

AT A GLANCE

LDJ Manufacturing, Inc.

LOCATION: Pella, Iowa

FOUNDED: 1995

EMPLOYEES: 70

IMPACT: Created 30 new jobs,
increased annual sales by 30%

OVERVIEW: LDJ is a family-owned manufacturer of fuel and service trailers used in the agricultural and construction industries. Partnering with CIRAS through a transformation plan is helping them continue to grow and create jobs.



Project Helps LDJ Add 30 Jobs and Increase Sales by 30%

When CIRAS account manager Derek Thompson began working with LDJ Manufacturing, Inc. (LDJ), the family-owned manufacturer of fuel and service trailers was a growing company, but its rapid growth had created some challenges.

Loren and Jean Van Wyk had started the Pella, Iowa, company in 1995 as a side business to farming. Their goal was to manufacture and sell products to make farming a better way of life. The first products included biomass furnaces and boilers as well as contract manufacturing.

As the Van Wyks listened to their customers' needs, they expanded their product line to include trailers to deliver fuel to the field as well as service trailers for generators, tools, welders, and other items that allow farmers to basically have a shop in the field. LDJ soon became a full-time endeavor as the company's reputation for building high-quality trailers

and for developing innovative solutions to meet needs in the agricultural and construction industries gained momentum.

In 2011 the manufacturer was growing at 25–30 percent per year. The rapid growth created new constraints within the business that threatened to impede future growth.

"We were experiencing a lot of challenges operationally," says Luke Van Wyk, LDJ general manager. "We wanted to find the best practices on how to meet those challenges, particularly in terms of process flow through the plant, and we turned to CIRAS to help us do that."

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On the Cover: LDJ worker rinses a 100-gallon stainless steel tank manufactured for use with diesel exhaust fluid.

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

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Thompson met with members of the LDJ leadership team to discuss an appropriate business strategy. It was subsequently decided to undertake a Business Improvement Generation (BIG) project applying Theory of Constraint (TOC) principles.

CIRAS project manager Mike Willett met with the LDJ team weekly to guide them through the five-phase BIG process, beginning with establishing a common understanding and agreement of the problem. The team then developed a process map and reality tree to help understand the current state and document the undesirable effects.

Phase three focused on strategies and tactics needed to achieve the project goal of improving process flow. The team developed a future process map and reality tree and discussed how to address changes that were needed in order to move forward.

In the final two phases, the team identified how to create change, developed an implementation plan, and began implementing the plan.

The LDJ team identified the paint areas as the primary constraint. “Going through the BIG process helped us make some changes in the equipment we used and the way we managed our staff,” Van Wyk says. “We started doing more with switch shifting to make sure the paint booth was running all of the time and incorporated some different processes to ensure we maximized our trigger time.”

The company also implemented a plan for continuous improvement. Each

quarter the leadership team, operators from the plant floor, and employees from various departments meet to examine problems, propose solutions, and implement changes. The goal is to gather together a diverse team to collect a variety of perspectives. The steps learned in the BIG project are used to come up with solutions.

One solution involved a 35,000-square-foot capital improvement project, adding manufacturing and warehousing space. The addition was completed in November of 2012. A \$1 million loan from the USDA Rural Economic Development Loan and Grant program helped finance the expansion project. The Iowa Area Development Group, a CIRAS partner, assisted LDJ with the application process.

Luke Van Wyk credits CIRAS for helping LDJ move forward. “CIRAS did a great job of helping us to understand what steps we could take to increase throughput in our company,” he says. “This has allowed us to better respond to demand for our products in the market and grow at a more rapid pace than we otherwise could have.”

The BIG project with LDJ has evolved into a transformation plan, according to Glenn Volkman, CIRAS account manager. “LDJ has transformed the way they do production. CIRAS often helps a company with a specific problem, but more often now we’re looking at the whole picture—everything a company is doing—in order to find out what is preventing the company from being more profitable.”

A transformation plan helps a business implement lasting, positive, and



Above (from left): LDJ workers prep a trailer before it enters the state-of-the-art paint facility; ASME-certified welders manufacture tanks to be used on fuel trailers; and a 750 Gallon Service Special trailer that transports diesel fuel, diesel exhaust fluid, and oil including room for tools and parts.

integrated change so the company is ready to act on emerging opportunities and maintain a competitive advantage. "Components of the plan include identification of key steps needed to help the company achieve their goals. These steps may range from technical assistance projects to hiring an engineering graduate to partnering with faculty on an applied research project," states Volkman.

Through the development of the transformation plan, the CIRAS and LDJ relationship has progressed to a two-way partnership. When CIRAS partner Iowa State University Environmental Health and Safety (EH&S) needed a company to pilot their recently developed online safety training modules, LDJ agreed to do so.

Because of the strong safety culture established at LDJ with widespread employee participation and workers routinely touring the facility looking for safety concerns, the company was uniquely positioned to help with reviewing and critiquing the five EH&S modules: Bloodborne Pathogens and Sharps, Labeling of Chemicals, Safety for Manufacturers, Lockout/Tagout, and GHS: The Globally Harmonized System of Classification.

Obtaining input from users at the worksite is an important step in the process of offering new programs, according to Linda Weldon, EH&S safety training specialist. "Our goal is to have a better product in the end, and feedback from users helps us achieve that," she says.

"It is important that users find the material interesting, and that it provides a good understanding of the concepts presented," Weldon

explains. "We want participants to be engaged in it."

Participation in the testing has benefits for LDJ as well, according to Van Wyk. "It helps us be at the forefront of

implementing safety processes," he explains. "We have a fantastic safety record because we have taken a very proactive approach in how we handle safety and how we train employees. It is like most things in life—you can stand up and talk about safety all day, but it is what we do that counts."

With the changes LDJ has made, ranging from production processes to capital improvements to inventory policy changes, the company has reported a 30 percent increase in sales and added 30 jobs.

