

NRRI Now



NATURAL RESOURCES RESEARCH INSTITUTE

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All baitfish sold in Minnesota must be raised or harvested in Minnesota to avoid introducing exotic species into the state's lakes and streams. Redtails, a native baitfish, are favored by anglers and walleyes alike.



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Redtails Hatched at NRRI

In Perspective



When we have visitors at NRRI, I am frequently asked if I don't get tired of giving tours of the Institute. My response is not at all! In addition to being the best way to promote the Institute, tours give me a chance to interact with NRRI scientists and technicians, see progress on projects first hand, and become acquainted with exciting new ideas. A recent tour was a case in point. I was taking several guests through NRRI's machine

displays. I'll bet, however, that only a few individuals closely associated with the project can picture what the undercarriage with its underwater sensors might look like. Of more concern to me, however, is that because of its subtle role, NRRI's machine shop—or model shop as I like to refer to it—is seldom in the forefront of publicity efforts.

In any event, I concluded that the very important roles played by Gene Betts and Steve Johnson in NRRI's machine shop are frequently out of sight, out of mind, and needed more publicity starting with this NRRI *Now* column. In order to appreciate the NRRI machine shop there are a couple of facts that need to be understood. The first is that it is not just a conventional machine shop but more of a model shop. We frequently say that if an entrepreneur can bring an idea in on the back of a napkin, the shop can help to design and develop a cost-effective prototype. It is this design function, relying on exceptional operator experience in conjunction with sophisticated computer and machine shop capabilities, that we pride ourselves in. Second, important to our success and our clients' success is a network of commercial machine shops. When an idea is ready, say for production of multiple units, we work to engage a commercial shop and effect a smooth transition. This close association with commercial

businesses recently led Gene Betts to play a lead role in establishing an active metal fabricators association for northeastern Minnesota.

A third consideration is that machine shop services are made available to entrepreneurs and small businesses with ideas covering many topical areas. Thus, accomplishments range from helping to design and prototype the award-winning Ladder Buddy™ to cost efficient design of sophisticated medical devices. Demand for these client services has continued to increase to a point where we have begun to discuss a more restrictive prioritization process, particularly because many clients need matching financial support. Finally, it is important to note that the machine shop plays a vital support role to internal natural resource-based research projects. To all these clients, whether they are external or internal, NRRI's machine shop is neither out of sight nor out of mind.

Michael J. Lalich

Michael J. Lalich
Director

THE MACHINE SHOP PLAYS A VITAL SUPPORT ROLE TO INTERNAL NATURAL RESOURCE-BASED RESEARCH PROJECTS.

shop that is under the capable guidance of Gene Betts. An object with a rather intricate structure sitting on a desktop caught my eye. I asked Gene what it was, and he told me it was the "housing" for the underwater sensors for Apprise Technologies' robotic buoy. A discussion of the machine shop's extensive role in assisting Apprise followed.

I had to chuckle. Talk about being out of sight, out of mind. Apprise's robotic buoy has received statewide and national attention, and pictures of the three armed yellow buoy system with its array of solar cells have shown up in numerous articles and

Aquaculture



Redtails hatched at NRRI, cooperator facilities

Aquaculture in Minnesota is a quiet but growing industry which links tourism, recreation and the state's natural resources to rural communities and businesses.

Researchers from NRRI, Minnesota Sea Grant and the Agricultural Utilization Research Institute are looking at the technical and economic feasibility of commercially spawning and raising redtails. This past summer hornyhead chubs (locally known as redtails) were spawned and hatched in both NRRI's indoor aquaculture laboratory and at three industry cooperators' outdoor facilities. This is the first time redtails have been successfully hatched on a large-scale basis.

NRRI/Sea Grant aquatic biologist Paul Tucker raised wild-caught redtails from fry to marketable size in one year compared to the minimum three years required in a natural setting. Using pelleted feed in an indoor aquaculture system, Tucker was able to grow 95 percent of the fish to a marketable size by the 1999 Minnesota walleye opener.

