

G
P
R
P

“If a picture is worth a thousand words, a rapid prototype
is worth a thousand pictures.”

COMMUNIQUE - SDSU

Volume 2, No. 1

January-February 2003

INSIDE NEWS

*Rapid Prototyping—
GPRPC Cuts costs
and improves
product designs
Page 2-3*

**Company Feature:
Smith Equipment
in Watertown, SD.
continued Page 4-6**

*SE Technical
Students Tour
Page 7*

**Raven Renews
Sponsorship
continued Page 7**

*Consortium in Brief
Page 8*

*Upcoming Calendar
Events, GPRPC
Goals, and our Web-
site plus Email Info!
Page 8*

GPRPC makes Governor’s Economic Regional Board Meeting Agenda

GPRPC is leaping forward at a jackrabbit pace in the advanced technological world of rapid prototyping.

Jerry Visser, GPRPC Operations Manager presented at the Governor’s Regional Board meeting on January 8th, 2003. This regional economic meeting began on schedule at 10 a.m. in the SMART Center located in Aberdeen, SD.

Audience members discovered through a power point presentation, a 10-minute video and other visual aids how industry as well as education people can use this cost-effective advanced technology method called *rapid prototyping*, for product development, research and education.

In addition, Visser demonstrated the rapid prototyping process along with a promotional segment on the product development capabilities that rapid prototyping makes available for industry and educational customers in their Brooking’s facility. Visser shared completed products plus website and newsletter information. Partnership and sponsorships information was made available before closing with a question and answer session.

Whether you are looking for available relocation properties, tax information, county statistics, options or current information on what’s happening in economic development in South Dakota, call the main office at 1-800-872-6190 or review the Governor’s Office of Economic Development (GOED) website at www.sdgreatprofits.com to get the whole scoop on SD. *

GPRPC Makes The Today’s Ag Show

Carrie Law, producer and host of this 30 minute weekly television magazine has chosen to put rapid prototyping on the extension program show, *Today’s Ag*, which airs on Sunday evenings, 10:30 p.m. on KELO-TV. To find out more about the *Today’s Ag* show along with upcoming segments, please review their website www.todaysag.com

According to their website, *Today’s Ag* is the only TV program in the nation backed by major land grant universities, including: Iowa State University, the University of Nebraska, South Dakota State University, and North Dakota State University.

The GPRPC segment aired on Sunday, January 19th, 2003. To learn more about GPRPC services, review our website at <http://learn.sdstate.edu/gprpc> *

Raven Industries renews Membership!!!

As of January 1st, Raven Industry is continuing their support of the work being accomplished and the potential work rapid product development can do at GPRPC.

Continued on Page 7



**Wanda Muckey, Tester said,
“(Smith) Tests every tip that
leaves the building (for quality).”**

Company Feature: Smith Equipment, Watertown, SD.

Smith offers durable products, backed by a *life-time warranty*.

“Rapid Prototyping proved the concept and allowed us to get on with the project,” said Gary Foos, Project Engineer for Smith Equipment. “New designs are where rapid prototyping comes in...”

Read how GPRPC assisted in reaching these product conception, quality and production goals, like as in the torch shown in the above photography.

Continued on page 4.



Meet the Staff

Operations Manager

Jerry Visser

Program Manager

Carrie Steinlicht

Student Technicians:

Paul Stein

Shiva Masetty

Graduate Research

Assistants:

Rajesh Nagarajan

Davender Hooda

Theresa Jensen

Writer/Editor

Photographer

The *GPRPC Communique*

Newsletter is a monthly publication. The viewpoints presented in this publication do not necessarily reflect the viewpoints of GPRPC.

Submissions are welcome and the deadline is the third Friday of each month.