"CIRAS did a great job of helping us to understand what steps we could take to increase throughput in our company."
—Luke Van Wyk

➤ **For more information, contact Glenn Volkman at 515-205-3786 or gvolkman@iastate.edu.**

LinkedIn—www.linkedin.com

LinkedIn's mission: Connect the world's professionals to make them more productive and successful. Currently, LinkedIn touts more than 225 million members worldwide with nearly half a million in the state of Iowa.

How does LinkedIn relate to government sales? Internet users spend 25 percent of their time on social networking sites, 65 percent of companies on LinkedIn have acquired a customer through this medium, and more than 66 percent of government agencies are using social media to conduct business (according to Defense Contractor Marketing online).

What does this mean for your company? Since most government agencies share information and engage with industry via social networking, having a LinkedIn presence can help your company find new opportunities, build dialogues with existing customers, and locate potential partners for proposals. Engaging in social networking can help you market to government clients, drive potential customers to your website, and generate leads.

There are several ways that you can participate on LinkedIn. A LinkedIn member page is your online, personal brand; the keywords that you use will help others find you. A company page is a centralized location where other LinkedIn members can stay apprised of company news, products and services, and business opportunities. LinkedIn group participation allows you to connect with like-minded professionals related to your industry and interests.

The CIRAS Procurement Technical Assistance Team has identified tips and tools to assist you as you navigate through LinkedIn. **For more information on how LinkedIn can help capture government sales, contact Beth White at 563-370-2166 or whiteb@iastate.edu.**

Understanding the Research behind Creating Innovative Ideas

Coming up with innovative ideas can be an overwhelming task. Nevertheless, it is a critical endeavor if companies hope to grow. Businesses must nurture an innovative culture to keep new ideas emerging.

That’s why CIRAS offers services to help clients understand the innovation cycle and its four key stages—Definition, Discovery, Development, and Delivery.

“We have the conversation with companies about how they execute each of the stages and then evaluate where the gaps are,” says Paul Gormley, CIRAS project manager.

The gaps are unique to each company. Some need help figuring out how to create and refine ideas, while the challenge for others is how to determine which ideas to pursue. Additional issues relate to developing prototypes, conducting market research, and delivering the products.

Regardless of the specific need, CIRAS’ goal extends beyond solving an immediate problem. Founded on the concept of engage-educate-embed, CIRAS works to educate clients so they thoroughly understand problems and related issues and will know how to address future issues as they surface.

Before releasing a portfolio of new services to assist companies in commercializing innovations, CIRAS needed to evaluate the research behind innovation and creating ideas. “That’s a distinguishing feature between CIRAS and most other resources available to businesses. We want to bring only the best research-based practices to our clients,” Gormley says.

Research in the latter stages of the innovation cycle is well-understood. However, the Definition and Discovery phases are complex and researchers are continuously learning about creativity and its role in innovation. CIRAS turned to Erin MacDonald, an assistant professor of mechanical engineering at Iowa State University, to conduct a literature review of

peer-reviewed journals to better understand which methods in the Definition and Discovery phases are most grounded in terms of research and which are drawn mostly from practical experience.

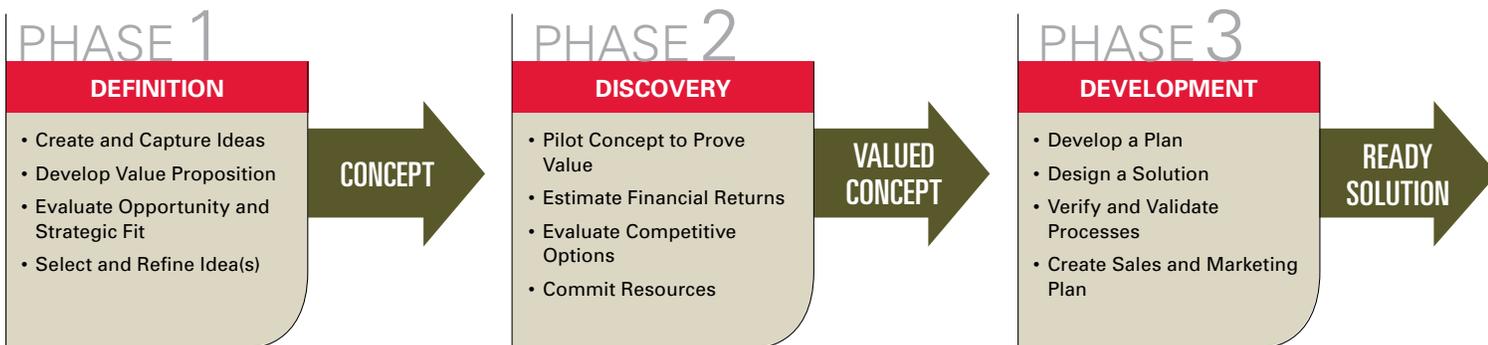
“When CIRAS puts the stamp of approval on a program, we really want it to be vetted as working and being effective,” MacDonald says. “We were looking to see if there was validity to what is being taught, and we definitely accomplished that.”

“When CIRAS puts the stamp of approval on a program, we really want it to be vetted as working and being effective.”
—Erin MacDonald

MacDonald notes that research supports a process for coming up with new ideas, called ideation, as a key component of the Definition phase. Ideation involves groups or teams of people working together to brainstorm new ways to solve problems. The team members are challenged to break out of their usual form. The goal is to stretch and expand the participants’ perspectives, thus sparking new ideas.

For instance, one of the base concepts examined was stimulus mining, which is the active exploration of existing market offerings, direct customer interaction or observation, and new technologies that the participants would not normally be exposed to. The research showed that the use of a stimulus was proven to expand both the variety and quality of ideas created by participants in the studies.

The Innovation Cycle



“It makes sense,” says Gormley. “If you bring the same knowledge base and talk to the same people in the same way, you’re probably going to get the same results. With stimulus mining, we change one of the components to get different, hopefully better, results from the same people.”

Although the challenge of coming up with new ideas can be very daunting, MacDonald says training in ideation tools can be empowering for manufacturers. “This program offers a structured approach to get started. It’s like a toehold in the mountain, and once you get started you have the momentum to keep moving forward.”

