

Outsourcing Engineering

by Kevin T. Higgins, Senior Editor

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With the in-house engineering cupboard almost bare, food and beverage companies' need for engineering services has never been greater. Where they'll find it is the question.

Outsourcing of engineering overhead and other technical expertise is by no means a new phenomenon, but the trend shifted into overdrive in the last decade. In-house engineering, if it exists at all, has reached the point where "they don't even have the ability to supervise and observe," remarks one service provider.

Indeed, engineering firms that used to build gleaming new plants now spend their time evaluating the service life of compressors and boilers and overseeing the relocation and commissioning of equipment and entire lines in a facility in another time zone. Service firms are the de facto engineering teams of today's food manufacturers. And while outside engineers are finding more receptive ears for some of their innovation proposals, the relationship with food and beverage clients remains somewhat stilted.

Some food manufacturers are embracing the open approach to technical innovation, an idea championed in 2003 by Henry Chesbrough, a professor at University of California-Berkley. Instead of relying on engineering service firms, open innovation circumvents those relationships and appeals to the global community, an approach some deride as "the flea market of technology." An example is G-WIN, the General Mills Worldwide Innovation Network.

Anyone with a browser can submit novel proposals to G-WIN or suggests solutions to one of dozens of specific challenges posted on General Mills' Web site. Most are ingredient or formulation oriented, though a handful involve core processes. The most intriguing: a turnkey ice-cream production system, from fluid-dairy receiving through filling and hard freezing, scalable to 3 million gallons a year. Total delivered cost: \$5



Pasteurization tanks and other equipment traditionally used to produce ice cream are a cost-prohibitive expense, General Mills has determined. The company is using the open innovation concept to solicit breakthrough engineering concepts to lower those manufacturing costs. Source: Dairy Foods.

million. "The current capital expenditures required for new traditional manufacturing systems are cost prohibitive" for General Mills' ambition to expand manufacturing capacity globally, the G-WIN site explains.

Blame it on Chesbrough or reality TV, but the open casting call has come to plant engineering.

"With today's economy, everybody's trying to maximize their return with minimal investment," reflects Joe Bove, vice president-design engineering at Jacksonville, FL-based Stellar. That translates to more assignments for the A/E firm's maintenance and operations division, which evaluates utility systems such as refrigeration, compressed air and hydraulics and makes recommendations on moderate investments that can produce rapid paybacks. In a few cases, food companies are asking Stellar to shoulder responsibilities that used to be the purview of staff engineers who no longer are around.

Downsizing and retirements have left some organizations without the corporate engineering standards that used to guide design philosophy, component specification and installation guidelines for plant equipment and infrastructure. "Companies are trying to retrieve that knowledge," says Bove, and they are turning to engineering service firms to do it.

Some food companies are nibbling at the corners of partnership with long-time professional services firms, but the relationship is accountability-driven, suggests Greg Crnkovich, senior packaging engineer with the Austin Co. in Atlanta. "You're never handed a project, just because you did a good job on the last one."

How may we serve you?

Procter & Gamble's decision to outsource engineering a quarter century ago is sometimes cited as a bellwether event, the opening volley in the downsizing of staff engineering departments. Today, engineering seldom is viewed as a manufacturer's core competency. Start-up firms created in the last 20 years never had an engineering culture to disassemble; they are marketing-driven organizations with little understanding or appreciation of technology as tool for a competitive advantage.



Corporate engineering standards for compressors and other utilities are sometimes lost when staffs are downsized, creating a new

Product and packaging innovation is the focus of today's food companies, both old and new. "Twenty years ago, an ice-cream plant might produce 10 products in four sizes," suggests Darryl Wernimont, a director at Jacksonville, FL-based Haskell Co. "Now there are 150 varieties and multiple packaging options. Formulation is a core competency, and they're shifting process responsibility off themselves."

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engineering
service firms.*

David Dixon, senior director-strategic accounts at Kansas City-based Burns & McDonnell, agrees. He remembers when companies like Wrigley would design their own packaging machines, doubling speeds and enjoying a competitive edge. The staff expertise to execute those types of change simply doesn't exist anymore.

Lean is creeping into the formulation area, as well, prompting firms like Burns & McDonnell to move beyond engineering and "way upstream in the process," Dixon adds. "Quality assurance and R&D people are approaching us for help in formulation, safety and the manufacturability of the products themselves."