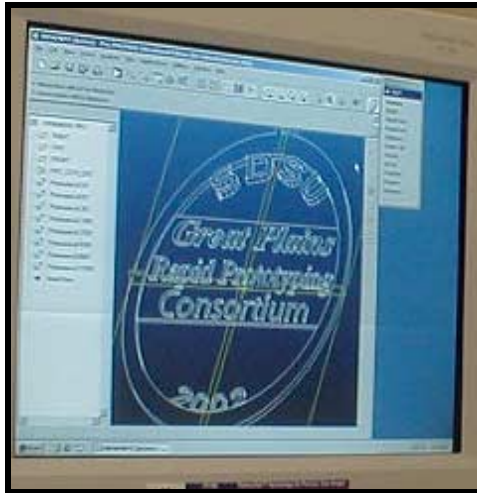
20 copies of this document were printed by the Consortium at a cost of \$4.16 per newsletter.

The Great Plains Rapid Prototyping facility mailing address and location:

**Ron Reed Economic Development Center
2308 6th Street
Brookings, SD 57006**

<http://learn.sdstate.edu/gprpc>

Call us to discuss your product requirements or to schedule a company or school tour:
(605) 688-5960



ABOVE: Shown is the ProE or ProEngineer illustration on the computer before processing begins on the machines. (Step 1)



ABOVE: The Viper machine shows the finished master part. **RIGHT:** The master part is resting on the platform. Resin drippings can be seen on the panel. (Step 2)



LEFT: Wearing protective gear, Jerry Visser removes the master part from the Viper. **ABOVE and RIGHT:** The SLA machine makes the master part that is used in making the silicon mold. (Step 3)



Rapid Product Development

Rapid Prototyping is a process of making a model of a design using advanced laser technology through CAD programming and production. For models with many complex curves, rapid prototyping can reduce design and engineering production difficulties.

In the Sept-Oct 2002 *GPRPC Communique-SDSU* issue, readers were informed how employing rapid prototyping would save time and money for their companies when assisting in their product development. This article will offer a visual explanation of the production process that is utilized at GPRPC.

The photos illustrated the steps that GPRPC takes when assisting to meet the rapid product development needs of your company. The process begins after receiving the data from the customer. The customer's product measurements are entered into the



LEFT & ABOVE: Paul Stein is mixing the hardener and the resin. (Step 4)
RIGHT: Stein is injecting this mixture into the mold. (Step 5)



CAD program on the computer. Design changes can easily be made to enhance the product on the computer. Once the information is entered, the 3D Systems Viper machine creates the plastic models by solidifying a liquid photopolymer resin using a solid-state laser. Layer by layer, the computer graphics are reproduced, making a hand-held model available within hours! "People react better to something in hand...their (customer) input is better," said Gary Foes, Project Engineer for Smith Equipment and GPRPC client. At GPRPC, our staff puts the concept in your client's hands making their ideas 3-dimensional.

Design and test evaluations can be performed to create the best product for your clients while determining the product functionality. This cost-saving conceptualization process thus supports rapid prototyping in being an efficient and premium presentation method.



LEFT & RIGHT: The white color illustrates the fast curing process. The type of resin used, determines how fast it changes from liquid to a solid plus the quality after it hardens in regards to the flexibility of the mold. Liquids can solidify within 1 to 1 1/2 minutes. (Step 6)



LEFT: Stein removes the finished product from the mold. (Step 7)
RIGHT: Stein smiles for the camera after completing his work. (Step 8)

Whether medical or architectural models, building restoration, industrial parts, mini-sculptors or company specialty items, there are few limits on what rapid prototyping can do for your business. Due to being more accurate and versatile methods of production along with the short run resin tooling capabilities, makes this the current superior prototyping methods available in the area.*

What's Up?! **At the Consortium**

Congratulations!!!
To Becky Scholten: who has been part of the Consortium since the beginning as a student technician. Good luck in your new engineering position at Daktronics. *You will be missed!!!*

Thank You's! **From the Consortium**

To Gary Foes: and other Smith staff for the fantastic December Tour of Smith Equipment, the great advice, and the good lunch following a busy morning!
Thank you!

To Dr. George Schosow: for getting rapid prototyping introduced to the USD Medical School and opening another door of possibilities for GPRPC.
Thank you!

To Lloyd Lunde: for your continuous and enthusiastic support of what is trying to be accomplished through education at GPRPC.
Thank you!

To Lawrence Diggs: for getting rapid prototyping introduced onto the Governor's Economic Board Agenda and into new industry prospects.
Thank you!

