



AT A GLANCE

Barilla America, Ames Plant

LOCATION: Ames, Iowa

FOUNDED: Company founded in 1877; Ames plant established in 1998

EMPLOYEES: About 13,000 globally; 162 at Ames plant

IMPACT: Safety culture assessment boosted communication with workers and eventually is expected to save the company as much as 36 percent on insurance premiums.

ANNUAL SALES: More than \$4 billion worldwide by Barilla Group in 2012.

OVERVIEW: Barilla, a global leader in pasta and other Italian meal products, is a privately owned company dedicated to delivering the highest-quality pasta and products while continuously reducing its footprint on the planet and promoting wholesome and joyful food habits. The company adheres to its longstanding traditional principles and values, considers employees a fundamental asset, and develops leading-edge production systems.

Safety Culture Assessment Saves Barilla Money via Better Understanding of Employee Attitudes

The way Larry Covington describes it, there was nothing really wrong with the safety record at Barilla America, but things in 2013 just didn't seem to be getting any better.

"Our safety record for the most part was performing at good levels," Covington, senior plant manager at the pasta maker's Ames plant, recalled. "We had only one lost workday in about three years, but our trends on recordables were up and down, and we set some pretty aggressive safety targets we wanted to achieve."

So, with CIRAS' help, the company turned to Iowa State University safety expert Nir Keren for a survey of worker attitudes about safety. Keren's work ultimately helped Barilla bridge the gap between company safety rules and what workers believed was the way things really were expected to be done.

The result for Barilla has been a few changes in management style and a stepped-up employee watchfulness—including an increase in worker identification of things that could have

caused an accident or injury but didn't. The new culture eventually is expected to save Barilla money by reducing the number of workplace incidents that must be reported to government safety officials and by lowering Barilla's insurance premiums—by as much as 36 percent.

"You need to understand the informal systems and the formal systems and be able to measure the gaps," said Keren, an associate professor of occupational safety in Iowa State University's Department of Agricultural and Biosystems Engineering. "Once you capture data on employees' tendencies and understand the formal and informal systems, companies can develop safety programs to rev up their official systems so the cracks between the systems narrow down."

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On the Cover: Barilla products are made at 30 production sites across the world, including at the Ames plant.

CIRAS Mission: *Every day we will enhance the performance of industry through applied research, education, and technical assistance.*

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Creating a strong safety culture at manufacturing companies doesn't happen overnight. It's a multilayered, multiyear process that requires real employee buy-in. And it can affect a company's bottom line. According to the U.S. Occupational Safety and Health Administration, a business with a strong safety culture "typically experiences fewer at-risk behaviors, consequently they also experience low accident rates, low turnover, low absenteeism, and a high productivity."

The key, according to Keren, is knowing the difference between what management thinks is the safety mindset and how workers are perceiving things. To help companies understand, Keren has developed a safety culture assessment that includes simulated scenarios where workers make decisions and select factors—such as peer pressure, productivity, and safety—that influence the decisions they make. In addition to the typical questionnaire, companies can add a few open-ended questions to gather feedback on other specific issues and concerns.

Keren administers the survey confidentially over the course of a few days to ensure participation from employees on all shifts. He then analyzes the data and provides recommendations to companies on topics such as safety performance, employee attitudes, perception of safety, communication, and company follow-through on safety initiatives.

By the time Barilla turned to CIRAS and Keren for help, the company had been working on a behavior-based safety culture for more than a decade.

Employees were actively participating on a safety steering committee, using safety behavior observations as part of employee performance evaluations, and receiving ongoing training. Covington and other managers tried several different ways to reinvigorate safety efforts, but improvements had plateaued—and in some cases, the momentum on safety was starting to shift in the wrong direction.

Covington said the company ultimately decided on Keren, in part, because Barilla recognized that having an independent entity assess the culture was the best route toward obtaining honest feedback from employees.

"To this point, we hadn't done anything as an organization to get a snapshot or analysis of how employees in general felt about safety at Barilla," Covington said. "Our whole focus is to get zero injuries. We don't want anyone going home in a physical or mental state worse than when they came in" to work.

"We wanted to find out if there was something we were missing," Covington said.

When the assessment concluded, Keren gave Barilla a summary of the survey's findings and recommended steps to enhance the company's safety climate. Covington described the report as a roadmap outlining ways to address worker concerns.



Barilla's Ames plant is capable of producing 122,000 tons of pasta annually on its four production lines. Each day the Ames plant produces an average of 156 tons of long pasta and 172 tons of short pasta in 33 different shapes.

"We got a phenomenal response from employees," Covington said. "We had pages of information on what people felt, how we could improve things, and what I could do differently. It was very encouraging. Of course, not all feedback was positive, but we got so much feedback it was a great indicator of people believing in having a safe workplace and wanting to do the right things."

Today, Barilla's management team is more visible on all shifts and has increased communication around safety concerns, Covington said.

Within the first seven months after the assessment, Barilla began seeing the safety culture momentum shift back in a positive direction. The plant is approaching 10 months with zero incidents defined by OSHA as needing to be recorded and has had zero lost workdays in just over two years. Covington credits these improved statistics to Keren's suggestions and to the improved behaviors of employees.

Barilla plans to continue to implement more of Keren's recommendations

in the coming year and intends to adjust the safety program to continually improve.

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—Larry Covington

be the true measure of success—how employees feel about the safety culture after three years of going down this path," Covington said.

In the meantime, Covington is satisfied with the progress he is seeing and says he highly recommends the safety culture assessment to other companies that want to take their safety program to the next level.

"Safety has always been a primary focus for Barilla," he said. "Our overall philosophy is that there's nothing we do here that's worth getting hurt over. We make pasta. It's not worth anyone leaving here without the same faculties and capabilities they walked in here with that morning."

Iowa State and CIRAS Launch New Online Safety Training Modules

Annual safety training for Iowa manufacturers is getting easier, thanks to five new online training modules recently launched by CIRAS and Iowa State's Department of Environmental Health and Safety (EH&S). The new \$50 to \$55 courses include the following:

- Blood-Borne Pathogens and Sharps for Manufacturers
- Fire Extinguisher Inspection and Maintenance for Manufacturers
- GHS: The Globally Harmonized Systems of Classification and Labeling of Chemicals
- Lockout/Tagout
- Manual Material Handling for Manufacturers

The training modules are available at www.ciras.iastate.edu/management/safety.training.asp. Most of these courses fulfill OSHA annual training requirements. At the end of each module, which typically take 15 to 30 minutes each for employees to complete, employees will receive a printable certificate.

"We wanted to create a means for Iowa manufacturers to take these safety courses online," said Jim Poe, CIRAS project manager.

The EH&S department develops online trainings using best practices in the industry with guidance from experienced subject matter experts who have certification in their fields.

The five new courses are offered in addition to existing online training for Iowa Underground Storage Tank (UST) owners and operators. More than 200 employees from 64 companies have completed the free UST Class C Operator training module. In 2013, EH&S Learning Management System (which administers the online trainings) recorded more than 20,000 online and on-site sessions with clients.

For more information, visit www.ciras.iastate.edu/management/safety.training.asp or contact Jim Poe at 515-290-1398 or jrpoe@iastate.edu.

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CIRAS Sets Table for Food Companies' Success

For Iowa State University meat specialist Joseph Cordray, it all comes down to Americans' changing demands for dinner.

Evolving societal preferences have created new opportunities for Iowa food companies, Cordray believes. Firms just need to innovate—or, if necessary, to find someone who's willing and able to help them do it.

"Your spouse's definition of a home-cooked meal I guarantee is not the same as your grandmother's definition of a home-cooked meal," Cordray, a professor of animal science in the College of Agriculture and Life Sciences (CAL) at Iowa State University, said of the changing consumer demand. "Your grandmother used to spend all day in the kitchen making it."

