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CENTER FOR INDUSTRIAL RESEARCH AND SERVICE
Partnering with the Iowa Manufacturing Extension Partnership

IOWA STATE UNIVERSITY
University Extension

IOWA STATE UNIVERSITY
College of Engineering

CIRAS NEWS

INSIDE

CIRAS productivity team gives Schumacher Elevator a lift

Firm returns favor in team synergy

By Dennis Smith, Engineering Communications and Marketing

Call it growing pains.

Over the last ten years, Schumacher Elevator, a Denver, Iowa-based service provider and manufacturer of custom elevators, had made a number of changes to expand its business. In 2000, for example, it consolidated five units into a single new production facility, followed by the installation of an SAP enterprise resource planning system to help the family-owned firm compete with larger companies.

These and other decisions were paying off in increased sales and diversification of the company's client base. But big changes brought big challenges—especially in communications between a sales force aggressively courting new customers and an engineering department focused on maintaining the standards of service and design that had distinguished Schumacher throughout its history.

"If a company goes through a growth spurt," notes CIRAS Industrial Specialist Jeff Mohr, "often they'll find they've outgrown systems that were previously adequate."

CIRAS's Mike Willett had long been acquainted with Schumacher through past projects and the Cedar Valley Manufacturers Association. CIRAS had assisted the firm with the 2000 design of its new production facility; Willett also participated in an ISO 9000 quality assurance project for Schumacher in 2003. His familiarity with Schumacher and its leadership gave team members early insight into the company's situation.

Mike Willett, CIRAS (center), learns about the process from the perspective of Jason Lobeck (seated) and Tom Miller.

"The delivery dates sales was giving engineering weren't being met. This isn't unusual in firms where engineering design is part of a custom product," Willett remarks, expanding on Mohr's perspective. "If Schumacher had just done stock elevators, they wouldn't have had this problem. But they specialize in a niche custom market. So just about every job they do is different."

Vice-president and CFO Jeff Schumacher had seen the problem coming for some time. He realized that the increasing bottlenecks between sales, engineering, and production were due not to any one person or unit, but instead to a host of factors that transcended individuals.

Schumacher had earned his master's in industrial manufacturing systems engineering in 1990 from the University of Iowa, followed by an Iowa MBA in 1998. As such, he counts himself among the cohort of young executives steeped in the management theories of the eighties and nineties who, rather than impose top-down solutions, express confidence in employees to find their own answers—in this case, with help from a CIRAS team comprised of Willett, Mohr, and Tim Sullivan.

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CIRAS Mission Statement

The mission of CIRAS is to enhance the performance of Iowa industry through education and technology-based services.

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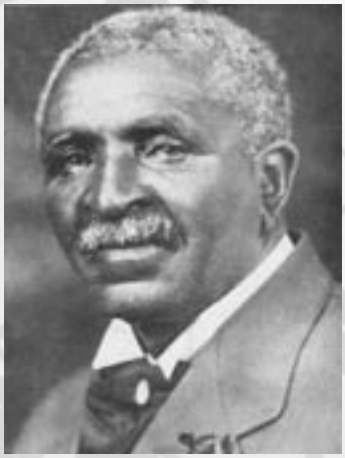
BIOWA Development Association and BIO announce G. W. Carver Award for Innovation in Industrial Biotechnology

BIOWA Development Association, in partnership with the Biotechnology Industry Organization (BIO), has announced the creation of a new George Washington Carver Award and Prize for Innovation in Industrial Biotechnology. The annual award will recognize significant contributions in a field integral to the advancement of a biobased economy, including industrial biotechnology, biological engineering, environmental science, economics, and education. "The award will also emphasize the important goal of using biotech innovation to develop a sustainable biobased economy and will encourage real solutions based on biotech processes," said BIO President Jim Greenwood in an announcement at the World Congress on Industrial Biotechnology and Bioprocessing in Orlando, Florida, on April 21.



George Washington Carver

Greenwood noted that the announcement of the new award came the day before the 35th anniversary of the first Earth Day. "As we pause to celebrate this Earth Day, we in the biotechnology industry should take time to reflect upon the contributions we've made to preserve our world by developing technologies that help save energy, reduce toxic chemical pollution, and replace fossil fuels with renewable resources," he said. "I believe that the use of industrial biotechnology to produce renewable energy and chemicals from agricultural feedstocks can make a huge contribution to efforts to reduce greenhouse gas emissions and help farmers become part of the solution that Carver envisioned."

According to Georg Anderl, president of BIOWA Development Association, the George Washington Carver bioeconomy prize not only honors the beliefs, innovations, and stewardship of Carver, but also his vision that an economy based on biorenewable crops was realistic. "It is very fitting for Iowans to be involved in developing this award because George Washington Carver studied at Simpson College in Indianola, Iowa, and at Iowa State University," says Anderl.

In his announcement, Greenwood explained that George Washington Carver is considered the father of biobased products. "By honoring those who have worked successfully toward this goal, this award will serve as a lasting memorial to the original vision of George Washington Carver who, over a century ago, pioneered the creation and commercialization of sustainable biobased products, materials, and energy derived from renewable agricultural feedstocks," said Greenwood.