To Carrie and Mark at Today's Ag: for getting rapid prototyping introduced into the agricultural community.
Thank you!

Smith E

~To achieve higher quality through continuous improvement



Faces of Ground Zero, Portraits of the Heroes of Sept. 11, 2001 by Joe McNally, a Life book portrays the work of Smith Equipment. This company is a leading manufacturer of oxy-fuel cutting and welding equipment; cutting, brazing and welding torches; HVAC equipment; gas pressure regulators; specialty gas regulators, and gas mixers. Their company philosophy *to achieve higher quality through continuous improvement of every aspect of the organization* played a vital role in their abilities to strategically plan the operational steps necessary to meet the challenges when fulfilling everyday customer orders and following the 911 attacks. A portrayal is offered of some of these outstanding people and unique parts of this profitable company where micromanagement isn't allowed while actively practicing the company philosophy and supporting the mission statement.

In a cooperative effort with the Governor's Office, the Watertown plant was able to respond immediately. All torch components were manufactured, assembled and tested through a teamwork effort before leaving on the only aircraft flying for non-military purposes in our country that day heading for the New York City rescue teams.

According to their website, Smith was established in 1916, by a small boy who liked to invent and improve things to make them work easier and better, Elmer Smith was the founder of Smith Inventions, Inc. A few name and management changes later, this leading manufacturing company has now become part of Illinois Tool Works (ITW) Premium Welding Components, where a commitment to quality combined with highly skilled and involved employees set the stage for a bright future!

"(You are) Never more than 50 feet from an Illinois Tool Works



ABOVE: Bob Julius, a Design Engineer Technician, holds a Life book that shows a picture (left page) of a man holding a an extended heavy-duty torch used after the 911 attacks in New York City.

RIGHT: Closeup of this rescue worker and the extended heavy-duty torch made by Smith.



ABOVE: Gary Foos and Sharon Warrington hold a gas regulator. The background shows the regulator testing machine that took two years to develop. This is the one stop testing spot for gas regulators. UPPER RIGHT OPPOSITE PAGE: A gas regulator. UPPER LEFT THIS PAGE: #1 seller, Little Torch, is used for jewelry & medical products.

(ITW) product," said Gary Foos, Project Engineer and Smith Equipment employee for nearly 15 years.

The Smith process begins in the Model Shop where staff design their own Smith projects or provide support for other products. "For some of the new torches, we will use rapid prototyping," said Foos. Rapid prototyping can be used to enhance current products. In addition, this rapid product development method will assist by developing products quicker, saving possibly 4-6 weeks of developing time.

"Ergonomic and competitive issues" will play a large part to "get a competitive edge on redesigning the torch." Rapid prototyping technology is making an impression when developing new lines of product from conception through design quality in order to assist clients to stay or be more competitive in today's markets. "Application is an art form" at Smith Equipment and must be "deliberate and persistent," said Foos, because patents and people are equally important and celebrated here.

Next, the Lab Testing Room offers space where Designers can verify the design and do functional testing in a safe well-ventilated area when trying to create original or improve current company products.

Smith staff develops a lot of their own test equipment according to Foos, including two years to develop a regulator testing machine that tests pressure, functionality, and leaks of the gas pressure gauges.

quipment

is improvement of every aspect of the organization.~



Although the Automation Process and the use of computers enhanced productivity this was not done at the expense of the people. When automation appeared at Smith, "They didn't lay anyone off, just transferred them to where (were) short in the company," said Michael Greeley, CNC Machinist and Smith Employee of 14 years.

In addition, Programmable Logical Controls (PLC) were introduced within the company. PLC's are electronic controls used to manufacture products. With these in the "hands of creative people, the sky is the limit!" said Foos. Also, there are two traditional toolmakers and manufacturing engineers who assist in special manufacturing projects.



ABOVE: An automated machine is shown machining, forging, milling and drilling to produce heads. The robotic arm is reaching inside the machine for a part. ABOVE RIGHT: A 15-year-old automated machine. RIGHT: Tammy Klose, CNC Operator of Automation Equipment, where it's "quite busy and a lot of hours."