MacDonald speaks from experience. Prior to earning her MS and PhD degrees, she worked as a product development manager and design consultant. She recalls being frustrated by the lack of a structured plan for coming up with new ideas. While she was successful—holding patents for two designs—she decided to attend graduate school so she could learn more about the process for creating new products.

In addition to providing academic evidence on the effectiveness of the methods, this research has provided insight into the development of the methods and how and why they work, according to Gormley.

“If you look around the country, you can see that companies have had success using these methods, but we wanted to know why they were successful,” he explains. “Once you know why something works, it increases the probability that we are using the best methods for a given situation.” Because of this, CIRAS is now better able to match company goals with a set of ideation methods that are most likely to produce the desired results.

PHASE 4

DELIVERY

- Refine Sales Literature
- Communicate to Team
- Integrate into Current Practices

INNOVATION



Iowa State students in the Introduction to Engineering Design and Creativity and Imagination in Engineering Design classes have a great role model for their studies. Erin MacDonald, who just began her fifth year as

an assistant professor in mechanical engineering, worked in product development prior to her graduate studies at the University of Michigan.

Her career has included designing hiking products and serving as an assistant product development manager and design consultant. It was these experiences that led MacDonald to graduate school.

“We didn’t use any formal method to come up with our ideas for new products,” she explains. “It was frustrating, and I thought there must be a systematic way to approach this. I wanted to study how to do it.”

While earning her MS and PhD degrees in mechanical engineering, MacDonald began to focus on how people make decisions about products and what is important to them. Her research now is on socio-technical systems, which is the interaction of people and designed technical products.

Her goal is to increase representation of consumers in the design process of products and technologies aimed at sustainability. That means finding out such things as what is important to consumers and what they consider when making decisions. That information can then be used in the design process.

MacDonald notes, “It is a lot easier to model engineering elements to come up with more efficient designs than it is to model a person. When you add people to the equation, it becomes much more challenging.”

Nevertheless, that is what MacDonald is working to do on a current project focused on optimizing wind farm layout with landowner concerns. “Improving people’s relationships with these technologies can go toward improving the success of the technology,” she says.

➤ For more information, contact Paul Gormley at 319-721-5357 or gormley@iastate.edu.

Mid-Sized Companies Will Drive Most Of This Year's Job Growth

America's mid-sized companies will be responsible for much of the job growth this year, according to the National Center for the Middle Market (NCMM) at Ohio State University's Fisher College of Business.

Mid-sized companies with revenue of between \$10 million and \$1 billion will create 70 percent of the jobs in 2013, thanks to a projected growth rate of 5.8 percent for mid-sized companies during the second quarter, and the expectation that 43 percent of mid-sized companies will increase employment over the next 12 months.

Forty-eight percent of 1,000 executives surveyed from middle-market companies said they expect the global economy to grow, an increase from 22 percent last year. Two-thirds of the middle-market executives say they are confident in the U.S. economy, compared to only 50 percent last year.

"Confidence among executives in services, manufacturing, wholesale trade and construction industries was particularly high," says the center. "This growing sense of confidence in the economic outlook at the national and global levels is encouraging executives to take additional growth-related initiatives through new investments. One year ago, middle market companies were split between whether to invest or hold onto extra cash, at 51 percent and 49 percent respectively. This quarter, nearly two-thirds of middle market executives plan to invest rather than hold on to extra cash."

The biggest concern of mid-sized company executives is the cost of health care, with nine out of ten saying it was their top concern. "Health care costs could hinder further growth among middle-market companies," says Anil Makhija, academic director at the NCMM.

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CIRAS Celebrates 50 Years of Service to Iowa Business and Industry

CIRAS, a part of Iowa State University Extension and Outreach, began a yearlong celebration of 50 years of service to Iowa business and industry on June 6. At a special ceremony in Des Moines, Iowa Governor Terry Branstad signed a proclamation acknowledging CIRAS' role in assisting Iowa industries. CIRAS services include engineering, government contracting, management practices, productivity, quality, safety, supply chain management, sustainability, economic development and innovation.

The proclamation reads:

WHEREAS, Iowa State University Extension and Outreach Center for Industrial Research and Service (CIRAS) is the industrial extension arm of the university and has been helping the College of Engineering and Iowa State University Extension and Outreach carry out their land-grant mission; and

WHEREAS, CIRAS was established in July, 1963, after receiving authorization and appropriated funds from the General Assembly, along with unanimous Board of Regents approval; and

WHEREAS, CIRAS enhances the performance of industry through applied research, education and technical assistance; and

WHEREAS, CIRAS has a vision for healthy Iowa communities through business prosperity; and

WHEREAS, CIRAS and partners, over the past five years, have reported a cumulative impact from companies of more than \$1.5 billion with 22,264 jobs added or retained as a result of the assistance they received;

NOW, THEREFORE, I, Terry E. Branstad, Governor of the State of Iowa, do hereby proclaim May 2, 2013 the start of the 50th Anniversary celebration of CIRAS and urge Iowa companies and communities to partner with CIRAS to help our state prosper and grow.

IN TESTIMONY WHEREOF, I have here-unto subscribed my name and caused the great seal of the state of Iowa to be affixed. Done at Des Moines this sixth day of June in the year of our Lord two thousand thirteen.

Terry E. Branstad
Governor of Iowa

AT A GLANCE

Genova Technologies

LOCATION: Cedar Rapids, Iowa

FOUNDED: 1997

EMPLOYEES: 150 (90 full-time professionals and 60 contracted professionals)

IMPACT: More than \$50 million in awarded government contracts over the past three years.

ANNUAL SALES: \$32.3 million

OVERVIEW: A national systems, software, and IT services provider with specific expertise in the aerospace, defense, transportation, and health information technology industries.

Government Contracting Fuels Growth at Genova Technologies

Since 1997, Genova Technologies has established a proven reputation in the health care and defense sectors for highly effective and efficient software engineering services. Genova specializes in project management, custom software development, requirements capture, and multilevel IT consulting nationwide.

Genova has seen tremendous success over the years, growing the company from a small 14-person office in 2001 to more than 150 employees and \$32.3 million in revenue at the close of 2012.

