



NATURAL RESOURCES RESEARCH INSTITUTE

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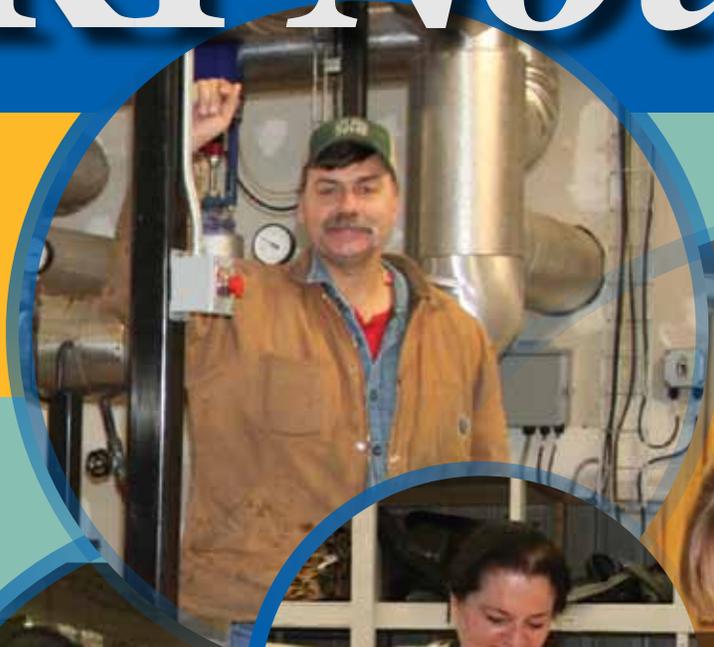
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**SPECIAL ISSUE:
NRRI'S PRODUCT DEVELOPMENT FUND**

Behind the numbers in the news – job growth, gross domestic product, economic indicators – are people with entrepreneurial passion. To help those people, NRRI relies on a vast network of grantees, partners, experts and agencies and adds unique research capabilities to move an idea forward. Together, we create jobs.



From the Director

Michael J. Lalich

I trust you will enjoy this issue of *NRRI Now* focusing on Institute support to entrepreneurs and small business. The assistance provided to these NRRI clients is thanks to product development and process improvement grants totaling \$350,000 over several years from the Blandin Foundation and Knight Foundation. These foundation grants have allowed NRRI to deploy expertise, research equipment and laboratories to assist entrepreneurial clients with developing and realizing their dreams for new and improved products. Feel free to dream with them as you read the accounts in this issue.

A typical grant may be about \$10,000 to \$20,000, requiring some cash and in-kind contribution from the grantee. All applicants must present their requests before an Advisory Board of NRRI and economic development professionals. It's an exceptionally rewarding experience for NRRI staff to work with these clients, both prior to and after an award has been designated – there is always a degree of excitement and anticipation in the process. One thing that's evident is the close rapport and trust that develops between the client, NRRI scientists and business development professionals.

To be sure, not all of the awarded initiatives will be successful. Sometimes disappointing but valuable results from these studies indicate that a concept or idea does not work or perform to the level anticipated. As you read the stories, recognize that these accounts are of progress early in the process. Picking the big winners in terms of job creation, sales or other criteria may be difficult at this stage. Looking at product development projects from a historical perspective, I would not have projected that Northern Contours would grow from two entrepreneurs to over 500 jobs, primarily in Fergus Falls. Nor would I have projected the growth of Partridge River in Hoyt Lakes and Superior to a company employing 200 in a 15 year period before a horrific fire and other business conditions led to its demise. More often, growth into a successful company supporting 10 to 50 jobs seems to be more

realistic. It's the vision, determined effort and risk taken by these entrepreneurial leaders that leads to success no matter what the scenario.

While each of these stories keys primarily on product development and process improvement scenarios, each entrepreneurial circumstance is different, frequently requiring a broader range of services. One role of NRRI we should not overlook is the ability to connect clients to vital links within the business community or industry. Concurrent to laboratory support on product development, these clients may require assistance with business planning, market assessments, and financial planning beyond what NRRI offers internally. The UMD Center for Economic Development (CED) is a joint program of NRRI, the Labovitz School of Business and Economics and the Swenson College of Science and Engineering. CED has been a long term partner, assisting NRRI clients with business plan development and subsequent bank financing. A number of other local and regional economic development entities, for example the Iron Range Resources and Rehabilitation Board and APEX, partner to assist these entrepreneurs and small businesses.