ABOVE: Jeff Dargatz, a CNC Machinist is working by a machine with a Controller. This has the program that tells machine how to make the torch parts from mostly brass.

progress, following a Market Rate Demand approach, producing product as needed through machine association and pick tickets, plus revised packaging has resulted in most Smith Equipment products going out at a quick rate leaving only a 30-day inventory or less.

"Nickel-plating is done on most of the Smith Equipment welding products," said Foos. This may be a trademark for Smith in today's industry. **Continued pg 6.**



LEFT: Carolyn DesLauriers, a Manufacture Technician is working the Quality gauge tester to see if the gauge is properly functioning. ABOVE: A close up shot of the pressure gauge tester showing the scale calibrating 0-400 pounds of pressure.

Smith Equipment

Mission Statement

To be the preferred supplier of cutting, joining and regulating apparatus by

- providing customers with premium quality, high performance, and cost effective products and service while sustaining a culture,
- Which attracts and develops quality employees and enhances mutually profitable customer and vendor relationships.

Company Principles
are to simplify focus,
flow, empower
and trust.

“Rapid prototyping helped prove the concept and allowed us to get on with the project,”
said Gary Foos,
a Project Engineer.

“Ninety percent of all Pitot Tubes used in the United States manufactured new airplanes start here!
(Smith Equipment)”
said Gary Foos,
a Project Engineer.



ABOVE LEFT: Michael Greeley, CNC Machinist, holds a drilled part. The background shows one of the old machines. Inset photo: Shows how the old machines drill holes around the perimeter. ABOVE RIGHT: Cindy Helwig, a Wire Technician, demonstrates how wires are insert around the perimeter. These are gel coated so the wires slide easier. “A Technician can do 300 easily per hour,” said Helwig.



ABOVE: Foos holds a point swaged, part of the semi-finished process.
BELOW: Foos (center) explains the Pitot Tube used to register air speed on jet aircrafts to Lunde (left) and Visser (right). They are made with pure nickel that won't change geometrically during temp changes.



Smith continued... This is how the Plating Department's work is recognized by the customer, while making for a good appearance and wearability.

From Receiving to Assembly through Shipping, the “product moves in a general direction through consolidated work cells.” Using the ITW principal of in-lining processes really made a positive difference in productivity numbers.

Empowering their employees with the tools to develop their ideas has made for more efficient quality production. For instance, Smith employees designed their own drilling machines to be faster for adjustments and easier setups. This empowerment strategy showed in the resulting production numbers while “creating an environment for the employees to feel an ownership for their work and in their contributions...they really count!” said Foos.

“Three-fourths of a million gauges per year...2.25 million in six years!” said Bob Wakeman, Project and Design Engineer for Smith Equipment.



ABOVE: Bob Wakeman, Project & Design Engineer holds a cutting torch with a flashback arrestor.

Smith is showing growth in the specialty Gas Equipment markets as well.

The soft seal of the tips allows Smith Equipment to locate a flashback arrestor in the head of the torch, making this a patentable feature. There is no doubt that Smith *is the leader* in the 51 countries now being served. By empowering their own people and their customers, Smith carries a genuine distinction of rare quality in today's markets.

Please review the press release about Smith's employees efforts to meet the needs following the 911 attacks on their website www.smithequipment.com Also, their official company website offers a company history, what's new, products, salespeople, regional and factory training, policies, press releases, contact us, links, downloads, and ask the experts sections.*

Raven Industries Membership continued... To learn more about the available services and products, plus how Raven Industries' personnel can integrate your system, review their website at www.ravenind.com. This offers a complete description and history of their company.



LEFT: GPRPC finished master mold for Raven Industries. ABOVE: Finished product including a urethane elastic gasket made by GPRPC staff for Raven Industries.

Southeast Technical Institute Students tour two Facilities

Thirty-six Southeast Technical Institute students plus staff arrived at 8 a.m., November 13th, 2002, and then split into two groups for a day of industry education. Both groups visited the SDSU Rapid Prototyping Lab located in the Ron Reed Development Center and Larson



Manufacturing Company while in Brookings.