"We are pleased to announce this award," Jill Euken, executive director of BIOWA Development Association, said. "At this point, we are working closely with BIO to identify the specifics of the award including application process and deadlines. As that information becomes available, it will be posted on the BIOWA Web site at http://www.biowa.us/."

BIO represents more than 1,000 biotechnology companies, academic institutions, state biotechnology centers, and related organizations in all 50 U.S. states and 33 other nations. BIO members are involved in the research and development of health-care, agricultural, industrial, and environmental biotechnology products.

BIOWA Development Association is a trade association of biobased industries, academia, and public interests who are working to build the bioeconomy in Iowa. BIOWA works to develop regional biorefineries, biobased businesses, and investment opportunities in biobased businesses for Iowans.

For more information, please contact Jill Euken at 712-769-2600; jeuken@ciras.iastate.edu.

New distance courses

By Joe Monahan, EDE

Iowa State has added three more programs to its distance education roster for engineers who want to earn certification or advanced degrees without traveling to campus. Various delivery methods are used (e.g., Internet streaming or CD-ROM), creating flexibility for students.

It's now possible to get certified in systems engineering or to earn a master's degree in industrial engineering or information assurance. Here's a summary of the new distance education offerings.

Systems Engineering Certificate Program

The Systems Engineering Certificate Program was developed for engineers, regardless of undergraduate discipline, and others seeking to increase their professional knowledge and advance their careers. It's constructed to help students develop the analytical abilities needed to design, evaluate, and manage complex systems involving many components and demanding specifications. The intent of the program is to extend the ability of engineers to work across disciplinary boundaries and to develop the engineering management capabilities needed in today's work environment.

Master's of Science in Industrial Engineering

The master's of science in industrial engineering offers education and research programs that address fundamental issues relating to productivity, cost, quality, and lead-time. These programs focus on engineering management, operations research, manufacturing, human factors, and enterprise computing.

Enterprise Computing and Information Engineering

Enterprise computing and information engineering is focused on advanced studies in the principles and practices of information engineering for enterprise-wide systems. The main research areas include engineering methods and information technology used to design, analyze, and implement scalable enterprise systems. Courses are offered in e-commerce systems engineering, data mining and knowledge discovery, enterprise modeling and integration, and manufacturing information systems.

Manufacturing Systems Engineering

The focus of manufacturing systems engineering is on the development and application of tools and methods that support the product realization process. Main research areas include the design/manufacturing interface, manufacturing processes, and systems integration and design. Courses are offered in rapid prototyping, CAD/CAM, concurrent engineering, automation, and quality control.

Applied Operations Research

Applied operations research is focused on the development and application of mathematical tools and models to problems of a quantitative nature. Main research areas include the design and analysis of quantitative models for problems in industrial, commercial, and governmental systems and their operations; the development of methods and techniques, which are used in the design and analysis of models; and the attainment of the underlying theories for the methods and techniques.

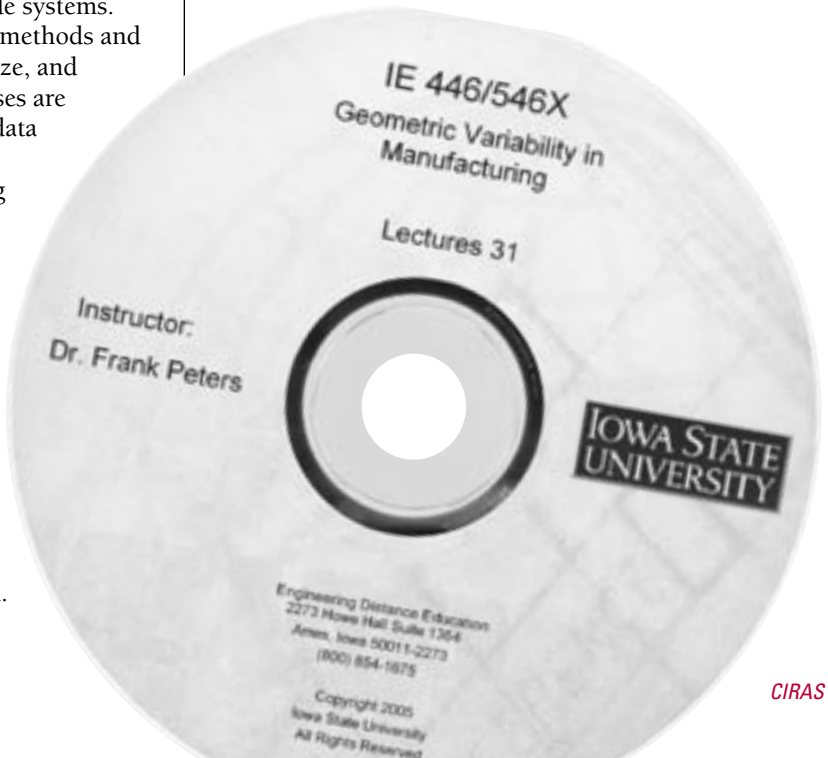
Information Assurance Graduate Program

The master's degree in information assurance is designed for students with an interest in stopping computer hacking by improving computer security systems. The interdisciplinary program involves six areas in three colleges. Each student has a "home department." While all students complete a common core set of courses, there is an opportunity to specialize in an area of information assurance supported by the student's home department.

