Software Tools Heading Mainstream

Body Controllers Follow Powertrain

When we wrote about software development tools in the June 2001 Hansen Report, there seemed to be more challenges than opportunities. Specifically, carmakers were finding it difficult to reorganize engineering to make full use of the tools being offered. Today, with worldwide sales between $300 million and $400 million per year and annual growth rate percentages between seven and the low teens, the automotive software development tools industry is no longer emerging—it is now established.

Scott Lehman, automotive marketing manager for The MathWorks, noted, “Powertrain tools are moving out of research and advanced development into mainstream production programs.” Continuous modeling tools such as Simulink from The MathWorks (Natick, Massachusetts) or ASCET-SD from ETAS (Stuttgart, Germany), have been widely used to test powertrain controls for at least a decade. The MathWorks, I-Logix and ETAS are the largest automotive software tools suppliers in the world.

Most carmakers and suppliers who use tools to develop automotive software follow the “V-diagram” (below), which defines the development steps followed to go from specifying requirements, at the upper left-hand side of the V, through automatic code generation, to a finished and verified design on the top right-hand side of the V. The MathWorks, I-Logix and ETAS are the largest automotive software tools suppliers in the world.

Ford Money Crunch Stifles E/E

In what may prove a shortsighted effort to save costs and pretty up its financial picture, Ford has recently downsized its automotive engineering budget and backed away from its commitment to several forward-looking electronics programs. Ford now aims to focus on cost improvement, quality and effective implementation of the electronics that are factory installed in Ford production vehicles. At the expense of multimedia, telematics, networking, new E/E architecture and software tools development, Ford will focus on safety and powertrain electronics. According to one insider, Ford has cut North American E/E engineering resources by roughly 20%.

This spring, Ford replaced Cary Wilson, a well-connected visionary and director of electrical and electronics systems engineering, with Jeff Wood, a former truck plant manager known for professionalism, organizational discipline and getting the job done. Despite being educated as an electrical engineer, Mr. Wood has had very little experience developing electrical and electronics features for factory installation. Jeff Wood reports to Will Boddie, vice president, North American engineering. The new E/E organization has not yet had time to complete a new strategy for electronics at Ford, except for the notion that, for now, it will put proper execution of designs and cost reduction above all else. According to one well-placed Ford executive, electrical/electronics engineering is definitely not considered by Ford to be a core competence.

Ford’s participation in E/E standards-making has also been affected by the budget squeeze. Ford will annually save about $300,000 and a couple of man years of engineering as a result of its withdrawal from E/E standards-making. Ford will annually save about $300,000 and a couple of man years of engineering as a result of its withdrawal from E/E standards-making.
Software Tools...

implementation works. Based on the tested implementation, a tool can automatically generate production software code that will run on the ECU’s (electronic control unit’s) microcontroller. Up the right side of the V, the actual ECU is tested with models that simulate the operation of the vehicle.

Whether designing powertrain systems or body electronics systems, carmakers aren’t yet at the point where they are benefiting from every element in the V tool chain. According to Rick Boldt, I-Logix’ director of product marketing for Statemate, powertrain engineers started on the right-hand side of the V with calibration and test equipment, then they came across to the left-hand top to develop ways to specify systems and components as simulatable models. Now they are moving down to the bottom toward auto code generation. State-machine-based tools such as Statemate first offered graphical modeling tools, moving down the V to automatic code generation.

I-Logix is now promoting tools for testing including a new release called M ode1-C cheker, which analyzes the model using formal verification technology to make sure the model accurately reflects the requirements.

Body (Cabin) Controls

Introduced to the auto industry years after software tools were first used for the powertrain, tools such as I-Logix’ Statemate are now being widely applied in body electronics applications. In the spring of 2001, “some carmakers were thinking about bringing body electronics development tools out of research,” said George LeBlanc, vice president of marketing for I-Logix. “Today those model-based tools are actually being used in the U.S., Scandinavia, Europe and in Japan.” In the States, General Motors and Chrysler have sourced new body controller designs using computer models to specify the requirements.