Product development and process improvement support is a unique niche for NRRI, strengthened by a history of successful entrepreneurial support dating back to days in the 1980s and early 1990s when the Greater Minnesota Corporation and Minnesota Technology, Inc. funding provided necessary resources. The experience has allowed us to hone our expertise, and we have built a laboratory and research capability that entrepreneurs and small companies would not normally have access to. I'm excited to note that we are currently adding one-of-a-kind, state-of-the-art equipment in the area of minerals, renewable energy and forest products that will help us to bring even more value to entrepreneurial clients in the future.

The challenge going forward for NRRI is to continue to find funding to support these clients. In this regard, \$100,000 has recently been dedicated as part of the "Mining Cluster" grant supporting entrepreneurial efforts associated with the mining industry. There is an excellent prospect of continued foundation support, and an effort is being launched to find new sources of support. (See the back page for more information.)

Stay tuned. We will keep you up-to-date on some of these currently emerging business ventures as they mature and with NRRI's effort to continue to support these entrepreneurial businesses. They are key job creators at a time when jobs are a national need and the subject of much focus.



SPECIAL ISSUE: NRRI'S PRODUCT DEVELOPMENT FUND



Top That! by Loni, International Falls, Minn. Lean manufacturing processes

Jobs created/retained: 2

Sometimes new businesses are launched after careful planning, research and preparation. And sometimes a business seems to launch itself. Such is the case of Top That! in International Falls, Minn.

Owner Loni Bright had completed her nursing training and lined up a job when the town's need for a seamstress (which she had a talent for) took over her work life – and her home. A flower girl dress she had sewn for a friend won first place in the county fair, and her phone started ringing.

"I wanted to be home with my kids at that point so I decided to try sewing because people were flooding me with projects," said Bright, whose vivacious personality matches her last name. "I had piles of sewing everywhere. It got to where there wasn't room for my family, and customers would stop by during dinner time. I was going stir crazy."

As the home sewing took off, Bright spent an afternoon with a woman in town who had a custom boat cover business. She showed Bright how to make boat covers – a more lucrative business than hemming jeans and fixing zippers.

It wasn't long before "a boat bigger than my house pulled up in front," Bright exclaimed. "The gal who had the boat cover business closed her doors and put my name and phone number on the door!"

Top That! by Loni (rhymes with baloney) was born. But Bright had no place to work on a custom boat cover. She quickly found a storage unit to rent and hauled her sewing machine out there every day to get the job done.

Bright realized that the big boat was a huge opportunity – literally. "I thought maybe this is what it would take to make an income that matters," she said.

As the business took off Bright contacted UMD's Center for Economic Development for advice and was assigned to Pam Sarvela who is now NRRI's Business Development Manager.

"I knew that what Loni needed was the whole Lean Manufacturing concept applied to her manufacturing floor," said Sarvela. "She didn't have the organization to be effective, but initially she didn't have the cash flow and she wasn't ready."

Bright moved her business into a space behind a gas station with room to bring boats inside to work on them. About a year and a half later she called Sarvela and said, "I'm ready to take the next step."

NRRI Program Director Brian Brashaw organized a Lean Training session with Bright and two other International Falls small businesses. Brashaw's idea is to create a small business network in the community for mutual support. His message of work efficiency and time management – plus the help to clean up and organize – resonated and is paying off.

"Brian told Loni to think about what activities make money and which ones don't, to understand where she should be spending her time," Sarvela explained. "He asked her how many boat covers she thought she could make in one month, and Loni said one. Just one boat cover a month."

"We need jobs up here so badly. If I can do anything to add jobs here, keep it local, I will do that."

– Loni Bright

Once the work stations were set up and tools organized Bright's production increased. She can now make three boat covers a month, if the work is there.

"That's a big change, financially," said Bright. Enough so that she's hired an almost full time assistant who can sew, operate the computer ("I can't do anything with that!" she admits.) and helps answer the phone. "As long as I have work, she'll have a job."

The success of her business has given Bright the confidence to plan for expansion. She joined the Industrial Fabrics Association International which keeps her up-to-date on the latest fabric trends and feeds her creativity.

"It's opened huge doors. It's like an explosion of my imagination!" Bright enthused. "I can see so many possibilities for projects because I can call the Association and ask about different fabrics and their properties. They can answer any question."

Proof that Bright has a successful business model: a large manufacturer of ATVs wants to "borrow" a cover design she developed for one of her customers. They ordered one to copy her pattern. She also designed an ice house that attaches to the wing of a small airplane, and is the official "clothier" of the 30-foot-high Smokey the Bear statue in town.