For example, a person with an interest in network security will likely come from the electrical and computer engineering department and will have primarily technical elective classes to complete the master's degree. A person coming in from the political science department will have fewer technical electives and will focus more on the policy and social issues surrounding information assurance.

The program is one of a few information assurance programs in the nation.

For more information on these programs or to enroll in a course, visit the Web site at www.ede.iastate.edu or call EDE at 515-294-7470.



Making Iowa stronger

Collaborative efforts to successfully improve Iowa's economy have been highlighted by the Iowa Coalition for Innovation & Growth (ICIG) for 2005.

The purpose of ICIG is to establish a collaborative structure for coordinating the identification of economic priorities and the process for moving those priorities to reality. The coalition, established in 2001 by the Iowa Business Council and co-administered by the Iowa Chamber Alliance, works to competitively position Iowa as a world leader in the new economy by encouraging research, technology, business innovation, and growth throughout the state. Membership includes persons and organizations that desire and will work for a stronger economy in Iowa.

According to an Iowa Business Council spokesperson, "the ICIG moves into 2005 with increasing success and participation of individuals from across the state at even higher levels. ICIG oversees various 'Hot Teams,' which are devoted to addressing specific goals and outcomes and function purposefully to bring about substantive change as they meet throughout the year." ICIG currently has four Hot Teams that are making great strides on vital issues. Hot Teams include

- Advanced Manufacturing Research and Collaboration Cluster (AMRCC)
  Chair: David Corbin, Vermeer Manufacturing
- Entrepreneurial Formation
  Chair: Kurt Heiar, Regena Corporation
- Business Development and Processes
  Chair: Karin Peterson, Pella Corporation
- Health Care Lean
  Chair: Vince Newendorp, Vermeer Manufacturing

The AMRCC Hot Team promotes the use of advanced technologies, engineering, and processes to Iowa businesses. It conducts collaborative research and provides user sharing of technologies and best practices to make Iowa the leader in engineering and advanced manufacturing. Consisting of Iowa end-product manufacturers, their Iowa suppliers, and representatives from Iowa's Regent universities and community colleges, there are four working groups: (1) biomass; (2) product development tools and technology; (3) virtual communities of practice; and (4) Lean Enterprise. The AMRCC board and its working groups have developed actionable steps and established key measures of success. A Web site has been created to share their expertise, www.amrcc.com. Chair Dave Corbin said, "The Web site is increasingly popular; we're currently experiencing about 2,000 visitors per month."

Creating a statewide network of entrepreneurs, potential investors, and service providers is the function of the Entrepreneurial Formation Hot Team. "We want to connect people to foster business growth from start-up to the early stages," explained Chair Kurt Heiar of Regena Corporation. "This has been the reason behind our Iowa Entrepreneur Network Web site, www.iowaentrepreneur.org." The site serves as a one-stop information and networking resource for both Iowa entrepreneurs and investors. Established in 2004, the site now hosts an average of 1,500 visitors per month. To increase visibility and awareness of existing resources in 2005, this Hot Team will be creating a speakers bureau, holding a statewide conference for entrepreneurs, and traveling the state visiting with communities to encourage entrepreneurial formation.

The Business Development and Processes Hot Team currently is focused on introducing Lean Enterprise to state government agencies to improve the grants/licenses/permits application and approval processes, thereby removing barriers to developing and growing Iowa businesses. Initial results have been exceptional. Lean experts from team industry members have partnered with the Iowa Department of Natural Resources and the Iowa Department of Economic Development and are about to conduct pilot projects with Iowa Workforce Development.

A Health Care Lean Hot Team is focusing on introducing Lean Enterprises to health care organizations across the state and staying the course until Lean Enterprise is embedded in the culture of health care. With Lean as the tool to eliminate waste and free up resources for more value-added functions, workforce shortages can be addressed as well as quality and cost reduction for delivery of services. Thus far, Lean Enterprise has been piloted by three Iowa hospitals with positive results, and other health care organizations are considering pilot projects. The Hot Team will also be benchmarking Lean implementation in health care settings across the country and will continue to seek Iowa companies practicing Lean who would be willing to mentor and/or resource hospitals in their area.

"We're amazed by the results the coalition and its Hot Teams of volunteers have achieved to date and excited by the direction moving forward," said Dave Roederer, executive director of the Iowa chamber. "With the growth in ICIG interest and activity, it definitely won't be 'business as usual' for 2005."

For more information on the ICIG and Hot Teams, please visit the Iowa Business Council Web site at www.iowabusinesscouncil.com/ibc8.html.