Chrysler was one of the first carmakers to use I-Logix tools to create production designs. One of the earliest applications was in the 2002 Jeep Liberty, where Chrysler specified instrument cluster features using Statemate models. Chrysler expanded its use of tools as it designed clusters for the new large-car platform LX, which is due late in the 2004 model year.

More recently, Chrysler took what it learned from the LX and Liberty, including some feature models developed for those applications, to design a body controller for the new, small-car C- and D-segment platform, which goes into production in the 2006 model year. This time, Chrysler’s tools and methods engineers designed a brand new body module called the CCN (cabin control node). To design the CCN, Chrysler again made feature behavior models part of the quote package sent to suppliers. This time, however, they are also developing what Chrysler calls an implementation model, which puts all of the behavior models together with CAN drivers and diagnostic requirements for each particular module. Ultimately, Chrysler will send both the behavior models, which describe how particular features work, along with the implementation model as part of the quote package.

A first for Chrysler, the methods and tools group plans to use automatic code generation tools from I-Logix to convert tested models into production-ready software code that will be loaded on the CCN’s embedded microcontroller. “Without it, if we make a software change, on a cluster for example, an engineer has to manually run it through a test plan,” explained Laura Smith, in charge of Chrysler’s methods and tools group. Ms. Smith was pioneering tools development even before the Jeep Liberty’s cluster was designed. Next, according to Ms. Smith, her group will take on some of the other smaller body control functions, for example, window-lift or lift-gate controls. “We are just at the start of what we can do with these tools. We’ve successfully demonstrated a few programs. Now we are trying to make this our standard process for all electronics modules, but we certainly aren’t there yet,” she said.

General Motors has also been successful using software development tools from I-Logix to develop an all new, multiple-feature, high pin-count body controller called the common body architecture module. Due in the 2006 model year, suppliers expect the new body controller will eventually proliferate across most GM platforms. GM sent the model out with its bid package and accepted quotes only from suppliers with the means to understand the requirements expressed as a model. Den sol got the business. A according to one insider who asked to be kept anonymous, the unit worked the first time it was plugged into the test rig, despite being GM’s most complex body controller yet. Other carmakers who have taken software development tools beyond research include Renault, PSA, Ford in Germany, Opel, Nissan and Honda in Japan. Each of these carmakers has used I-Logix tools to generate feature models used in sourcing.

In North America, Ford has also been developing a model-based software release system. The carmaker intended to first use such tools to develop body electronics for a car based on the new Lincoln platform due in the 2005 model year. But while Ford is still intent on adopting software tools, Ford’s financial predicament forced the company to slow the pace and focus instead on another Lincoln model. Plus, Ford decided to bring the work in house. Ford had been working with Motorola SPS’ Virtual Garage, a research and development lab combining experience in
this spring from membership in A M I-C, the A utomotive M ultimedia Interface Collaboration. A nd Ford has stopped ac-
tively promoting I EEE-1394 as an interna-
tional automotive fiber-optic standard, an
alternative to the M OST standard. The
comp any has withdrawn its participation
on the Convergence management board,
which every two years plans and sponsors
the world’s most important international
congress on automotive electronics. Ford
is the host company for Convergence
2004, and Ford R &D manager Gerhard
Schmidt still plans to participate as the
conference chair. Formerly with Ford,
Cary Wilson, who is now in charge of en-
gineering at Panasonic A utomotive Sys-
tems of A merica, will be the Convergence
Technical Chair.

Given its de-emphasis, for now, on
some new electronics technologies, Ford’s
product development strategy stands in
sharp contrast to that of G eneral Motors,
which lately has been touting the
“brainpower” of its vehicles. In a two-page
advertisement in the Wall Street Journal,
GM highlighted its D VD players, X M sat-
nellite radios, O nStar, sonar-based parking
assist, GPS and head-up displays. Clearly
GM believes, as we do, that new electron-
ics features will attract customers to G M
vehicles and bring in more revenue at the
expense of Ford’s market share. If GM is
successful at Ford’s expense, electronics
advocates will gain influence with
carmakers around the world. However, if
Ford is successful with its back-to-basics
approach, automotive electronics will
take a big whack.