"The redtails raised at NRRI appeared heavier per length and more uniform in size than those harvested from

natural streams," noted Tucker. Baitfish retailers confirmed this observation.

In the next step, Tucker combined his knowledge of baitfish biology with the hands-on experience of Todd Sisson of the Agricultural Utilization Research Institute. They secured funding to help three baitfish wholesalers set up artificial stream systems. They then simulated natural stream environments to encourage the redtails to spawn and hatch. Eggs were successfully hatched this past summer and fry are growing at all four facilities.

Jeff Gunderson, associate director of Sea Grant, pointed out that although the program has been successful, it doesn't mean that commercially hatching and raising redtails is economically feasible. "The next phase of the project is designed to look at just that," said Gunderson. "The Minnesota Technology-funded research will examine profitability given different aquaculture costs and market



prices. Research will also continue on refining production techniques and managing the fish in commercial settings."

Currently, bait shops are supplied by wholesalers who harvest redtails from natural streams. However, increased demand for redtails in recent years and loss of spawning habitat has put pressure on several bait species, including redtails. Scientists hope that what they learn about spawning and raising redtails will ease the stress on natural streams while providing an economic aquaculture opportunity.

According to *Fish & Wildlife Today*, published by the Minnesota Department of Natural Resources, anglers

spend \$50 million annually on baitfish in Minnesota. As the fishing season progresses, redtails become even more popular and prices rise, sometimes topping eight dollars per dozen.

This project has been funded by Minnesota Technology, Inc., Minnesota Sea Grant and the Agricultural Utilization Research Institute with research conducted at NRRI's aquaculture laboratory and the three industry collaborator's facilities. NRRI's Carl Richards oversees the project.



Lake Superior Research

Planning for the future

Many would agree that one of the most precious possessions we have is the land where we live. Whether used for development or for recreational activities, the area around Lake Superior has become a highly coveted resource in recent years.

Researchers at NRRI are in the process of making that sharing easier, as they finish a three-year project that has collected geographical information about the basin into a series of databases for area users. The Lake Superior basin decision support project will act as an informational and educational resource that will help with local land and resource decisions while promoting stewardship and ecologically-friendly use of the land around Lake Superior.

“Realizing the importance of tourism as well as natural resource concerns, the project acts as an information source for the multiple users of the lake,” said landscape ecologist George Host. “In the context of this project, everyone around the lake affects it.”

Researchers are also using NRRI’s Geographic Information Systems (GIS) Laboratory to compile information about the physical qualities of the basin area into

a suite of accessible databases. Some of this information includes facts about the basin’s rivers and lakes, special forest types, different soils and animal habitat.

Using map-based graphics and computer models, this information will be made available to groups such as local governments, advocacy groups, resource management organizations and individual citizens. At this time, the databases include information on land use, climate, population and soil plus many other factors.

Townships, for example, may want to use the information base as a guide when determining zoning laws.

“Using these new resources will benefit local governments in decision-making processes,” said Host. “The task of regional planning will be simplified if they go into the planning process with a clear picture of the natural and cultural resources of the area.”

In addition, the project will work with educational organizations to encourage public awareness and support of Geographic Information Systems (GIS) -based land use findings.

One area the project is currently serving is Duluth’s Miller Creek region. Studying the effect of stormwater runoff on water quantity and quality, researchers have developed a model that can be used as a land-planning tool.

Currently, researchers are developing a compact disc of the data. The disc will also include informational materials such as sample surveys to identify public issues and unique transportation information such as emergency vehicle coverage zones.

In a more public realm, project creators are establishing touch-screen kiosks that would provide information about the basin for citizens and tourists. The kiosks will be housed in frequently visited locations such as Duluth’s future Great Lakes Aquarium at Lake Superior Center.

Joining Host in the basin project are NRRI’s Lucinda Johnson, Carl Richards, Mark White and Gerald Sjerven. The project was funded by the U.S. Environmental Protection Agency through the Minnesota Department of Natural Resources. The Lake Superior basin decision support project databases can be accessed at: www.nrri.umn.edu/lsgis

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NRRI Expansion

Ely Field Station opens

Nestled in the heart of Minnesota’s prized northern woods lies the newest expansion effort of NRRI—the Ely Field Station. The Vermilion Community College campus in Ely houses two offices, a full laboratory and a biological preparation area for studying biodiversity, water quality and other northern forest issues.