Instead, faster-paced lives today demand meals that are much more quickly prepared.

Rapid change is occurring throughout Iowa's growing food industry, experts say. Iowa companies are aggressively chasing new and better products, even as they labor to prepare for tough and complicated new federal safety rules. CIRAS is attempting to help with all of those concerns.

CIRAS for years has worked through the U.S. government's Manufacturing Extension Partnership to help firms find assistance via the Iowa State University Meat Laboratory, the university's Center for Crops Utilization Research (CCUR), and other affiliates. Last year, 70 Iowa food manufacturers who have worked with CIRAS reported a combined \$62 million in economic impact from a total of 132 different projects.

Federal government statistics show "processed food" was the second-largest manufacturing sector in Iowa in 2012, accounting for more than \$3.1 billion of the state's \$13.9 billion in exports.

"I think CIRAS and Iowa State as a whole are critical for businesses today in regard to how quickly the regulatory environment is changing," said Tim O'Tool, vice president of operations for C&S Products

Company in Fort Dodge. "Businesses today need to be able to develop those types of partnerships to be able to move through those changes."

Through CIRAS, Cordray and other Iowa State experts have worked for years to help both large and small food companies develop new products, protect food safety, and plan appropriately for growth. CIRAS experts regularly address ISU Extension and Outreach classes on meat preparation, offering expertise on topics such as business continuity planning, innovation processes, and Internet marketing strategies.

"What we're trying to get the meat industry to do is be more aware of CIRAS as part of some of the things we do," Cordray said. "It takes more than just being able to produce a good sausage to stay in business."

"I think CIRAS and Iowa State as a whole are critical for businesses today in regard to how quickly the regulatory environment is changing. Businesses today need to be able to develop those types of partnerships to be able to move through those changes."

—Tim O'Tool

The meat business is good, Cordray believes. He credits cultural change during the past few decades for building strong consumer demand for items such as preseasoned steak and pork loins that can cook in minutes in a self-venting package.

"The more value we can add to something before it leaves the state, the better off we are," he said. "We're a whole lot better sending out packages of processed meats, packages of sausages, and packages of ham and distributing them around the country than if we are sending out tractor-trailer loads of raw meat."



A group of Iowa Meat Processors that attended a workshop on business continuity planning.

Other Iowa firms are following different paths to value-added agriculture by seeking new food uses for corn and soybean oils or new chemical paths toward things such as improved animal feed.

Located in Iowa State's Food Sciences building, CCUR works with some of those food companies to smooth out the innovation. The center maintains a pilot plant where firms can produce test runs of a new product without shutting down their existing processing lines.

"If a scientist develops a new technology at bench scale, before they can get it out into the real world they have to do some additional work," said CCUR program manager Darren Jarboe. "You can do all kinds of things at the bench scale that don't translate well to the next level."

CIRAS seeks to help many more companies innovate in the future, according to CIRAS account manager Brenda Martin. At the beginning of 2014, food companies (manufacturers of food both for humans and animals) became Martin's full-time CIRAS responsibility.

"A lot of the food industry doesn't know that we exist yet," Martin said. "We want to provide food companies the same whole-business help that we offer other manufacturers—as well as continuing to assist them in navigating complex federal safety regulations."

Food safety and evolving regulations continue to be huge concerns for Iowa companies.

"What's new is the additional power behind the FDA," said Angela Shaw, an assistant professor in CALS food science and human nutrition. "If they see that you're not doing what you're supposed to, they can shut you down. Before, basically suppliers of all these ingredients could give you a letter saying, 'We've tested it. There are no fragments, no bacteria or whatever.' Now the government is saying that's not enough."

Shaw has worked with CIRAS to hold short courses and webinars teaching food companies how to comply with the new rules, which require that complex safety processes be put in place to guard against other problems.

CIRAS plans to continue those classes while encouraging more innovation, Martin said.

"Our goal is to help companies be more profitable and create sustainable growth."

—Brenda Martin

Food processors can contact CIRAS for assistance within Iowa State University or elsewhere. Food science education and technical assistance may include consumer panels, product testing and pilot runs, or research-based business management practices such as improving production capacity.

"Our goal is to help companies be more profitable and create sustainable growth," Martin said. "There are many food companies in the state of Iowa that could develop global opportunities. We want to provide them our support."

In 2012, Iowa State Engineering students worked on 53 projects for 27 different companies, generating \$17 million in reported economic impact. Here are a few more recent comments about company interactions with student engineers:

"The student teams at Iowa State University created real solutions to a challenging problem for our business. Their work was creative, and they focused on solutions that were beneficial to the customer and cost effective."

*—David Bywater
President, Tru Art, Iowa City, Iowa*

"Chemical engineering student teams did a great job in putting together analysis and simulation data with a limited input from the company. The reports generated by students will go a long way in assessing technical and economical feasibility of our process for waste to fuel and in determining the break-even capacity for making business profitable in different markets. Students were very motivated and worked very diligently. These ISU students are a great resource for small businesses and are potential future employees for the company."

*—Atul Kelkar, CEO and Founder,
Innovative Energy Solutions, Ames, Iowa*

"We enjoy providing an environment for students to get a real-life Lean experience. Students come in with new perspectives that really challenge our traditional ways of doing things. We absolutely welcome these new ideas to make us better. They learn the value of team member involvement and collaboration in solving problems. It's a win-win all around!"

*—Trey L. Purvis, Eng, Sr-Tech Ldr CI II
Pella Corporation, Pella, Iowa*

➤ For more information, contact Brenda Martin at 515-570-5282 or bkmartin@iastate.edu.

Understanding Workforce Mobility

by Liesl Eathington

The out-migration of young, college-educated workers has long concerned employers and policymakers in Iowa. Examining the characteristics of interstate migration flows can help inform workforce development efforts by tempering expectations for attracting and retaining certain types of workers.

Recent analysis of state-to-state migration patterns by age and educational attainment reveals a few key categories where Iowa deviates from national patterns. The analysis was based on 2008–2012 American Community Survey data from the U.S. Census Bureau. Migrants were defined as labor force members who changed their state of residence during the prior year. Only domestic migration was tabulated—workers who had migrated to or from another country within the past year were excluded. The analysis included unemployed workers, but it left out those currently attending high school or college.

Figure 1 illustrates the average propensity to migrate among U.S. workers with differing age and educational attributes. In general, a worker’s probability of migrating declines with age, but it increases with education. Nearly 6 percent of workers 18–24 reported changing their state of residence during the prior year, making them the most mobile worker group in the United States. By educational attainment, about 3 percent of U.S. workers with a bachelor’s or advanced degree changed states in a given year.

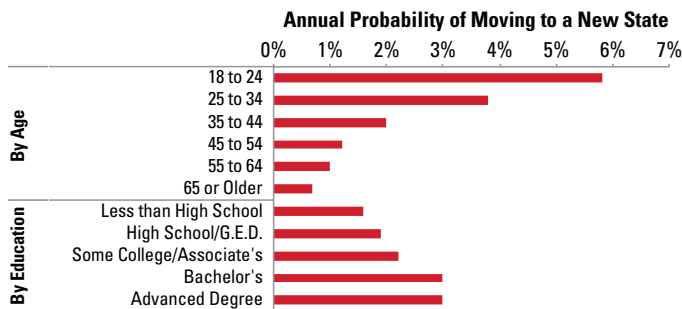


Figure 1. State-to-State Migration Propensities of U.S. Workers

The actual distribution of migrating workers by age and education differs from the pattern illustrated in Figure 1. That’s because the propensity to migrate is only half of the equation. We must also consider the size of the population in question; there simply are more workers in some age groups than others. Figure 2 reveals the national distribution of migrating workers by age and education. Comparative numbers for workers migrating into and out of Iowa are also shown. The margins of error associated with Iowa’s estimates are illustrated with dashed lines.