A n example of Ford’s go-slow policy
with new multimedia features is the
carmaker’s decision to have dealers install
Sirius satellite radios, rather than install
them at the factory. Factory installation
would produce a well-integrated, higher
quality installation, with no wires or con-
nectors showing and no holes in the roof
required to accommodate the antenna. In
model year 2004, Ford will offer the
dealer-installed satellite radio on only 20
models, whereas G M plans to offer fac-
tory-installed XM satellite radios on 44
models.

Some will suggest that Ford’s change in
approach to electronics is not meant to be
a strategic move, but rather a stop-gap
measure taken in response to a tough fi-
nancial situation that severely limits
available resources. For the first quarter
ending March 31, 2003, Ford’s balance
sheet showed that current liabilities sig-
ificantly exceeded current assets by $3.5
billion. In the second quarter of 2003, net
income fell 27%. O n June 30, 2003 Ford’s
automotive sector had $2.4 billion more
current liabilities than current assets.
Standard & Poor’s has given Ford a credit
rating of B BB; two more steps downward
would bring Ford’s rating to non-invest-
ment grade. W hile on July 15, 2003,
the stock closed at $11.31 per share, not
far from its 52-week high of $13.82, a recent
survey from M orningstar.com had 9 of 15
stock analysts rate Ford stock a “hold;”
one rated Ford a “sell.” A ccording to
M orningstar, “Wall Street analysts are no-
torious for cuddling up to the compa-

nies they follow. Y ou rarely see a sell
rating. A hold on W all Street is about as
bad as it gets.”

Th us far, Ford has not drastically cut
electrical engineering programs at Volvo
or Jaguar, the two Ford divisions likely to
lead the way with new electronics. T heo-
retically, that new technology could be
transferred to Ford once it is proven and
the costs are wrung out. H owever, Ford
has a nix on travel, which keeps the E/E
staffs apart and makes technology transfer
even more difficult than it already is.

Suppliers Frustrated
Ford’s suppliers have been frustrated
not only by the arm-twisting they are get-
ing from purchasing regarding prices, but
also by Ford’s apparent confusion about
what it aims to do with several E/E devel-
opment projects, which now appear to be
stalled. A ccording to one well-placed sup-
plier insider, “T here are programs that
suppliers have bid on in the 2005 to 2007
timeframe that are months late awaiting
decisions from purchasing. ... Ford is not
behaving rationally at this point.” H e
added, “Specifications are grinding to a
complete halt. For some new features,
they are missing model years, which will
make Ford less competitive in the future.”
Ford engineers now have to spend a lot
more time schmoozing suppliers to keep
them interested in any long-range devel-
opment projects that remain—a tough sell
these days. Suppliers may no longer be
willing to offer their brand new technol-
ogy to Ford first.

W hile Ford is saving money in the near
term by putting off investments in soft-
ware tool development, in E/E architec-
ture development, in new multimedia
products including navigation, in network
development and by withdrawing from
standards-making bodies such as A M I-C,
Ford will be less able to profit from elec-
tronics innovation in the future.

Gartner Dataquest Ranks Top Auto Semiconductor Suppliers
Of the top ten automotive semiconductor vendors in the world, two are from the U.S., four
are from J apan and four are from Europe. In contrast, the top nine suppliers in J apan
include companies; number ten is Motorola.

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Data: Gartner Dataquest, J uly 2003
The Company Profile... Brose

**Background**

Since the company's founding by Max Brose in 1919 in Coburg, Germany, Brose operated out of just one manufacturing facility until 1983, when a second Coburg factory was established. Today the company operates almost thirty facilities around the world, in Europe, North and South America, Asia and South Africa.

Chairman Michael Stoschek, grandson of the company founder, and the founder's family, own 100% of Brose. Mr. Stoschek is the only family member currently active in management of the company. A recent article about Brose in the Handelsblatt, which is often referred to as Germany's Wall Street Journal, stated, "Brose is Stoschek and Stoschek is Brose," indicating that the company is defined by its present chairman. Brose will likely remain family-owned. "There is no ambition at all to involve any other company," declared Jan Kowal, head of Brose North America.