In recognition of these accomplishments, Dawn Ainger, president and CEO of Cedar Rapids-based Genova, was recently awarded an Ernest & Young Entrepreneur of the Year Award in the Upper Midwest region. The award recognizes high-growth entrepreneurs who demonstrate excellence and success in innovation, financial performance, and personal commitment to their business.

One of the keys to this continued success is Genova's strong foothold in government contracting. In today's highly competitive and regulated government marketplace, the ability to win, keep, and perform government contracts is critical. Government contracting demands both a clear understanding of the process and a mastery of the many details that define each transaction and relationship.

"CIRAS has provided immeasurable support in many ways. They helped us understand and successfully navigate a myriad of small business laws, regulations, and government contracting requirements" states Doug Brock, controller at Genova Technologies. "They also showed us how programs such as Small Business Administration (SBA) 8a and 8m certifications and the Women-Owned Small Business (WOSB) status

will help us maximize our participation in government contracting."

Early on, Genova leveraged its expertise in software for avionics while working with client Rockwell Collins. This led to contacts with the Department of Defense. With Genova's proven record of service to the University of Iowa Hospitals and Clinics, they became a provider of IT solutions for the health and human services sector, developing strategies and plans for Centers for Medicare and Medicaid Services high-profile initiatives.

In 2007, Genova was the recipient of a competitive Blanket Purchase Agreement (BPA) for requirements analysis. "Our BPA is available to any U.S. Department of Health and Human Services agency," says Brock. Genova was also awarded a General Services Administration (GSA) IT Schedule 70. This is among the most

"CIRAS has provided immeasurable support in many ways. They helped us understand and successfully navigate a myriad of small business laws, regulations, and government contracting requirements"

—Doug Brock

widely used acquisition vehicles in the government and is the largest GSA Schedule in terms of number of contract holders and sales.

"Holding a GSA Schedule is a way to lower barriers of entry into the federal marketplace. It provides vendors with the preferred tool that the government uses to make purchases," explains Julie Fagle, a CIRAS government contracting specialist.

Estimates show that the U.S. government spent more than \$40 billion in 2012 with companies that were directly contracted through the GSA. With 23 percent of all government expenditures federally mandated to be made with small businesses, becoming a certified vendor for government buyers can prove extremely valuable and lead to increased sales and revenue.



Members of the Genova Technologies management team include (L to R) Wayne Schellhammer, chief operating officer/president, health care systems; Dawn Ainger, president and CEO; Scott Stimart, president, defense and commercial systems; Doug Brock, controller; and Janet Wardlaw, director of operations.

➤ For more information about government contracting, contact Julie Fagle at 319-310-8612 or jafagle@iastate.edu.

CIRAS Advances Lean Culture at Iowa Companies

CIRAS aims to connect national and international experts with Iowa companies. When it comes to Lean culture development, CIRAS is supporting companies around the state to develop and sustain their Lean culture through public workshops, training, coaching, and connections to experts.

“CIRAS brings true passion to help north Iowa manufacturing companies be competitive in the global workforce,” says Steve Schnieders, Stellar Industries’ operations manager.

Each year, employees from companies such as Stellar Industries, ALMACO, and Pella Corporation attend seminars sponsored by CIRAS and the Iowa Lean Consortium (ILC). Employees were so impressed with presenter Mike Hoseus, an internationally known Lean culture expert, they turned to CIRAS for help arranging on-site workshops.

During his visit to Pella, which has been on a Lean journey for 20 years, Hoseus met with the executive leadership team, senior leaders, and department managers, reaching 245 Pella employees.

A year after the workshop, Gina Singer, one of Pella’s continuous improvement managers, says she still hears people talk about building an army of problem solvers. Additionally, the way Hoseus introduced himself during the workshop struck a chord with managers. “He said when he was a manager he worked for his team. They didn’t work for him. You’ll now hear people introduce themselves at Pella and say ‘I work for X team.’ This is true servant leadership.”

Stellar Industries began its Lean culture journey eight years ago and hosted sessions with Hoseus for all employees

in 2012. “The most important thing we learned was...we need to develop a standard for problem solving and make it so everyone can participate,” Schnieders says.

Another takeaway for Stellar Industries’ employees was that it is important to recognize that employees’ small daily improvements impact the organization.

ALMACO invited Hoseus to meet with its employees after Justin Woods, quality and continuous improvement manager, heard Hoseus describe the exact scenario ALMACO was experiencing during a seminar cosponsored by CIRAS and the ILC.

“Mike did an excellent job of explaining why we needed to change. He also helped our Continuous Improvement Steering Committee develop a plan moving forward,” Woods says.

Today ALMACO is focusing on teaching problem solving companywide and educating leaders on Lean culture. “We have an improved focus on the customer. This has improved the quality of product we are delivering to our customers,” Woods says.

He adds that the Lean culture allows the company to improve systems and perform more consistently, resulting in improved cost-savings initiatives.

For all of these companies, a Lean culture means that employees and leadership strive to do better each day.

“We have an improved focus on the customer. This has improved the quality of product we are delivering to our customers.”
—Justin Woods

AT A GLANCE

ALMACO

LOCATION: Nevada, Iowa

FOUNDED: 1884

EMPLOYEES: About 275

OVERVIEW: ALMACO is a leading manufacturer of agricultural research equipment.

Pella Corporation

LOCATION: Pella, Iowa

FOUNDED: 1925

EMPLOYEES: About 6,000

OVERVIEW: Pella manufactures energy-efficient windows and doors for new construction, remodeling, and replacement projects in residential and commercial applications.

Stellar Industries

LOCATION: Garner, Iowa

FOUNDED: 1990

EMPLOYEES: About 270

OVERVIEW: Stellar Industries is an employee-owned and operated manufacturer of hydraulic truck-mounted equipment.



Additionally, respect for people in a Lean culture translates into challenging them intellectually. “Having a culture based on continuous improvement and respect for people will lead to a happy and tenured workforce,” Schnieders says.

Singer adds, “In a sustained Lean journey, continuous improvement is driven by everyone, every day.”

