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SPECIAL REPORT: MANUFACTURING TECHNOLOGY

Giving Machines the Gift of Gab

Instead of resetting equipment after each production run, manufacturers are tapping "M2M" gear that communicates specs for specific jobs

Potatoes are potatoes, right? So why do french fries from McDonald's taste different from Burger King's? It's all in the deep fryer, says Rick Caron, chief technology officer of London-Based Enodis ([ENO](#)), which supplies the Frymaster brand to more than 100 restaurant chains, including McDonald's ([MCD](#)) and Burger King.

The size of the oil vat, the power of the burner, and, most important, a computer-controlled "temperature curve" -- the specific speed at which the oil reheats after three pounds of frozen french fries are dumped in -- make each chain's fry taste distinctive. And each one has its own proprietary specifications for both the deep fryer and the temperature curve.

NO HICCUPS. To keep the assembly lines running quickly and smoothly while making hundreds of different models, Enodis employs a high level of automation technology. As raw material heads down the line, each production machine connects to a central server via an Ethernet cable and automatically downloads a specific program for the job, then cuts the metal as specified.

Once finished, the machine then downloads another program for a new job, letting the production line build many different models without a hiccup. It's part of a manufacturing trend growing as both wireless and wired network technology drops in price: Machines on the assembly line are becoming more interconnected, giving manufacturers tight control over every part of their shop floors. "Doing short runs in this business is really important," says Caron, "and we can't afford to be a job shop" -- one that manually resets its machinery after each run.

The technology that keeps Enodis' production line running smoothly is called machine-to-machine (M2M) communications. In the late 1990s, technologists predicted that every machine and appliance, from a soda-vending machine to an air-conditioning unit, would send signals back to a server to let the service company know that the vending machine needed more Cokes before it ran out or that the AC was close to breaking and needed a tune-up.

STARTUPS GALORE. While applications like that are slowly taking hold (see BW Online, 4/26/04, "[A Machine-to-Machine 'Internet of Things'](#)"), analysts have high hopes for M2M technologies. IDATE, a French research firm, expects the industry to take off from about \$24 billion today to reach more than \$264 billion by 2010.

For now, the most progress has come in manufacturing. Once reserved for high-tech semiconductor fabs and huge automotive plants, technology that lets machines download instructions -- like that at the Frymaster plant -- have become fairly common on the plant floor.

While many of the advances have been implemented in-house by larger manufacturing companies, a new crop of startups is making a go at providing M2M software and services. SensorLogic, which uses a cellular network to help companies relay data among machines, received \$10 million in its first round of venture capital last year and now has 25 to 30 clients, with many still in the pilot-project phase.

FIX ME, PLEASE. nPhase, another startup, helps manufacturers build M2M systems for products they make. "We're enabling midsize manufacturers to use this technology," without the prohibitive overhead development costs, says nPhase Chief Executive Steve Pazol.

These startups are leading the way to the next step in M2M: using wireless technology to reach beyond the shop floor. SensorLogic, for instance, attaches sensors to one client's (SensorLogic says a nondisclosure agreement keeps it from revealing the company's name) electric motors. Using the cellular network, the sensors transmit the level of vibration on the motor back to a central server at the customer's facility, giving clues to when it might be close to breaking.

When a part does break, the wireless transmitter not only tells the manager exactly which part on which machine is broken but also coordinates with the corporate info-tech server to tell where and how a replacement part can be ordered. "On a large factory floor, it's just as important to find the broken part quickly as it is getting the new part," says Haroon Alvi, vice-president for marketing at SensorLogic.

MODEM ATTACHED. Other manufacturers are also using wireless machine communications to help provide service after their product has left the factory. Gardner Denver, a maker of air compressors used in other plants, is testing a plan to deploy its compressors with a wireless modem attached (it plans to roll the service out in the next 45 to 60 days).

Gardner Denver will help customers by monitoring the temperature, air pressure, and other measurements, and then send technicians in for tune-ups before real problems occur.

"Service like this just wouldn't work without wireless," says nPhase's Pazol, which manages the project for Gardner Denver. "No client is going to let you come in and wire up every air compressor on the floor to its corporate IT network."

FALLING PRICES. Wireless providers, including Verizon ([VZ](#)), BellSouth ([BLS](#)), Nextel ([NXTL](#)), T-Mobile, and SBC-owned ([SBC](#)) Cingular are beginning to catch on, and all now offer packages for manufacturers that want to use cellular bandwidth to transmit data, says Alvi.

Still, some hurdles remain. The cost of wireless modems can be prohibitive, and the amount of bandwidth that the sensors can use remains fairly small. Security is also an

issue: Manufacturers are hesitant to open up their machinery to attacks from hackers, and some are unsure whether they want to provide a partner with real-time production data, according to a report by IDATE.

The "Internet of things," as M2M was called in the 1990s, hasn't come to fruition yet -- but as prices of wireless chips and modems continue to drop and as manufacturers warm up to the new opportunities, more and more machines are going online every day.

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