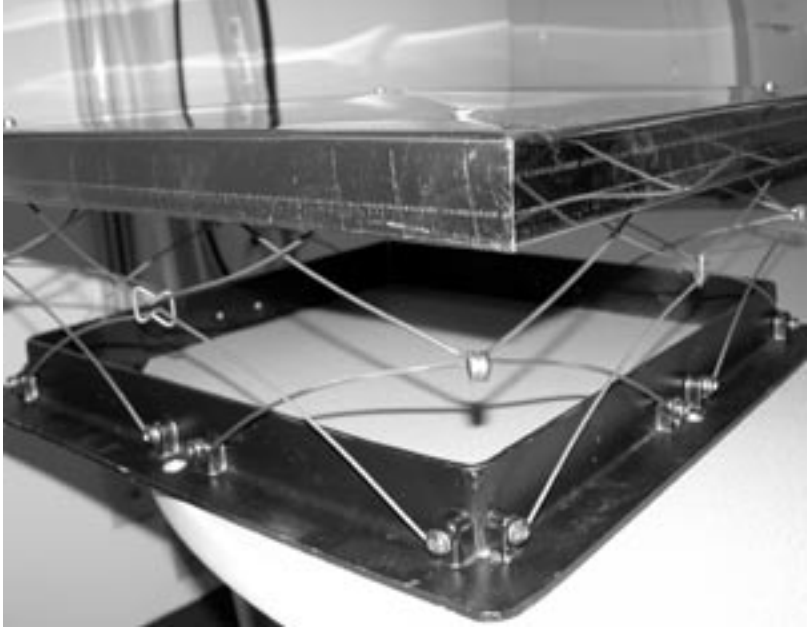
Calling in the materials experts

By Robert Mills, Communications Specialist, IPRT

Solving design and manufacturing problems often involves answering difficult questions about materials. What is the exact composition of a material? Is the material defective, and, if so, what caused the defects? What is causing corrosion? What's the best way to heat treat a part? Which is the best, most cost-effective material to use?

Metallurgists in the materials assistance group of the Institute for Physical Research and Technology at Iowa State University can help answer these and just about any other materials questions. Since 1993, the group has leveraged the world-class expertise and facilities of Iowa State and the Ames Laboratory to solve the materials problems of Iowa companies. With a staff dedicated to working with Iowa companies, the group completes over 50 projects each year, many in concert with CIRAS. IPRT's materials scientists provide short-term assistance—up to 40 hours—on nonroutine materials problems.

The group offers services that cover just about all aspects of metals and alloys. The metallurgists can help identify, select, and verify materials as well as characterize microstructures, analyze chemical composition, and prepare and fabricate advanced materials. They can also perform mechanical testing and characterization and optical and electron microscopy, and they can identify and classify manufacturing defects.



Metallurgists from IPRT assisted Copperfield Chimney Supply, Inc., of Fairfield, Iowa, in confirming a safe design of its spring-activated chimney cover. IPRT's materials experts are available to help Iowa companies solve nonroutine materials problems.

The IPRT scientists are also proficient in many materials processes, including heat treating and powder metallurgy processing and fabrication, and are well versed in materials cleaning, finishing, and coatings as well as joining technologies such as welding, brazing, and soldering. They can assist in understanding and applying alternative or innovative materials and materials processing.

IPRT's materials experts often work with CIRAS engineers to help Iowa companies. For instance, Copperfield Chimney Supply, Inc., of Fairfield, Iowa, came to Iowa State for assistance designing a spring-activated chimney cover. Engineers from CIRAS worked on the product design and called on Paul Berge, an IPRT metallurgist, for assistance with evaluating a critical component.

The covers have a unique design in that they sit horizontally on the chimney top and are raised when the chimney is in use and lowered when it is not. Springs hold the cover in the "up" position, but the heat of a chimney fire could cause the springs to fail. In that case, a "fusible link" in the cover triggers a safety mechanism to prevent it from closing. The fusible links are pieces of metal designed to fail at a specific temperature. Berge determined that the links used in the Copperfield design were performing as specified, confirming that the temperature at which the links operated was accurate and that the design of the cover was sound.

IPRT's metallurgists are frequently called upon to solve complex materials problems. Wells Dairy Inc., the dairy

About IPRT Company Assistance

IPRT Company Assistance provides access to world-class expertise and equipment to help Iowa manufacturers and entrepreneurs address technical problems and R&D needs. IPRT is a network of scientific research centers at Iowa State University and has been assisting companies from all corners of Iowa since 1987. Each year IPRT helps about 200 firms—from one-person start-ups to Fortune 500 corporations—solve scientific and engineering problems.

In addition to materials assistance, IPRT Company Assistance also has expertise in nondestructive evaluation and helps arrange contract research projects with Iowa companies. Like the materials group, the NDE experts focus on short-term technical assistance, while the contract research group facilitates research projects with experts from Iowa State and the Ames Laboratory.

processor located in Le Mars, Iowa, came to IPRT for help discovering the cause of a small leak that allowed ammonia to escape from an aluminum freezer plate.

The company located a defect in the plates but couldn't determine its cause. Using a sample supplied by the company, Berge analyzed the defect and determined it was most likely caused by the welding process used to join the aluminum. Berge made suggestions to correct the problem, which were then implemented by Wells Dairy. The company reports that no ammonia leaks have occurred since, and the safety of the operation of the plate freezer has greatly increased.

Help with manufacturing processes is another common reason Iowa companies come to IPRT. For instance, Jacobs Corporation of Harlan, Iowa, was having difficulty adjusting its heat-treating process for a critical part. Berge studied the problem and, using his years of experience in materials, suggested an improved method. Jacobs successfully tested the new process and reports that it is now marketing the part to different industries.

Getting help from IPRT's materials experts starts by contacting IPRT Company Assistance or working through a CIRAS or IMEP representative. Typically, the company needs to describe the problem, provide samples, and supply background information. IPRT scientists will then establish a project scope, complete the project, and provide results to the company.