➤ For more information, contact Jeff Mohr at 515-450-7639 or jeffmohr@iastate.edu.

ISU Research Park Facility Improves Collaboration and Flexibility at Vermeer

In spring 2012, Vermeer opened a new facility at the Iowa State University Research Park in Ames. "We opened the facility not only because of opportunities with recruiting prospective team members, but also to collaborate with Iowa State to bring together industry and academia on specialized projects and research," says Sara Hunter, marketing assessment manager at Vermeer.

Since the facility opened, its 13 desks have been filled each day. Full-time team members in the Ames/Des Moines metro area can work remotely from the Ames office a few days a week rather than commuting to Pella. Team members from Pella also travel to Ames to meet with business partners from various parts of the state.

Vermeer has also increased its collaboration with the College of Engineering through student engineering capstone projects and has more than doubled the number of Iowa State students it hires for internships.

Vermeer has also increased its collaboration with the College of Engineering through student engineering capstone projects and has more than doubled the number of Iowa State students it hires for internships. The internship and capstone opportunities allow students to gain real-world experience, learn about Vermeer, and even secure part-time employment during the school year.

"We want students to understand what real projects are like at Vermeer, so if they decide to work for Vermeer they have already experienced our culture and the type of work they'll be doing," Hunter says.

On October 7, Vermeer brought its industrial and agricultural equipment on campus to give students a better understanding of how Vermeer products improve infrastructure, work farms and ranches, as well as manage natural resources around the world.

In recent years, CIRAS has collaborated with Vermeer on Lean product design, identified student capstone projects, and provided training at CIRAS workshops.



Cy stands next to equipment Vermeer showcased on campus in October to help students better understand the company and its products.



Environmental Engineering Research Laboratory (EERL)

The EERL is a service of the civil, construction, and environmental engineering department and provides chemical analysis and related training and consultation services in support of university-sponsored research. Documented quality control receives top priority and is made available to researchers wishing to verify the quality of results.

Example Applications

- Pollutant transport in groundwater
- Hg removal efficiencies using wet or dry scrubbers
- Hg levels in fish
- Levels of deleterious elements in biomass
- Trace element partitioning in coal combustion streams
- Chemical characterization of agricultural waste materials
- Pesticide concentrations in fish

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Exploring Iowa's Competitive Advantages in Manufacturing by Liesl Eathington

Iowa's competitive edge in manufacturing is evident from its high concentration of production jobs relative to other states. Iowa ranked third among the 50 states in its percentage of nonfarm jobs in manufacturing in 2011.

The underlying reasons for Iowa's manufacturing strengths are more difficult to discern. One widely held view is that low costs for labor, land, and other capital make Iowa an attractive location for manufacturing activity. Indeed, gross domestic product (GDP) data for Iowa's manufacturing sector reveal lower-than-average payments to key factors of production such as labor and capital.

The two largest components of GDP are compensation of employees and gross operating surplus. Employee compensation includes wages and salaries plus the value of employer-paid benefits. Gross operating surplus comprises payments to owners and investors, in the forms of proprietors' income and corporate profits. A small remaining portion of GDP (2.7 percent in Iowa) includes production and import taxes net of subsidies.

Figure 1 illustrates where Iowa and other states rank on average manufacturing compensation and gross operating surplus per job. States are classified as "high compensation" or "low compensation" if their average compensation ranks among the top or bottom half of states, respectively. Similarly, states are labeled as "high surplus" or "low surplus" based on a ranking of their average gross operating surplus per job. Iowa falls into the low compensation/low surplus category along with Arkansas, Kentucky, Mississippi, Missouri, South Dakota, and West Virginia, among others.

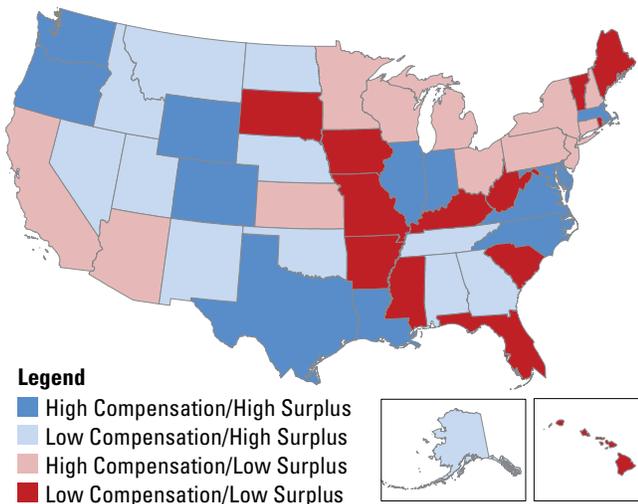


Figure 1. States Ranked by Average Employee Compensation and Gross Operating Surplus per Manufacturing Job

While Iowa's apparent status as a "low-cost" state seems a reasonable explanation for its high manufacturing employment concentrations, a more in-depth analysis of GDP by detailed industry challenges this simple explanation.

Figure 2 classifies Iowa's various manufacturing industries along the same two dimensions of GDP described above: average employee compensation and average gross operating surplus per job. An industry is classified as high compensation, low compensation, high surplus, and low surplus depending on Iowa's ranking among the states for that industry. Readers should note that the labels "high" and "low" are not used in absolute terms across industries, but only to describe Iowa's relative position for the given industry.

Industries listed in red represent areas of particular strength in Iowa's manufacturing sector, as determined by "location quotient" (LQ) analysis. Location quotients are obtained by dividing a state's percentage of jobs in a given industry by the national percentage of jobs in that industry. Hypothetically, in the absence of any geographic competitive advantages, the LQs for all states should equal one. A ratio exceeding one implies a competitive advantage in that industry. Iowa has two industries (machinery and food and related products) with LQs exceeding 2.0 and another five industries with LQs exceeding 1.25.

The simple schematic in Figure 2 quickly reveals that some of Iowa's most competitive manufacturing industries have higher average compensation and higher average surplus when compared to other states. Considering both business climate and quality of life factors, this is the most desirable quadrant from an economic development standpoint. The low compensation/high surplus and high compensation/low surplus categories are slightly less desirable because of implied trade-offs between workers and owners/investors. The low compensation/low surplus quadrant is the least desirable from a holistic economic development perspective.