At GPRPC, a CAD explanation and video production were used to explain the potential that rapid product development services made available through the use of the Viper and Stereolithography machines at GPRPC.

The question and answer portion of this educational opportunity brought forth numerous inquiries about the durability and sustainability of the final rapid prototyping product.

In addition, the students received a firsthand look at the two machines responsible for these unique part creations while gaining valuable knowledge in this exciting field of CAD programming and production available in this region of South Dakota.

Also, the students and staff members received an informative industry tour of Larson Manufacturing Company. *

ABOVE: Lloyd Lunde, Instructor studies a product result of rapid prototyping development in his hands. BELOW LEFT: Jerry Visser is utilizing a video as part of his presentation. BELOW RIGHT: A few of the Southeast Technical Institute students who were in attendance for these industry educational tours.



Great Plains Rapid Prototyping Consortium

Sponsors:

- *Falcon Plastics, Inc.
- *SDSU's Polytechnic Center of Excellence

Members:

- *MTR
- *Raven Industries
- *Larson Manufacturing, Inc.
- *First District Association of Local Governments.
- *Daktronics, Inc.

Contributors:

- *Excel Energy
- *South Dakota Board of Regents
- *South Dakota Governor's Office of Economic Development

Technical Advisors:

Vista Technologies

Interested in becoming a sponsor or member?

Benefits include:

- newsletter and website advertising
- structured fees and services
- cost-effective product development
- time-effective part production
- premium quality and efficient local service

Calendar of Events

January 2003

8th Governor's Economic Regional Board Meeting
*Aberdeen SMART Center

19th TODAY'S AG show airs
*Sunday, 10:30 PM on KELO-TV

21st Brookings-SDSU Capitol Day
*State Legislature in Pierre, SD.

February 2003

8-9th Builder's Home Association Trade Show
*Brookings Area Multiplex

10th Lake Area Technical Class
*Watertown, SD

March 2003

13-16th Sioux Empire Home Show
*Sioux Fall's Arena

Great Plains Rapid Prototyping Consortium Goals

- 1) Provide access to and hands-on training for students and partners in rapid prototyping equipment both on site and via the Internet.
- 2) Provide a venue whereby students and educations can cooperate with industry leaders and potential employers in the design process.
- 3) Provide a venue whereby the partners can regularly discuss design issues related to rapid prototyping while serving as a resource of additional information.
- 4) Provide means to improve the knowledge base in rapid prototyping and/or related technology through research activities at South Dakota State University.
- 5) Create an atmosphere whereby partners can enhance their ability to provide new innovative products to the customer. Also, to positively impact the SD economy and the surrounding region.
- 6) To increase the number of memberships to cover expenses after the initial startup.

Nothing in the world can take the place of persistence.
Calvin Coolidge

One man with courage is a majority.
Andrew Jackson

Consortium in Brief...

Oct 25th, 2002 SD National Science Foundation EPSCOR Conference

After a brief opening and welcome, this *Science on the Move* mobile lab day consisted of a comment segment from the NSF staff along with a mobile lab overview. A poster viewing and very cool scientific visualization segment included software development and demonstrations by EROS staff. The afternoon events were updates regarding SD's Biomedical Research Infrastructure Network and Educational programs including panel discussions in Material Science/Nano-Technology, Scientific Visualization and Biocomplexity. Following planning sessions, an EROS Date Center Tour concluded the lab day.

Oct 28th, 2002 SME Student Chapter Tours the Consortium

Ten students from the Society of Manufacturing Engineers (SME) of Chadron State College along with Kevin Miller, Assistant Professor of Industrial Technology attended a GPRPC educational tour lead by Jerry Visser.

Nov 20-21st, 2002 Visser Presents SDSU Workshop

Discovering the potential of rapid prototyping was the goal of these two hour-long sessions given by Jerry Visser, GPRPC Operations Manager. Through a power point presentation along with visual aids followed by a Q&A section, Visser addressed the possibilities of rapid prototyping in education for students and teachers alike.



**We got a sign...
can you find GPRPC???**