According to NRRI director, Mike Lalich, the Ely Field Station is now a reality that was conceptualized several years ago. “Covering northeastern Minnesota from a service perspective makes great sense,” he said. Ely’s proximity to national parks and forests, peatlands and the Boundary Waters Canoe Area Wilderness makes the station a logical fit from a geographical and technical standpoint.

In addition, algal taxonomist John Kingston was hired to oversee the station and focus research efforts on local and regional issues. “I plan to bring NRRI’s research strengths to the northern forests,” said Kingston. “Some potential projects include looking at nutrient status in lakes and rivers, interpreting fisheries stocking success based on algae indicators and documenting biodiversity in wetlands.”



John Kingston, a veteran lake biologist, will oversee the operation of NRRI’s new Ely Field Station located on the Vermilion Community College campus.

Kingston brings over 20 years of aquatic research to his new position, including prior studies on the Great Lakes, Duluth Harbor and inland northern lakes. He specializes in looking at the sediment, biological history and water quality of lakes over time by examining indicators such as the organisms left in the lake sediment. Most recently, Kingston managed the biological data for the National Water Quality Assessment Program.

“With a person of John’s caliber, we can mold the Ely Station program to fill the needs of both citizens and the environment in northern Minnesota,” noted Lalich. “His extensive background in lake ecology will also allow us to compete nationally and internationally for grants.

Although the majority of NRRI research is conducted at the Institute’s Duluth facility, the Ely Field Station is NRRI’s fourth extension effort. The Coleraine Minerals Research



Laboratory in Coleraine specializes in product and process improvement of taconite and other Minnesota minerals while peat scientist operate a 525-acre facility near Zim. The Center for Economic Development on the UMD campus coordinates NRRI’s Business Group activities along with regional Small Business Development Centers, Minnesota



Technology, Inc. and Bureau of Business and Economic Research projects.

Wastewater Update

Alternative systems performing well

Four years ago NRRI researchers joined a team that broke ground to study on-site alternative wastewater treatment systems. At the same time, residents living on Grand Lake near Duluth needed assistance with developing a community system in a problematic area—the water table is near the surface and most standard systems didn't work on the small lakeside lots. In a third project, researchers joined forces with the Northern Lights Tourism Alliance of the Iron Range Resources and Rehabilitation

Board (IRRRB) to demonstrate solutions for the many resort owners in northern Minnesota who need to upgrade their on-site treatment systems.

Spearheaded by NRRI's Barb McCarthy, a team of industry experts, county health departments and state agencies examined each scenario and developed solutions. The projects offer valuable, documented performance data with the goal that they will be considered as alternatives in areas where standard systems fail to meet state standards.

At the first experimentation site, six systems were originally installed for a side-by-side comparison: 1) standard trench system 2) in-ground peat filters 3) single-pass sand filters 4) aerobic treatment system and 5) constructed wetland 6) drip irrigation system for distributing treated water. In 1998, three constructed wetlands and modular peat filters became operational; most recently a textile filter with polishing sand filter was added. In addition, a three-celled constructed wetland was built to handle wastewater from a small slaughterhouse, vegetable-washing operation, school and institutional residence.