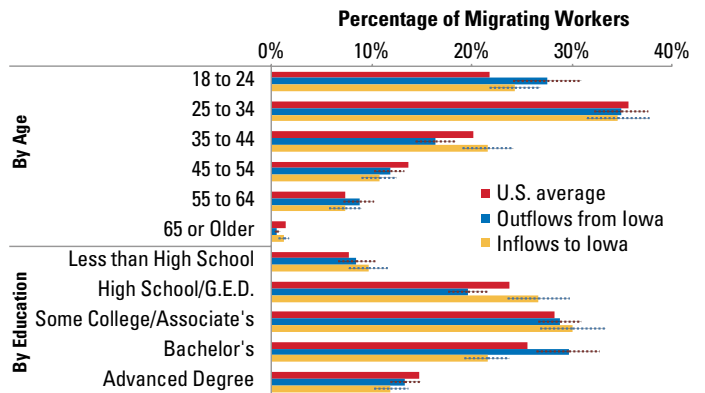


Figure 2. Distribution of State-to-State Migrants

Iowa does not strongly deviate from overall national migration patterns by worker age and education. Many apparent differences are not statistically significant when accounting for margins of error in the data. Only five categories showed significant differences between Iowa and U.S. averages, as summarized below:

Category	Summary
Age	Iowa had comparatively more out-migrants ages 18–24
	Iowa had comparatively fewer out-migrants ages 35–44
	Iowa had comparatively fewer out-migrants age 65 or older
Education	Iowa had comparatively fewer out-migrants with just a high school diploma
	Iowa had comparatively fewer in-migrants with just a bachelor’s degree

Boiling it down, just two Iowa categories had statistically significant differences in the distributions of worker in-flows and out-flows. Iowa had a comparatively higher fraction of in-migrants than out-migrants with just a high school diploma. Conversely, Iowa had a higher fraction of out-migrants than in-migrants with a bachelor’s degree as their highest degree attained.

Perhaps most interesting is the relative absence of recent evidence that Iowa is losing its young, college-educated workers at abnormally high rates. Consider the following:

- Although Iowa’s out-migration rates among workers 18–24 exceed national averages, the state also has a high rate of in-migration for this age group.
- Iowa’s rates of out-migration of college-educated workers are not significantly higher than national rates; however, Iowa does lag in its rates of attracting college-educated workers into the state.

The time period covered by this analysis included a severe recession that likely altered typical migration patterns across the United States. Nonetheless, findings suggest that efforts to retain young, college-educated workers can only take the state so far.



Innovation Summit Provides First Step for Plastics, Rubber Manufacturers

CIRAS experts plan to continue working with the Iowa companies who attended a spring plastics and rubber industry Innovation Summit in the hopes of turning several possible business growth ideas into viable new products.

Twenty-eight engineers and executives from 17 Iowa companies spent April 15 in an Ames hotel ballroom as part of a summit focused on Iowa's plastics and rubber manufacturers. Participants, guided by CIRAS staff, spent the day exploring various aspects of their industry and trying to think beyond current limitations.

"It helped generate some interesting ideas to improve their businesses," said Shankar Srinivasan, CIRAS program director of the Economic Development

Administration's University Center Program. "I think companies understand now that CIRAS and Iowa State University have resources that can help them realize their goals."

CIRAS experts plan on working with summit participants to develop the ideas.

One of them will be Sam McCord, chief executive of MCG BioComposites, a Cedar Rapids company that makes plastic plant stakes. McCord hopes to adapt one of his existing products into a

new line of markers for public bike and walking trails. Doing so could drastically expand an already growing business.

The summit process "really helps us with the brainstorming—fleshing out both the good and the bad," McCord said. "Actually, it was all good. There was no bad."

According to McCord, MCG BioComposites by April already had doubled production of the 40,000 plant stakes it sold in 2013. The company expects to sell more than 300,000 stakes in 2014.

➤ For more information, contact Shankar Srinivasan at 515-290-6702 or srighan@iastate.edu.

STAFF NEWS



Paul Dunnwald—Account Manager

Paul Dunnwald joined CIRAS in January as an account manager. He brings more than 20 years of experience to CIRAS from the automotive, aerospace, and defense industries, where he held engineering, operations, and business management jobs. In those positions, Dunnwald increased process efficiency, enhanced inventory utilization, developed and launched products, and grew company revenues.

Dunnwald earned a bachelor's degree in mechanical engineering from Iowa State University in 1992. His service territory is Polk County and southwestern Iowa.



Mike O'Donnell—MEP Director

In March, Mike O'Donnell was named director of CIRAS' Manufacturing Extension Partnership (MEP), a U.S. Department of Commerce program administered by CIRAS. Previously, O'Donnell was MEP interim director and program director of the Economic Development Administration University Center Program. He has expertise in supply chain management and innovation processes.

Prior to joining CIRAS, O'Donnell worked in the appliance industry in Australia and also served as a project manager in the defense industry. He holds bachelor's and master's degrees in mechanical engineering from Bucknell University and a master's of business administration from Iowa State.

All About 8(a) *By Gordon Bonnes*

Government entities, especially the federal government, have passed laws over the years to identify and aid businesses owned by disadvantaged individuals. Most of these laws exist to identify small groups of similar businesses that governments can target for contract opportunities to help the businesses mature into prosperous firms. One such group of disadvantaged businesses is identified simply as 8(a) firms.

The U.S. Small Business Administration (SBA) accepts applications for inclusion in this program from business owners who are both socially and economically disadvantaged. Social disadvantage generally refers to ownership by someone of a major racial or ethnic group, whereas economic disadvantage refers to those owners' limited capital and assets.

CIRAS' Procurement Technical Assistance Program educates and guides business owners through this application process so companies can apply for certification as an 8(a) firm. It's a lengthy procedure, but the benefits are worth it. Advantages of being an 8(a) firm include a nine-year SBA business training program and SBA assistance in obtaining sole-source and limited-competition awards that are reserved for 8(a) firms. Disadvantaged businesses also receive help in forming partnerships for added business strength and capability, so there is a high demand for these types of businesses by large government contractors seeking subcontractors to hire.

Regency Consulting of Sioux City received its 8(a) certification in 2009 and has leveraged it for numerous contract awards, both competitive bid and sole source. Further, it has sponsored a very valuable mentor-protégé relationship that has been instrumental in the company's success.

CIRAS can help businesses apply for this or many other small business special preference programs.

For more information, contact Gordon Bonnes at 712-308-2229 or gbonnes@iastate.edu. Or, to participate in more discussion, join our LinkedIn group at <http://linkd.in/1ICgNWF>.

CIRAS Helps Regency Consulting Rocket Share of Federal Contracts Upward 28 Percent



Kari Burnside

Near the end of 2012, Kari Burnside was handed the keys to a then-dormant Sioux City company and was instructed to "see what she could do with it."

A bit more than a year later, Burnside and five staff members can boast of turning Regency Consulting into a dynamic, thriving supplier of computer hardware and services, mostly to federal government agencies. Under Burnside's leadership as director of sales—and with a little guidance from CIRAS' Procurement Technical Assistance Program—federal contract

awards grew from \$7 million at the beginning of 2013 to about \$9 million by the end of the year.

"It's been a blessing," Burnside said. "CIRAS has been instrumental to my success over the last year."

"CIRAS has been instrumental to my success over the last year."

—Kari Burnside

The task of building Regency from the ground up was daunting, but Burnside, who has a background in computer sales at Gateway and other companies, attacked the problem. She quickly learned how the government market worked and found agencies that fit Regency's client profile. Burnside also contacted the U.S. Small Business Administration (SBA) for assistance and learned that she could register Regency as an 8(a) firm, which would give the company preferential treatment by the federal government.

It was the SBA that suggested Burnside connect with CIRAS.

