go into new vehicles as they are being manufactured starting in mid-November, and the software upgrade should be sent to dealers at the end of the month.

In October, Jim Buczkowski, director of electrical and electronics systems engineering at Ford, who oversaw the development of MyTouch, was replaced by Graydon Reitz. M r. Reitz comes back to the EESE director's job after a three-year stint as quality director for the Americas. M r. Buczkowski, recently honored with the title of Ford Technical Fellow, moves to Ford Research to work on advanced electronics subjects. He is responsible for the global electrical and software technical specialist community and discipline.

Sync 2 represents a very ambitious redesign of the automotive interface, one that will sweep broadly across most Ford and Lincoln products. Following its first appearance on the MKX, MyLincoln Touch will be made standard on all new Lincolns. MyFord Touch will next appear on the 2011 Explorer and later on the all-new Ford Focus. By 2015, about 80 percent of Ford's North American models are expected to offer Sync 2 technology.

Bsquare

Instead of working with an automotive tier-one supplier, in 2008 Ford hired Bsquare, a very small ($37 million in 2009 sales) engineering services company and Microsoft contractor and distributor located in Bellevue, Washington. Bsquare's work included the design of Sync 2's touch panel. At the heart of Sync 2 is the 8-inch touch panel, which controls navigation, media, HVAC and phone. Bsquare also handled Sync 2 software and hardware systems integration, work that included testing the system across hundreds of Bluetooth phones, portable media players and other devices.

Bsquare was responsible for implementation of the entire user interface including Adobe Flash graphic and multimedia software, speech recognition, navigation, media, climate controls and phone.

Before partnering with Ford, Bsquare's experience with factory-installed automotive systems was limited. It had worked on point-of-sale terminals, handheld terminals and smartphones and with Microsoft on the original CE platform. A s an authorized Microsoft CE for automotive integrator, Bsquare worked on personal navigation devices.

The Ford project was expected to be completed in the second quarter of 2010, but according to a Bsquare 8-K filing with the SEC on June 29, 2010, Ford and Bsquare "encountered significant cost and project overruns" and as a result Ford agreed to pay Bsquare an additional $3,782,376 in fees and adjustments. And further, "because of program difficulties," the two parties agreed to restructure their...
working relationship such that Ford has committed to put up an additional $5.6 million in order to cover 35 Bsquare engineers, 20 of whom would have a one-year commitment from Ford. This latest agreement with Bsquare will expire on June 30, 2011. Thus far, from 2008 through the first three quarters of 2010, Bsquare’s work on behalf of Sync 2 has cost Ford almost $30 million.

Ford’s Infotainment Business Model

Sync 2 is a very ambitious undertaking that redefines the cockpit’s entire user interface, and Ford has assumed responsibility for the complete systems integration and validation, work that was performed by Microsoft and Continental for the first generation Sync. Ford had two main motivations for the approach it took. First, it saw an opportunity to significantly lower the cost of infotainment systems by eliminating the tier-one’s profit, but more significantly, it wanted to own and control the intellectual property that comprises Sync 2.

According to Ford, Sync 2 development is a strategic investment that helps to define the Ford brand. It is a crucial element of Ford’s DNA. By owning millions of dollars worth of Sync 2 software, Ford can reuse all or part of it in other vehicles. And by owning the prints that define the electronics, Ford can further reduce costs by using contract manufacturers to build its hardware. Flextronics is building some of the Sync 2 modules.

According to Jim Buczkowski, “the financial benefit of the Sync 2 business model is evident in the low price Ford charges for a system with an 8-inch touch screen in the center stack and two 4.2-inch cluster displays.”

MyFord Touch is part of a $1,100 option on the lower trim level Edge models. Included in that $1,000 is $395 for the Sync software, $240 for a rear view camera and $365 for new hardware including the displays. Sync 2 is standard on the top trim levels of Edge, the Limited and Sport. On the Lincoln MKX, MyLincoln Touch is a standard feature.

“A further advantage of our business model is the access it gave us to tier-two and three technology providers that helped our engineers come up with great innovative ideas,” said Mr. Buczkowski.

Microsoft, whose main goal is to generate license revenue from its Windows Embedded Automotive software, had a much smaller role in Sync 2 development than it had with Sync 1. Nevertheless, Ford still benefits from associating the Microsoft brand with Sync.