In November 2001, Brose acquired the Bosch Group's closure systems division, but that was the first acquisition made since the company's founding in 1919. "In 1971," said M. R. Kowal, "Brose shipped €2.8 million ($3.2 million) worth of product, and by 2005 we are going to be shipping €2.2 billion ($2.5 billion) in sales each year. The Bosch closure division represents less than 10% of future Brose sales—so more than 90% of our company has come from organic growth."

According to company literature, Brose has an exceptionally sound financial basis for profitability. Since it was founded, the Brose Group has been able to finance its growth without bank loans. A part from the company's rigorous cost management, a major factor in its financial wherewithal has been a dividend payout policy agreed to by all shareholders limiting dividend payouts to no more than 10% of net profits. Remaining profits are plowed back into the company.

According to Brose CEO, Michael Stoschek, there are three reasons for the company's financial success:

- Brose is now a global company having won significant new business outside of Germany
- Cost discipline
- Dividend payment restraint

**Organization— Four Product Groups**

Brose is organized into four product groups: Window Regulators, Door Systems, Seat Adjusters and Closure Systems, each under P&L (profit and loss) management. Each product group has its own engineering organization. Each manufacturing plant is also independent with its own R&D facilities in Europe and North America.

Brose's Central Electronics/Electrical (E/E) parts organization is responsible for the development of all E/E parts and the manufacture of up to 20% of the electronics parts used in Brose products. The Central E/E unit is part of the Door Systems product group. Other centralized groups include purchasing, personnel, finance, quality, production and plant planning.

Brose is organized to serve the world's major carmakers, including Chinese and Japanese carmakers. The company reaches...
the Chinese and Japanese markets through its joint ventures: Shiroki Brose in Japan, and Guangdong Brose and Shanghai Brose in China. While Brose hasn’t landed any business yet with Japanese OEMs in Japan, it has won significant business with Mitsubishi Motors in the States and with Toyota in Europe.

## Window Regulators

According to Brose, it was the first company to make power window control units for a series production vehicle. Brose’s product line today includes manual and power arm and cable window regulators. In terms of sales, window regulators are Brose’s leading product, accounting for 41% of sales in 2002.

Brose’s power window regulators with the anti-pinch feature account for the majority of electronics Brose sells in Europe. “Eighty to ninety percent of all power window regulators in Europe come equipped with an anti-trap feature,” said Mr. Kowal. In Europe, anti-trap is required for one-touch “express-up” power windows. “In the United States,” Mr. Kowal continued, “only 2% to 3% of vehicles are made with an anti-pinch or anti-trap feature.” The feature automatically reverses power-window closure if anything or any part of a person gets stuck between the closing window and the door frame.

A anti-pinch or automatic reverse is not required in the U.S., even for the express-up window feature. Most carmakers choose instead to meet the less demanding operational safety requirements described in U.S. FMVSS (Federal Motor Vehicle Safety Standard) 118, section 4 (S4). S4 states that the power window can only operate under the following conditions: The key must be in the ignition in the start, on or accessory position; or, after the engine has been shut off, before either of the front doors is opened; or, if the windows can be operated with a remote control device the range of the device is limited to six meters or less, without a clear line of sight or 11 meters or less, with a clear line of sight. If those conditions aren’t met, or if a carmaker opts to include auto reverse as an added safety feature, the anti-trap compliance standards are more stringent than they are in Europe.

A according to FMVSS 118, section 5, the window must reverse direction before the squeezing force on a semi-rigid test rod (from 4 mm to 200 mm in diameter) exceeds 100 N ewtons. Those rods have a force-deflection ratio of at least 65 N ewtons/mm for a rod that’s 25 mm in diameter or smaller and at least 20 N/mm for a rod larger than 25 mm in diameter. The corresponding European standard (74/60/ EEC (4)) requires a force-deflection ratio of just 10 N/mm for any size object in the window opening.