With "tablets and tablets" of ideas, Bright is hoping to expand her product lines and hire more workers over the next five years. "We need jobs up here so badly," she said. "If I can do anything to add jobs here, keep it local, I will do that."

Loni Bright can be reached at topthatbyloni@frontier.com.

Project Update:



Loll/Epicurean/ Intectura

Product testing and manufacturing efficiencies

When three men decided to start building skate parks back in 1997, they could not have imagined the evolution that would take place over the next 15 years. They started working with NRRI in 2000 as a partner in product testing and development – and today their growth is off the charts.

Working with NRRI to test new uses for their skate park materials, the single business morphed into two – Epicurean Cutting Surfaces (kitchen cutting boards and utensils) and Loll Designs (modern outdoor furniture). Out of those two businesses, a third emerged: Intectura, a new distributor of architectural materials. As each new business launched, the three men relied on NRRI to help develop manufacturing efficiencies, new products and test materials for high performance.

Today, Loll Designs employs 20 workers, Epicurean has 27 employees and Intectura has three with growth projected for all three companies.

Polly Talen, program director for the John S. and James L. Knight Foundation: "NRRI's Product Development Fund gets entrepreneurs the research and technical expertise they need to fuel their ideas, and connects small businesses with a broader network of support. Together we will build a stronger economy."



Aluminum Cabinet Company, Duluth, Minn. Small business assistance

www.aluminumcabinetco.com

Jobs created/retained: 4 → **Three-fold increase in productivity** — — — — —

Small business owners wear many hats to keep things rolling. Kelly O'Toole is no different. "Designing, selling, billing, answering the phone... I'm doing everything," he said of his Aluminum Cabinet Company.

But what he's doing works. 2011 was his best year in the seven he's been in business, almost tripling his sales over the previous year. He credits a stubborn Irish streak, a rebounding economy and assistance from NRRI.

A sheet metal worker by trade, O'Toole began the company in 2005 by making cabinets for a race trailer. He couldn't find a local powder coating business, so he bought the equipment and taught himself how to do it. Building his aluminum custom cabinetry business kept him busy, so O'Toole leaned on NRRI's Pam Sarvela to pull together the financing assistance he needed to grow.

"NRRI is one of the puzzle pieces a small growing business like this needs," Sarvela explained. "We were able to pull together funding entities and provide them with the documentation needed to secure the financial resources necessary to keep this company alive and growing. NRRI was the gateway to northeast Minnesota's network of business support."

In 2007 O'Toole used a Small Business Administration loan to buy fabrication equipment and stock some inventory while his website generated Internet sales.

"The wheels started rolling along and then in 2008 the wheels fell off the bus like it did for everyone," said O'Toole. "We were able to work

through [the recession] but it was slow for the longest time."

He went out looking for more orders for his small job shop and approached neighboring business Cirrus Aircraft. The down economy was forcing them to look for new parts suppliers and O'Toole got the certification he needed to make airplane parts. Business started picking up, he added more equipment and moved the business to a larger space.

"We had an order from Greece to build 33 museum cabinets and we were trying to move the shop," said O'Toole. "We had to get set up fast."

NRRI's expert in Lean Manufacturing, Brian Brashaw, did some quick layout work with O'Toole to help configure the production process and he

was rolling again. He's also used NRRI's rapid prototype lab to design custom toolbox handles for his trailer products.

"It's great to have NRRI as a resource," said O'Toole.

"Pam was a catalyst putting people together while I was trying to keep the business going. And it's great to have the prototype center right there."

The company has a lot of available capacity, and O'Toole is gearing up for growth. With five full-time employees and one part-time, his work still comes in through word-of-mouth and Internet sales. With some strategic marketing, he plans to hire a shop foreman and get his machines running all day long.

"I'm stubborn as the day is long and I wouldn't take on an investor, so it took me longer to get where I'm at," said O'Toole. "But I'm probably still here because I'm that five percent that went against the grain."

"I'm probably still here because I'm that five percent that went against the grain."

— Kelly O'Toole

Grand Log Homes, Grand Rapids, Minn. Product testing and process development

www.grandloghomes.com

Jobs created/retained: 2 → — — — — —

"NRRI helps companies reduce the time it takes to get a product to market and minimizes the risk. But the company owners need to have the energy and passion to make it happen. It's still up to them."

Brian Brashaw, NRRI program director, speaks from 20 years of experience helping new and small wood products businesses get rolling.

And it's that winning combination - NRRI and entrepreneurial passion - that brothers Richard and Charlie Mizia are hoping will pay off in 2012. Their engineered "hybrid log" for high-end log home construction is being unveiled at trade shows and they're as ready as they'll ever be.