Software Fix

A frequent problem with the launch of a complex new infotainment product, Ford has had to address its share of unforeseen glitches as Sync 2 rolled out. Late last month, for example, several suppliers were called in and told to immediately fix a memory problem with the touch screen display. But without a tier-one to take full responsibility, it was left to some of the tier-two suppliers to help figure out what was causing the problem and who was responsible for fixing it.

The system had a memory constraint problem that was dully fixed by changing the parameters used to address memory, a software fix. Well into the development of Sync 2, engineers decided they needed to define the electronics, software engineers or people who have experience managing software development. Project leaders may have underestimated the effort required to do validation testing of software, a huge, labor-intensive task. And without dedicated engineers at the factory, as problems arise, development engineers have been forced into a troubleshooting role, and that takes them away from their main work.

Discrete Architecture

Sync 2 comprises nine separate modules: the main Sync module, an electronics finish panel, a silver box radio, a separate HD radio, a GPS antenna module, a media out module, the display, the instrument cluster and a remote climate-control module. What normally is integrated into one box has been distributed across a number of boxes and sourced to different suppliers. In theory, that would leave Ford free to source each module with the lowest cost players, thereby reducing the total cost of the system.

Alternatively, integrating some of the

continued on page 3
Carmakers Speak...

GM’s Micky Bly wants suppliers of power electronics and other parts used in electric and extended range vehicles to understand the fundamental shift in requirements that has occurred. “In conventional vehicles, the parts might be used just three hours a day, but in the future, with electrification, we need to account for all the time the vehicle is in a plugged-in state. Many of these parts will be running 24 hours a day.”

Honda’s Yoshio Suzuki wants more systems engineering help from toolmakers. “We can simulate parts of the vehicle, but it is very hard to join them all. We would like to use systems engineering tools from the conceptual level and requirements planning through to the actual vehicle. We need something to make sure all the functions work together.”

Chrysler’s Alan Amici wants tier-one suppliers to invest in tools that will lead to stable, more mature software earlier in the development process. “A’s design cycles approach 18 months, we no longer have time to go back to the supplier or the software team to iterate. At the end of the project we want to be doing only minor modifications and fine tuning, not major changes.”

Ford’s Jim Buczkowski wants “tools that help us develop HMI, the human machine interface to the vehicle. We want to be able to add new features quickly. HMI is our DNA,” he said.

Software Is Key to Innovation

A ll six panelists said that software is a core engineering discipline at their carmaker.

“In the past, we relied to a greater extent on hardware innovation because we were limited by RAM and by processor throughput, MIPS. Quite frankly, RAM is now cheap and MIPS are becoming less expensive,” noted Mr. A. Michel. “At Chrysler, innovation is moving from hardware into software, where you are truly adding value.”

Dr. Würtenberger agreed, “Moore’s Law is still true. So software [not hardware] development is the bottleneck keeping us from taking advantage of what silicon can do. If you think about what happens with cloud computing, moving features around the net, software will have a big impact on what’s happening in cars over the next five years.”

According to Mr. Duval-Destin, software innovation and reuse will be furthered by a utosar and Genivi standards, which will enable the software industry to play a greater role in automotive.

Electronics Penetration

Panelists were asked what percentage of the average vehicle’s cost comes from electronics, electrical parts and software. Here are their rough estimates:

BMW: Up to 30% or 35% when electric cars are included in the average. It will not get higher because electronics helps lower costs.

Honda: Almost 30%

Ford: 20% to 30%

GM: A much as 60% to 70% for a full electric vehicle; 20% for conventional vehicles

Chrysler: 10% to 20% for conventional vehicles

PSA: Declined to give a figure but said “The ratio is stable because we [continue to] do more with less.”

ADAS Poses a Unique HMI Challenge

A sked about some of the challenges carmakers are facing in the development of advanced driver assistance systems, Micky Bly talked about the need to better understand how to seamlessly engage and disengage the driver when autonomous steering or braking takes control of the vehicle. “How do you convince the driver to let go, and how do you bring him back into engagement? We at GM are very open to anyone working in that space.”

Ford...

modules would eliminate the cost of some separate housings. The number of electronics components could be further reduced through device integration.