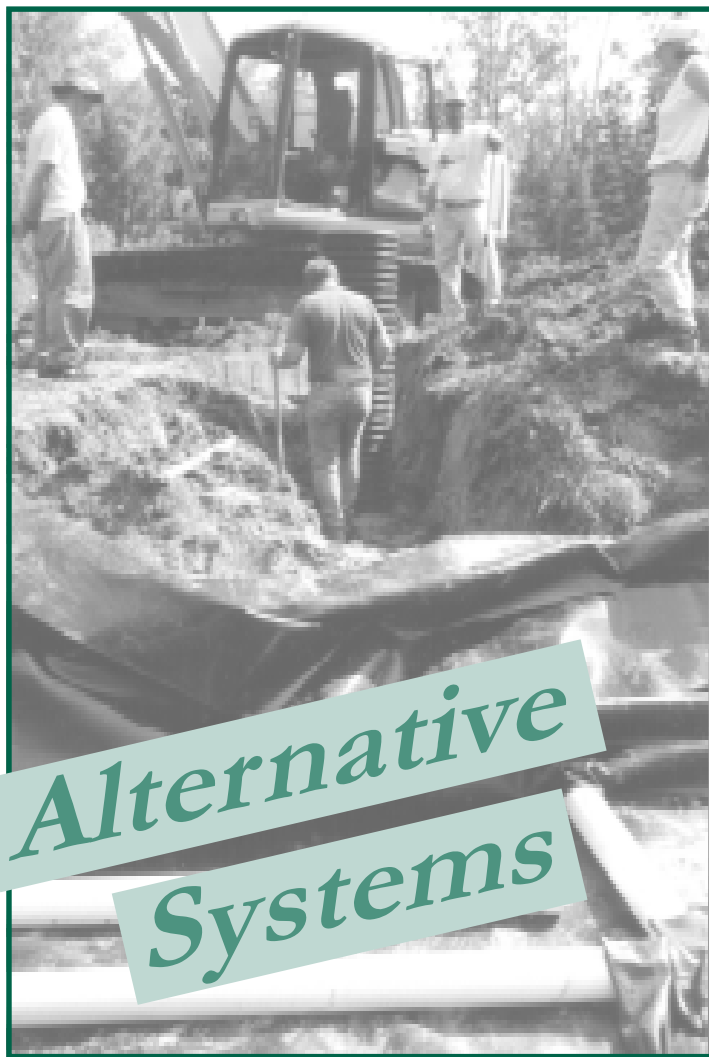
The constructed wetland servicing Grand Lake residents has operated successfully since 1995, notably through Minnesota's snowiest and

coldest winters on recent record. "The cluster wetland system at Grand Lake has performed well in treating wastewater to protect the health of its residents and to minimize impacts on the water quality of Grand Lake," noted McCarthy.

The third project has assisted the owners of three resorts—Burntside Lodge near Ely, Dodge's Log Lodges near Two Harbors and Northern Lights Resort on Lake Kabetogama near Ray. Each system was designed specifically for the resort's unique landscape, soil conditions and wastewater needs. "I believe that the wetland system at Northern Lights will be a resounding success and serve as an example and viable option for others faced with the same problem," wrote Northern Lights owners Paul and Linda Cloyd.

NRRI scientists monitor these systems on a routine basis. Rich Axler, Steve Monson Geerts, Jerry Henneck and Jonathon Pundsack contributed to these projects which were funded by a variety of sources including the Legislative Commission on Minnesota's Resources, Minnesota Technology, Inc. and St. Louis County.

An engineered mound system and constructed wetland were designed and built for specific site conditions at Northern Lights Resort.



Alternative Systems

Geology

Science teachers head to class

The Minnesota Minerals Education Workshop combined classroom instruction, field trips, rock samples and curriculum during three days in August for K-12 teachers. This is the third year for the workshop, which is sponsored by private companies and public agencies, including NRRI, to increase teacher knowledge about Minnesota's geology and the contributions of the mining industry.

"The workshop is a 'win-win' situation for teachers," said Wendy Robertson, Duluth area teacher. Robertson was so pleased after attending the workshop last year, she signed up for this year's, too.

Field trips included a detailed look at North Shore Mining Pellet Plant in Silver Bay, stops at state parks, local quarries and a look at Duluth's Stowe School rock garden. Stowe's rock garden was created through the combined efforts of many volunteers, including community leaders in Gary-New Duluth and NRRI scientists. Rocks showcasing Minnesota's geologic history were brought to the school and landscaped to make an attractive learning experience for students and the community.