Since June 2013, Regency Consulting has worked closely with Gordon Bonnes, a CIRAS government contracting specialist based in western Iowa. Bonnes helped Burnside find contract information and contacts inside the government. He also assisted her with developing a general supply award (GSA) schedule.

"If I need anything, he's so knowledgeable," Burnside said. "He's always ready to help."

With a successful 2013 in the books, Burnside says her goal for 2014 is to focus on specific accounts to grow Regency's base.

"I'm trying to drive the business and grow it in targeted areas," she said. "Last year I was all over the place, just trying to get my name out there."

CIRAS helped her focus.

> For more information, contact Gordon Bonnes at 712-308-2229 or gbonnes@iastate.edu.

SPECIAL REPORT: WORKING ON WORKFORCE

AT A GLANCE

IOWA'S WORKFORCE SHORTAGE

(First in a Series of Articles)

LOCATION: Iowa

EMPLOYEES: Roughly 200,000

OVERVIEW: Businesses across the state are searching for hard-to-find qualified employees. Problems are of particular concern to Iowa manufacturers, where experienced workers are poised to leave.



Iowa's Worker Shortage: An Old Problem Requiring New Solutions

by Ron Cox and Jeff Eckhoff

"Help Wanted," indeed.

The story is everywhere this year, in boardrooms and political discussions, in Iowa, and across the country: jobs and the people needed to fill them. Will there be enough qualified workers in the coming years to keep the machines running in U.S. manufacturing?

The answer to that question may depend on which expert you consult. But the problem cannot be denied.

Consider the following:

- The chairman of the Iowa Business Council has described access to highly skilled workers as "the challenge going forward" for Iowa companies.
- Iowa Workforce Development, based on federal labor statistics, has declared a looming "middle skills gap" for jobs that require more training than high school but less than a four-year college degree. Thirty-three percent of Iowa workers have the necessary training, according to a report issued last year, but 56 percent of Iowa jobs require those skills.
- Iowa State University economist Dave Swenson has predicted that Iowa is entering "a period of economic stagnation due primarily to constraints on the size of its labor force." Baby boomers are preparing to retire, and there's no one to replace them. Iowa traditionally has exported young professionals, Swenson notes. The trend—a migration to metro areas in Iowa and to bigger cities beyond—portends poorly for rural areas, where much of the state's manufacturing lies.

Other evidence argues, however, that any shortage of available workers is more chronic than acute (and some have argued that there is no shortage at all):

- For all but a farm-crisis handful of the last 40 years, Iowa's unemployment rate has been significantly lower than the national average (see Figure 1).

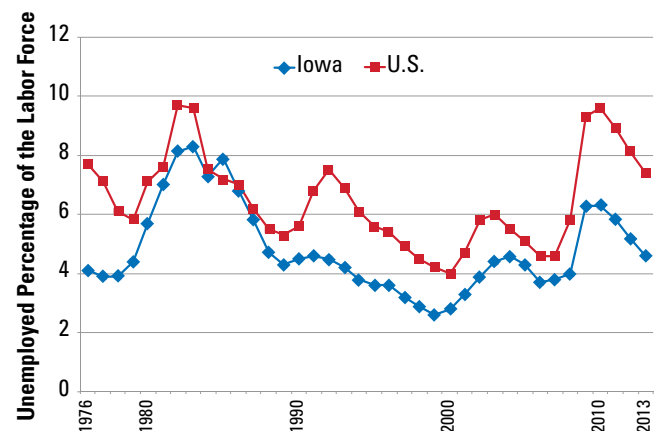


Figure 1. Since 1976, Iowa unemployment has almost always remained below the national average.

Source: Local Area Unemployment Statistics, U.S. Bureau of Labor Statistics

Continued on page 10

- Measured another way, workers have long made up a higher percentage of Iowa’s population (see Figure 2).
- A 1988 CIRAS survey of Iowa manufacturers found that 55 percent of respondents expected labor availability to be a problem in the next two years, while 73 percent were worried about “employee skills.”
- Research by the Boston Consulting Group in 2012 pegged the shortfall between jobs and job seekers as involving less than 1 percent of the nation’s 11.5 million manufacturing jobs. The report said only five of the nation’s top 50 manufacturing cities showed signs of the normal wage inflation that you’d expect to see when workers are hard to find.

Swenson, the ISU economist, argues that some Iowa companies have been shedding workers slowly for years as others expanded. Layoffs provided a readily available pool of workers for Iowa’s remaining manufacturers to meet their needs.

The real threat now is that many experienced employees in that pool are on the verge of retirement. And the people being sought to replace them—both new high school graduates and older, slightly more educated workers capable of using technology and solving problems—are in short supply and being chased by other types of businesses (see Figure 3).

“I buy that there are shortages of skilled workers in many places, but it’s not just manufacturing,” Swenson said. “It’s in education, it’s in health care, and it’s in financial services. Everybody’s wanting the same kind of workers, and they’re all clamoring for some fraction of that middle-skills territory.”

So what’s to be done?

Anecdotal information from a number of growing Iowa companies shows that some firms have been able to solve their workforce needs. How? Why are some companies more able to attract and retain skilled workers?

This is the first installment in a series of *CIRAS News* articles on the strategies that some Iowa companies are using to tackle the workforce shortage issue. We also will showcase Iowa-based programs available to help resolve this systemic problem.

In this issue, we focus on the first step—filling the pipeline. Later articles will take an in-depth look at methods to create a work environment that attracts employees to your company and retains them once you have them. We will explore innovative ways to share staff between businesses, and we’ll look at ways to do more with fewer people. Our last issue in the series will look at some key performance indicators that might be used to gauge how an individual company and the state of Iowa are doing to resolve workforce needs.

We look forward to sharing the best suggestions with Iowa industry at large.

➤ **To share your company’s best practices on any of these issues, contact Ron Cox at 515-294-0099 or rcox@iastate.edu.**

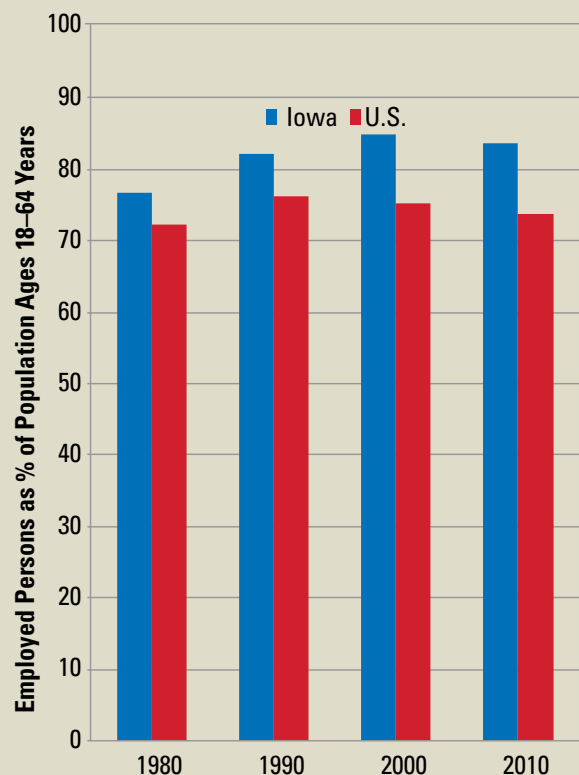


Figure 2. Working-age population that is actually working.