Other Carmakers Will Consider the Sync 2 Business Model

Whether or not Ford’s Sync 2 business model becomes an industry trend will depend on how quickly the problems with the initial launch are fixed. According to Ford, the problems aren’t at all major; they are typical of any launch as complicated as Sync 2. “A majority of the software glitches that have shown up in the field have centered on compatibility issues with some Bluetooth-equipped phones,” explained Alan Hall, a Ford communications manager. “Another problem that has come up is in Canada, distances on the navigation screen are measured in kilometers but directions are read out in miles. A s we get reports from the field we do our best to roll that into a future update.”

Ford will add unique features to Sync 2 for the new Explorer due at the end of this year as well as special features for the new Focus. “A s we expand usage of this infotainment platform, the great opportunity with software is we get a lot of efficiency and reuse so we are able to add those new features,” said Said Deep, Ford global product communications manager.

Despite the rough start, Ford will probably not be dissuaded from this new business model. “You are going to see a bit more of this from Ford,” Mr. Buczkowski said.

From August 11, 2010, when shipments began through the end of October, 10,690 Edge and 2,038 MKX vehicles have shipped. A ll of the MKXs and 80% of the Edges had the Sync 2 system.

If the quality problems are solved and Sync 2 proves to be as popular with consumers as Sync 1 has been, more carmakers will consider bringing design integration in house and get along without a tier-one supplier. GM successfully developed OnStar largely in house, and Audi, in a joint venture with software provider Elektrobit, is designing the architectural framework and platform for Audi’s newest infotainment system. Though, in contrast with Ford, Audi is having a tier-one supplier, Harman International, build the system.
The Company Profile... Clarion Co. Ltd.

**Headquarters:** 7-2, Shintoshin, Chuo-ku, Saitama-shi, Saitama 330-0081, Japan

**FY 2010**
- **Consolidated Sales:** ¥174.8 billion ($2.094 billion)
- **R&D:** 10.7%
- **Capital Expenditures:** ¥5,855 million ($70 million)
- **Operating Margin:** 0.34%
- **EBIT:** ¥5.5 billion ($66 million)
- **Operating Margin by Fiscal Year**
  - FY 2006: 2.8%
  - FY 2007: 1.7%
  - FY 2008: 2.2%
  - FY 2009 (6.8%)
  - FY 2010: 0.3%
- **Net Profit:** ¥500 million ($6 million)
- **Working Capital:** ¥20.5 billion ($246 million) as of March 31, 2010
- **Total Debt:** ¥46.9 billion ($562 million) as of March 31, 2010
- **Shareholders’ Equity:** ¥17.1 billion ($205 million) as of March 31, 2010
- **Market Capitalization:** ¥35 billion ($419 million) as of November 5, 2010
- **Main Products:** Car audio and navigation components and systems, cameras
- **Ownership:** Hitachi owns 63.8%
- **Top Customers:** Nissan, with 30% of sales; Ford, 14%
- **Employees:** 9,128, of whom 1,156 are employed at R&D centers
- **Sales per Employee:** ¥19.1 million ($229,276)
- **Key Competitive Strengths**
  - In the very crowded infotainment market where Clarion competes with many highly competent global players, one of its greatest strengths is decades of experience serving OEM customers who demand high quality products, according to Paul Lachner, Clarion Corporation of America’s vice president of automotive sales. "Most of our competitors came out of the retail world. We came from the auto industry. We were an OEM supplier first and our history and culture of satisfying OEM customers is certainly one of the reasons our customers choose Clarion. Along with that comes our experience in systems integration and our understanding of what carmakers want. Our top customer, Nissan, buys from us because we know them well and we know how to meet their needs."

**Background**
- Founded in 1940, Clarion has been serving the automotive industry since 1951 when it introduced Japan's first car radio. The company was listed on the second section of the Tokyo Stock Exchange in 1962 and was upgraded to the first section in 1970. Over the next three decades Clarion expanded its car audio and navigation product line, as well as its global presence. In December 2000, Hitachi formed a joint venture by Hitachi, Clarion and Xanavi Informatics. At that time, Xanavi was Hitachi’s and Nissan’s infotainment system subsidiary. Clarion was acquired by Hitachi in December 2006. One month later, Xanavi became a 100% Clarion subsidiary, and the two companies merged completely in 2009.
- Hitachi Automotive's focus is primarily on powertrain, suspension and hybrid technologies, while Clarion's strength is infotainment and multimedia. There is little product overlap between the two companies, with the exception of some camera and driver assistance products. In Japan, Hitachi handles the infrastructure-based telematics products and services; the in-vehicle equipment is Clarion's domain.
- Sixty-four percent of Clarion is owned by Hitachi. The second largest shareholder is Japan Trustee Service Bank, with 3.5% of the company.
- Clarion's plans call for net sales to grow annually at 4.6% over the next three years, which will bring the company to ¥200 billion ($2.4 billion) for the year ending March 31, 2013. Much of that growth will come from markets in China, India and South America. Clarion expects to produce an operating profit margin of 5% in 2013. The operating margin in the fiscal year ending March 2010 was 0.4%.

