



MANUFACTURING TODAY WI™

Celebrating Manufacturing in Wisconsin's Schools

Fond du Lac

Project G.R.I.L.L.

Page 4 — Project G.R.I.L.L. teaches students all the steps of taking an idea from concept through production - with the end result being a fully functional grill. The design process and fabrication of these complex grills takes an entire school year during which each student group is mentored by both their technical educational teacher and a manufacturing partner. This year there are over 90 students from a total of eight area high schools participating.



Sheboygan Area School District

Taking Vision to Reality

Page 6 — It often takes the perfect set of conditions to achieve the greatest accomplishments. Such is the case in Sheboygan, WI as industry and education have come together to form a landmark collaboration known as Red Raider Manufacturing. “We have come to realize that some of the most valuable learning for a student can take place outside the traditional walls of a school. These experiences for students are perfectly matched with our goal that every graduate is college and career ready.”



School District of Mishicot

Mishicot Enterprise

Page 16 — Mishicot Enterprise is a student run manufacturing business located within Mishicot High School. Local businesses have used the enterprise for engraved glasses for their coffee shops, restaurants and awards for service. Alumni from as far away as Seattle, WA have ordered products for their businesses.



Rice Lake High School The Welding Pathway

Page 9 — Years in the making, groundwork for the first ‘welding pathway’ began in earnest this spring, thanks to the added efforts of Technical Education Instructor Chuck Carr, and the cooperation between Rice Lake School District and local manufacturer Rice Lake



Weighing Systems. The Pathways goal? Get students the skills necessary to earn an entry level position, in a field of their choosing, upon graduation. The hope? Put graduates to work locally.

Middleton-Cross Plains Area School District

Cardinal Enterprise at Middleton High School

Page 19 — MHS juniors Sean Bertalot and Andrew Lund shared information about the Cardinal Enterprise program, which was offered as a class to students for the first time in the fall semester of 2017–18, to the Board of Education. “We got to see first-hand how a business works and first-hand what works and what doesn’t work,” said Lund, who plans to go to college and enter business management. “I loved the class.”



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Celebrating Manufacturing in Wisconsin's Schools

Since the fall of 2013, *Manufacturing Today WI* has been exploring the depth and scope of opportunities Wisconsin's schools are offering their students in the area of manufacturing. The partnerships that exist between schools, colleges, businesses and communities are incredible!

In this issue you will find both new articles and highlights from the school-based manufacturing programs that we have covered in past issues. We will continue to feature more highlights in the Fall issue of *Manufacturing Today WI*. Watch for it at the beginning of the 2018-19 school year.

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Project G.R.I.L.L.

*Bernadette Seefeld
Director of Educational Programs
Envision Greater Fond du Lac*

Project G.R.I.L.L. is a project based learning experience for high school students that strives to develop a strong future workforce by positive highlighting careers within manufacturing. The G.R.I.L.L. portion of the title stands for Growing Readiness in Learning and Leading. While the program was developed in Sheboygan County, Envision Greater Fond du Lac has provided the program to area school districts since 2008.

Project G.R.I.L.L. teaches students all the steps of taking an idea from concept through production - with the end result being a fully functional grill. The design process and fabrication of these complex grills takes an entire school year during which each student group is mentored by both their technical educational teacher and a manufacturing partner. This year there are over 90 students from a total of eight area high schools participating: Campbell-sport, Fond du Lac, Laconia, Lomira, North Fond du Lac, Oakfield, Ripon and Winnebago Lutheran Academy.

In addition to the fabrication of grills, the students participate in the program's Parade of Manufacturers throughout November and December. The Parade spans over three days

during which every participating high school team tours the eight participating manufacturing businesses along with the Fond du Lac campus of Moraine Park Technical College (MPTC). Students learn first-hand about the breadth and scope of each business' work as well as the wide variety of careers and post-secondary education available within the world of manufacturing. When asked about their experience during the Parade of Manufacturers, one student from Winnebago Lutheran Academy shared that "touring the manufacturing companies was a good experience because it allowed me to see the different jobs and career options that those companies offered. It also allowed me to learn more about the companies that are sponsoring Project G.R.I.L.L. and how they would be able to help us in making our grill. It was cool to see the different buildings and all the different things they did at their companies." Another student from Fond du Lac High School expressed that "doing the business tours for Project G.R.I.L.L. has broadened my outlook on businesses that I could apply for employment at after high school," which supports Project G.R.I.L.L.'s goal of developing a strong, local manufacturing workforce.

Additionally, throughout the upcoming months the manufacturing representatives



along with the MPTC representatives will attend the school tours. These tours allow the students to present on the progress of their grills, ask for advice and showcase what they have accomplished thus far. It is also a great opportunity for the manufacturing representatives to ask the students questions about their process while providing additional coaching. When asked about the impact that this program has on student's career choices after high school, the Technology Education and

Engineering Instructor from North Fond du Lac High School stated, "I have been a Technology Education teacher for the past 34 years and have had the opportunity to be a part of Project G.R.I.L.L. for six of those years: five years with Oakfield High School and now one year with North Fond du Lac. During those six years, I have seen so many of my students positively impacted by this experience. By my

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Oshkosh North High School Spartan Manufacturing Company



Spring/Summer 2016

To help students in preparation for a manufacturing career, Oshkosh North High School has implemented a new class using the Project G.R.I.L.L. program. This program was the perfect curriculum to bring to Oshkosh to increase students understanding of the demand in the manufacturing industry in the Oshkosh Community. Project G.R.I.L.L. pairs high

schools with manufacturing companies to manufacture a grill through partnered design. G.R.I.L.L. stands for "Growing Readiness in Learning and Leading." This opportunity is for 14 to 18 students in total each year. Four-six regular education students mentor students with disabilities with less experience, skills; in welding, design, marketing, and finance. The class runs like a business. Students are in charge of carrying out the daily activi-

ties and flow of the project. Oshkosh North regular education staff and special education teachers, Mr. Quednow and Mrs. Williams, are in the class for safety, quality control, and assistance with breaking down material to meet each student's needs. The business that partnered with the newly formed "Spartan Manufacturing Company" supports, through hands on assistance, in the design and build of a grill. Throughout the process, students experience design, assembly, project management, marketing, and finance skills needed to run a small company. Through the interview and hiring process with the business, mentors were partnered with students with disabilities in their area of interest. Together the employees of Spartan Manufacturing Company gain skills needed to be a good production worker including practical skills, the ability to work

quickly and methodically, and collaboration skills while concentrating on repetitive tasks.

Oshkosh North student, Jordan Demille, head of Marketing and Finance for Spartan Manufacturing Company said, "I am graduating this year with more self-esteem and self-determination than I ever had." Spartan Manufacturing Company has found a way to assist special education students by increasing the skills needed to work in careers that will provide independence, financial stability, and pride in our careers.