With \$25,000 in Product Development Fund assistance, the Mizias tapped NRRI prototyping abilities and manufacturing knowledge to develop a way to build large diameter half or whole logs using small diameter trees. The idea for Grand Log Homes started 20 years ago with a veneered foam-core log siding product they developed with the help of NRRI.

"Our new hybrid log derives its strength from a laminated wood arch," explained Charlie Mizia. "The way Richard engineered it, you can make half-log siding or a solid log that looks like a real log. We are pretty motivated to get this to market because we have all sorts of goodies waiting in the wings."

Watching the log home construction business closely, the Mizias have long been aware that national log home builders are in serious decline

due, in part, to rising costs and declining availability of large-diameter construction logs. The brothers' patent-pending technology gives builders the large logs that are in demand, but with better use of wood resources and higher r-values than a natural log.

"Our Grand Logs have the same authentic curb appeal of natural logs and more durability than a veneered foam core log product," said Charlie.

They're hoping to create enough of a "buzz" at trade shows to attract investors and get a manufacturing facility rolling out product in Itasca County, Minn., this

year. In five years, they envision employing around 50 people and dispatching installation crews to build Grand Log Homes across the country.

NRRI connected the Mizias with a Minnesota millwork company to manufacture their first components, and helped develop the clamping mechanism to make the logs, along with other product testing and prototyping.

"That is really significant for us," said Richard. "We had to get the project to a certain point to attract investors. You can't go from A to C without going through B. This project gets us a product that's fully developed and ready to go."

"You can't go from A to C without going through B. This gets us a product that's fully developed and ready to go."

— Charlie Mizia

Project Updates:



WISCONSIN OVEN-ROASTED LIGNOCELLULOSIC FIBER

Goodwill Industries Mattress Recycling Resource market development

Hauling waste from Duluth to a landfill in Saron, Wisc., 75 miles one way, was a logistical problem for the Western Lake Superior Sanitary District. Bulky trashed mattresses only made the problem worse.

So in 2002, Hank Fisher at the Minnesota Pollution Control Agency brought together people he thought could help get the mattresses out of the trucks and out of the landfill. The working group was made up of representatives from various governmental agencies, the hospitality industry, mattress retailers, waste haulers and local prison administrators. Goodwill Industries was interested in taking on this new venture.

First, state and local funds were used to develop a business plan, establish mattress collection infrastructure at county disposal sites and get Goodwill the equipment they needed to deconstruct the mattresses. Then, Product Development Funds, along with other funding, engaged NRRI in finding markets for the components. The final piece that made the project successful was finding a local inventor to come up with a way to compress the steel springs.

Today, Goodwill Industries employs 10 workers recycling some 3,000 mattresses a year. The bundled steel springs bring in revenue of \$350 per ton and some 160 tons of steel were melted down at a local foundry in 2010. The hope is that mattress recycling facilities will be developed across the country, employing people, eliminating a landfill problem, and creating a new business to manufacture the unique recycling equipment.

WOLF Wood, Inc. Product development and testing

When the Wisconsin Business Innovation Commission went looking for a way to add value to their state's hard and soft wood resources, NRRI had a great idea for them to consider – thermally-modified wood. The thermal modification process makes any wood species more dimensionally stable and rot resistant, which means local woods can be used in ways they previously couldn't.

The wood "baking" process has been used successfully in Europe for decades, and is just catching on in North America. WOLF (an acronym for Wisconsin Oven-roasted Lignocellulosic Fiber) plans to operate like a research and development organization, testing the parameters of the thermal modification process on a variety of wood species and products, while also developing new products.

NRRI's Product Development Fund program made it possible for WOLF to use NRRI engineers and lab testing equipment to develop a new line of houseware products.

Still in start-up mode, the company will incubate their first thermal modification lab at NRRI with a new lab-sized kiln to arrive from Spain in June.

Wade Fauth, Vice President, Blandin Foundation: "The product development fund is an excellent mechanism to combine the research capabilities of the University with the innovative thinking of entrepreneurs in a way that fuels economic growth."



American Peat Technology, Aitkin, Minn. New product development

www.americanpeattech.com

Jobs created/retained: 16

Scouring junk yards for parts and building their own equipment from scratch, American Peat Technology in small town Aitkin, Minn., is an unlikely hero in the current scramble to create jobs. But with \$25,000 from NRRI's Product Development Fund and a company investment of \$1.5 million over five years, the company of four grew to 20 employees with more growth in sight.