The problem for Brose is not that it can’t accommodate the U.S. anti-trap requirements, but meeting the standard makes the feature expensive for carmakers. “If, however, the carmaker decides up front that it wants to design a door especially to accommodate automatic window reversal, we should be able to come close to the European price,” explained Lynne Edgar, motor and electronics engineering manager for Brose North America. “Brose is launching a product in North America that combines a full motor system and a complete control electronics package.”

Mr. Kowal estimated that if the U.S. requirements for anti-trap were the same as Europe’s, Brose could realize an additional $40 million ($46 million) in annual sales. He continued: “In Europe, Brose has between 70% and 80% of market for the anti-trap feature, in part because we offer anti-trap technology requires harmony between the electronics and the mechanics. The seal in the glass comes in wide variation; if the [electronics specialist] doesn’t have that experience he can be very surprised with what can go wrong.”

### Door Systems

Door systems (or modules) include all of the functional equipment that opens and closes the window and the door. That includes the steel carrier, the door frame, which surrounds the window opening, the...
Brose

window regulator system, door handles, door latch, wiring harness, electronic control units, loudspeaker, seals, and in some instances the window glass. The interior trim, including switches, typically ships separately.

“...There is definitely a trend worldwide toward door modules,” declared Mr. Kowal. “Our door modules cost less than what the carmaker could do it for in-house.” A assembly logistics are simplified, floor space is saved, quality is improved, warranty costs go down significantly and carmaker development costs are saved.

Brose has built door modules where the dry (interior) side is completely sealed from the wet (exterior) side. That saves money by eliminating the need to seal dry-side components individually.

Brose estimates the company has about 39% of the global market for door modules. Key competitors in the market include Intier, Kiekert, Grupo Antolin and ArvinMeritor.

Seat Adjusters

Brose introduced power seat adjusters in Europe in 1979. The company’s product range today extends from manual and power adjuster systems and components to complete metal seat structures including all mechanical, electrical and electronic components, for functions such as power headrest adjustment and lumbar support.

In its seat adjuster business, while Brose is often selected by the carmaker, it also directly serves such top-tier seat suppliers as Faurecia, Lear and JCI. (For the door system, window regulator and latch businesses, it usually serves as a tier-one supplier.) “The quality of most American seat adjusters is lower than in Europe,” opined Jan Kowal. “European seat adjusters are lighter and more quiet.” As a result, says M. Kowal, “Two of the Big Three North American Carmakers have started to bring the European technology to North America.”

Closure (Latch) Systems

On November 1, 2002, Brose acquired engineering and production of door latches (closure components) from Bosch, marking Brose’s first entry into that product segment. The Bosch closure division, started construction on a new manufacturing facility in Chicago, where production of the door modules is scheduled to start in 2004. Brose’s selection came well into the development process.

Another new piece of business for one of the Big Three led to Brose’s decision to build a new facility in 2004, in London, Ontario, Canada. The Ontario facility is expected to be operational in 2005, building seat adjusters for Johnson Controls.

The Brose seat adjuster assembly includes the height and length adjustment mechanism, motors and the rails on which the seat rides. According to Brose, the OEM selected the Brose-designed seat adjuster because it operates smoothly and quietly, weighs little and is comfortable to use.

Brose recently announced another new door-module program for a Big Three carmaker that also requires a new manufacturing plant. This one will be built in Tuscaloosa County, Alabama; production is to begin early in 2004.

Central E/E Organization—Electronics is Core

A head of Brose’s Central E/E organization, Manfred Adams has worldwide responsibility for anything to do with electrical or electronics technology at Brose. A profit center itself, the unit’s main objective is to support each of the main product groups: Window Regulators, Door Systems, Seat Ajusters and Closure Systems. In May 1998, Central E/E employed 30 people; today 180 people work for the unit. Brose identified electronics as a core competence in 1998 because, said Volkswagen Group is Brose’s largest customer. The remainder of the top ten are, alphabetically:

BMW, DaimlerChrysler, Ford, General Motors, Porsche, PSA, Renault, Rover, Toyota

Other end-use customers: Alfa Romeo, Bertone, Citroen, DAF/Leyland, ECA, Faurecia, Fiat, Honda, IVECO, Johnson Controls, Karmann, Keiper, Lancia, Lear, Seating, MAN, Matra, MCC, Mitsubishi, Pininfarina

Brose Customers
Mr. Adams, “Electronics is very important as a differentiator of the functionality of our products.”