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Appleton Area School District A-Tech Prepares High School Students for the World of Work

Spring/Summer 2017

A-Tech was created in response to a need for workers to fill the growing demand for skilled manufacturing positions in Northeast Wisconsin. The manufacturing environment in the region is strong and growing. In cooperation with the local technical college and business leaders, this Appleton Area School District (AASD) charter school is focused on providing serious students with the skills needed for a successful career in advanced manufacturing and industrial technology.

Using a project-based, hands-on learning approach, the school day features a mix of manufacturing related courses (Welding, Machining, Mechanical Design, Automated Manufacturing) and a mix of traditional core classes (Math, Science, English, Social Studies). A-Tech labs are second-to-none with brand new equipment that mirrors what the students will see in industry. Students in A-Tech learn about the world of work in a variety of ways. In the classroom they are exposed to the basics of machining, welding, mechanical design, automation, math for the trades, reading blueprints, project-based learning, and other classroom experiences designed to reflect the world of work.

A-Tech appreciates the involvement of manufacturing professionals making classroom presentations and demonstrations and businesses opening their doors to allow students to tour their production facilities and to do job shadows with experienced workers.



Our students benefit from attending A-Tech in a multitude of ways. They get to learn what a career in manufacturing is really like. It's like taking a test drive before buying. They could make money while learning. Seniors enrolled at A-Tech have the opportunity to complete a paid internship for school credit. A-Tech students can also earn nearly one-third of the college credits needed to receive an associate's degree.

A-Tech graduates gain advantage over other applicants entering the workforce. They'll already have hands-on experience in a variety of trades and skilled labor, making them attractive to potential employers.

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Fond du Lac, Wisconsin

Taking Vision to Reality

Nicole Sondalle
Marketing & Communications Specialist
Sheboygan Area School District

It often takes the perfect set of conditions to achieve the greatest accomplishments. Such is the case in Sheboygan, Wisconsin as industry and education have come together to form a landmark collaboration known as Red Raider Manufacturing. Family-owned companies that value community involvement and a progressive-thinking school district that recognizes its role in preparing students for a diverse set of post-secondary options, all set in a climate of trust and mutual respect where working together is the norm, not the exception.

“Schools often come to us and ask ‘How did you do it?’” commented Jason Duff, Sheboygan Area School District Academic & Career Planning Coordinator. “It began, not with us asking our local employers to build a facility. It started with us going to industry with humility and asking how can we better prepare our students for the careers of tomorrow.” That initial question sparked discussions about curriculum which, in turn, led to a realization that the existing facilities and equipment did not meet the needs of the proposed student learning outcomes.

It was only then that the group embarked upon an ambitious capital campaign to raise \$4.2 million. The Sheboygan Area School District Board of Education made its own sizable commitment by allocating nearly \$1 million from the district fund balance, allowing the \$5 million facilities to break ground in March 2016 without the need to levy additional taxes. 12,400 square feet of additional space was completed and unveiled to the public in October of that same year. The spaces at Sheboygan North and Sheboygan South High Schools, house state-of-the-art manufacturing and engineering equipment to prepare students for successful local college and career paths.

Make no mistake, Red Raider Manufacturing is not as simple as ‘if you build it,

they will come.’ An oversight committee comprised of influential business and educational stakeholders meet monthly to discuss ongoing efforts to revise curriculum, align with middle school programs, and measure progress toward goals. During the 2017-18 academic year, special attention has been paid to rebranding the advanced manufacturing programs in our schools. Duff remarked, “We are finding that many students carry a stigma about manufacturing careers — that all the jobs are dirty, monotonous, and low-paying. We’re working to create awareness of the significant changes that have occurred, especially in the companies in our area, which have led to careers requiring advanced technical skills that earn family supporting wages.”

An important tool that has aided the marketing efforts has been Inspire Sheboygan County. Inspire is the connecting tool between local career coaches and students in the county. Students can learn about careers and companies through their own research or by communicating questions directly to career coaches. The usage of the tool, which is embedded into the Career Cruising platform, has skyrocketed over the last two years.

The development of work-based learning activities coordinated by Inspire has become invaluable to the area schools’ academic and career planning efforts. These include career experience days hosted by local companies as well as the increasingly popular co-op. Inspire coordinated 73 unique co-ops over three quarters of the 2017–18 academic year, up nearly 40% from the previous year when it was first offered. In a co-op, a student works and learns at a company for a minimum of 75 hours over the course of ten weeks. “We have come to realize that some of the most valuable learning for a student can take place outside the traditional walls of a school. These experiences for students are perfectly matched with our goal that every graduate is college and career ready.” commented Duff.

Back in October 2016 when the ribbon was



cut, one might have been inclined to dole out congratulations for a job well done. However, the team of educators and industry knew then, which continues to be reinforced daily, there is much work ahead. The sky is the limit in Sheboygan. But only by working together is the shared vision becoming reality.

For more information, contact:

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Visit our Red Raider Manufacturing website below:

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Beloit Memorial High School

Purple Knight Manufacturing: Investing in the Manufacturing Pipeline



Spring/Summer 2014

Beloit Memorial High School's Technology Education program challenges have been similar to many of the programs across the United States. Dilapidated spaces and outdated equipment, with the need to provide relevant and rigorous real world experiences for students we must begin to transform our programs to meet the needs of the 21st Century. In December of 2012 the renovation of the Manufacturing and Welding area began. All of the outdated equipment was removed from the space. Through the advisory committee guid-

ance it was recommended to begin investing in CNC machining equipment. Our first semester with the new equipment was a learning experience, with new equipment and tooling, also brought new challenges.

Throughout the first semester it was important to offer different experiences for students. During the month of October (Manufacturing Month) we wanted to begin taking students to facilities so they could see first-hand what manufacturing looks like today. Our investment in manufacturing will provide invaluable learning experiences for students. As we continue to redevelop and improve we have had

two high profile Wisconsin officials and many local companies and school districts tour our new manufacturing and welding facility. This recognition has provided validation that we are making the right decisions for our students and our community. We are "Beloit Proud"!

Where Are We Going Next?

Spring/Summer 2016

Beloit's REACH Advanced Career Education program is about providing technical skills and training that will help prepare students for the workforce or continued education. Three years ago the Beloit School District invested in helping change this image by updating our CNC and Welding programs. This included input from professionals in the community, it was determined at that time the equipment in the space did not reflect the industry of today. This required an extensive renovation as well as equipment investments to help revitalize the program. Today we look to provide new opportunities for students to help prepare them for life after high school.

Our instructor Terry Schindler comes to us with 11 years of machining and welding experience. Currently Mr. Schindler is working at getting his students' credentials and certifications for the National Institute for Metalworking Skills (NIMS) and the American Welding Society SENSE program. Both of these programs offer certifications that are



transferrable, so the students can take them wherever they go in manufacturing.