At the heart of the company's strategic plan is reed sedge peat – a plentiful and little understood natural resource in Northern Minnesota. APT capitalizes on peat's natural ability to attract and store toxic heavy metals. The company's unique granulation process preserves the natural chemical mechanisms found in any peatland but in a durable product with excellent hydraulic characteristics. With the help of NRRI Chemist Igor Kolomitsyn, its APTsorb product is chemically modified to target specific contaminants such as heavy metals and mercury to treat industrial and mining discharges.

"Igor's method allows us to tailor these products and make them specific for other ions such as mercury, selenium, barium or arsenic," explained APT President Doug Green. "Right now there's a lot of interest in removing sulfates, but we can change horses in mid-stream if the market demands it."

APT was founded in 2003 with BioAPT, a peat-based microbial carrier that is inoculated with bacteria beneficial to crops. While producing BioAPT, the small company realized that their bogs naturally reduce mercury in rainwater from nine nanograms per liter to about 0.6. This is well below the requirement of the Great Lakes Initiative, an Environmental Protection Agency restoration effort that sets water quality standards for many pollutants.

"NRRI's Product Develop Fund allowed us to get started and move forward. Without [NRRI] there would be zero progress..."
– Doug Green

Using the Product Development Fund, Kolomitsyn was able to focus on finding the specific molecular site within the

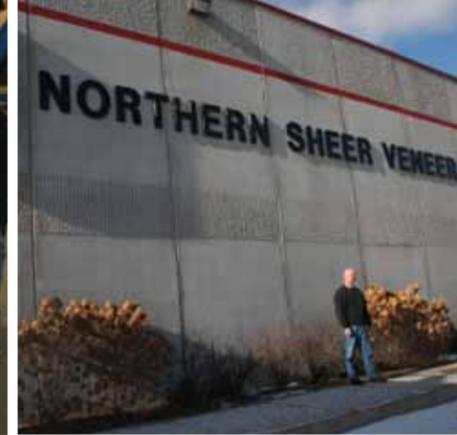
peat granule responsible for attaching the mercury through adsorption – adhesion of ions to the granule surface. Other chemical pollutants can also be attached to the peat surface.

"Igor identified it and now we had something that we knew was working," said Green. "But the company was broke, just getting started. We probably didn't have any business exploring in these areas."

But when Kolomitsyn told them there's a better way to attach the mercury functional group, Green knew he wanted to collaborate with the NRRI chemist to develop it further. Once a research agreement was in place, Kolomitsyn and APT worked together to attach an intermediate molecule that effectively bonded the group inside the granule to the "reactive skeletal system," as described by Green.

The peat product is less expensive and easier to produce than its petroleum-based competition and it is biodegradable for standard landfill disposal. The company believes so strongly in its new product that over the past five years it has invested all of its profits into more research and development. And mining giant Freeport McMoRan is partnering with APT, allowing the company's in-house chemist to work with Kolomitsyn to further develop and document the performance of APTsorb.

"Very simply, if we were to rely completely on our balance sheet to fund the research, it would never get done," explained Green. "NRRI's Product Develop Fund allowed us to get started and move forward. Without Igor's knowledge there would be zero progress toward the heavy metals and mercury granules that we have today. I can say that for sure." 9



Field Logic, Superior, Wisc. New product development and testing

www.fieldlogic.com

Jobs created/retained: 10

While it may be true that one man's trash is another man's treasure, finding value in something headed to the landfill takes some effort. NRRI's Product Development Fund helped an archery manufacturer process and test many materials before finding the right "trash" to make a successful new product line.

Field Logic, Inc. has been manufacturing nationally recognized archery sporting goods for 12 years. They wanted to expand their product line with a lower cost target, and needed an effective, lower cost target material. But finding the right material at the right price, in a market of rising raw material prices, is more complicated than one would think.

"Initially, our goal was to develop a low-cost, green target product by bonding industrial scrap materials," explained Paul Marihart, Field Logic Safety Coordinator. "NRRI provided funding, contacts and resources to help us experiment with bonding many different material combinations for target testing."

The elusive target material needed to withstand repeated arrow shots without losing shape, tearing a larger hole in the target or ricocheting arrows back at the archer. Weight was also an important consideration - heavy enough to withstand impact, but not too heavy for the consumer.

"We tried and tested a variety of materials, from opened cotton shoddy (bonded cotton/synthetic material) and high denier polyester blends recovered from mattresses, to natural materials such as flax

fiber inter-twined with cotton and bi-component fibers," said NRRI researcher Tim Hagen.

The experiments eventually led to the perfect solution.

