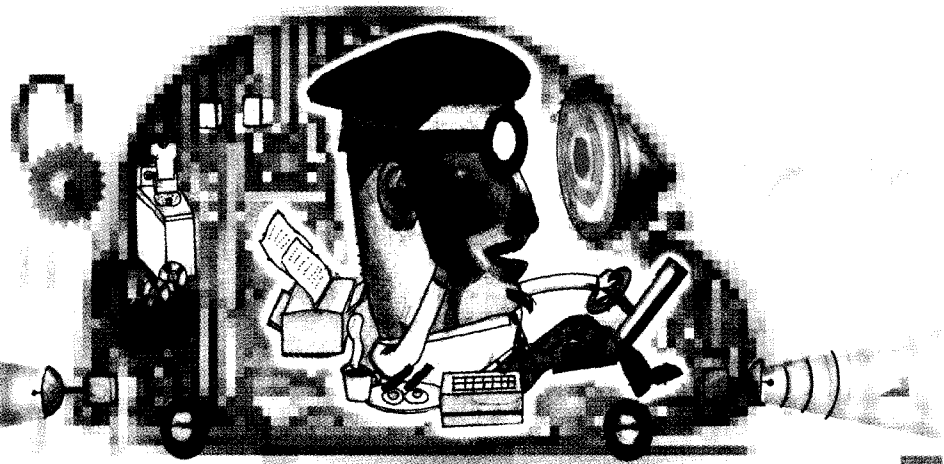


AutoIntelligence



Here are seven technologies transforming the auto industry...and why you should care.

From the gleam in a designer's eye to the scrap heap of a reclamation center, everything that goes into a car's design, manufacture, marketing and even recycling is changing rapidly and dramatically. The auto industry is fomenting a revolution that all managers should watch carefully, because sooner or later, the revolution will visit you.

Like computers, the size and dynamics of competition in the auto industry (constant cost-cutting, increased functionality and choices) make it a leader in product and process innovation. What happens in the auto industry today migrates to many other industries tomorrow.

Here are just seven of the major technologies driving change in this industry:

DESKTOP PROTOTYPING

The design time for a new car has collapsed from the five-year "paper chase" of a decade ago to three years currently, with expectations that another year will be cut from the schedule. "Virtual design" via sophisticated computer modeling techniques has made a physical model almost redundant, says Charles Sestock, manager of technical operations for

Chrysler International, at DaimlerChrysler. "It dramatically reduces the engineering time for locating components in 'the battle for real estate' under the hood and behind the dash," he says. Chrysler's Intrepid was one of the first models designed essentially on the desktop.

The members of a car's design team these days are likely to have an "electrical" tacked on to their "engineering" degree. The 1999 Volvo S80 was produced with no physical link between the accelerator and the engine: The gas pedal activates a digital signal. The latest Lincoln Continental uses more than 40 computer chips in its design, with a processing power of 40 million instructions per second. Soon these systems will allow a mechanic to retrieve information on past failures.

JUST-ABOUT-ZERO INVENTORIES

The single biggest category of cost for a new car is inventory: raw materials, work-in-progress and finished goods. The auto industry is attacking all three.

But the truth is, the industry has always been a leader in using technology to revolutionize the supply chain and the manufacturing process. Automakers pio-

neered the "just in time" (JIT) approach to inventory and are now a leader in what I call JAZ, or "Just About Zero" inventories. For example, Ford allows suppliers access to its computers to view shipping schedules, quality metrics, parts release schedules and vehicle program information. While making things easier for suppliers, Ford will save big on inventories and at least \$1 billion a year on supplier communications alone.

Finished goods inventory is another big cost sink, with distribution alone estimated to cost 25 percent to 30 percent of the final selling price. According to Mark Hogan, president of General Motors' new e-GM division, if the company could reduce its dealer inventory by just 10 percent, it could save upwards of \$2 billion annually.

IN-TRANSIT MODULAR MANUFACTURING

To reach its cost and speed objectives, the auto industry is moving to "modular production." Parts from thousands of Tier I and II manufacturers are being consolidated into large subassemblies by subcontractors, leaving just the final steps of assembling the car in the factory.

Again, to save time and money, such "modules" will eventually be put together "in-transit," avoiding costly physical facilities owned by the automakers. The retail dealer potentially may become the place of final assembly, leading the rest of the manufacturing world toward one of my strategic maxims for the next century: Move manufacturing as close to the final customer as possible. To complete this scenario, automakers would cease being manufacturers and become designers and global brand managers.