Our manufacturing advisory committees have played an integral part in the development of the program and the direction we are headed in. A key topic in our meetings is curriculum and what must be covered so that our students are prepared for a career in manufacturing. One of our local companies has made a commitment to have one of their employee owners spend one day per month working in the shop with Mr. Schindler. They are doing this to help mentor the students and to give them insight into the industry. The advisory committee is the key to networking, whenever we have a question or a problem we reach out to the members of our committee for assistance. The nice part is that if they are not able to help, they know someone who can. We are continually adding more people to our committee because of these relationships that we have forged.

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Hortonville High School

Manufacturing, Engineering and Technology Program Continues to Expand and Prepare Students for the Future

Fall/Winter 2014

In spring 2014, the Manufacturing, Engineering, and Technology (MET) Department at Hortonville High School (HHS) underwent a major face lift. As part of a \$7 million renovation to the high school, the department's space was completely redesigned and made over. This came about because the community as well as district leaders saw the need that will allow the department to expand and better prepare their students for success after high school. In 2011, the department added a pre engineering pathway for the students to study as well as enhanced its manufacturing / trades curriculum. Since that year, the department has added additional courses each school year to continue challenging and preparing students for future education and the workforce.

On the manufacturing /trades side, we have added a welding and fabrication class for juniors and seniors as well as a measurement and benchmark class for sophomores to our already

robust course offerings. The measurement and benchmark class is the first class in a series of three intended to expose students to the machining field. Through the youth apprenticeship program, the department places several students during their senior year in machine shops where they are gaining much needed experience in the workforce. Two HHS students who went through the youth apprenticeship program said this: "The CAD and shop classes we took in the high school gave us the basic knowledge and sparked an interest that we didn't have before. We both went from knowing nothing about the trades – to wanting to pursue a career as a machinist thanks to the Manufacturing, Engineering and Technology department and the apprenticeship program."

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Three Lakes School District

Three Lakes Putting the Fab into Fabrication

Fall/Winter 2014

The Fab Lab at Three Lakes has brought in a number of pieces of technology to help the students learn these skills. This equipment includes a CNC Router, CNC Plasma Cutter, 5 3D printers, a laser engraver, a 4 axis mini-mill, and a vinyl cutter, along with a number of industry standard software programs.

The focus at Three Lakes isn't necessarily just on the technology, but using technology to help develop critical thinking skills, and give students the opportunity to learn manufacturing and engineering techniques to give them immediately applicable job skills. The school has partnered up with a number of local businesses to create a set of certificates. These certificates verify that students have become proficient in a set of skills, which the earning of gives the students a much more likely chance of being hired by these local businesses. Students can earn certificates in Manufacturing, OSHA Safety Certificate, Solidworks Basic User, Solidworks Intermediate certificate, and Youth Leadership.

The Three Lakes Bluejay CNC Club

Spring/Summer 2016

This year Three Lakes' Technology Education Teacher, Mike Gorney, has worked to help expand opportunities for students in Three Lakes' Fab Lab and in his classes by starting the Bluejay CNC Club. The CNC club was started to let any student in grades 7-12 get extra experience using Fab Lab equipment, such as the CNC router, CNC plasma and the laser engraver, as well as traditional shop equipment, and to use that experience to both design and create gifts, specialty items, or parts for local businesses. The club also has a licensing agreement to produce and market Bucky Badger items. Besides gaining skills and learning more about manufacturing and marketing using CNC equipment, the club also has been able to use the money that has been made to purchase additional equipment.

Students also have an opportunity to travel to local industries to see their manufacturing



techniques, and to make connections between what they have been doing at school, and what they may be able to do once they graduate. We're looking forward to seeing our students move out into the community to get internships, and then jobs with these companies, and maybe even starting their own businesses someday" said Gorney.

Three Lakes Fab Lab Going Strong

Fall/Winter 2017

The Fab Lab at the Three Lakes District has been very active over the course of the past year, and we don't slow down at all during the summer! Besides teaching students during the school year from K-12 about the engineering design process, and designing and creating solutions to everyday problems or for outside people of businesses, we also have a strong community and professional practice presence in the community and the state.

All year long, the lab is open to community members on Tuesday and Thursday nights. Community members (anyone in the district) are able to come in, purchase a semester membership, and learn how to use the software and hardware that are present in our lab.

This summer also saw opportunities for the second year during the summer for both local and visiting students with a Maker Camp that lasted for three days in August. The event was held in conjunction with the Three Lakes town library, and the local model railroad club pitched in with a real world challenge dealing with programming railroad lights.

Besides students and community members getting to have all the fun, Three Lakes was also in the third year as a training center for teachers to learn more about fab labs and how to do utilize it. Teachers from all over the state have been coming to Three Lakes for the two weeks classes, and not only are they gaining experience and all of the curriculum that we use, but we are creating a community of fab labs and users that can work together to help each other expand and continue to improve teaching and learning for students.

Northland Pines School District

Eagle Fab Lab and Eagle Manufacturing

Fall/Winter 2017

Our newly remodeled lab is complete and we are busy touring students, faculty, school administrators, state officials, and community groups showcasing the Eagle Fab Lab. The Eagle Fab Lab has been well supported because those involved see the great opportunities it can provide for both Northland Pines students as well as local community members.

The word is quickly spreading on another program we are developing in the Technology Education Department, Eagle Manufacturing. Eagle Manufacturing is a small group of students that have dedicated countless hours to developing a student based enterprise. The "business" within the school is designing and building high quality products for other businesses and organizations within our community. This program is proving to give students real world experiences in design, product development, manufacturing, and problem solving, while also learning soft skills in relation to customer communication, quality control, and teamwork. Students are also responsible for receiving orders, distributing and tracking work orders, and meeting deadlines while also creating invoices and accounting for expenses and profits.

We are starting Digital Manufacturing class that this fall that will be centered in the Fab Lab. Our goal over the next few years is



to integrate students from Business Education, Art, Technical Education and other areas to form an actual business model for Eagle Manufacturing with our students learning the various components that are within a business. Our response for this first year was very good and as a result we will be running two sections of this new class.

The Eagle Fab Lab and Eagle Manufacturing are on the leading edge regarding both facility and equipment, rivaling top high schools in the state as well as mirroring

industry standards. Both will be able to offer incredible opportunities to our students as well as our community members, and our students will have the potential to leave high school very well prepared for both jobs in industry and advanced education and training.