"One day, sample material arrived that met all of our needs when simply bagged," said Marihart. "The bag targets could take many, many arrow shots, and the best part is that the scrap material would have gone into a landfill somewhere."

The target bags became Field Logic's new Hurricane product line which includes a large range target, a medium-sized bag target and a small

crossbolt stop. And, according to Marihart, it's no small thing to stop a crossbolt these days. New technologies have led to faster, much more powerful bows - the targets must have superior arrow-stopping performance.

"It's a very profitable product for us," said Marihart. "We've added about 10 jobs here in Superior to make the Hurricane bag target products, but the impact goes beyond here - scrap brokers, truckers, sales representatives in the stores... a lot of people benefit getting a new product to the customer."

"The impact goes beyond here - scrap brokers, truckers, sales representatives in the stores... a lot of people benefit getting a new product to the customer."

- Paul Marihart

Northern Sheer Veneer, Spooner, Wisc. Marketing and product development

www.sheerveneer.com

Jobs created/retained: 4

Projecting a five-fold revenue increase for 2012

With a unique technology and a couple of patents pending to make ultra-thin, real wood veneers for endless applications, there's one thing Tim Doyle didn't have - wood products industry connections. For that he relied on NRRI.

"I go to a trade show and I don't know anybody," said Doyle, marketing director at Northern Sheer Veneer. "I walk down the aisle with [NRRI program director] Pat Donahue and people are calling out to him. He knows everyone, domestic or international."

So when Doyle showed Donahue the log peeling technology in 2007, Donahue said it was "the last gold nugget in the wood products industry." No one else was making wood veneers so thin you can run it through a printer.

The problem was that it was so unique that people didn't quite know what to do with it. The craft industry was one of the first to see its potential - Michael's stores started carrying a line of wood craft paper this winter.

A grant from NRRI's Product Development Fund program was matched by Northern Sheer Veneer and together Doyle and Donahue discussed markets for the product. Unfortunately, the 2008 recession hit just as they developed a new ceiling tile product with a local manufacturer. It was bad timing.

"They wanted to do it locally, but their hands were tied by corporate," Doyle explained. "But Pat did all the legwork, creating relationships... that was completely invaluable."

NRRI also helped Doyle develop a wood credit card that would withstand the rigors of bending, washing, multiple swipes - just like a PVC credit card, but made of sustainable, biodegradable wood. This product is poised to launch and Doyle is focused on a specific industry.

"The gift card industry is \$40 billion a year, and just one percent of that is \$20 million," said Doyle. "If we can replace just one percent of PVC gift cards with wood... We know how to do it, what equipment we need. We're just waiting for one push over the top."

His first order for the cards came from Sweden in 2009, before Doyle even had the press to make them. He used NRRI's press to fulfill the order. Together they improved the product, learned about adhesives and coatings, and made the necessary industry connections.

Doyle anticipates 2012 to be his best year yet and envisions adding more equipment and shifts, creating jobs in rural Wisconsin.

"If our business was a dollar last year, it will be five dollars in 2012," he said. "We're recruiting partners, we have orders coming in... Everything that was done in conjunction with NRRI is now starting to pay off."

"If our business was a dollar last year, it will be five dollars in 2012. Everything that was done in conjunction with NRRI is now starting to pay off."

- Tim Doyle



Superior Thermowood of Minnesota Market development and product testing

Jobs created/retained: 4

Palisade, Minnesota, [pop. 1,295] might seem an unlikely place for a new business to start-up and develop a world-wide market. But that's just what John Bieganek is doing – and NRRI's Product Development Fund helped him, against all odds, do it.

"I'm just getting the market going. It's a day-to-day struggle to keep the doors open and I about ran out of money," said Bieganek. But his enthusiasm is growing, not waning.

With an investment of \$1 million in a kiln from Finland Bieganek can thermally-modify Minnesota wood species for seemingly limitless possibilities – lighter semi-truck beds, more durable guitars, faster Pinewood Derby cars, no-chemical treated plywoods, weather-resistant siding... The ideas keep coming.

The large kiln can "cook" about 10,000 board feet at a time rendering aspen, basswood, ash or any of Minnesota's plentiful trees, more durable, rot resistant and lighter. This means Minnesota wood is more valuable – even to customers as far away as Germany.

"I took the risk because it's something I believe in. I might not become a millionaire, you know, but I can say I did it," said Bieganek.

Using Product Development Funds, NRRI program director, Pat Donahue, has helped Superior Thermowood of Minnesota identify new markets and make connections throughout the wood products industry. Especially significant is the technical data

NRRI is able to gather for different applications of different treated wood species.