Source: United States Census data

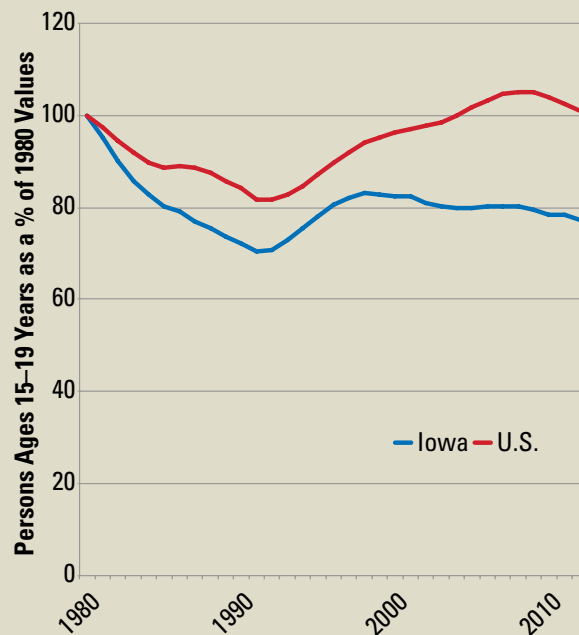


Figure 3. Iowa has fallen behind the national average in the population available to enter the workforce.

Source: United States Census data

Filling the Pipeline: By Growing Your Own Workers

Despite the worker shortage, Grace Swanson doesn't have much use for recruiters any more.

Swanson, vice president of human capital at Ankeny-based Accumold, said her company still hires two or three experienced tool and die makers every year. But since 2006, Accumold, a “micromolder” that makes pieces for hearing aids and other medical devices, has filled most of those jobs through a special arrangement with Des Moines Area Community College.

Accumold has funded 30 DMACC scholarships since the program began. Students work 20 hours per week, then they graduate to full-time jobs with the company. Seventy-five percent are still on the payroll.

“There are certain spots that we still hire experienced people for,” Swanson said. “Mostly, we seem to do better growing our own.”

Welcome to a new imperative of American manufacturing—to properly fill a résumé pipeline, companies now must seek out young people before they're ready to work.

Manufacturers of all types now regularly reach out to children as young as middle school to promote careers in science, technology, engineering, and mathematics (STEM). Efforts become even more involved after high school. Programs similar to Accumold's provide company-paid education and a likely (but not always guaranteed) job for successful candidates to become diesel mechanics at Des Moines-based TMC Transportation or welders at Vermeer Corporation in Pella.

“We have a variety of programs in the community college system to help keep the industry pipeline full,” said DMACC President Rob Denson. “This is a top priority for us. For instance, the DMACC Career Academy in Ames provides courses to Story County's seven school districts in a variety of programs in demand by Iowa industry. We do the same all over our central Iowa district and also have a statewide program with the Iowa Association of Business and Industry.”

Most scholarship programs target new-to-working young people who aren't interested in a four-year degree. Applicants generally are screened before classes start to make sure they show signs of technical proficiency and an ability to take coaching. Then, companies commit.

Vermeer's welding program has worked well enough that DMACC's Southridge campus planned to launch similar classes in July centered around industrial painting.

President and Chief Executive Mary Vermeer Andringa, who also serves as co-chair of the Iowa Governor's STEM Advisory Council, touted another program—in which Vermeer provides summer internships to teachers and guidance counselors—in

“There are certain spots that we still hire experienced people for. Mostly, we seem to do better growing our own.”

—Grace Swanson



Eighth-grade students from Waterloo visit John Deere Engine Works during STEM Day.

an interview she gave to the STEMconnector.org blog last fall. “Motivating even a few teachers every year can renew a STEM focus in the classroom and excite hundreds of kids toward creating a stronger and more talented future workforce,” Andringa said.

Stacie Halverson, human resources manager at Geater Manufacturing and Machining Co. in Independence, Iowa, said her 225-person firm has worked for two years to educate students in more than 15 school districts about the benefits of a manufacturing career. It now appears to be paying off in a recent uptick of job applications from quality young people.

Going forward, such programs are “going to be the way of the world,” Halverson said. “A lot of small companies like ourselves, I think, are going to have to work very hard to get our names out there and get recognized as a good place to work.”

Among larger firms, Rockwell Collins and Deere & Company both encourage employees to volunteer at STEM events and visit Iowa classrooms. Both provide support to Iowa schools that implement Project Lead the Way, a STEM-intensive curriculum for middle school and high school students.

Both companies also are major supporters of FIRST LEGO League and other teams promoted by FIRST (For Inspiration of Science and Technology).

“About 40 percent of our salaried workforce is in a STEM-related role,” said Patrick Barnes, program director for John Deere's global STEM-related outreach, John Deere Inspire. “John Deere's future success depends on a well-educated workforce with strong STEM skills.”

Manufacturers simply can't take for granted any longer that dependable workers will appear when needed, said Jenny Becker, community relations manager at Rockwell Collins.

“Young people know what doctors do,” Becker said. “But young people don't know what engineering is all about. When they start to get that connection with engineering and the technology and all the cool stuff, then they start to get excited.

“But it does take some deliberate programs to get kids to understand that,” Becker said, “because it's not as natural.”

Luring Labor via LEGOs

A two-minute video from the last Iowa championship plays to the uneducated observer like a mishmash of concert footage and sci-fi TV: Robots prowl over elevated tables while a teeming mass of youngsters watch and yell. Funny hats abound.

"It's meant to be crazy," said Camille Schroeder, director of K-12 outreach programs at Iowa State University's College of Engineering. "This is your brain on engineering."

This is FIRST LEGO League, a growing phenomenon in Iowa that supporters credit for celebrating intellectual achievement and encouraging more and more young people—especially girls—to consider careers in science-related fields.

FIRST LEGO League is run internationally by a foundation organized by Dean Kamen, the inventor of the Segway. Founded in 1998, it began in Iowa three years later with only a handful of teams and serious local concerns about whether anybody would show up. More than 400 teams attended last year.

It works like this: Teams of students ages 9 to 14 combine their efforts to perform research projects and solve tasks on a game board using special LEGO robot kits. Challenges are organized according to a different theme every year.

Participants work side by side with adult coaches, including corporate volunteers. This gives team members plenty of chances to hear firsthand how science fits into a real-life job.

"You have to work with kids when they're young," said Schroeder. "And then you need to keep that interest



going as they progress. Because if you wait to get a kid interested in STEM (science, technology, engineering, and mathematics) when they're a sophomore, junior, or senior in high school, it's pretty much too late."

Junior FIRST LEGO League, for kids ages 6 to 9, follows a similar pattern using less complicated problems.

Success so far has been encouraging—for parents, teachers, and Iowa corporations. Pat Barnes, program director for John Deere Global STEM-related Outreach Initiative, John Deere Inspire, cites research showing that students are "three times more likely to go into engineering if they're on a FIRST team than if they're not."

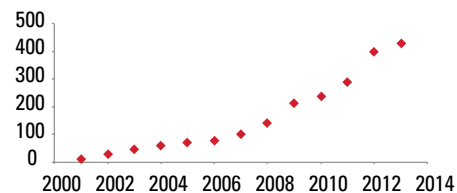
The FIRST mission statement notes potential for broader effects, however, citing a goal of inspiring young people to build skills "that foster well-rounded life capabilities including self-confidence, communication and leadership."

Three years ago, a team of Girl Scouts from Ames and Gilbert called the Flying Monkeys won the FIRST LEGO League Global Innovation Award. They did so by inventing a prosthetic device that ultimately helped a three-year-old Georgia girl with missing fingers on her right hand write her name for the first

time. The Flying Monkeys also landed a trip to a Brazil conference, an invitation to the White House Science Fair, and \$20,000 that they're using to get their device, Bob-1, patented.

Former Flying Monkeys coach Melissa Murray says team members are 9th- and 10th-graders now. Most are exploring a wide variety of career options, including engineering and marine biology. "Math and science are still important to them," Murray said. "But their minds keep changing as to what they want to be."

FIRST Lego officials announced in June that another Iowa team had just been named a runner-up for the same national innovation award. The Robotic Raiders, from Williamsburg, will receive \$5,000 for inventing "Cyclone Survivor," a board game to teach elementary school students how to prepare for tornadoes.