**Clarion Sales by Marketing Channel**
- FY 2010 Sales: ¥174.8 billion ($2.094 billion)
  - Aftermarket, 23%
  - OEM, 77%

**Clarion Sales by OEM Customer**
- Nissan, 30%
- Ford, 14%
- Honda, 6%
- Suzuki, 5%
- Others, 29%

** Clarion Sales by Product Segment**
- FY 2010 Sales: ¥174.8 billion ($2.094 billion)
  - Audio/Visual, 37.8%
  - Navigation (including A/V navigation), 51.3%
  - Other, 6%


**The Company Profile Continued**

**Clarion Sales by Region**

<table>
<thead>
<tr>
<th>Region</th>
<th>FY 2010 Sales: ¥174.8 billion ($2.094 billion)</th>
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<tbody>
<tr>
<td>Europe</td>
<td>9%</td>
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<tr>
<td>Americas</td>
<td>30%</td>
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<tr>
<td>Asia &amp; Oceania</td>
<td>8%</td>
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<tr>
<td>Japan</td>
<td>53%</td>
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**Clarion Employees by Region**

<table>
<thead>
<tr>
<th>Region</th>
<th>Total: 9,128</th>
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<tbody>
<tr>
<td>Europe</td>
<td>7%</td>
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<tr>
<td>Americas</td>
<td>18%</td>
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<tr>
<td>Japan</td>
<td>28%</td>
</tr>
<tr>
<td>Rest of Asia</td>
<td>47%</td>
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**Clarion Stock History, Nov. 2007 - Nov. 2010**

Source: Marketwatch.com

**Branding**

In the aftermarket especially, Clarion audio and navigation systems are known for being robust, given the company's long history as a tier-one automotive supplier. "But we don't necessarily have to work with our own brand," noted Mr. Lachner. "For example, we supply the Rockford-branded systems for Nissan. Rockford handles the equalization; we supply the source unit hardware and do the system integration."

Clarion also builds Bose-branded systems for Nissan. Clarion makes the Bose head unit, but no longer supplies the amplified speakers. Clarion also provides McIntosh-branded products for Subaru and the Ford GT. (McIntosh was formerly a Clarion brand.) And Clarion produces navigation/audio head units for Ford that are Sony branded.

Clarion does not view branded speakers as an essential component in the multimedia systems it supplies to OEM customers, seeing it almost as a commodity business today. The company sees a growing trend in OEMs sourcing low cost speakers from companies such as Foster and Onkyo.

**Sales and R&D Employees by Country**

**Sales Network Employees by Country**

<table>
<thead>
<tr>
<th>Country</th>
<th>Total as of August 31, 2010:</th>
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<tbody>
<tr>
<td>Japan</td>
<td>832</td>
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<tr>
<td>China</td>
<td>184</td>
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<tr>
<td>Malaysia</td>
<td>55</td>
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<tr>
<td>USA</td>
<td>45</td>
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<tr>
<td>Mexico</td>
<td>18</td>
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<tr>
<td>Europe</td>
<td>15</td>
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<tr>
<td>Taiwan</td>
<td>7</td>
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**R&D Employees by Country**

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<tr>
<th>Country</th>
<th>Total as of August 31, 2010: 1,156</th>
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<tbody>
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<td>USA</td>
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<tr>
<td>Mexico</td>
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<td>Taiwan</td>
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**Silver Boxes**

Rather than sourcing an integrated audio head unit from a single supplier, carmakers are increasingly purchasing audio components separately. One supplier might be chosen to handle the control panel with its switches; another for the display, and a third to supply the silver box, consisting of the head unit's radio and other electronics.