For more information, contact IPRT Company Assistance-Materials at 800-884-8548, e-mail to icap@iastate.edu, or visit the Web at www.iprt.iastate.edu/assistance.

Understanding technologies is key to a manufacturer's success

CIRAS announces an opportunity for Iowa manufacturers to participate in an upcoming educational session about equipment located in two Iowa State University research labs. The event, scheduled for October 11, will involve demonstrations and opportunities for hands-on experience with equipment in the Rapid Manufacturing and Prototyping Lab and the Acoustics Lab. The following topics will be addressed:

- Applications using the laser scanner and coordinate measuring machine
- Creation of a solid model with scanned data
- Creating parts using rapid prototyping machines
- Noise control in manufacturing

Due to limited lab space, only 10 participants can be accommodated for this session. The program will begin at 10 a.m. and end at 3 p.m. Cost is $40, which includes lunch. Participants will park off campus and be shuttled to the event.

For more detailed information or to register, call John Roberts, CIRAS, at 515-294-0932; jroberts@ciras.iastate.edu.

Extension leader to retire

Stanley Johnson, vice provost for Iowa State University Extension and an internationally acclaimed agricultural economist, has announced he will retire later this year.

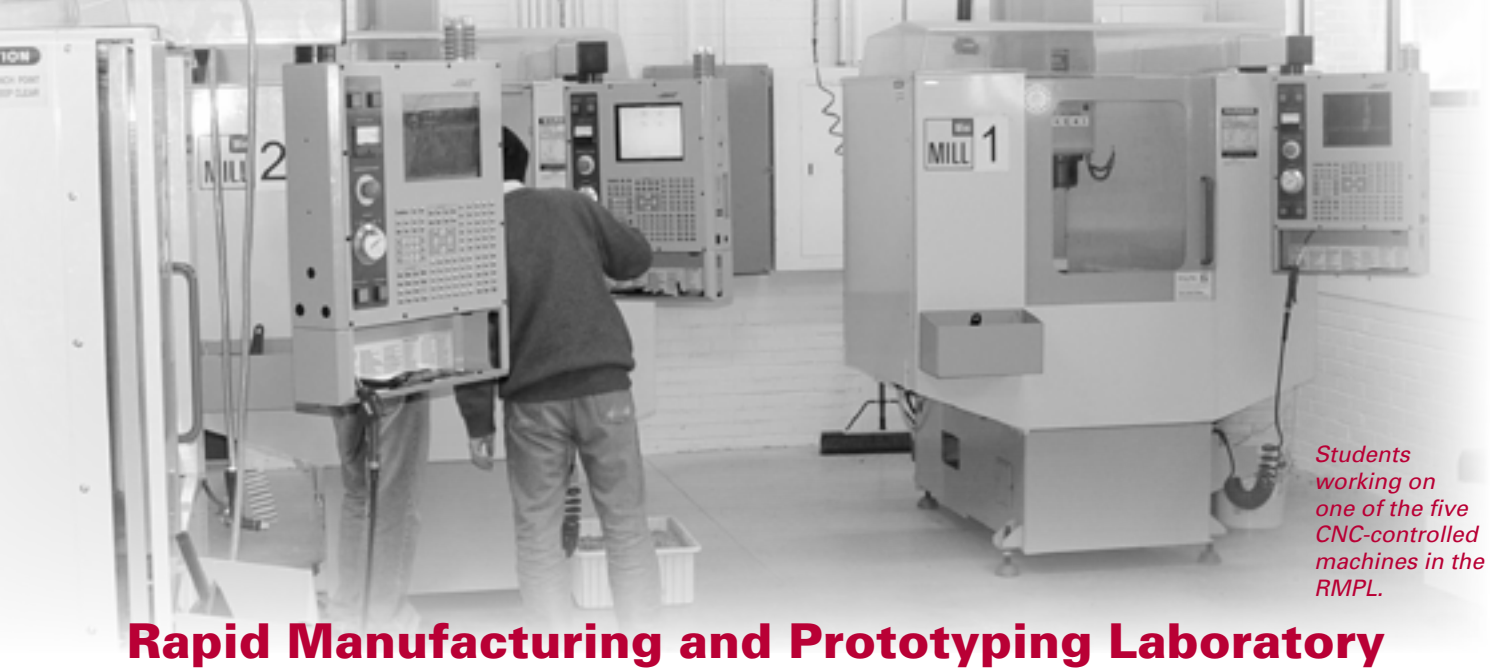
Johnson has served as vice provost for extension since 1996 and professor of economics since 1985. He is a Charles F. Curtiss Distinguished Professor in Agriculture. Prior to his appointment as head of extension, Johnson was director of the Center for Agricultural and Rural Development.

As vice provost for extension, Johnson oversees the network of services and offices in all 99 Iowa counties, with 1,300 employees.

Johnson received his PhD from Texas A&M University, College Station. Prior to joining the Iowa State faculty, he held faculty positions in economics and agricultural economics at the University of California, Berkeley; the University of California, Davis; the University of Missouri, Columbia; Purdue University; the University of Georgia; and the University of Connecticut.