FIRST LEGO League has seen Iowa participation skyrocket since it began here in 2001.

➤ **For more information about FIRST LEGO League and other programs directed locally by the Iowa State College of Engineering, visit www.isek.iastate.edu or e-mail isek@iastate.edu. A complete directory of STEM outreach programs at Iowa State University is located at www.ispy.iastate.edu.**

CIRAS Mission: *Every day we will enhance the performance of industry through applied research, education, and technical assistance.*

CIRAS is supported in part by the DoC/NIST Manufacturing Extension Partnership, the DoD/DLA Procurement Technical Assistance Program, and the DoC/EDA University Center Program.

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AT A GLANCE

Timberline Manufacturing Company

LOCATION: Marion, Iowa

FOUNDED: 1993

EMPLOYEES: 145

IMPACT: Various projects have led to lower purchasing costs by tens of thousands of dollars and contributed to company growth and profitability.

OVERVIEW: An employee-owned, customer-focused electrical contract manufacturer specializing in wire harness assembly, control panels, and circuit board assembly.



Timberline Manufacturing Company specializes in control panel assembly (*right*), electronic assembly, and wire harness assembly (*left*).

Timberline's Long-Term Relationship with CIRAS Enhances Company Growth and Profitability

There is no magic bullet for business success. No business knows that better than Timberline Manufacturing Company.

The Marion, Iowa, assembler of wire harnesses and control boards worked with CIRAS for four years on a series of projects focused on the company's permanent improvement. CIRAS experts have coached Timberline leaders and worked to educate company employees about materials management, the theory of constraints, government contracting, and strategic planning. CIRAS also provided technical assistance to the 20-year-old Timberline as it transitioned from a three-owner firm to an employee stock ownership plan (ESOP) in January 2013.

This long-term relationship has had a reported \$1.2 million economic impact over the last three years, as Timberline lowered purchasing costs, acquired new customers, and boosted its growth and profitability. Last year, Rockwell Collins named Timberline its "Supplier of the Year" from among all of the company's international and U.S. suppliers.

"CIRAS has been a good resource when we've needed it," said Timberline President Mike Johnson. He describes CIRAS as a reliable, trusted resource that Timberline, as well as other small businesses, can turn to for expertise and advice.

"CIRAS has helped us map a way forward," Johnson said.

One of the first things CIRAS helped Timberline with was a materials management project. "We had a homegrown materials management group, but we asked ourselves how we become a world-class purchasing group," Johnson said.

After working with CIRAS, Timberline developed a supplier evaluation process and improved supplier relations and accountability. "We consolidated some of our purchasing and lowered our cost by tens of thousands of dollars," Johnson said.

In a subsequent project, CIRAS helped Timberline use the Theory of Constraints to evaluate its entire process. The project helped the company identify where the constraints on its business were and determine where they should or shouldn't be. Through this effort, Timberline also looked at pricing, incentivizing customers appropriately, and incremental business models.

"It opened up our eyes to different ways of doing things," Johnson said.

Timberline ultimately adopted a new pricing model because of the project, and the company acquired business from new customers.

Other CIRAS projects with the company have included work to educate Timberline about government contract requirements for certain projects.

For advice on strategic planning and long-term coaching, Johnson currently meets every few weeks with Sean Galleger, CIRAS account manager, to assess the company's path. Discussions have included how to make cultural adjustments after becoming an ESOP, looking at what drives the company's profits, and continuing to identify and address bottlenecks and constraints.

Johnson said he and Galleger frequently discuss the company's "default future"—what the future will look like if Timberline continues to operate as it currently does.

That view—thanks to a focus on finding Timberline's strengths, flexibility, and adaptability and determining how to use those to improve profitable growth—is looking better.

➤ For more information, contact Sean Galleger at 515-290-0181 or galleger@iastate.edu.



Dr. Lisa Lang

CIRAS-arranged Webinar to Show Job Shops How to Get More Done Faster

Custom job shops (manufacturers who make individual, custom products for a host of different clients) have one enormous problem in common—scheduling all that work in a high-mix, low-volume environment.

The solution, according to a national expert on Theory of Constraints practices, is to just stop focusing on efficiency and instead worry about getting a steady stream of work done.

It's called the Velocity Scheduling System. It's blatantly counterintuitive, and it's the topic of a CIRAS-arranged webinar scheduled for July 15 at 11 a.m.

"Dr. Lisa" Lang, chairman of the board for the Theory of Constraints International Certification Organization, said in an enthusiastic e-mail to CIRAS that her webinar "covers EXACTLY how to get more jobs done faster... We cover how scheduling is traditionally done, the scheduling problems most shops encounter, and the mistakes most shops make when trying to schedule."

Lang's online talk will focus on her Velocity Scheduling System—an

approach that one Iowa machine shop credits with cutting its time per job by one-third to one-half.

"Nothing is held back," she said. "During the webinar, you learn the full system and what to do tomorrow."

Traditional manufacturers, who are focused on mass production, operate much differently than "job shops," said

CIRAS Project Manager Michael Willett. Yet job shops "are often pressured to adopt some of the same solutions and are rightfully skeptical."

"Since often the ability of the company to get jobs out within a short lead time is tied directly to the amount of sales they receive, scheduling

is a huge issue with just about every job shop or product line manufacturer that builds to order," Willett said.

There is no cost for viewing Lang's webinar. Lang additionally works as a paid business consultant.

One firm that's already completed Lang's 14-week "Velocity Scheduling System Coaching Program" is East Iowa Machine Company (EIMCo), a manufacturing facility with 135 employees in Farley, Iowa. East Iowa Machine Company converts raw metals into finished component parts and assemblies for customers in a variety of industries across the country.

Matt Goss, quality control manager at EIMCo, said his company learned through Lang's training how to reduce their work-in-progress (WIP) hours and move jobs through their shop faster. When EIMCo started the training, they had roughly 10,000 hours of WIP and needed approximately 12 to 15 days to complete an average project. The company now runs with just more than 3,000 hours of WIP and is able to finish jobs in a seven- to nine-day timeframe.

"We're getting items moved through the process faster," Goss said. "This system has given us better tracking of jobs through our shop and has allowed us to improve our focus on the jobs in process, so we can finish them quickly and move to the next job faster."

"We cover how scheduling is traditionally done, the scheduling problems most shops encounter, and the mistakes most shops make when trying to schedule."

—Lisa Lang

➤ To register for Lisa Lang's scheduling webinar, visit www.VelocitySchedulingSystem.com/CIRAS. For information after July 15, e-mail mwillett@ciras.iastate.edu.

Because We're Just That Cool: CIRAS Makes Made In Iowa Site

Manufacturing generates about 17 percent of Iowa's gross domestic product, making it one of the largest sectors of the state's economy. Yet it gets proportionally less respect. To better showcase this economic sector, and to have a little fun, CIRAS this summer is launching a new website (and Apps that will come later) focusing on products manufactured in Iowa.

Both the free MadeInIowa app, which is expected to be available this fall for Android and iOS devices, as well as the web site at www.MadeInIA.org, let students, potential employees, and businesses search for information by product name, career type, industry, or county. Each product listed will include a company and product description, product photo, and company logo.

"We want to give a platform for manufacturers throughout the state to highlight all the great products we make and great careers that go along with that," said Mike O'Donnell, a program director at CIRAS.

The goal of the MadeInIowa site is to show high school and college students, as well as state-level decision makers, the many products and wealth of career opportunities that exist in Iowa's manufacturing economy. The game will test students' knowledge by displaying logos of Iowa manufacturers and asking students to guess where the companies' products are made. Game scores are based on how closely (geographically) they guess the correct answer.