Mr. Lachner observed: "The market for audio systems is getting more fragmented. Some people have looked at the radio and decided that the expertise required to make the chassis and what's inside it doesn't necessarily come from the same company that excels at making the plastic buttons and knobs on the control panel. And that expertise is also different from what it takes to make the display." Another thing that's motivating silver box sourcing is styling. By moving the box out from behind the center stack, designers have more freedom to create unique and appealing interiors.

Clarion has a long history not only as a silver box supplier but as a systems integrator. Clarion HMI is the company's new brand slogan, which refers to its intention to focus on products that connect the driver to music and information in a user-friendly way.
duced," noted Mr. Lachner. “Even though it takes a lot longer for old media to go away than for new media to be introduced,” said Mr. Lachner, “but I don’t know of any vehicles today that don’t have a CD player, other than base fleet vehicles that come with only a simple AM/FM radio. Greater than 90% of our audio head unit business still includes a CD mechanism.

“It takes a lot longer for old media to go away than for new media to be introduced,” noted Mr. Lachner. “Even though demand for cassette mechanisms peaked in the 1998 model year, more than 12 years ago, it was only about 18 months ago that we shipped our last cassette mechanism. A lot of people still listen to CDs or at least want the option of listening to them.” But Clarion is now seeing a trend away from six-CD mechanisms.

**Mechanisms**

Clarion has the capacity to produce more than six million CD, MD, cassette and DVD mechanisms each year, and despite the extremely fast uptake of portable digital media players and smartphones, the market for Clarion’s mechanisms won’t soon disappear.

“We have some future programs aimed at young buyers that don’t include a CD player, and “mechless” systems are available in the aftermarket,” said Mr. Lachner, “but I don’t know of any vehicles today that don’t have a CD player, other than base fleet vehicles that come with only a simple AM/FM radio. Greater than 90% of our audio head unit business still includes a CD mechanism.

**Integrated Navigation Systems**

Clarion supplies fully integrated navigation systems. Ford offers Clarion navigation systems in every one of its 2011 models sold in North America, with the exception of the Lincoln MKX and Ford Edge.

Ford’s Clarion-supplied navigation systems have featured many OEM industry innovations including these:

- First system to offer Sirius Travel Link services
- First to integrate a Sirius receiver
- First to use a dual tuner module for both audio and data content
- First OEM system to provide full control of a portable media player
- First OEM system to contain Gracenote’s database of album information including artwork

Clarion supplies integrated navigation systems for Infiniti vehicles and latest generation high-end navigation for many Nissan vehicles including the Altima, Maxima, Z, GTR and Quest. These systems feature a high-resolution navigation engine and eight-inch display, voice recognition, XM Satellite real-time traffic, junction view, music ripping and more. Legacy Clarion navigation systems are available in the Murano, Pathfinder, Armada and Titan.

**eConcept – Upgradable and Scalable Infotainment Systems and Components**

“Among the new products that Clarion is working on, anything related to smartphones and connectivity is going to have promising revenue potential,” noted Mr. Lachner. Foremost among these perhaps is eConcept, which provides the means by which all of Clarion’s products, from a simple silver box up to a full-featured infotainment system, can have a connection to the cloud.

**Distinctions Claimed by the Company**

- Produced Japan’s first car radio in 1951, first car stereo in 1963 and first cassette car stereo in 1968.
- World’s first AutoPC using Microsoft Windows CE Automotive, in 1998
- Clarion produced the world’s first birdseye view camera system in 2003, for Nissan.
- First in the industry in 2005 with full iPod control with direct connection (no adapter box).
- In 2005 introduced Japan’s first iPod compatible integrated AV HDD navigation system.
- A Clarion AV unit and DVD changer was installed in NASA’s International Space Station in 2007.
- In 2010 Clarion started delivery of car audio to Tata Motors, India, for Nano vehicles.

**Cameras**

One of Clarion’s fastest-growing product lines is cameras, a business which today produces tens of millions of dollars in annual revenue, but is expected to grow to between $200 million and $300 million annually within five years. Clarion supplies Nissan with front view, rear view and around view cameras and expects many more of those applications in the future, not only from Nissan.

Legislation in the United States will likely increase demand for rear view cameras once NHTSA (National Highway Traffic Safety Administration) completes rulemaking required by the Cameron Gulbransen Kids Transportation Safety Act of 2007. The deadline is February 28, 2011. The law is meant to reduce tragic
Clarion introduced a CCD camera with a 190-degree anamorphic lens, followed by a 130-degree CMOS VGA camera in 2010.