His international service has included research and development projects in China, Colombia, Egypt, Indonesia, Mexico, Morocco, Russia, and Western Europe. He also has served since 1995 on the World Food Prize Advisory Board. He is the author of 11 books and has published more than 160 articles. In addition, he has supervised more than 150 master's and doctoral students.

Johnson will continue in his position until his successor is named, which will likely be this fall.



Students working on one of the five CNC-controlled machines in the RMPL.

Rapid Manufacturing and Prototyping Laboratory

By Matt Frank, Assistant Professor, Industrial and Manufacturing Systems Engineering

Iowa State's new Rapid Manufacturing and Prototyping Laboratory (RMPL) is a research and educational facility that houses some of the most advanced systems for creating new computer designs, physical models, and even functional parts. The objective of the laboratory is to educate about rapid processes and to serve as a research facility for new concepts in rapid manufacturing and prototyping. Located in Sweeney Hall on the Iowa State campus, the lab is a 3,000-square-foot facility with a high-bay laboratory containing various computer-controlled equipment, research office space, and a new computer laboratory housing reverse engineering (RE) and rapid prototyping (RP) machines. The computer laboratory has four modern PCs running the latest CAD/CAM and RE software including AutoCAD, ProEngineer, Solidworks, MasterCAM, SigmaNest, and RapidForm. This combination of software allows users to either create their own CAD drawings or create a 3D CAD model from a physical model of an existing part. The latter is done using either the new 3D laser scanner or the FARO arm. These devices can be used to capture data points on the surface of a part and regenerate the part in the "virtual" environment of the CAD system.

The laser scanner is the latest addition to the laboratory and is a very powerful piece of technology. CIRAS purchased the laser scanner this spring and decided to house it in the RMPL. The laser scanner is an advanced "camera" that projects a laser onto the surfaces of an object and records the location of all of the points it touches. Once all of the surfaces have been scanned, this set of thousands of points is input into a computer equipped with RE software (RapidForm 2004). Next, a complete CAD model of the part is produced. This CAD model can then be used to create prototypes and parts. The scanner can be used for various purposes, either for reverse engineering or even inspection. For example, if a user has an old component for which no CAD drawings exist, he/she can either take the time to measure and recreate the model or use the scanner to directly capture the data. The scanner can also be useful when working with parts that were carved or shaped from a material like wood or clay. In this situation, we are most often relegated to using the original carved model as a pattern and creating molds over and over until we have enough duplicates. Not only tedious, this process can be quite inaccurate as well. A better approach is to use a laser scanner to convert the complex shapes of the model into electronic data for unlimited use. Laser scanners are also useful for inspecting complex surfaces. If a part to be inspected has regular features, like flat surfaces or cylinders, it is often easier to measure with a set of calipers or a coordinate measuring machine (CMM). However, inspecting a complex surface may not be so simple. The laser scanner can be used to simply scan the surface to be measured and then compare that set of thousands of data points with a known CAD model of the part. The deviations from the true shape can then be calculated inside the RE software.

Once a CAD model is finished, users can send their file to one of two RP machines in the computer lab, a Stratasys 1650 Fused Deposition Modeler or a Z-Corp 402 3-Dimensional Printer. Once the user is satisfied with the design, he/she can create a set of numerical code (NC) instructions for one of five computer numerical controlled (CNC) machines in the main laboratory. The machines include three three-axis vertical milling machines, one four-axis vertical milling machine, and a plasma cutter. The computer lab is separated by a wall of windows but is connected to all machines via serial cable or the Ethernet. NC code from the computer lab is simply routed to the appropriate machines, which can be monitored or controlled from the computer lab.

RMPL research is investigating new methods for rapid prototyping and, more importantly, rapid manufacturing. The term rapid manufacturing implies a need to make functional parts, not just models. The major goal of the research is to eliminate the pre-process engineering time and skill

required to create a custom part. Therefore, the term rapid means fast and easy process planning, fixture planning, and setup planning for making one or a few functional parts.

The current focus is to exploit CNC machining as a rapid manufacturing process. While CNC machining is highly automated, it is not necessarily a rapid process because it requires a skilled person to determine the type and size of tools, the type of cutting operations, the sequence of operations, and a fixture design, which is often the most difficult part of the process. In the lab's current approach, a complex model is machined with layer-based machining operations from several orientations. Software is being developed to decide where these numerous orientations are, what tools are needed for each orientation, and how to automatically generate fixture support structures. The goal is to go directly from a CAD model to loading a piece of stock material and pushing the start button, without the hours of planning by a skilled machinist.

The rapid prototyping methods being developed in the RMPL are intended to satisfy needs currently unmet by existing RP technologies. The vision is to create new methods that can make truly functional parts with real manufacturing materials. This will give manufacturers a new option for dealing with very small batches of new product orders. For example, if only one or a few custom parts need to be created, the money and time spent process planning and creating jigs and fixtures cannot be recouped over hundreds or thousands of parts. So it might make sense to use a rapid manufacturing process that would need no setup time or planning. A push-button operation such as this could be used to create custom parts for industrial or even medical applications. Also, a rapid method could be used to create service parts for existing equipment. Rather than setting up production systems that have not been used in years or stocking hundreds or thousands of service parts, a manufacturer could simply rapid manufacture the parts as needed.