<p>Low Compensation/High Surplus</p> <ul style="list-style-type: none"> Nonmetallic minerals Miscellaneous manufacturing Textiles and related products Paper Printing and related Chemicals 	<p>High Compensation/High Surplus</p> <ul style="list-style-type: none"> Machinery* Furniture and related products Food and beverage products* Plastics and rubber products
<p>Low Compensation/Low Surplus</p> <ul style="list-style-type: none"> Primary metals Fabricated metals Electrical equipment and appliances Transportation equipment Petroleum and coal products 	<p>High Compensation/Low Surplus</p> <ul style="list-style-type: none"> Wood products Computer and electronic products Apparel and leather products

Figure 2. Rankings for Iowa's Manufacturing Industries
 Note: Industries listed in red have employment LQs exceeding 1.25, and those with an asterisk have LQs exceeding 2.0.

This simple analysis suggests that Iowa's core competencies in manufacturing run much deeper than low cost structures. A comparatively low cost of doing business is just one of many advantages that may help attract and retain manufacturing firms in the future.

CIRAS and the College of Human Sciences Partner on Employee Wellness Program

While wellness programs in large corporations have shown positive impact, small and mid-sized companies have been unsure what to do about employee wellness, according to Mike O'Donnell, former CIRAS Economic Development Administration (EDA) program director and current Interim Manufacturing Extension Partnership (MEP) Director.

CIRAS had discovered the issue while conducting financial, social, and environmental assessments of businesses through the EDA University Center Program. "We found that companies were really good at human resource management, but they had many questions about employee wellness," O'Donnell explains. Questions included the following: Do the benefits outweigh the financial costs? Are employees interested? And what is the right type of program for a particular company?

To find answers, CIRAS launched an EDA-funded project in 2012 at three Iowa manufacturing companies—The Graphic Edge in Carroll, Rosenboom in Sheldon, and Timberline Manufacturing Co. in Marion—to develop wellness programs and validate their effectiveness.

College of Human Sciences Extension and Outreach specialists Ruth Litchfield, associate professor of food science and human nutrition, and Tim Griesdorn, assistant professor of human development and family studies, began the project by conducting health risk assessments. In-



Iowa State University researchers are working with three Iowa manufacturing companies, including Rosenboom in Sheldon, to improve employee wellness.

stead of just looking at a single indicator such as diet or exercise, the researchers took a holistic approach assessing physical, financial, and emotional health for 60 employees at each company.

Following these appraisals, 30 workers from each site were randomly selected to receive follow-up training and educational materials.

"One of our goals was to facilitate employees taking advantage of available employee benefits and resources in the community," Litchfield says. "For example, in one community we invited representatives from a new health club to provide a sample class at the worksite. We also worked to help the companies find ways to encourage physical activity, such as posting walking routes workers could use during breaks or making space for a stationary bicycle."

Educational materials offered guidance in reducing stress, managing finances, and developing healthy eating habits.

The researchers also demonstrated exercises for improving flexibility. The results of the health appraisals had revealed that many workers had poor or low flexibility in their arms, according to Litchfield. "Poor flexibility can lead to injuries on the job," she explains, "but it also has long-term health implications that could affect their ability to live independently in later life."

The attention to employees' wellness has sparked interest in such programs, according to Kathryn Langel, human resources at Rosenboom. "Working with Iowa State has helped generate interest in wellness programs," she says.

AT A GLANCE

The Graphic Edge

LOCATION: Carroll, Iowa

FOUNDED: 1989

EMPLOYEES: More than 180

OVERVIEW: A market leader in the custom screen printing and embroidery industry providing garments for teams, schools, organizations, businesses, and individuals.

Rosenboom

LOCATION: Sheldon, Iowa

FOUNDED: 1974

EMPLOYEES: About 300

OVERVIEW: A family-owned leading manufacturer of custom hydraulic cylinders.

Timberline Manufacturing Co.

LOCATION: Marion, Iowa

FOUNDED: 1993

EMPLOYEES: About 130

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

"We hope to use this as a springboard for the possibility of implementing our own wellness program down the road. The employees who participate in the program are excited about it, and others are interested in becoming a part of it."

In January, Litchfield and Griesdorn will do follow-up appraisals to assess effects of the program on the workers and also collect health claim and absenteeism records. The results should help companies make more informed decisions about wellness programs and their impact on employee well-being and the company's bottom line. This is particularly relevant as the Affordable Care Act is implemented, allowing employers to offer more incentives for wellness programs.

Beginning this fall, CIRAS and Human Sciences Extension and Outreach are partnering to make wellness programs available to businesses statewide.

➤ For more information, contact Ruth Litchfield at 515-294-9484 or litch@iastate.edu.

Q&A with Sarah Rajala, College of Engineering Dean

Sarah Rajala became the 12th dean of Iowa State University's College of Engineering in April. After her first few months on the job, CIRAS spoke with Dean Rajala about her vision for the college, current research initiatives, and working with Iowa businesses and industry.

Q What is your vision for the College of Engineering?

A Iowa State University's College of Engineering is recognized nationally and internationally for the quality of education we provide our students, the high caliber of our faculty and staff, and the impact of their scholarly research. Our success comes from a strong commitment to our land-grant mission, conducting research that addresses society's most challenging problems, and ensuring high ethical standards and a strong work ethic.

Continuing to achieve excellence will require us to deliver the best education to our students utilizing new pedagogy and technology, conduct cutting-edge research that improves quality of life, and continue to build our partnerships and collaboration with corporations, government entities, and other educational institutions. With growing undergraduate enrollments, we will need to recruit more faculty and graduate students, and expand and upgrade our facilities.

Q What opportunities are you most excited about at Iowa State and CIRAS?

A I am excited to have the opportunity to assist the College of Engineering in its move to become the premier engineering program among public universities. We have everything it takes to achieve this vision—it's a great place to be in.