In April 2001, Brose began manufacturing some of its electronic parts in-house in a new, 3,000-square-meter facility in Hallstadt, Germany, near Bamberg, about 40 km from Brose’s original site in Coburg. Roughly 2,500 square meters of the Hallstadt E/E facility is devoted to manufacturing, 500 square meters houses logistics and inventory.

“Here in Hallstadt we have the best competence for doors that you can find anywhere in the world,” declared Mr. Adams. “We have the Door Systems product group here, the Central E/E product group, E/E manufacturing and door and window system manufacturing—all in one plant,” he said.

Brose used roughly €700 million ($801 million) worth of electronics and electrical parts in its products in 2002. The group’s top selling electronics products are (in order of sales): door electronics modules, window regulator modules and seat memory modules. Today, the company manufactures about 7% of those modules in-house; the remainder is sourced from outside suppliers. In two years, that in-house percentage will grow to roughly 15%, but Brose plans to limit in-house electrical and electronics parts manufacturing to 20% of its total E/E requirement.

Part of the reason Brose is in the E/E business is to improve its knowledge of electronics, specifically, the company wants to make sure its E/E parts complement Brose’s manufacturing processes and vice versa. That is why the company located E/E engineering and production close to systems engineering and production, despite the high labor cost in Germany. Lower volume electronics manufacturing will be done in Germany.

High volume projects, which account for 80% of Brose’s business, will be manufactured in France, Ireland and the United States, as well as in the Czech Republic, China, Mexico and other low-labor cost countries. Outside E/E suppliers will primarily support high-volume business.

The electronics that Brose makes in house must pass formal make-or-buy analyses by the Central E/E unit. In-house parts tend to be more in tune with Brose’s manufacturing processes. For example, since it manufactures in relatively low volume, Brose can use so-called “flying probes” instead of in-circuit testers to test populated printed circuit boards. Used by Brose’s outside suppliers, in-circuit testers handle many boards at once with hundreds or thousands of pins that must be electrically connected to special contact areas placed around the circuit board. In operation aboard the vehicle, these contact areas can make the electronics susceptible to electromagnetic interference and to environmental degradation. In contrast, flying probes use only four pins, which make a series of contacts and can approach the board from a number of different angles. That reduces the need for multiple contact areas, making the finished board smaller and more reliable. Flying probes can also be more easily adapted to changes in test processes.

Brose is working hard to standardize the parts it uses, for example, the interface between the motor and electronic control unit, including cable, connectors and some electronics. “We need a standard interface that covers everything from a single, two-pole motor to a highly integrated door module.

Brose designed its own standard ASIC part but, especially with smaller volumes, one of our key E/E suppliers operates in regions of the world. Therefore, we need suppliers who can support us with an international manufacturing footprint,” he said. Offering an opportunity to potential suppliers, Mr. Adams told us, “Not every one of our key E/E suppliers operates in every region where we manufacture. We try to have at least two suppliers for each part but, especially with smaller volumes, that is not always economical.”

Mr. Adams said, “Electronics is very important as a differentiator of the functionality of our products.”
modeling and simulation along with automotive expertise, to help it develop underlying methodology and a new tool chain. Chrysler also worked with the Virtual Garage in adapting Motorola's VeriState-SM formal verification tool for automotive use.

Modeling Powertrain Controls—Mainstream

While some insiders believe that tools are seriously underexploited, The MathWorks' fellow and chief market development officer, Jim Tung, believes that—at least in the area of powertrain controls—progress is well underway. “Carmakers and suppliers are taking advantage of continuous software development tools such as Simulink, but they are doing so cautiously. While there is still a way to go, they have made a good start in utilizing model-based tools in design, implementation and test. [How fast they adopt such tools] is a question of their expectations and of how quickly processes that touch multiple organizations can be changed without fracturing things. The organizations we deal with are being careful in reworking their process,” said Mr. Tung. “What's changed in the last few years,” he continued, “is that advanced research has finished defining the processes, which are now being pushed into the mainstream. They have had success, and so they have fully bought into the tools. The concept has been proven, the next step is doing it.”