"When we go to wood tradeshows, that's really helpful," Bieganek said. "They ask a gazillion questions."

With a background in construction, Bieganek understands the limitations of wood. When he learned of thermally-modified wood, he invested in Superior Thermowood of Canada, and then worked with a partner to start up Superior Thermowood of Minnesota. Now he's operating the business on his own with four full time employees and one part-time. And he's leaving plenty of room to grow.

"My five year goal is to have another kiln going and then focusing on OSB [Oriented Strand Board] because that will be a huge market for structurally engineered panels," Bieganek said. "If we can get a structurally engineered panel that won't mold or rot, that's huge."

The kiln he purchased is the only one of its kind in the United States, though some thermally-modified wood is being processed on a smaller scale in Indiana. He believes that with a second kiln, he'll be able to process as much as two million board feet a year, double his current output, hire about 15 more workers and keep suppliers busier, too.

"NRRI has been a huge, huge asset," said Bieganek. "I've made a lot of contacts that I never would have without Pat."

**"I took the risk because it's something I believe in. I might not become a millionaire, you know, but I can say I did it."
– John Bieganek**

Project Updates:



Mat, Inc.

Product development and testing

One of the components recovered from mattresses recycled at Goodwill Industries in Duluth has the potential to become a value-added product for Mat, Inc. in Floodwood, Minn. But to move its "potential" status to "viable" is going to take more ingenuity – and more research.

The Product Development Fund program provided Mat, Inc. with access to NRRI's R&D capabilities and engineer Tim Hagen's textiles industry knowledge. Hagen developed a way to open up the cotton fibers, blend it with other materials and mold it into filtration systems. The goal for the filters is to remove oil and particulate matter from stormwater and clean oil-laden air from restaurant exhaust vents.

The testing was promising and showed potential of saving the filtration manufacturer 50 percent on their raw materials, but some stumbling blocks got in the way.

The recycled mattress cotton comes with metal staples that cause problems in Mat, Inc.'s machinery. Hagen believes a process can be developed to remove those staples. And the stormwater filter density needs to be tweaked. He's hoping that funding will become available to allow further research to overcome these problems to find a new market for the recycled components in mattresses.

MR Fence Tech

Product development and testing

Mike Burgess knew something many people don't: Over 875 million linear feet of fencing – mostly steel and wood – is sold in the U.S. each year. So it's no wonder Burgess wanted to develop a fence post out of a new environmentally sensitive material that could perform even better.

NRRI Scientist Matt Aro worked with Burgess on developing posts out of chemically bonded phosphate ceramics. The material is a quick-setting, magnesium-based cement that doesn't need firing to harden. The posts would be low maintenance, require no painting, reduce heaving from frost, and lower installation costs. The testing was promising, but there was one insurmountable challenge – the cost of one of the raw materials unexpectedly rose much higher than they anticipated.

"NRRI was a valuable resource for me. I couldn't have done that research myself," said Burgess. "Even though it's not viable at this time, maybe the price of the materials will come down and we can look at it again."

Burgess was grateful that NRRI could help him quickly get results so that he didn't invest time and money in the project. But that doesn't mean he's given up.



PHOTO CREDIT: Kathryn Nordstrom Studios

“The genuine willingness of people to help someone with a unique idea has been wonderful.”
– Ann Harrington

Ryan's Rustic Railings, Orr, Minn. Product improvement and production efficiency

www.rusticrailings.com

Jobs created/retained: 16

Ryan Holman's business in Orr, Minn., is ready to grow. Standing in a new, still empty, 21,000 square foot building, he can visualize the equipment and employees producing his specialty rustic log staircases and furniture. Holman started Ryan's Rustic Railings in 2000 with the help of NRRI, and now he's counting on the Product Development Fund to help him expand.

Holman's father builds log homes which creates a ready market for log accoutrements. But prepping logs is a time consuming and imprecise art when done completely by hand. NRRI helped Holman find the right technology – a rounding machine from Germany – that became “the heart of the whole operation,” according to Holman.

“Probably 80 percent of our products get run through that machine. I would say that machine doubled the size of the company in two years,” he added.

Now, he's working with NRRI to acquire a specialty bandsaw that will add more efficiency to producing his rustic staircases, and boost his production even more.

“A lot of the stuff we sell is pre-made and must be user-friendly for the contractors,” Holman said. “With the right equipment we can make it perfect and get no call-backs, so the customer is happy.”

Holman is also working with NRRI to develop a flat-pack, easy-to-assemble outdoor furniture line using a European connector system. Feedback from customers tells him that putting together heavy log yard swings is a challenge. The connectors that NRRI is testing on his products will make putting the swings together a snap.