Classroom instruction highlighted Minnesota's geology including rock identification and curriculum designed to bring the information home to all ages of students. Teachers found sure-fire ways to bring the entire



NRRI's Mark Severson explains the new rock garden at Stowe Elementary School.

history of Minnesota's geology alive to students—from learning Minnesota was once close to the equator to formulas for bringing the geologic timeline down to a classroom period, teachers and students now have the information and skills to appreciate some of the oldest rocks in the world.

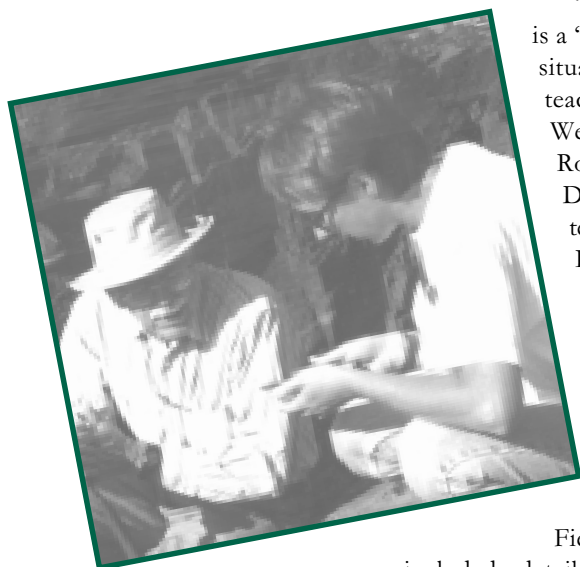
"Partnerships are the success behind this workshop," said Susan Balgie, Minnesota Department of Natural Resources public information officer. "One group could not supply the high quality experiences available for all the teachers. We have a core group of people and agencies working together to make this workshop the best it can be."

Sponsors of this year's event are the Minnesota Department of Natural Resources, NRRI, U. S. Geological Survey, U. S. Forest

Service, Minnesota Geological Survey, Iron Range Resources and Rehabilitation Board, Iron Mining Association of Minnesota, Aggregate and Ready-Mix Association of Minnesota, American Institute of Professional Geologists, CAMAS-Shiely Division, Geological Society of Minnesota, Minnesota Asphalt Pavement Association and Society of Mining, Metallurgy and Exploration, Inc.

NRRI geologists Mark Severson, Larry Zanko and John Heine have participated for three years in the workshop by conducting classes and field trips for teachers.

"This workshop is a great way to showcase both the local geology of Minnesota and to show how locally mined materials, including taconite, clay or gravel, are used in products that we use every day," said Severson.



UMD professor John Green shares knowledge with science teachers from across Minnesota

In Business

Business Revisited

Van Technologies is well-connected

Today, as we continue to learn more and more about the depletion of our natural resources, most of us try to practice environmental-friendly ways. Larry Van Iseghem, founder and president of Van Technologies, took his concerns to another level. In 1992, with technical and business support from NRRI, he launched his company, located between Duluth and Two Harbors, which specializes in producing coatings for wood, metal and plastics that are safe for the environment. Eight years later, with six employees plus national and international clients, Van Technologies still continues to conserve resources and seek periodic technical and business advice from outside sources.

According to Jim Skurla, NRRI business development specialist, "Our assistance as well as a wide array of other valuable resources, is available to local companies that design and manufacture natural resource-based products."

Van Iseghem was aware of the opportunities that were available to him when he started Van Technologies. Initially, he sought help from NRRI wood products specialists to develop coatings that performed like other oil-

based coatings on the market without emitting toxins into the atmosphere. Then, Van Iseghem contacted the NRRI Business Group for guidance in writing a business plan—the first step toward securing start-up financing.

With the help of the Business Group, Van Iseghem was referred to other area organizations that help local entrepreneurs in need of financial aid, such as Northeast Ventures and the Northland Foundation. In turn, those organizations referred him to additional groups that also assist start-up companies. Soon Van Iseghem had established a strong network.

Once he had sufficient funding, Van Iseghem thoroughly researched the coatings market. Together with Skurla, he formulated an industry overview and took an in-depth look at potential competitors. Even today, they constantly update their research to meet the needs and trends of the changing market.