The RMPL facility is part of the Department of Industrial and Manufacturing Systems Engineering and is located at 1210 Sweeney Hall. CIRAS has full access to the RE and RP equipment and makes these technologies available to Iowa industry for demonstration and educational purposes. The IMSE faculty member in charge of the RMPL is Dr. Matt Frank, and the CIRAS contact for RE and RP is John Roberts.

For more information on the Rapid Manufacturing and Prototyping Laboratory, please contact John Roberts, CIRAS, at 515-294-0932; jroberts@ciras.iastate.edu.

Session will introduce lab

The new Rapid Manufacturing and Prototyping Laboratory (RMPL) at Iowa State University will assist the Center for Industrial Research and Service (CIRAS) with its efforts to educate manufacturers about engineering technologies. Manufacturers have access to the lab through CIRAS for education and demonstrations of the laser scanner, CMM, and rapid prototyping equipment. CIRAS will demonstrate the technologies with individual manufacturers and is also planning an educational session for a group of individuals this fall (details of the upcoming session can be found on page 7).

Iowa Procurement Technical Assistance Center (PTAC) is offering a new service

The Iowa PTAC has instituted a new service: the staff will help create on-line catalogs for clients who have obtained a U.S. General Service Administration (GSA) contract. All Federal Supply Schedule holders are required to input their product data information on the GSA Advantage on-line catalog system within six months of receiving their GSA Schedule Award. For most companies, this is a fairly straightforward process. If your firm offers a diverse set of products, however, this new service may help you meet the requirement more efficiently.

Iowa PTAC recently assisted Pfohl's Inc. by placing 40,000 items on the GSA schedule. John Kirpes, sales manager for Pfohl's, said that as a result of all of their products being on-line, "we received a call from a contracting officer… who saw we had a GSA contract number and called because we are offering more products than anyone else. They plan to order from us."

Iowa PTAC provides bid preparation, electronic commerce, market research, and post-award assistance to clients and also counsels them in preparing GSA always-open solicitations.

For more information on the Iowa PTAC, please contact Bruce Coney at 515-289-0281; bconey@ciras.iastate.edu, or Kathy Bryan at 515-289-0280; kbryan@ciras.iastate.edu.

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"We'd been interested in the Theory of Constraints," Schumacher recalls, "and Tim and Jeff Mohr had a number of workshops in the Cedar Falls CIRAS office. We had the opportunity to attend a session on project management, and it was like a light went on: everything we were hearing in that seminar was something we were living through every day in our business."

First described by Dr. Eliyahu Goldratt, the Theory of Constraints (TOC) is a process of continual improvement by which companies identify and address factors in the business model that limit their ability to achieve their goals. Broadly recognized as useful for tackling production issues such as bottlenecks, scheduling, and inventory overstocks, TOC has also been applied to process and project management issues similar to Schumacher's.

"The Theory of Constraints calls for a kind of paradigm shift in thinking about the company as a whole," says Tim Sullivan. "It's important that traditional departments come to a full understanding of their interdependence. They must realize that a solution for one group that causes a problem for another is not really a solution."

The essence of TOC, Sullivan maintains, lies in taking advantage of this mutually held, holistic understanding of the company to identify the small number of factors that are truly limiting global performance (as opposed to being local bottlenecks) and to develop robust solutions. Accordingly, the focus for TOC practitioners is not the theory itself, but instead the company, its people, and the cause-and-effect network of policies, measures, and behaviors that exist in their current reality.

"When we go into a company we're not trying to sell them on TOC," Sullivan stresses. "We're there to help them solve their problem. And the first layer of resistance we run into is, well, 'you guys just don't understand our problem.' Since a problem affects individuals and departments differently, we spend a lot of time with individuals and small groups getting to understand the problem from their perspectives."

In order to better grasp the firm's issues, Dan Klein, Schumacher's vice-president of operations, assembled members of the sales and engineering staffs, along with employees from purchasing and production—anyone who might potentially be affected by the project. Working in groups, Klein and the CIRAS team looked at how Schumacher moved jobs through their system and compiled a list of desired outcomes that would have to be part of a "real" solution.

The goal from the outset, Sullivan notes, was to develop a process for reasonably estimating the firm's current capacity and loading, then making sure this information was shared throughout the company. If successful, the process would allow sales to offer clients delivery dates reasonably based on the engineering, design, and production areas' ability to meet them.

In the second phase of the project, Klein says, the group went into half-day CIRAS-facilitated training sessions with twenty employees divided into two groups. "That was really an eye-opening experience for some of us," he recalls. "The examples and exercises they used were really helpful in driving home the points we needed to understand."

Kevin Kane (left) and Don Kester (center) show Willett the increasing demand for Schumacher elevators.

In the third phase, an implementation team of ten members was formed to focus on common issues and devise a plan to resolve them. "This is truly a work-in-process, so we'll maintain that group to target where we need to make improvements," Klein continues. "We're still researching how we do bid documents on the front end with sales, and we're looking at software that might create a better output for engineering. But those steps have begun."

"This project and the group we've set up can serve as a model going forward," adds Jeff Schumacher. "CIRAS gave us the tools and helped us up front, but it's our responsibility now. And by letting us take ownership before they left, I think it will have a much higher probability of success."