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Rice Lake High School The Welding Pathway

A pilot program is underway at Rice Lake High School (RLHS) that addresses the needs of an often overlooked portion of the student population: students who, for whatever reason, are reluctant to commit to post-secondary education. The RLHS 'Pathways' initiative will include many tracks — from agriculture, to business, to manufacturing — all focused on giving students skills that can be immediately applied in the workforce. Years in the making, groundwork for the first 'welding pathway' began in earnest this spring, thanks to the added efforts of Technical Education Instructor Chuck Carr, and the cooperation between Rice Lake School District and local manufacturer Rice Lake Weighing Systems (RLWS).

Rice Lake Weighing Systems continues to be a great supporter of the Rice Lake High School Welding Program. Kevin Larson, welding engineer at Rice Lake Weighing Systems is a great resource whenever there are any questions. Kevin also is our contract for any materials that are needed for the welding students. Rice Lake Weighing Systems supplies an endless supply of I beam cutoffs whenever needed to the welding classes. These materials provide our students with a tremendous amount of welding which is needed to become proficient in the welding field.

Since May of 2013, RLHS instructor Chuck Carr has been undergoing continuing education of his own, working closely with Kevin to learn the specialized skills required of a welder. While mastering these skills and immersing himself in modern manufacturing culture, Carr has also partnered with the manufacturer to develop a comprehensive welding curriculum for the high school.

Another program that is currently supported by Rice Lake Weighing Systems is the Student Internship Program at Rice Lake High School. Lori Katcher, Rice Lake Weighing Systems Human Resource Employee, works with Rice Lake High School to place students in areas of Career Interest to our students with the Rice Lake Weighing Systems Employees. Rice Lake Weighing systems has placed students in areas such as, Manufacturing Engineering, Mechanical Engineering, Packaging Engineer, Software Engineering Electrical Engineering, Marketing, and much more. These students get a great out of the classroom, real life experience with Rice Lake Weighing Employees working alongside them to see what their career consists of. For many of these students, it has given them a solid direction toward a career path with their future education.



We are working with Wisconsin Indianhead Technical College's Welding Academy program. The Welding Academy offers an introduction to the basics of Shield Metal Arc Welding (SMAW) and Gas Metal Arc Welding (GMAW), emphasizing accepted applications in butting and joining metals using standard welding techniques. There are a total of 11 transcribed credits – in addition to SMAW and GMAW, courses include Print Reading and Math. This program is taught in the high schools by dual certified instructors, developed with the input of area companies to include the welding skills they require of their employees.

On completion, the students will acquire two Technical Diplomas: Shielded Metal Arc Welding and Gas Metal Arc Welding. This will enable them to get an entry level position in welding and/or work part-time while

completing the one-year welding technical diploma at WITC.

Rice Lake High School and WITC Technical Welding Instructor Ric Eckstein have also brought Technical Students from WITC to Rice Lake High School to work with the Rice Lake High School Welding Students on many different welding processes and techniques.

The Pathways goal? Get students the skills necessary to earn an entry level position, in a field of their choosing, upon graduation. The hope? Put graduates to work locally.

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The WE Shack

The concept of the We Shack began several years ago when a local commercial contractor, Chris Mlejnek, toured our construction program. Chris expressed his desire to increase students' exposure to commercial construction concepts. We were not providing instruction in commercial construction, and did not believe schools in our area, including a technical college, were. Hence, the WE Shack.

Many thoughts and ideas on solving the gap between school and business led to building a multi-functional enclosed trailer. The trailer not only gave us a platform to teach some commercial construction concepts, it also provided a project to challenge our advanced CTE students. Mr. Carr's level four welding students fabricated the trailer from a set of blue prints; Mr. Cutsforth's machining class fabricated the pivoting axle system; Mr Cutsforth's construc-

tion class built the structural means of the trailer; and Mr. Buchmann's home repair finish with the wall, floor, and ceiling coverings. Are you catching on to the "WE" in We Shack?

As the project evolved, the "WE" grew even bigger. From Administration to Maintenance, people were offering help without seeking recognition. Behind the scenes, they were promoting and encouraging the project. Their enthusiasm spread through the community. Again, the "WE" grew. Every time there was a hurdle, someone guided us.

The "WE" which started out as Warrior Engineering soon got overshadowed by the true meaning of "WE." This project brought out the best in talented students, dedicated staff and administration, and a community connection that is immeasurable.

What else could we attach "WE" to?



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School District of the Menomonie Area Mustang Manufacturing

Spring/Summer 2015

Menomonie has recently developed a student-operated enterprise called Mustang Manufacturing. Mustang Manufacturing is an initiative that produces a variety of products including custom manufactured furniture, plaques, name plates, small construction projects, machined parts and a variety of other products. Products are manufactured according to customer requests. Currently, participants are senior level students concentrating in the business/ marketing or technology programs enrolled in the school's capstone senior internship (work-based learning) program. The business and marketing students are responsible for all of the billing, payroll, web-page design and marketing components; whereas, the technology students handle the manufacturing components of the business including material inventory, machine maintenance, and all production requirements.

The development and operation of the enterprise has been a total school partnership. We feel that Mustang Manufacturing follows our district's mission to prepare students to become lifelong learners, caring individuals

and responsible citizens; adding to Menomonie's already rich educational system. Students participating in this program develop skills (soft skills) which are much more difficult to teach than learning to operate equipment or deliver a finished product. These skills include the ability to learn, reason, prioritize, understand time management, communication, work ethic, honesty, problem solving, teamwork, creativity and a host of other skills. We feel that transferrable skills such as these will last our students a lifetime equipping them for success in whatever career they choose.

Spring/Summer 2016

Students utilize the school metal's lab, woodworking lab and FabLab, equipped with both traditional manual machinery and CNC machinery, to produce the needed orders. Currently, participants are senior level students concentrating in the business/marketing or technology programs enrolled in the school's capstone senior internship (work-based learning) program. The business and marketing students are responsible for all of the billing, payroll, web-page design and marketing com-



ponents; whereas, the technology students handle the manufacturing components of the business including material inventory, machine maintenance, and all production requirements. All of these students work closely with the business/marketing teachers and technology teachers who are responsible for the supervision of the program. Students participating in the program are paid through "piece work"

with 75% of the profits going to the students and 25% of the profits going towards the upkeep of equipment and business expansion.

We are lucky at Menomonie to have such a great administrative team, who is student focused! Our school's curriculum director approved the program. The school's business director developed an account for the enterprise for deposits and another account to distribute payroll. The human resource director hired the students as district employees. Our high school administration approved the course offering and was instrumental in offering the course as part of the school day during our school's senior internship program. From that point the program was made a reality. We are currently in our third year of Mustang Manufacturing

and are happy with the development of the program and excited of its future.

www.msd.k12.wi.us
(715) 232-1642



Chetek-Weyerhaeuser Area School District

Technical Education Changes Boosting Skills in Schools



Spring/Summer 2015

Two years ago, the Chetek-Weyerhaeuser High School Technology Education Department sought out a path that would give students another opportunity for postsecondary success. Almost one third of Chetek-Weyerhaeuser's graduating seniors had no plans to continue their education after high school. While the CWHS technology education department offered a broad range of classes that gave students an introduction to several different areas, the curriculum lacked depth, rigor, and advanced skill development. After hearing about a drastic need for welders, the technology education staff and

administration started looking into welding certifications. A push for machinists became the next goal of the department, but required drastic changes to the curriculum. The department transformed its metal working program from two classes to ten.