MadeInIowa is an electronic extension of CIRAS' popular Made in Iowa display, which is showcased at industry conferences and other events such as Iowa State University's Engineering Career Fair. The new site currently includes items that CIRAS has in its physical Made in Iowa display, but CIRAS hopes to expand the site's and app's coverage through regular updates. Any Iowa manufacturers who want their product(s) included can submit information at <http://bit.ly/1n3Ekwo>.

MadeInIowa was created for CIRAS by Simanta Mitra, an Iowa State University senior lecturer in the College of Liberal Arts and Sciences, and two computer science graduate students, Vivek Sribalasu and Satish Maddala.



Look closer at Iowa's rolling landscape and you may be surprised to discover what is made here—everything from transportation equipment and powered machinery to quilting machines and barbecue sauce. When you buy products manufactured in Iowa, more money stays in our local communities.

APQS

Overview: APQS longarm quilting machines are handmade, one at a time, by master craftspeople with down-to-earth midwestern values and meticulous attention to detail. APQS is known for superior quality and craftsmanship, as well as for treating customers the way quilters expect—with care, compassion, and responsibility.

Location: Carroll, Iowa

Founded: 1983

Employees: 30



Kness Mfg. Co., Inc.

Overview: It began with A. E. (Brick) Kness' invention of the World's Best Multiple-Catch Mousetrap. Ninety years later, Kness Mfg. Co. Inc. is a world-renowned producer of effective, cost-efficient pest control products for catching all types of rodents and live animals. Third-generation Kness family members carry on the tradition of excellence and innovation.

Location: Albia, IA

Founded: 1924

Employees: 35



Sterzing Food Company

Overview: Sterzing Food Company was founded 80 years ago by Barney Sterzing as a supplement to his candy business. The company, which was owned by Barney's family until recently, still uses Sterzing's process of slow-cooking thinly sliced potatoes in small batches.

Location: Burlington, Iowa

Founded: 1933; purchased by long-term employees Craig Smith and Gary Schmeiser in 2011

Employees: 20



Want to Buy a Rapid Prototyping Machine? Don't Decide Too Rapidly

Sometimes early adoption isn't the best decision for a manufacturing business.

Innovative Lighting, of Roland, Iowa, was among the first companies in the state to purchase a rapid prototyping machine—a selective laser sintering device—to make prototype parts to show its customers.

“They could see it, feel it, and touch it,” Jim Johnson, director of molding, said of the parts. “It was better than a (computer-aided design) file or a 2-D drawing.”

Innovative Lighting owned the machine for about eight years, but the company now outsources to meet all of its rapid prototyping needs.

Customers were happy with the parts, Johnson said, but the costs of owning a machine didn't make economic sense. Some of the issues were a pricey maintenance agreement, significant time training employees, expensive printing material, and small printing dimensions.

“It's cheaper for us to go out and get the prototype parts made,” Johnson said.

Companies considering purchasing a rapid prototyping machine should make sure the investment is appropriate for their businesses and not be blinded by the latest manufacturing fad, said Chris Hill, manager of innovation programs for CIRAS.

“It's not designing your parts to a process, it's finding a process that best meets your objectives,” Hill said.

“It's not designing your parts to a process, it's finding a process that best meets your objectives.”

—Chris Hill

Rapid prototyping technology has been around for more than a decade. One of the most popular forms at present is 3-D printing, in which

a three-dimensional, solid object of almost any shape can be generated from a digital model. Multiple thin layers of material, usually resin, are gradually built up to create a shape.

The popularity of 3-D printing has mushroomed for several reasons:

- The cost of printers has dropped significantly over the past few years.
- Today's resins are more advanced

than they used to be, and many rapid prototype parts now closely resemble the final product.

- Newer printers can produce parts of varying sizes, from 6 inches to 55 inches, depending on the machine.
- Parts can be created in hours on a 3-D printer instead of days or weeks using traditional prototyping methods.

These and other factors may tempt many manufacturers to purchase their own 3-D printer. But Hill recommends that companies consider a few other items before making the investment:

- Ensure you have trained people to run the machine.
- Develop a maintenance/service plan up front.
- Designate a separate room for the printer.
- Consider annual operating and service costs.
- Project your needs for the system beyond the first year.
- Determine if the system will offer you a real competitive advantage.

David Simpson, mechanical design engineer at Ryko Solutions in Grimes, recently sought out-of-house rapid prototyping services for a trade show. He needed the parts fast and accurate, so he turned to fused deposition modeling, a type of 3-D printing.

Having the prototype in hand let Ryko's customers see and touch the parts, which led to small changes in the design. After a few more tweaks, the customer signed off on the project. In the end, three sets of parts were printed for a cost of about \$2,000 each.

“It's been a great experience for us,” Simpson said. “We were able to get parts made quickly and refine the design in a matter of a few weeks.”



➤ For more on rapid prototyping machines and their role in innovation, see the column on page 20.



Industrial Assessment Center (IAC)

The IAC program at Iowa State University is one of 24 IACs located nationwide. With funding from the U.S. Department of Energy, the IAC provides a free service to manufacturers to identify monetary savings from reduced energy usage.

Example Energy Savings Measures

- Lighting systems
- HVAC systems
- Heat recovery applications
- Compressed air systems
- Boiler and chiller systems
- Motor upgrades
- Process heating improvements

For more information, contact

Dr. Greg Maxwell
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gmaxwell@iastate.edu
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Mark Your Calendars for Iowa State University Fall Career Fairs

Fall at Iowa State brings more than the start of a new semester and football season. It's also career fair season. Iowa State's Engineering Career Fair alone routinely draws more than 300 employers and more than 5,000 students. Employer registration for most fall career fairs began in mid-May, and spaces fill up quickly. Here's the fall schedule and how your company can reserve a space at each career fair.

Engineering Career Fair

September 23, Noon–6 p.m., Hilton Coliseum and the Scheman Building

Last year's fall Engineering Career Fair, which is organized in large part by students, drew 5,700 students in search of a job and resulted in more than 1,300 interviews within three days of the event. Companies can reserve a space by contacting Engineering Career Services at ecs@iastate.edu. Visit www.engineering.iastate.edu/ecs/career-fair for more information.

Business, Industry, and Technology Career Fair

September 24, Noon–6 p.m., Hilton Coliseum

A joint venture of three colleges (Business, Liberal Arts and Sciences, and Human Sciences), employers can reserve a space at this career fair through CyHire at <https://cyhire.iastate.edu/employers>. Learn more at www.business.iastate.edu/careers/career-fair.

People to People Career Fair

September 24, 1–5 p.m., Scheman Building

Hosted by the College of Human Sciences and the College of Liberal Arts and Sciences, this career fair focuses on careers in social/human services, education, health/wellness, government, and hospitality. Reserve a space via CyHire at <https://cyhire.iastate.edu/employers>. Get more information at www.hs.iastate.edu/career-services/career-fairs.

Agriculture and Life Sciences Career Day

October 14, 9 a.m.–3 p.m., Lied Recreation Center

Employer registration for this career day begins in July. For details, visit www.career.cals.iastate.edu/ag-career-day and contact Mike Gaul, director of career services in the College of Agriculture and Life Sciences, at mikegaul@iastate.edu.



Advanced Manufacturing Conference is October 9

The Iowa Association of Business and Industry (ABI) is hosting Iowa's Advanced Manufacturing Conference on Thursday, October 9, from 9:00 a.m. to 4:30 p.m. at the Des Moines Area Community College FFA Enrichment Center, 1055 S.W. Prairie Trail Parkway, Ankeny, Iowa.

The goal of this annual meeting is to convene advanced manufacturing minds from across the state to discuss innovations, trends, and challenges facing the industry today.

The event will take place less than one month before the highly anticipated mid-term elections with Frank Luntz, CEO of Luntz Global, a political strategist and a frequent commentator and analyst, providing the keynote address, "2014 Election Insight." Luntz will discuss how upcoming election results will impact American productivity.