CIRAS is an important part of the college and plays a key role in achieving the outreach,

engagement, and service aspect of our land-grant mission. CIRAS has a long history assisting Iowa businesses and communities. For 50 years, it has been improving the quality of life in Iowa through education, applied research, and technical assistance. Last year, CIRAS and its partners assisted more than 1,300 companies with upwards of \$400 million in total impact reported. I look forward to getting to know the folks at CIRAS better and continuing to look for new opportunities in the future.

Q How do you see CIRAS contributing to the college's goals?

A CIRAS is part of the college's corporate team, which includes Engineering Career Services, Engineering-LAS Online Learning (ELO), and our industry-based research centers and projects. Two areas that are extremely important are CIRAS' ability to help connect the college to industry in Iowa for our students' capstone design projects and internships as well as identifying opportunities for industry-based research that our faculty may not be aware of so that they can become engaged in those opportunities.

Q What are some of the college's new programs that can benefit Iowa businesses?

A We are interested in expanding our collaborations with companies to enhance educational and workforce opportunities for our students, assisting in the lifelong learning of corporate employees through ELO (www.elo.iastate.edu), and identifying new industry-based research.

We are working to increase corporate involvement in our students' capstone design experiences. It is important for the students to engage in solving real-world engineering challenges as part of their education. The capstone design projects and industry internships are an important component of our students' education, as well as providing industry early access to our engineering talent.

We also have a growing online program that provides continuing education opportunities for employees of Iowa companies and around the world. Employees can take classes online for professional development or to pursue a certificate or a master's degree.

Q What college research initiatives could have a big impact on Iowa companies and/or the Iowa economy?

A We want to take the research conducted at Iowa State and find ways to transfer that technology to existing companies or to create new companies. Two initiatives that focus on this are the Engineering Research Center for Biorenewable Chemicals (CBiRC) and the Bioeconomy Institute.

CBiRC provides a foundation for biorenewable, resource-based industrial chemical production. In addition to its educational and research mission, CBiRC partners with large corporations, start-up companies, and small businesses.

The Bioeconomy Institute is a university-wide initiative focused

AT A GLANCE



Sarah Rajala

IOWA STATE START DATE: April 1, 2013

PREVIOUS JOBS: Dean of the Bagley College of Engineering (2008–2013) and department chair of electrical and computer engineering (2006–2008) at Mississippi State University; associate dean for research and graduate programs (2002–2006) and associate dean for academic affairs (1996–2001) in the College of Engineering at North Carolina State University

EDUCATION: Bachelor's degree in electrical engineering from Michigan Technological University, MS and PhD degrees from Rice University

ACHIEVEMENTS: Fellow of the American Association for the Advancement of Science, American Society for Engineering Education (ASEE), and Institute of Electrical and Electronics Engineers; past president of ASEE; chair of the Global Engineering Deans Council

on biorenewable resources for the production of chemicals, fuels, materials, and energy. A major focus of this institute is the transfer of technology from basic research in the laboratory to the marketplace.

Additionally, Iowa State's Institute for Transportation conducts research, delivers education, and provides service to the Iowa Department of Transportation, as well as to Iowa companies.

Q What do you see as the college's role in Iowa's economic development?

A First and foremost, we will continue to provide the engineering workforce for the state. Iowa State is one of the top 10 producers of engineering graduates in the nation, so there's a huge talent pool that industry in Iowa can tap into. Of course, the other aspect where we can excel is in the transfer of technology from research at the university to new or existing businesses.

Q How might your past outreach experience with businesses contribute to your and the college's efforts?

A At both North Carolina State University and Mississippi State University, the Colleges of Engineering played a key role in economic development. The colleges worked closely with the states and state agencies to recruit new companies to the state. The expertise of the faculty, staff, students, and administrators was often key in the decision-making process for a company to

start a new facility or to relocate to the state.

Since I am new to Iowa, I do not know the extent to which the college participates in economic development, but I want to build relationships with state officials and agencies and make sure they are aware of what we have to offer. If there are opportunities for us [the college] to be more impactful, we are happy to do so.

CIRAS Awarded Grant to Establish Advanced Manufacturing Innovation Network

The U.S. Economic Development Administration's (EDA) 2013 University Center Program competition recently awarded Iowa State University a \$1,250,000 grant over five years to establish the CIRAS Advanced Manufacturing Innovation Network.

The program's goal is to address gaps in Iowa's economic ecosystem through a three-step process. The team will perform a SWOT (strengths, weaknesses, opportunities, and threats) analysis of selected advanced manufacturing industry sectors; facilitate innovation summits for university faculty, industry, and Iowa leaders to create innovative ideas; and incubate ideas to promote commercialization and business growth.

"The EDA University Center Program is an integral component of Iowa State University's effort to drive innovation-based economic development and job creation in Iowa," says CIRAS Director Ron Cox. "The EDA-ISU partnership will help match university experts with advanced manufacturing companies to provide the innovation and technology solutions Iowa industry needs to remain competitive in a global economy."

Iowa State is one of 19 colleges and universities in 10 states receiving a total of \$12.5 million in new EDA funding to run five-year programs that will leverage university assets to promote American innovation and strengthen regional economies.

Since 1980, the Iowa EDA University Center has operated within CIRAS. This new funding at Iowa State will help generate and retain jobs as well as stimulate industrial and commercial growth in Iowa.

For more information, contact Shankar Srinivasan, Iowa EDA University Center Program Director, at 515-294-9461 or srigshan@iastate.edu.

Siouxland Regional Lean Conference: Organizational Engagement in Lean

Looking for an affordable, value-added conference to support your company's new or existing Lean development? The Siouxland Lean Consortium (SLC), CIRAS, and Western Iowa Tech Community College (WITCC) are sponsoring the first Siouxland Regional Lean Conference on January 15, 2014, in Sioux City, Iowa.