Throughout the years, NRRI has developed a long-term relationship with Van Technologies. In one instance, Victor Krause, NRRI wood products technician, was on-site at Van Technologies for an extended period to help



Head chemist Teresa Thorson mixes specialized coatings in the Van Technologies laboratory.

optimize a new coatings line. Skurla and Van Iseghem meet periodically to develop company forecasts and projections. They also look at prominent issues affecting the coatings industry. Most recently, they saw a need to advance the market outreach of the company. After weighing many options, they decided that in order to have a more significant edge over today's competitors, Van Technologies needed to hire a full-time marketing specialist.

Van Iseghem expects this addition to further expand the company's 40 percent growth rate into national and international markets.

If you would like your name added to the Center for Economic Development mailing list, please call (218) 726-7298

NRRI Staff

Award Winning Staff

Based on regional, national and international reputations for quality work, several NRRI researchers have recently been honored in their respective fields.

NIEMI NAMED TO BINATIONAL COMMITTEE



Gerald Niemi has been named a U.S. representative to the Lake Superior Binational Forum. This organization, which advises U.S. and Canadian governments about critical issues relating to Lake Superior, consists of 24 members from business, environmental groups, industry and academe. Forum members are also responsible for developing strategies for eliminating pollutants and contributing toward the foundation of a healthy economy.

PASTOR HONORED IN FINLAND



John Pastor was recently recognized as an honorary member of the Finnish Society of Forest Science. The Society was founded in 1909 to promote research in forest and wood science. With its network of more than 500 Finnish and international members, the society strives to enhance links between researchers and practical foresters while promoting public interest in forestry research. This lifetime achievement attests Pastor's dedication to his profession and the health of forests across the globe.

JOHNSTON TO CHAIR SOILS GROUP



Carol Johnston was recently named Chair-Elect of the Wetland Soils Division of the Soil Science Society of America (SSSA). The organization of more than 6,000 international professionals is dedicated to the advancement of soil science. The primary goal of the Wetland Soils Division is to provide a common forum whereby wetland soil scientists can discuss major research issues and future directions, communicate effectively with other professional societies on the role of soil science in wetlands, provide a common base for publication of wetland related research and provide national and international leadership in this area.

MCCARTHY AWARDED BY GOVERNOR



Barb McCarthy recently received a Certificate of Commendation from Governor Jesse Ventura for her work and partnership in a regional wastewater treatment effort. For the past four years, McCarthy has been successful in bringing together both public and private sectors to design, construct and monitor alternative wastewater treatment systems for resorts across northern Minnesota. As examples of "performance-based systems," they are used at locations where inadequate soil conditions prevent the use of traditional treatment methods. To date, constructed wetlands, engineered mounds, recirculating sand filters and drip irrigation distribution systems have been installed.

McCarthy leads a team which includes representatives from the Northern Tourism Alliance of the Iron Range Resources and Rehabilitation Board, Minnesota Department of Health, Minnesota Pollution Control Agency and St. Louis, Cook, Lake, Itasca, Aitkin, Crow Wing and Cass Counties. The Northern Lights Tourism Alliance provides overall direction for the project.

NRRI *Partners*

Forest Products Partners

The company that partnerships built— Rosandich Wood Products

Over the past year a quiet company has evolved in Cook. Rosandich Wood Products converts Timberstrand® lumber into a thick veneer using thin kerf saw technology. The finished product has already found its way into the geometric wood window industry in the Upper Midwest.

Several years ago the NRRI research team of Pat Donahue, Xianzhi Quan and

Suzanne French developed a method to re-manufacture Timberstrand®, a thick veneer manufactured by TrusJoist McMillan in Deerwood, into thin, flexible lamellas. However, the concept and methodology needed an industry cooperater to move ahead. When Randy Rosandich approached Donahue looking for entrepreneurial ideas in the wood industry, Donahue recognized the opportunity to bring the prototype to the next level.