### Infotainment System Platforms

Since it first began working closely with Microsoft in 1995 on the AutoPC multimedia computing platform, Clarion has worked with numerous versions of Microsoft’s infotainment software platform, the latest version being Windows Embedded Automotive. Clarion has also built multimedia systems based on µTRON and on the QNX operating system.

“While the QNX and Microsoft software platforms will continue to be strong, the Genivi alliance will be a very powerful force in the future,” Mr. Lachner said. “A standard platform is needed, and the Genivi open-source platform based on Linux looks to be a frontrunner, which is why we are participating in its development. Our goal is to be able to go to our OEM customers and say, ‘this is the direction we think you should go,’ because right now, they don’t know which platform is going to be successful.” Recently SAIC and Jaguar Land Rover joined BMW, PSA, GM, Renault-Nissan and Hyundai as Genivi alliance members.

### China and other Emerging Markets

With the rise in the value of the yen against major currencies, which makes goods manufactured in Japan more expensive, Clarion will continue to move production and engineering operations from Japan to China. Already 52% of Clarion’s manufacturing is done in China, and that percentage will increase as the company transfers navigation equipment manufacturing from Japan to China over the next couple of years. Only 30% of manufacturing today is done in Japan.

Clarion will also increase the number of engineers working in China. “We have already moved a number of Japanese R&D management personnel from Japan to China and they will build that organization,” Mr. Lachner said. In March 2010, 184 R&D employees worked in China, accounting for 16% of Clarion’s total R&D staff. Clarion started manufacturing some of its products in China in 1995.

Clarion operates three factories in China, two in Dogguang and one in Xiamen, which together produced a total of 3.9 million audio and navigation systems plus 4.7 million playback mechanisms in the last fiscal year. Clarion sales in China have grown from ¥2.9 billion in FY 2003 to ¥7.7 billion in FY 2010.

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**The Company Profile Continued**

<table>
<thead>
<tr>
<th>Products</th>
</tr>
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<tbody>
<tr>
<td><strong>Automotive</strong></td>
</tr>
<tr>
<td>Car audio systems</td>
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<tr>
<td>Car DTV</td>
</tr>
<tr>
<td>Display head units</td>
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<tr>
<td>Car navigation systems</td>
</tr>
<tr>
<td>Center control panels</td>
</tr>
<tr>
<td>Car radios</td>
</tr>
<tr>
<td>Car speakers</td>
</tr>
<tr>
<td>Power amplifiers</td>
</tr>
<tr>
<td>Car antennas</td>
</tr>
<tr>
<td>Car cameras</td>
</tr>
<tr>
<td>Multifunction ECUs</td>
</tr>
<tr>
<td><strong>Buses, Commercial Vehicles</strong></td>
</tr>
<tr>
<td>Bus audio systems</td>
</tr>
<tr>
<td>Multimedia systems for sightseeing buses</td>
</tr>
<tr>
<td>TV monitors for sightseeing buses</td>
</tr>
<tr>
<td>Audio guidance systems for route buses</td>
</tr>
<tr>
<td>Audio for construction equipment</td>
</tr>
<tr>
<td>Vehicle rear mirror systems</td>
</tr>
<tr>
<td>PA systems for vehicles</td>
</tr>
<tr>
<td>Communications equipment</td>
</tr>
<tr>
<td>Drive recorders</td>
</tr>
<tr>
<td>Navigation equipment for commercial use</td>
</tr>
<tr>
<td>Automotive telematics terminals for commercial use</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>Modules</td>
</tr>
<tr>
<td>CD/MD/Cassette/DVD mechanisms</td>
</tr>
<tr>
<td>Tuners</td>
</tr>
<tr>
<td>Content/Services</td>
</tr>
<tr>
<td>Portal site: my.clarion.com</td>
</tr>
<tr>
<td>Sightseeing movies: Moviem, a Japanese travel and driving information website that offers video clips of travel destinations.</td>
</tr>
</tbody>
</table>

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back-over accidents by eliminating the blind spot behind light vehicles. Phase in for whatever solutions NH T SA determines will satisfy the requirements of the legislation will take four years.