This type of program would not be possible without support from businesses, technical colleges, the school board, and administration. Tech Ed instructor Bob More-

head also sees a bit of change in the mentality toward technical education that has helped spur interest in advancing and changing the curriculum offered. "There was a point in the past where it was believed every kid needed to go to a 4- year college, and those who worked blue collar jobs were looked down upon and considered second-class," notes Morehead. "Now there is a shortage of skilled workers. We need to re-educate students and parents that there is a demand for skilled labor and change the mentality of society. The opportunities are out there. It is pushing schools to look at what we are teaching and what we should be teaching."

Education with the Skills that American Manufacturing Needs

Spring/Summer 2017

Four years ago, the Chetek-Weyerhaeuser High School Technology Education Department set out on a mission to overhaul their technical education department. Since the renovations to the technical education curriculum and department were completed, students, teachers, and administration have worked closely with local manufacturing companies to develop graduates with the knowledge and technical skills to help fill the needs of the local industries. Those partnerships have led to a number of new and exciting opportunities that will allow students to get a head start on life after high school.

In December, the CWHS technical education department received an \$8,500 grant from the Gene Haas Foundation. Two years ago, CWHS purchased a Haas TM1-P CNC machining center. Without the generous support and educational discounts offered by the factory retailer, a small school like CWHS would be unable to purchase such a piece of equipment.

Regional and local partnerships have also yielded great success. A company near Chippewa Falls, and another in Chetek have

continued to offer scholarships for any student wishing to continue their education in the machine tool industry. This is also the second year of Chetek-Weyerhaeuser's manufacturing youth apprenticeship program. The apprenticeship program continues to expand and has grown in popularity. It offers students real-life, paid work experience while providing them with technical skills and knowledge. The program also allows a student to try out an occupation before making a decision about the direction of their post-secondary education.

In the spring of 2016, CWHS graduated the first three students earning American Welding Society SENSE Level I welding certificates. CWHS is one of the only high schools in the state to graduate students from the SENSE program. Only students who complete all of the advanced welding courses have the opportunity to earn a certificate, and not all students who take the classes will become certified. It is a very rigorous process that involves passing several written tests as well as performance welds using multiple welding processes.

www.cwasd.k12.wi.us
(715) 924-2226



Hurley High School Northwoods Manufacturing

Spring/Summer 2014

Northwoods Manufacturing is a student run business just getting underway in Hurley, Wisconsin and doing it quickly. One year ago local Industry had a vision for what they would like to see in their local school system. These industries, like many around Wisconsin, were seeing the skilled labor shortage hit home.

These industries pooled their efforts and approached the school with an idea. This idea was to start a successful technology education program which trained students to fill jobs in their area. From the start, the school and the current technology education teacher Roger Peterson were on board. They began doing research on other schools in Wisconsin that have successful technology education programs which targeted skilled trades. They found that school in Eleva-Strum. Teacher Craig Cegielski had found that by creating a student run business, students get the training they need, and the shop gets the updates it needs within a normal school budget. The local industry and school members took a tour of Eleva-Strum and liked what they saw. Soon after, they began to make plans to create a program similar to Cardinal Manufacturing at the Hurley High School. During their visit of Cardinal Manufacturing, they were brought into contact with student-teacher Jacob Hostettler.

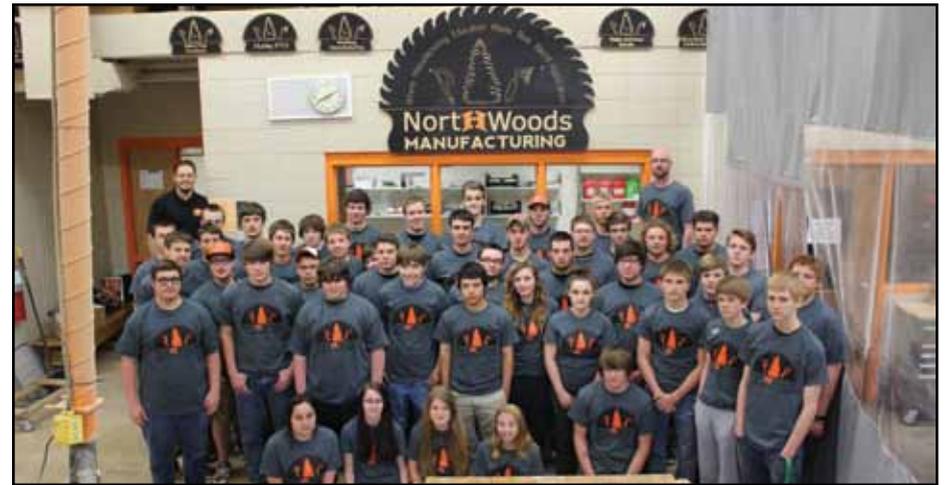
With Jacob's previous involvement with Cardinal Manufacturing and Roger Peterson's (Current technology education teacher at Hurley) vision and experience they were soon

collaborating for the future of the Hurley High School's Student-run business.

Fall/Winter 2014

Since last year a lot has happened in the Hurley School shop, A complete transformation you could say. The shop went from being a typical high school technology education classroom to a advanced manufacturing learning department. A lot of this is due to the industry support the school was able to receive throughout the year. On top of the Industry support many members of the community also got involved and donated money to the cause. Because of this, the school was able to raise over 100,000 dollars to help revamp the shop and boost the start of Northwood's Manufacturing.

On top of the updated facility, both teachers Roger Peterson and Jacob Hostettler have seen an increase in class numbers and a complete moral change within the students. Hostettler says, "The students are much more focused on learning and self-progression than at the start of last year". Since the start of the program behavioral issues have went down drastically and students take more pride in being in a "SHOP CLASS". It's something that they can look forward to and be proud of at the end of the day. After all, a program like this would never be possible without the students. "So far the Program has been a huge success; we are excited for our first year in business and can't wait to see what the future for Northwood's Manufacturing holds". For more information about Northwood's



Manufacturing Please visit our Website or email: northwoodsmfg@hurley.k12.wi.us

Fall/Winter 2015

In only its second year of operation, the business is gaining recognition. In January, Northwoods Manufacturing received the 2014 Business of the Year Award from Iron County. "Our mission is to provide students with real world manufacturing experiences that will prepare them to enter the work force with production skills and work ethic to make them desirable candidates for industry," said Teacher Roger Peterson. At Northwoods Manufacturing, the emphasis is on "real world application." Students are learning manufacturing skills by producing products for their business. "This type of program has been great for student morale and skill level as they see an immediate purpose to the skills they are being taught".