Rosandich then approached TrusJoist McMillan's Greg Schuyler with NRRI prototype in hand. Schuyler completed the test marketing, encouraged company officials to back the product and promoted sales through the company's extensive sale force. Rosandich developed an exclusive rights agreement with both NRRI and TrusJoist McMillan, then began searching for machinery and a manufacturing facility.

A worker remanufactures Timberstrand® veneer into thin lamellas using thin kerf saw technology. Rosandich Wood Products operates in conjunction with Hill Wood Products in Cook.



Randy Rosandich and Steve Hill demonstrate the flexibility of remanufactured Timberstrand® veneer that has made an immediate impression on the geometric window industry.



Based on his extensive knowledge of European wood manufacturing equipment Donahue helped Rosandich locate Wintersteiger, a German frame saw manufacturer, and apply for a \$40,000 grant from Minnesota Technology, Inc. Rosandich then arranged to purchase a used machine.

At the same time Jack LaVoy of the Iron Range Resources and Rehabilitation Board (IRRRB) matched Rosandich up with Hill Wood Products in Cook. LaVoy knew that Steve Hill, a third-generation owner of the 50-year-old company, was looking for a product expansion area. Rosandich's product was a perfect fit. Rosandich and Hill worked out an agreement in which they share manufacturing space and employees.

Upon delivery of the frame saw, Hill and his mechanical team disassembled and reassembled the saw three times in order to understand how the machine worked.

"It was Steve's machine tool knowledge that made a world of difference on the production level," noted Donahue. "They were then able to quickly figure out how to cut the different species and make the different products."

The company's first prototypes entered the window frame market this past spring. Rosandich Wood Products has grossed nearly \$500,000 to date and expects to reach one million dollars in sales by early 2000. An estimated 30 percent of sales come from the

agreement with TrusJoist McMillan with Hurd Millwork, Kolbe & Kolbe and Karadco being the primary clients.

Rosandich continues to work with Donahue's team to look at additional applications such as domestic flooring and interior door components. He also notes that without NRRI's extensive industry contacts and experimentation with Timberstrand®, Rosandich Wood Products would still be just an idea—not reality.

"There's no way possible that I could have done this alone and be where I am today," Rosandich said. "Without these partnering

relationships, I don't think I could have made this happen."

Based on technology developed by NRRI forest products researchers, the motivation and networking of an ambitious entrepreneur, integration of European machinery and the development of several crucial partnerships across northeastern Minnesota, Rosandich Wood Products is making its presence known.

Project Highlights

GRAND OPENING

The newly built Coleraine Minerals Research Laboratory is scheduled to open in mid-October. The \$1.8 million project will house offices plus chemical and sample preparation laboratories for 24 scientists and staff. Coleraine researchers focus on product and process improvements and cost reductions to maintain and enhance the competitiveness of Minnesota's taconite industry. Additional research looks at

methods to improve the processing for copper, nickel and titanium deposits in northeastern Minnesota and environmental remediation techniques to reduce contaminated harbor sediment throughout the Great Lakes.

SMALL BUSINESSES AWARDED

Regional small businesses were honored at the Seventh Annual Joel Labovitz Entrepreneurial Success Awards during Small Business

Week in June. Winners were awarded in four categories: MCM Enterprises of Aitkin in the Emerging Entrepreneur category; Citon Computer Corporation as the Start-Up Entrepreneur; A&L Partnership in the Mature Entrepreneur category; and Van Technologies, Inc. as the Inventor winner. In addition, a special award, Lifetime Achievement, was given to Two Harbors business icon Roy LaBounty, founder of LaBounty Manufacturing.

NEWSLETTER TO FEATURE MTI PROJECTS

The Winter 2000 issue of the NRRI *Now* newsletter will highlight projects completed or in progress using Minnesota Technology, Inc. grants. NRRI uses this funding to assist Minnesota companies in becoming strategically competitive.



Check us out: www.nrri.umn.edu

The Natural Resources Research Institute was established by the Minnesota Legislature in 1983 to foster economic development of Minnesota's natural resources in an environmentally sound manner to promote private sector employment.

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