Clarion expects its association with Hitachi A utomotive will also lead to increased camera business. Hitachi makes powertrain and chassis control systems that will increasingly rely on visual information from Clarion cameras.

Starting with CCD (charge couple display) cameras, Clarion has been putting cameras into vehicles since 1988. In 2009 Clarion introduced a CCD camera with a...
Which of these standards will find high-volume application in more than 200,000 vehicles per year at your company within the next five years? I put that question to the Carmakers Speak panelists during Convergence 2010 in Detroit last month. The table below summarizes how these top electrical engineers responded.

### Autosar

No standard under consideration worldwide will have as big an impact on the cost of software and hardware as Autosar, though adoption beyond the pioneers has seemed rather slow. Nevertheless, four of the six panelists said they would deploy fully compliant Autosar systems in high volume by the 2015 model year. General Motors will also deploy the standard but won’t reach 200,000 units per year until after the 2015 model year. Ford initially will only deploy some Autosar-compliant networks.

### FlexRay

FlexRay is the high-speed, safety-critical bus protocol pioneered by BMW, Mercedes, NXP and Freescale. In the works at least since 2000, adoption of this standard too has been quite slow. Among the Carmakers Speak panelists, only BMW said it will adopt the standard in high volume. BMW will use FlexRay in chassis and powertrain control systems but not separately as a replacement for CAN, which some carmakers have considered.

### Genivi

Like Autosar, Genivi, the open source infotainment software platform pioneered by BMW, will significantly reduce the cost of software development. As expected, BMW, who will eventually use the Genivi platform in all its models, will be up and running in high volume by the 2015 model year. PSA and GM, who are also members of the Genivi alliance along with Hyundai, Renault-Nissan, SAIC and Jaguar Land Rover, indicated their commitment to Genivi, though reaching 200,000 units per year by the 2015 model year is not likely. Ford, who is instead committed to Windows, won’t use the standard and will Chrysler by then.

### Terminal Mode

Terminal Mode is the smartphone connection standard developed by Nokia and supported by the Germans. With Terminal Mode, smartphone applications can be viewed on the vehicle’s display, heard on the audio system and controlled by means of the vehicle’s HMI. Among the panelists, only BMW and PSA said they will use Terminal Mode in high volume by model-year 2015. According to Michael Würtenberger of BMW, “With Terminal Mode the carmaker has the last word on which applications can be presented on the vehicle display.” PSA’s Marc Duval-Destin agreed. “We think Terminal Mode is a must,” he said.

GM’s Micky Bly is not at all a believer in Terminal Mode. “Everybody will have their own way of doing something similar; it won’t be limited to what is being defined by Nokia,” he predicted.

### Ethernet

“In the 2014-2015 time frame, BMW will deploy an Ethernet network in a driver assistance system that links video cameras to a central processing unit,” said Dr. Würtenberger. Besides BMW, only GM said it will use Ethernet in high volume, “in a network that links a network that links a number of controllers,” according to M. Bly.

Honda will only use Ethernet for downloading data to the vehicle.

### Bluetooth Message Access Profile

Especially tailored for automotive applications, Bluetooth MAP defines a set of features and procedures to exchange messages between mobile devices and an onboard terminal. All six carmakers intend to make use of the standard in high volume applications. “MAP will give us the ability to send a lot more information across the Bluetooth stream,” said Ford’s Jim Buczkowski.

<table>
<thead>
<tr>
<th></th>
<th>Al Amici Chrysler</th>
<th>Micky Bly General Motors</th>
<th>Jim Buczkowski Ford</th>
<th>Marc Duval-Destin PSA</th>
<th>Yoshio Suzuki Honda</th>
<th>Michael Würtenberger BMW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autosar</strong></td>
<td>Yes</td>
<td>Will start but won’t reach 200K units by 2015</td>
<td>Will start with some networks</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>FlexRay</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No - cost too high</td>
<td>No - cost too high</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Genivi</strong></td>
<td>Probably not</td>
<td>Most likely</td>
<td>No (Microsoft Windows Embedded Automotive)</td>
<td>2014 launch, limited volume initially</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Terminal Mode</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Ethernet</strong></td>
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<td>Yes</td>
<td>No</td>
<td>Under investigation</td>
<td>Only for data downloads</td>
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</tr>
<tr>
<td><strong>Bluetooth Message Access Profile</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>