Northwoods Manufacturing's students showed off their skills at the Second Annual

Northwoods Manufacturing Open House on March 15th. "All the kids down there, about 40 or so, are doing live demonstrations on all the manual equipment," said Hostettler. "We also have some of the stuff we've made throughout the year on display." "It's a lot of fun," said one Hurley senior. "It's easy work if you put your mind to it. There's plenty of opportunity for jobs out there. They're looking for people constantly. It's a fun field to get into."

Spring/Summer 2017

Northwoods Manufacturing is in its fourth year of operation, and has seen some new improvements over the years since the beginning such as the addition of more digital read-outs for the lathes. Improvements have also been made on the mills with the purchase of power feed for the axes, KURT work-holding vices, and even a new mill from SHARP. Northwoods also has a Browne & Sharpe coordinate measuring machine for precise quality control, and other new measuring tools. Another change to the program since the start is teaching the National Institute of Metalworking Skills curriculum. There are around 15 students that are certified in various levels of the NIMS credentialing system.

Northwoods has also expanded its business from machine tool operations into welding and fabrication by creating custom trailers, bike racks, and even a lightweight, aluminum framed, ice shack.

Looking into the future, Northwoods plans to move their operations to a larger facility, purchase another CNC mill, and more fabrication equipment. Northwoods also plans to continue the NIMS Certification curriculum with the goal of certifying 70% of all students with at least 4 level one certifications. One of Northwoods Manufacturing instructors Jacob Hostettler also hopes to add community education classes to the program.

Baldwin-Woodville High School Baldwin Woodville Industries

Fall/Winter 2014

Baldwin-Woodville is a small high school with around 400 students. There are two Tech Ed teachers who teach a wide variety of classes. We have been very fortunate to have had some great support from our administration and area businesses to help us purchase equipment and develop new curriculum.

Many of the changes to our program began about six years ago when I teamed up with our other Tech Ed Teacher at the time, Jake Kusilek. We began by updating our curriculum and course descriptions with the goal of giving students a place to apply what they were learning in other classes. We picked up new equipment along the way through fundraising and through the help of our administration. Things really began to take off however about three years ago when we began working very closely with a Woodville manufacturer. The company president came to us with the idea of developing a Manufacturing Pathway for students. His idea started with students taking Tech Ed courses

as Freshmen and Sophomores. We then began working with WITC to set up Transcribed Credit Courses that students could take as Juniors and Seniors. During this time students interested in this as a career pathway also would begin working at the company. Upon graduation the company would hire these students and then pay for them to attend WITC to complete their degrees. Upon graduation from WITC the company would then hire the students full time.

We set up Baldwin-Woodville Industries with the goal of creating a student run business within the school. Jake was mostly in charge of this aspect and began manufacturing parts and selling them. The goal of the business is to pur-



chase new equipment in the future to help us keep advancing our program.

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Eleva-Strum School District Cardinal Manufacturing



Years ago, the shop at Eleva-Strum High School, laid in much the same state that many school shops struggle in. Underequipped and out of date, the shop needed to catch up with the times. The machinery that was there needed a tune-up. Some pieces needed cleaning; others, replacing, and many pieces weren't even there.

In 2007, this was the scene Craig Cegielski took in the day he accepted the job as Tech Ed Teacher. It was humbling, to say the least. But Cegielski had a mission. He'd come to plant an idea in this place, and with dedication, effort, and a love of getting his hands dirty, he would spur this program to new heights. Cegielski spent many extra hours bent over a worktable late in the night to meet deadlines. At other times, he was out in the community building partnerships with the local busi-

nesses. It's all paid off for him, though. Today, his program has become a nationwide epitome of what can happen in any school shop, with the right blend of work and ingenuity.

Cegielski's aim hasn't strayed from its mark. His mission is still the same as it was the day he first stepped through those garage doors. "(The intent was always) to run a higher-end manufacturing program, to close the skills gap, and to teach how a business works."

"Students in Cardinal Manufacturing are the cream of the crop," Cegielski states. "We only take the best. People wanting to get in need to go through an interview process, just like at a real business, and our admittance is limited."

The application process includes creating and submitting a resume, project portfolio, and a letter of recommendation. Once accepted,

Frederic School District Viking Manufacturing Products



Fall/Winter 2017

In a time where the demand for college and career readiness has become a growing focus in Wisconsin public schools, the Frederic School District began exploring creative options for exposing its students to a richer variety of technical skills and experiences. In reaching out to local business owners and relevant community members, a technical education team was developed to begin planning what is known today as "Viking Manufacturing

Products" (VIP). Representatives from local businesses, the community, and a technical college played a vital role in the development of the VIP programming.

The collaborative team toured local manufacturing companies, developed business plans, and scheduled a tour visiting a similar program in the Eleva-Strum School District, known as Cardinal Manufacturing.

VIP coursework began in the fall of 2016 with thirteen VIP students designing and producing wood products with a brand new CNC Router. In collaboration with Frederic's Business Department, VIP students are now responsible for setting up work spaces, organizing and maintaining necessary tools and materials required for individual jobs, training in the SolidWorks CAD and VCarve CNC programs, as well as the design and marketing of business promotions for VIP Manufacturing.

The Frederic School District was thrilled to announce the birth of its new business and technical education model and opportunities.



Cardinal Manufacturing

Cardinal Manufacturing and the Eleva-Strum Technical Education is about to jump into another busy fourth quarter!

Cardinal Manufacturing hosted multiple workshops sharing our model of education to many schools around the country. School administration, school instructors, career counselors, and industry partners all attended from 6+ states. Interested in attending a workshop? Come join Cardinal Manufacturing instructors, students, industry perspectives, and administrative perspectives as they host a Cardinal Manufacturing, Starting or Growing Your School-Based Enterprise Workshop. Many teachers, administrators, and industry partners contact Cardinal Manufacturing each year to learn how to create a program like it in their own districts. Please visit the Workshop Registration page on www.cardinalmanufacturing.org or contact us to register!

We continue to be very proud of our students from competing in SkillsUSA

Regional events to daily projects around the shop to meet customer deadlines and expectations in the student run business. One stand out great learning and community project this semester was created by students combined hard work, talents, and visions to create a custom snow plow for a local community member.

Besides the daily day to day jobs and schooldays we always like to travel to promote our program. A successful trip was to Scottsbluff Nebraska to the Educational Service Unit 13 conference where students presented on creating career ready students. Our students have certainly proved this!