A morning survey of participants will identify current issues and challenges facing Iowa manufacturers. The survey results will be shared during the afternoon session.

The event also will feature a panel discussion highlighting Iowa's manufacturing stories and a presentation by some of Iowa's top legislative leaders.

To register and for more details, visit the "Events Calendar" on the ABI website, www.iowaabi.org.

Conference Schedule—Thursday, October 9

All events are in the DMACC FFA Enrichment Center unless indicated otherwise.

- 8:30 a.m.–9:00 a.m. **Registration and Continental Breakfast**
- 9:00 a.m.–9:05 a.m. **Welcome—General Session**
Mike Ralston, President, Iowa Association of Business and Industry
- 9:05 a.m.–9:35 a.m. **Manufacturing Industry Survey**
- 9:35 a.m.–10:35 a.m. **Iowa Success Stories—Panel Discussion**
Panelists: TBD
- 10:35 a.m.–10:45 a.m. **Networking Break**
- 10:45 a.m.–11:45 a.m. **Keynote Speaker**
Frank Luntz, CEO of Luntz Global, American political consultant and pollster
- 11:45 a.m.–12:45 p.m. **Networking Lunch**
- 12:45 p.m.–1:30 p.m. **Innovation Speaker**
TBD
- 1:30 p.m.–2:30 p.m. **Manufacturing Industry Survey Results**
ABI Advisory Council Members
- 2:30 p.m.–2:45 p.m. **Iowa Legislative Leader**
TBD
- 2:45 p.m.–3:00 p.m. **Closing Comments**
Mike Ralston, President, Iowa Association of Business and Industry
- 3:00 p.m.–4:30 p.m. **Networking Reception**

- **How to Do Business with the Army National Guard**
July 9, 2014 • 10:00 a.m.–11:00 a.m.
Webinar
- **Sausage and Processed Meats Short Course**
July 14–18, 2014 • 8:00 a.m.–Noon
Ames, Iowa
- **How to Get More Jobs Done Faster (for Custom Job Shops or Machine Shops)**
July 15, 2014 • 11:00 a.m.–Noon
Webinar
- **Improvement Kata Experience**
July 16, 2014 • 8:00 a.m.–4:30 p.m.
Williamsburg, Iowa
- **How to Do Business with the Army National Guard**
July TBD, 2014 • TBD
Webinar
- **ABI Market Wise**
August 19, 2014 • 10:00 a.m.–2:00 p.m.
TBD - Northwest Iowa
- **Gemba Walks: A Process for Leading the Organization**
August 21, 2014 • 9:00 a.m.–3:00 p.m.
Des Moines, Iowa
- **Food Microbiology Industry Short Course**
August 28–29, 2014 • 7:00 a.m.–5:00 p.m.
Ames, Iowa
- **ABI Market Wise**
September 16, 2014 • 10:00 a.m.–2:00 p.m.
TBD - Northwest Iowa
- **National Manufacturing Day**
October 3, 2014
Details: www.mfgday.com/events
- **Iowa's Advanced Manufacturing Conference**
October 9, 2014
9:00 a.m.–4:30 p.m.
Ankeny, Iowa
- **HACCP Workshop for Meat, Poultry, and Egg Plants**
October 16–18, 2014 • 8 a.m. to 6 p.m.
Ames, Iowa

For details, see the events section of the CIRAS website, www.ciras.iastate.edu.



Since 1963, we have delivered proven services to enhance the performance of industry. Our approach, Engage. Educate. Embed., creates specific solutions that allow each business and its community to prosper and grow. Coupled with a satisfaction guarantee, our typical client has achieved a 200% ROI. A vast network of university and industry experts brings years of professional experience to CIRAS. Clients have reported an economic impact of more than \$1.8 billion over the past five years.

				Account Manager	Economic Development	Engineering	Government Contracting	Innovation	Management Practices	Productivity	Quality Management	Safety	Supply Chain Management	Sustainability	CIRAS Operations
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Miller, JoAnn • Associate Director	515-294-4449	jvmiller@iastate.edu	Campus												●
Bangalore, Savitha	515-294-5240	savitha@iastate.edu	Campus												●
Barton, Leah	515-291-0733	bartonl@iastate.edu	Waterloo												●
Basu, Ranojoy	515-294-3420	rbasu@iastate.edu	Campus		●										
Berge, Paul	515-294-5972	pmerce@iastate.edu	Campus			●		●							
Boesenberg, Adam	515-294-5903	aboesebn@iastate.edu	Campus			●		●							
Bonnes, Gordon	712-308-2229	gbonnes@iastate.edu	Council Bluffs				●								
Clark, Susan	515-294-4475	skclark@iastate.edu	Campus						●	●					
Dunnwald, Paul	515-509-1377	dunnwald@iastate.edu	Campus	●											
Eckhoff, Jeff	515-231-7826	eckhoffj@iastate.edu	Campus												●
Fagle, Julie	319-310-8612	jafagle@iastate.edu	Marion				●								
Galleger, Sean	515-290-0181	galleger@iastate.edu	Waterloo	●											
Gormley, Paul	319-721-5357	gormley@iastate.edu	Marion					●						●	
Hill, Chris	515-294-5416	chhill@iastate.edu	Campus			●		●							
Li, Haiyan	515-294-1316	hli@iastate.edu	Campus												●
Martin, Brenda	515-570-5282	bkmartin@iastate.edu	Fort Dodge	●							●				
Mohr, Jeff	515-294-8534	jeffmohr@iastate.edu	Campus			●				●					
Muff, Brian	515-520-1033	bmuff@iastate.edu	Denison								●			●	
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THE INNOVATION CYCLE

Leveraging the Innovation Cycle: RP's Role in Discovery *by Chris Hill*

For an idea to become an innovation, it must pass through the four phases of the innovation cycle: Definition, Discovery, Development, and Delivery. In this article, we discuss a role for rapid prototyping within the Discovery phase.

Rapid prototyping (RP), which uses additive manufacturing (AM) technology, has recently gained great exposure. The term "3-D printing," one of the many AM technologies, is popping up in trade journals, at trade shows, on the Internet, and on television. Additive manufacturing machines are being used by more companies, schools, and even libraries. Awareness is increasing, costs are dropping, choice of materials is expanding, and material properties are improving. All of these factors are causing increased interest in RP. Thus, we have many companies asking, "How can I take advantage of this technology?"

We return to the innovation cycle to look at typical questions companies have about AM technology. Within the Discovery phase, we look to evaluate whether or not proposed concepts provide enough value to the customer to support a price and revenue that can justify commercialization. One of the best ways to accomplish this goal is to ask target customers if your concepts meet their needs.

Companies have used pictures, comparative products, nonfunctional mock-ups, and mold shop-built prototypes to communicate with potential customers. This is typically an

iterative process, with several refinements based on feedback from customers. To obtain the best information during this activity, you need the most realistic representation of your concept to minimize interpretation error by your targeted market.

Today's plastic-based AM methods can provide extremely accurate and functional prototypes. Advances in materials mean similar-to-production quality. Increases in build envelopes can now provide parts nearly 60 inches long, with some systems offering resolutions of 0.0004 inches, or half the width of a human hair. Metal-based AM technology is advancing quickly but is not as mature as plastic methods. It also offers realistic prototypes, but it has smaller build envelopes of under 15 inches and has higher cost structures. Most plastic and metal AM parts can be plated or textured to provide realistic representations.

These AM technologies allow companies to make product changes based on customer feedback and produce a new concept prototype in days or weeks versus weeks and months. This speed allows for several iterations to refine concepts and maximize potential customer value without unacceptable delays.

If you would like further information on how CIRAS can help you become more innovative, please contact CIRAS at 515-294-3420.



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