The one-day conference will focus on organizational engagement in Lean development with five different tracks:

1. Beginner track for company leaders to discover the basics of Lean development
2. Tools track to learn about using 5S methodology and other Lean tools
3. Concepts track that goes beyond Lean tools
4. Thinking track for companies that understand Lean development, but who still need to build or enhance a Lean business system
5. Culture track to gain techniques and tools for dealing with people, getting frontline employees and managers involved, and getting buy-in from employees

Keynote speakers include:

- Mike Wroblewski – North American director of the Kaizen Institute and founder of the gotboondoggle blog
- Denny Van Zanten – Pella Corporation Senior Group Vice President of product development, quality, national account sales, and customer service

Networking breaks will be included for attendees to gather in a roundtable format to discuss hot topics regarding Lean development.

Register by calling WITCC at 712-274-6418. The cost is \$125 per person.

For more information, visit the website www.siuoxlandlean.com/#!conference; contact Mike Thelen, cofounder of SLC and continuous improvement training manager at Wells Enterprises, at 712-548-5667 or mdthelen@bluebunny.com; or contact Jeff Mohr, CIRAS project manager, at 515-450-7639 or jeffmohr@iastate.edu.



FabTech 2013

FabTech 2013 is just around the corner— November 20–21, 2013. With more than 1,500 exhibitors covering more than 550,000 square feet of floor space at McCormick place in Chicago, this year's event is promised to be the best ever. Leave the driving to us and ride the CIRAS bus to see North America's largest metal forming, fabrication, welding, automation, and finishing event.

For more information, contact Jim Poe at 515-294-1507 or jrpoe@iastate.edu.

- **2013 Revolving Loan Fund Workshops**
November 12 or 13, 2013 • 9:00 a.m.–3:00 p.m.
Waterloo (11/12) or Ottumwa (11/13), Iowa
- **Basic Sausage Short Course**
November 12–14, 2013 • 8:00 a.m.–1:00 p.m.
Ames, Iowa
- **ABI Local Leaders Forum**
November 14, 2013 • 1:00 p.m.–4:00 p.m.
Callender, Iowa
- **FABTECH 2013: Networking and Product Show**
(CIRAS sponsored bus)
November 20–21, 2013
6:00 a.m. Depart Ames
(return 11/21 at 8:00 p.m.)
8:30 a.m. Depart Coralville
(return 11/21 at 5:30 p.m.)
Chicago, Illinois
- **2013 Iowa Women of Innovation**
November 21, 2013 • 4:30 p.m.–8:00 p.m.
Altoona, Iowa
- **5S Workshop: Going Below the Surface**
November 22, 2013 • 9:00 a.m.–12:00 noon
West Des Moines, Iowa
- **ERP Systems: How to Avoid the Money Pit**
December 5, 2013 • 9:00 a.m.–3:00 p.m.
Altoona, Iowa
- **ABI Local Leaders Forum**
December 12, 2013 • 1:00 p.m.–4:00 p.m.
Cedar Falls/Waterloo, Iowa
- **Cured Meat Short Course**
January 14–16, 2014 • 8:00 a.m.–12:00 noon
Ames, Iowa
- **2014 Siouxland Regional Lean Conference**
January 15, 2014 • 8:00 a.m.–5:00 p.m.
Sioux City, Iowa
- **ABI Legislative Briefing**
January 15, 2014 • 5:30 p.m.–7:30 p.m.
Des Moines, Iowa

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



Since 1963, we have been improving the profitability of businesses. We partner with companies and communities to help them prosper and grow. A typical partner achieves a 2,000 percent return on its investment—an astonishing \$20 of impact for every \$1 invested. A vast network of university and industry experts brings years of professional experience to CIRAS, making us a leading integrator of solutions in Iowa, contributing more than \$1.8 billion of reported impact during the past five years.

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Barton, Leah	515-291-0733	bartonl@iastate.edu	Waterloo									•
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CIRAS PARTNERS

Iowa State University
 Center for Crops Utilization Research
 College of Engineering
 Department of Environmental Health and Safety
 Engineering Career Services

Engineering-LAS Online Learning
 Industrial Assessment Center
 Institute for Physical Research and Technology
 Meat Science Extension

Des Moines Area Community College
 Iowa Area Development Group
 Iowa Association of Business and Industry
 Iowa Business Council
 Iowa Central Community College
 Iowa Farm Bureau Federation
 North Iowa Area Community College



THE INNOVATION CYCLE

Leveraging the Innovation Cycle: Discovery by Pete Nadolny

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, the second of those four phases, Discovery, is discussed in greater detail.

Recall that in the Definition phase, an idea is refined into a concept for a new product, service, marketing message, process change, or business model. The concept is a document that clearly defines an opportunity or problem statement, the target customer, and the proposed value proposition of the new solution. It also addresses the market size, competitive landscape, and strategic fit to the firm. Likely the initial concept will be inaccurate, so capturing this information early enables the team to refine the concept throughout the innovation cycle, resulting in a robust solution to deliver to the customer.

In the Discovery phase, the concept is tested to determine if it provides value to the customer that justifies payment and value to the company (i.e., profit) that justifies commercialization. This is an iterative process whereby the concept is initially shared verbally and physically via prototypes or pilot trials. Throughout this process, the concept is refined based on feedback from the customer and the internal team. What works; what doesn't? Is there evidence the customer will buy at your desired price or should you kill the project?

In parallel to customer feedback, internal and competitive assessments need to occur. The company must evaluate how to supply the concept. Do you have the correct infrastructure, technology, and capability to reliably deliver the solution? How do you compare to the competition on the aspects valued by the customer? Can you be profitable now and in the future? Why? These are questions that need to be answered in the Discovery phase that ultimately lead to proof of concept.

At the end of the Discovery phase, you should have a robust concept that has been proven internally and in the marketplace. The financial, strategic, and competitive analysis should be favorable, and the team should be comfortable taking the risk to develop the concept since value has been proven.

Organizations that feel they could benefit from a more systematic approach to the Discovery phase should start by examining how they determine the value of a new concept. Are the above questions considered prior to investment or are they considered after significant development costs are incurred? If you would like further information on how CIRAS can help you become more innovative, please contact your CIRAS account manager.



To participate in the innovation discussion, join our LinkedIn group at [linkd.in/12tVly1](https://www.linkedin.com/groups?gid=12tVly1).