The project has served as a model for CIRAS as well, demonstrating the effectiveness of the organization's team-based approach to service. Not only do clients get a second or even third set of eyes on their issues, observes Sullivan, the synergy of staff working on a common project helps them grow professionally as it builds capacity for CIRAS to serve companies facing challenges similar to Schumacher's.

"This project is just one example of what really sets CIRAS apart," adds Willett. "We're totally committed to helping our clients implement solutions. Working with the CIRAS Productivity Improvement Team is a win-win for the client and CIRAS."

For more information on how CIRAS can help your company, please contact Jeff Mohr at 515-294-8534; jmohr@ciras.iastate.edu or Tim Sullivan at 515-727-0656; sullytt@ciras.iastate.edu or Mike Willett at 319-433-1286; mwillett@ciras.iastate.edu.

Iowa State to host 2005 Biobased Industry Outlook Conference

The 2005 Biobased Industry Outlook Conference will be held at Iowa State University (ISU) August 29–30. The conference, "Growing the Bioeconomy: Planting Ideas, Cultivating Partnerships, and Harvesting Progress," will focus on providing the latest information on public policy directions for biobased products and bioenergy and encouraging entrepreneurship in biobased businesses. Iowa State hosted the 2004 Biobased Industry Outlook Conference, which was attended by over 250 farmers, researchers, economic developers, and other interested parties.

Paul Roberts, one of the keynote speakers at the conference, is the author of the critically acclaimed, *The End of Oil: On the Edge of a Perilous New World*. Roberts frequently writes and lectures on the complex interplay of economics, technology, and the natural world. He will present two lectures during the Biobased Industry Outlook Conference.

"We are very excited to have Paul join us at the conference this year. He will add tremendous insight into the future of the oil industry and also the need for biorenewable resources," Jill Euken, CIRAS biorenewables specialist, said.

In addition to attending Roberts' lecture, conference participants will have the opportunity to share ideas, strategies, and new technologies to promote the growth of existing biobased businesses. Breakout sessions will provide information about public funding sources and opportunities available to small business owners and encourage new initiatives by bioprocessors and biobased product manufacturers. A networking reception will allow participants to meet researchers and industry representatives and discuss partnership opportunities.

Panel discussions will provide a variety of information and opinions about topics related to biorenewable resources. One of the panel discussions is tentatively titled "Mainstreaming Biobased Processing and Bioproducts." The panel will discuss their company's current sustainable development efforts and challenges including public policy, the forecast for the next generation of feedstocks for biobased products, and partnership opportunities available to producer groups, bioprocessors, and other interested parties.

Additional breakout sessions, led by researchers and small business leaders, will focus on the current research and applications in biorenewables. The sessions will highlight potential opportunities and recent successes in areas such as new crops and technologies being explored in lignocellulose, which is a combination of lignin and cellulose that strengthens woody plant cells.

"This year's conference has a lot to offer people in terms of sessions and speakers," Euken said. "We hope to facilitate sessions that help spur conversations and new ideas for biorenewables in the Midwest."

For more information on the conference or registration, please visit the Web site at www.valuechains.org/bewg/Conf2005/ or contact Jill Euken at 712-769-2600; jeuken@ciras.iastate.edu, or Tim Sullivan at 515-727-0656; sullytt@ciras.iastate.edu.

New CIRAS Advisory Council members

CIRAS welcomes the following five new members to its Advisory Council.

Fred Buie is with Keystone Electrical Manufacturing Company, Des Moines. The company supplies protection and control switchboards and switchgear to public utilities, general contractors, and large industrial users, both private and public sector. Keystone also manufactures power delivery accessory equipment.

Brian Church is the quality manager of Glacier Daido America LLC, a company specializing in bearings used in gasoline and diesel engines, as well as industrial machines. The facility is located in Atlantic.

Brennan Fehr is a design engineer with Vantec, Inc. Located in Webster City, the company is a leader in quality custom plastic injection molding services. A total manufacturing partner, Vantec provides product development and engineering assistance on a full range of plastic molded parts and assemblies.

Wes Merryman is general manager, D.A.D. Manufacturing Inc., in Hiawatha. The company manufactures highly finished stainless-steel welded assemblies and components, primarily for the food and pharmaceutical industries.

Mitzi Pennington serves as director of operations, Fort Dodge Animal Health, a leading manufacturer and distributor of prescription and over-the-counter animal health care products for the livestock and companion animal industries. The company is located in Charles City.

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INSIDE

WebWatch: Improving the bottom line

Increasing productivity at the individual or departmental level won't necessarily result in improved overall productivity for your business or organization. To optimize your company's return on investment, you need to improve areas that have the highest capability to impact your company's bottom line. A CIRAS productivity team can assist in the process. Team members are trained in a variety of proven methods, including

- Lean Enterprise and Lean Manufacturing
- Material Handling
- Plant Layout/Simulation
- Process Design/Improvement
- Project Management
- Theory of Constraints

For more information on how CIRAS can help improve your bottom line, log on to the CIRAS Web site (www.ciras.iastate.edu) and click on the "productivity" link.

www.ciras.iastate.edu

Focus: Productivity

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