Like so many others, the recession cost Holman about half of his business, but now he's growing again. And with a new manufacturing facility, he has the room to keep expanding his product line.

“Our new swing product is going to grow the business because we can compete all over the U.S.,” Holman explained. “And being up here in Northern Minnesota, we have an edge on other companies. I get my raw materials from right around the area.”

“Our new swing product is going to grow the business because we can compete all over the U.S.”

– Ryan Holman

Marvel Concepts, Duluth, Minn. Product development for new business

Jobs created/retained: 1

It takes more than an “Aha!” to invent a successful new gizmo. In the case of Ann Harrington, inventor of a warming device for mammography machines, it took perseverance, the synergy of community and money. Money she didn't have.

“If someone had told me what it would take financially to do this, it would have been too daunting,” Harrington said. “It's better to have an idea and passion and let the synchronicities unfold.”

The idea and passion (born of an uncomfortable mammogram experience) carried Harrington through three prototypes of the CozyMamm and the accompanying patent work. The financial assistance came from a web of connections, including NRRI's Product Development Fund.

With a day job in speech pathology, Harrington started developing her idea in 2004 with a bit of financial backing from her mother. And about the time she had tapped out the resources of friends and family, a random meeting with a stranger led her to apply to Whirlpool's Mother of Invention contest. She won First Place out of several thousand applicants and received a much needed \$7,000.

“That money was immediately consumed by engineering,” said Harrington.

The original CozyMamm started out as a combination of fleece material, rice and wires which didn't quite work out. The second prototype was a polypropylene/metal combination that didn't stay warm long enough. But the third -- a precise tool with two heating capacitors and variable heat outputs for testing -- is a winner. Getting to that final design took a lot of perseverance, and again, money.

With the help of NRRI's Product Development Fund, Harrington hired electrical engineers (Design Solutions, Inc.) in the Twin Cities to build the complex guts of the machine, and Lava Designs

worked with them to design the casing and the charging unit. The prototype model was made in NRRI's Rapid Prototyping Lab. Harrington also uses UMD's Center for Economic Development for office space as she works to launch her product.

An initial Northland Foundation loan of \$40,000 later led to another \$100,000 loan when Harrington needed it most. She believes she would not have gotten that funding without all the other support first.

“The Northland Foundation especially wanted to see that collaboration. They value teamwork,” she explained.

At this point, Harrington is considering focusing her CozyMamm on the analog (versus digital) mammography market which currently holds about 30 percent of the market. She's researching any possible analog manufacturer warranty restrictions about using external heating elements on the machines.

Harrington is moving forward with the idea that, although digital mammograms are replacing analog, many smaller community hospitals won't be able to afford the expensive new machines.

“As long as there are analog machine being used, women will have chilly mammography experiences,” Harrington said. “I want to bring warmth and added relaxation to the process. Anything we can do to make mammography more comfortable so women won't avoid it, can help with early detection of breast cancer.”

From a speech pathologist to inventor has been a winding, challenging path. But the support Harrington received throughout the process continues to warm her heart.

“The genuine willingness of people to help someone with a unique idea has been wonderful,” she said.

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NRRRI seeks funds to continue

**“Coming together is a beginning;
keeping together is progress; working
together is success.” – Henry Ford**

Over the past five years, 20 regional companies have started or grown using Product Development Fund capital of \$350,000, adding their own collective investments of over \$900,000 and creating or retaining roughly 100 jobs. The small business owners believe in their company and realize they need the hands-on support that NRRRI provides.

That resource is now largely depleted and NRRRI is committed to refilling the coffers, but we need help. We're seeking out organizations and agencies that also want to support small business innovation. Our goal is to raise \$1.5 million and double our effort over the next five years – and NRRRI will put in \$1 for every \$5 raised.

What do we expect to accomplish with \$1.5 million?

- 300 regional jobs created or retained and the ripple effect of a stronger economy.
- A lean manufacturing specialist to help teach and network rural small businesses.
- Increased access for small businesses to NRRRI's labs, technologies and scientist knowledge.
- Client match of an additional \$1.5 million cash and/or in-kind effort.
- Increased private sector innovation and product commercialization.



Pamela Sarvela, Product Development Fund manager, enjoys working with entrepreneurs to help them succeed.

NRRRI goes beyond business consulting. We're applied research that gets real results. We also connect our clients with partners for finance packaging, business planning, market analysis and leadership development – critical elements of entrepreneurial success. Together we help businesses be stronger, faster, better.

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