Interested to learn more about the Cardinal Manufacturing program? Plan to attend the annual Open House! Monday April 30th, 4-9:00 pm at the Eleva-Strum Central High School Tech. Ed. Shop. Chinese Raffle, Silent Auction, food and drinks!

Check out our Facebook page and website: www.CardinalManufacturing.org or give us a call today! 715-695-2696 x2036

student participants are assigned a role that may include:

- Quoting jobs
- Ordering materials
- Manufacturing parts
- Quality control and inspections
- Shipping product
- Receiving product and materials

- Invoicing
- Customer service
- Accounting
- Marketing
- Maintaining work hours

Besides the great experience gained, the students receive a profit sharing check at the end of the school year based upon number of hours worked and other measurement tools. Only a portion of Cardinal Manufacturing earnings are paid to students after expenses and upcoming needs are covered. Most of the money earned supports the purchase of materials, equipment and facility needs to continually grow and improve Cardinal Manufacturing.

Working with industry leaders, Cardinal Manufacturing has added a great deal of CAD software and other equipment, including a CNC lathe and two brand new Haas CNC milling machines. They have received a lot of media attention, including two episodes on the Titan American Built television show. We have also benefited from publications like Manufacturing Today WI, Modern Machine Shop, and several others. They have all helped to draw attention to the program and spread the word to other schools and industries that this model of education is working here and can work anywhere in the country.

Although very young in its development, VIP maintains innovative goals in creating real-world, vocational, and technical experiences for its students.

VIP Students

"VIP was a big influence on my decision to attend a university for a degree in Manufacturing Engineering. The hands on involvement and selfpaced environment offered through VIP was a great opportunity for my learning style."

"VIP helped me make a decision to attend WITC for a career in Machine Tooling Techniques. Without my experience in VIP, I know I would not have made this career choice for myself."

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School District of Mishicot Mishicot Enterprise



Mishicot Enterprise is a student run manufacturing business located within Mishicot High School. The purpose of the enterprise is to provide a hands on learning opportunity for students to produce, market and oversee all operations of manufacturing and the online store.

A partnership began during the second quarter of the 2017-18 school year between the Intro to Business and the Intro to Manu-

facturing classes. The new CTE lab was used for production and the business lab was used for defining the business plan and creating the website. Students defined the products, researched prices and promoted the products through various media.

Teachers provide supervision and facilitate entrepreneurial decisions and oversee student creation of the financial reporting to the high school business office. The enter-

prise operation and provides students with experience in manufacturing, web design, ecommerce, accounting and marketing careers that would not occur in a traditional classroom setting.

Success of the project is determined by profitable sales, club enrollment and engagement, and future continued class offerings in business and manufacturing of the enterprise courses based on course registrations for the 2018-19 school year.

Students use state of the art laser engraving equipment and image manipulation software to produce custom engraved plaques, RTIC tumblers, and four different types of glasses. The products are listed on a student created and run website where customers can upload an image to be laser engraved on the product. Students manage the ecommerce store by ordering and uploading new products and answering inquiries by both email and phone calls.

The products move through production to packaging and shipping. Manufacturing machine operations, image manipulation software applications and distribution procedures are taught and applied through the fulfillment of customer orders in real time. Students perform jobs such as production manager,

operator, customer service technician, and shipping/receiving clerk.

The hands on entrepreneurial opportunity provides students with business experience in marketing, distribution, website management, inventory control, customer service, graphic design and accounting. They use email, documents and spreadsheets to communicate with suppliers, customers, distributors and Mishicot High School staff. This process targets district literacy goals in a real-world application where teamwork, communication and collaboration are a focus.

Local businesses have used the enterprise for engraved glasses for their coffee shops, restaurants and awards for service. Alumni from as far away as Seattle, WA have ordered products for their businesses. Within the school the RTIC tumblers are the biggest seller for students, parents, grandparents and staff.

mishicotenterprise.com
www.mishicot.k12.wi.us
(920) 755-4633



Badger High School It Isn't Just a Shop Anymore!

Spring/Summer 2014

It isn't just a shop any more. The metals lab at Badger High School is morphing to meet the demands of the workforce as manufacturing jobs move back to the area thanks to a growing economy and a paradigm shift in career and technical education. Since taking over the manufacturing program Technology Education Instructor Clint Geissler has been honing his four-year program to better prepare his students for careers in manufacturing and welding.

Through Badger's four-year curriculum, students begin with the basic skills of welding, machining, print reading and programming CAD/CAM software. As students go through the program, those skills are refined and students are tasked with fine-tuning measurements. Along with large group projects, students continue to work on individual projects each year through which they refine their skills on industry tools including milling machines, lathes, GMAW, SMAW, GTAW, a variety of cutting tools, and programming CAD/CAM to run the CNC plasma cutter. The focus of the senior year is the MSSC certification, soft skill refinement and planning for life after Badger including college tours, manufac-

turing tours and career readiness activities like resumes and job applications.

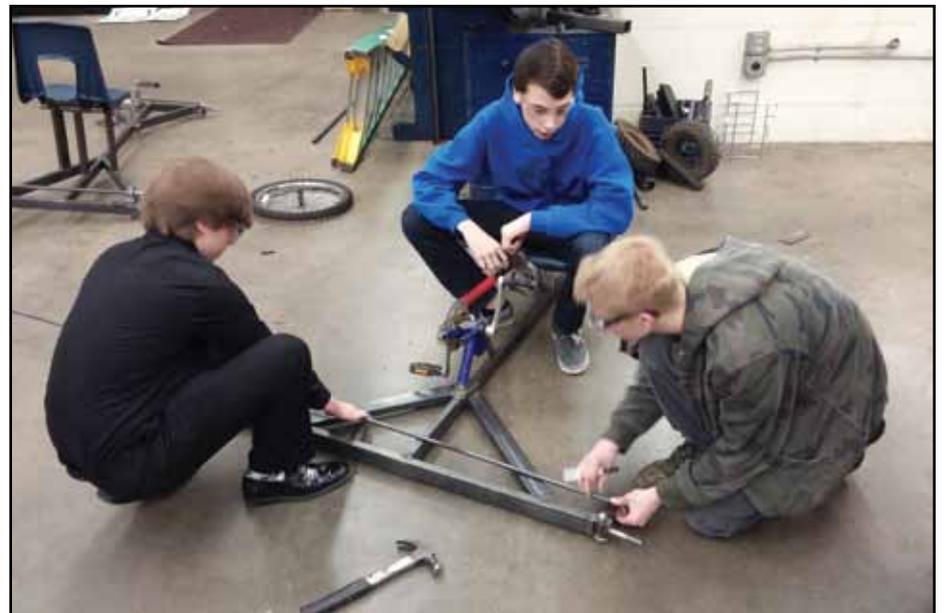
Students enrolled are seeing academic growth and potential for high-wage, high-skill jobs. Most importantly, however, Geissler hopes his program instills in his students the necessary skills to become productive, self-sufficient community members once they leave Badger.