Toyota said it was gearing up to make a custom car in five days, stunning U.S. and European automakers, which had previously stated that 12 days was the shortest time possible. Not to be outdone, Saturn's CIO, Frank Herby, says the company's goal is to do it in three days.

REAL-TIME PRODUCTS

The auto industry is on a fast track to conquering customer space and customer time. This means meeting the unique needs of customers at the initial

"point of requirement" and meeting their evolving needs over time.

A 1997 Boston Consulting Group study found that nearly half the people shopping for a new car couldn't find the configuration they wanted. To conquer customer space, Ford has already announced a partnership with Microsoft's CarPoint site to develop ways to offer customized vehicles to consumers. Its initial goal is to match buyers with existing inventory. Eventually, buyers will be able to select paint and interiors. When Toyota recently announced plans to offer a custom car, the deluge of phone calls effectively shut down its call centers and overwhelmed local dealers.

To conquer customer time, auto companies will allow customers to "upgrade" a vehicle as they would a PC. The Volvo S80's turbocharger can be upgraded, adding 50 more horsepower by changing the software. Several options are becoming available as "plug-ins," and some companies, particularly Japanese manufacturers, are working on cars that adjust dashboards to the individual driver. They are also developing steering, suspension and other systems that adjust to both the driver and the road conditions.

BIOTERIALS CONQUER PHYSICAL LIMITATIONS

New bioterials technologies (biotech and new materials) will transform many of the physical limitations of the materials used in today's cars. For example, new paints that absorb or reflect heat and light will keep cars cooler or warmer as needed, while using less fuel. New materials that "sense" both the driver and driving conditions (mentioned above) will make cars more responsive to changing needs and environmental conditions.

In Britain, the Ministry of Agriculture is experimenting with natural plants—in this case, flax fiber—to replace irreplaceable or nonrenewable materials used in car doors. In the United States, several universities and companies are working on biotech-generated materials to replace gasoline and plastics. Finally, at the end of a car's life, bioremediation agents that "eat" petroleum, plastics and metals would convert the car into useful and environmentally friendly substances.

Honda and Toyota are both coming out with hybrid electric cars that run on both gas and electricity, with the engine recharging the battery as it runs. Top industry researchers such as Larry Burns, vice president of R&D at GM, and Bernard Robertson, senior vice president of engineering and technology at Daimler-Chrysler, believe that "superclean" gas engines, hybrids and eventually hydrogen-powered fuel cells will be on the road in 10 years or less.

THE CHIP BEATS THE TIRE

As automobiles have become better designed and more reliable, fuel-efficient and aerodynamic, their physical differences have narrowed. The real differentiator today is a car's value-added services, primarily the "intelligence" built into it.

**Sooner or later,
innovations in the auto
industry will visit you.**

Take GM's OnStar system. It not only connects a car to the Web, but also can provide motorists with directions, unlock a car when the keys are left inside and call an ambulance after an airbag deploys. Several companies are developing products that will track a car when it is stolen and even eavesdrop on the thief.

The new Jaguar S-type is fitted with an electronic device that allows drivers to use voice commands to adjust the heating and air, control the stereo and dial a cell phone. Microsoft and Clarion Corp. are developing the Clarion Auto PC, which offers all this and a sophisticated, voice-controlled computer for directions, weather, e-mail message reading, traffic reports and the ability to find a desired station by just saying "jazz." Toyota sees the "intelligent car" being available in 10 years: This car will drive itself and adjust to traffic around it—aided by an increasingly intelligent road system.

VIRTUAL INTERMEDIARIES

If there's any business that's as unpopular with consumers as airlines and HMOs,

it's local car dealers. Most shoppers rate the experience of buying a car from irritating to downright infuriating. As a result, buyers have flocked to the Web to reduce the time spent on car lots.

The number of car buyers conducting research online jumped to 40 percent this past year. J.D. Power and Associates expects that number to top 65 percent in 2000. Indeed, an estimated \$205 billion worth of cars are expected to be purchased online by 2003. The two leading intermediaries in the field have also moved into auctions for used cars, and Priceline.com is rolling out its "name your own price" model with local dealers in one region at a time. Even GM recently joined the ranks of those selling directly to consumers online.

KICKING THE 'HIGH-TECH' TIRES

A Ford executive recently bemoaned in a *Wall Street Journal* article that the industry was facing "a potentially devastating shortage of talent," mainly because it is perceived as an old-school industrial dinosaur. Nothing could be further from the truth.

Next time you "kick the tires," recognize that the industry is a true technology leader in virtually every part of its business. Keeping a close watch on this industry will help you anticipate the product and process innovations that eventually will affect your business. Better still, understanding these dynamics can help you lead change in your own industry. **MR**



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