Greenfield projects were few and far between in recent years. Traditional A/E and design/build firms have adapted by using their process and packaging expertise and proposing new technologies and methods of operation. The changes are not necessarily revolutionary, either. "People assume all the low-hanging fruit has been picked, but I'm continuously amazed at how much remains," marvels Mark Shambaugh, president of Shambaugh & Son, Ft. Wayne, IN.

He cites the example of a request for heat-recovery proposal for a company with 17 production sites. After evaluating the 50-year-old boilers, Shambaugh concluded a direct-fired hot water system was a better option. "You no longer need a boiler to run those plants," he says.

Technology transfer from other food processing segments is another opportunity. Master CIP systems transplanted from dairies are an example. T. Marzetti, a New Plant of the Year winner ("Opportunity Knocks," Food Engineering, April 2007), realized significant up-time improvements and product-recovery rates between frequent changeovers by including a centralized CIP and pigging system that Shambaugh proposed. "If you operate in one plant, you need someone to challenge your SOPs to improve profitability," says Shambaugh.

Embedded engineers and technicians are becoming more common in

clients' plants, service companies report. Even when their presence is only periodic, these outside experts are assuming roles previously handled by corporate engineers. "We have become repositories of information about the client's own facilities," notes Mike Steur, client development director at Cincinnati's Hixson. Original design decisions, utility capacities and equipment added over time used to be catalogued in house; now, manufacturers increasingly are relying on support companies to track "facility creep," Steur says.

"Ten years ago, we just built the building," says Wernimont. "Now companies are saying, 'We need X amount of orange juice or chips; you design and coordinate the process and packaging and provide all the manuals to operate the line because we can't do it.'"

Economic hard times did not kill sustainable manufacturing initiatives. "Rather than going away, it's increasing," says Austin's Crnkovich, because of pressure from key customers such as Costco and Wal-Mart. Executing energy- and water-saving projects requires an investment in metering. "It's impractical to put meters on every piece of equipment, but you can do it strategically and start tying energy consumption to units of production," Steur says. With staff time in short supply, food plants are turning to service firms to do the work.

The complexity of metering likely will increase significantly in the coming years, adds Dixon. Food facilities are exempt from the greenhouse gas reporting system mandated this year by the US Environmental Protection Agency, but that could change. "The more sophisticated companies are anticipating the change and laying the groundwork now for measuring and reporting their emissions," says Dixon. Putting a system in place requires a "strategic partner, an extension of staff," he adds.

Directed innovation

Service firms continue to hire recent graduates and laid-off food engineers to handle process engineering and systems integration projects such as bulk handling and packaging integration, but those initiatives break no new ground. Projects that save \$20,000 are in high demand, but few companies are investing in game-changing breakthroughs.

Risk aversion is the enemy of innovation, believes Ed Goldman, senior vice president in the Technology Solutions Group of Qinetiq North America, and the current economic climate argues against assuming risk. "If you invest

in a project that dies, you're out of a job," says Goldman.

Goldman's group, formerly known as Foster-Miller, has a pool of 800 technical experts representing "every branch of science and engineering," he says. The Waltham, MA, firm specializes in directed innovation, putting together teams to solve complex challenges.

Large food companies are more interested in driving down costs than costly development work. Consequently, Qinetiq has shifted its focus to medium sized, privately held companies. "They usually know their business well, and their ability to identify new product opportunities is good," acknowledges Goldman. But a \$5 million investment that turns sour would be a big setback, and inability to secure bank financing is keeping those organizations on the innovation sidelines.

Financing is stifling even basic projects, seconds Shambaugh. His firm sometimes resorts to performance contracting, buying and installing equipment at its own expense, then being reimbursed from the guaranteed savings.

Anheuser-Busch maintained one of the last bastions of in-house engineering in the food industry until its acquisition in late 2008 by InBev. Within months, 350 of the brewery's 400 corporate engineers were terminated, among them Jerry Eyink, group director-project management. Speaking at Food Engineering's 2007 Food Automation & Manufacturing Conference, Eyink described an engineering culture that jealously guarded proprietary processes but still was open to looking outside the industry.

Every engineering service firm had to be reviewed and approved by two A-B engineers before working on an assignment pre-2008. Today, the organization is dependent on those suppliers and must cast a wide net when looking for innovation. Perhaps A-B will enlist the help of open-innovation facilitators like NineSigma, much as Kraft Foods has done for packaging research. Maybe it will align itself more closely with technology companies already collaborating with its Belgium owners. What it can't afford to do is stagnate. "Once you start losing the willingness to develop," warns Goldman, "you start to lose margin."

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