Ford, while lagging in its use of tools for developing body controls, is applying tools in production powertrain applications. In North America the carmaker has adopted the model-based design approach and is using The MathWorks' Simulink and Stateflow tools. Late last year, The MathWorks announced that Ford had also adopted the company's Real-Time Workshop Embedded Coder and had automatically generated production-ready code from tested models for a new transmission controller. Like GM's, this controller was operational the first time it was plugged in.

According to The MathWorks, Toyota started using its tools more than a decade ago and has gradually increased its dependence on them since. Toyota now has more than 400 licenses for The MathWorks tools, which have become the de facto standard at Toyota.

In the powertrain area, Chrysler has used Simulink model-based specs to define a few algorithms, for example, secondary air controllers and a mechanical variable valve timing system. But the company hasn’t yet used automatic code generation tools in powertrain.

Founded by Bosch in 1994, and today jointly owned by Bosch (90%) and Siemens VDO (10%), the German company ETS 5 has grown 42% annually over the last eight years to €111 million ($127 million) in sales in 2002. Its top customers include BMW, Bosch, DaimlerChrysler, and Ford. Sales grew last year by 8% and Manfred Schon, president of ETA S in the Americas, expects growth to continue as software increases in complexity and more software developers are employed to cope with increasing penetration of software in the vehicle. “While the majority of gasoline internal combustion engine design programs are using powertrain development tools, I expect growth will continue,” said Mr. Schon. “In the future there will be growth opportunities also in diesel engine design and the design of hybrid vehicle and fuel-cell controls.”

Growth is also expected as tools are used to design new chassis controls and networking systems. Mr. Schon expects the overall global market for software tools to double in the next five to ten years.

Ford, Fiat and Renault Pull Out of AMI-C

The automotive Multimedia Interface Collaboration is down to just five carmaker members following the departure of three major carmakers this past spring. Ford, Fiat and Renault are no longer members of the standards-making body. Fiat left due to the carmaker's extreme financial situation. Renault departed with the knowledge that its affiliate, Nissan, will carry on with AMI-C. Ford left AMI-C to save money—annual fees to Ford amounted to nearly $300,000—plus a couple of man-years of engineering talent. Ford has de-emphasized its commitment to new telematics and multimedia products, the development of which would have benefited from work that AMI-C members were doing. BMW, Volkswagen and DaimlerChrysler left AMI-C in 2001, citing excessive costs and time-consuming indecision as two of the biggest factors in their departure. Founded in October 1998 by six carmakers, reaching a total of 12 carmaker members in 2000, AMI-C is now down to GM, Toyota, Nissan, Honda and PSA plus thirty supplier members. Still a powerful alliance, the five remaining carmakers together account for about 39% of global vehicle production.

It is unclear whether carmakers will be better or worse off for pulling out of AMI-C. Those outside will save AMI-C fees and free up engineering resources that had been dedicated to AMI-C work. Nonmember carmakers also have the freedom to develop technology independently and more quickly than AMI-C, which has had trouble deciding where to focus its efforts.

On the other hand, outside carmakers will lose their influence over the creation of future AMI-C specifications. And since they will no longer be involved as specs are first developed, outside carmakers will not be able to start implementing standard AMI-C specs until after they are published, which could be a year or two after work on the spec was begun. Outside AMI-C, carmakers will also find it difficult to share the cost of non-competitive engineering work.

Clearly, since the market for telematics is developing more slowly than people expected, even just a few years ago, the need for AMI-C is now much less urgent. However, AMI-C has been working on the technology required to make telematics features more affordable. Unless the collaboration significantly increases membership fees or finds other carmakers willing to join, it will take even longer for the industry to get the cost of technology down, and that will further slow market development of telematics.