High School Manufacturing in the 21st Century

Spring/Summer 2016

Labor projections and local leaders indicate a need and we, as educators, must find ways to help fill the pipeline of qualified talent into the manufacturing field. At Badger High School, we are fortunate to have a dedicated instructor teaching a four-year, industry-driven curriculum in metals, machining and welding in a program that combines relevant projects with industry certifications. Add to that, the local manufacturing community is involved in helping to build that bridge from school to careers.

Instructor Clint Geissler has manufactured a program that is addressing the needs



of the industry while keeping kids interested through projects they can relate to, culminating with their senior capstone project where teams of students manufacture a custom chopper from conception to completion. The kids are in it for the projects, but along the way they are earning two industry certifications from the Manufacturing Skills Standards Council (MSSC) and transcribed college credit, and touring local facilities on a regular basis where they can see that the skills and projects they work on in class are honing skills that can earn them a good living in a competitive, local

workplace. Geissler said the tours provide a benefit to the students. "The biggest thing is that they see what is going on locally. Students are always impressed by knowing that products are made right here in Lake Geneva."

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Kimberly Area School District Teaching Technology for Everyday Lives



Fall/Winter 2016

Kimberly High School's Technology Education Teachers are preparing their students for careers in manufacturing by teaching relevant curriculum that exposes students to processes and expectations they

will see when they enter a job in the machining or welding field. All projects incorporate and expose students' valuable skills and experiences they will experience in industry. The skills specific to machining include proper setup and operation of a milling machine and lathe to product a part that falls

within specific tolerances. Additional skills in the metals shop include proper set up and operation of sheet metal equipment, hand tools and basic SMAW welding equipment to produce a project that falls within specific specifications.

One example of an advanced process is CNC milling. The students learn to write the code that the CNC machine needs to operate. They enter the code into the machine and it produces the part with amazing accuracy. Kimberly has three additional welding specific classes the students can take. Skills learned specific to welding include proper set up and operation of SMAW, GMAW and GTAW welding processes. In addition to proper set up and operation of the equipment students fine tune their individual welding skill to be able to produce high quality welding beads and projects using all three processes. The third level welding class at Kimberly is a dual credit class. The class is the GMAW Techniques 1 course which college students take when they get to the tech school. The same class is offered at Kimberly for dual credit.

In both Metals and Welding students learn the skill of reading blue prints properly.

Blue prints must be aligned to specifications and requirements that prints in industry are held to. Students are expected to produce projects independently and use problem solving skills taught in class to work through problems they might encounter.

Kimberly has many partnerships with area businesses. Businesses support our program in many ways. They donate material students can use to practice machine operating techniques and build projects. In addition, businesses offer job shadow and youth apprenticeship opportunities for our students. Youth apprenticeship opportunities are even more beneficial because students get the opportunity to work for a machining or welding company before they graduate. All of this helps them make confident decisions about future schooling and career pathways.

www.kimberly.k12.wi.us
(920) 788-7900

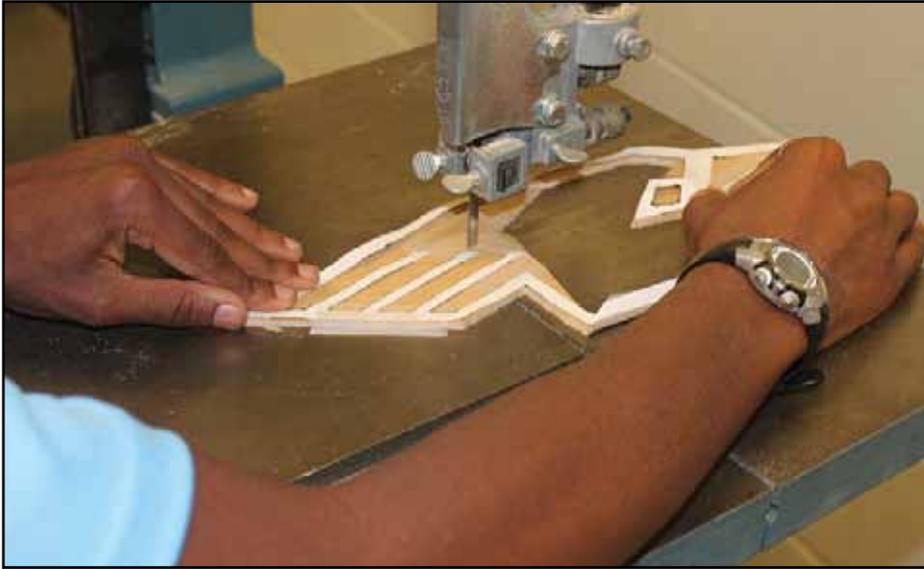


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Middleton-Cross Plains Area School District Cardinal Enterprise at Middleton High School



MHS juniors Sean Bertalot and Andrew Lund shared information about the Cardinal Enterprise program, which was offered as a class to students for the first time in the fall semester of 2017-18, to the Board of Education at its regular meeting on Monday, Feb. 12.

Staff members Cherie Hellenbrand (business), Eric Wheeler (metals) and Doug Johnson (woods) were instrumental in getting the course started and were also in attendance. Hellenbrand also credited Director of Secondary Learning Laura Love and MHS Associate Principal Lisa Jondle for allowing the school to add the course.

Hellenbrand, Wheeler, and Johnson

visited Eleva-Strum High School in the spring of 2017 to see their student-run business, Cardinal Manufacturing.

"We were interested in starting a program just like this and wanted to understand first-hand how Craig Cegielski made it happen," Johnson said. "Craig was welcoming in sharing his knowledge and giving us a tour of his shop along with the products his students were selling. His advice was to start small and grow over the years, and that is precisely what we did."

In all, 34 students were in the course, including eight girls.

They collaborated on products that were

made of wood or metals. Some of the items available to purchase included a wood and 3D version of a cube, a Cardinal head made out of wood with another metal cardinal head attached, and a trailer hitch, which Bertalot said was one of their most popular items although quantities were limited due to equipment issues.

Students spent the first couple of months with the start-up business creating a website, developing graphics, and making logos that were recognizable. Even though many start-ups take a couple of years before they turn a profit, Cardinal Enterprise made \$619 in Year 1.

Lund noted they made more money on projects such as wooden frames where items were donated. They are hoping to develop more community partnerships in the future in hopes of increasing profits.

The students strived for the best in craftsmanship and customer service, Hellenbrand said. The members managed all aspects of production and business from start to finish. The students designed every product they produced.

Students also made multiple grills, although they lost money. Still, the students said it was a valuable learning experience. Another challenge was making sure all of the students were motivated. The class was open to sophomores, junior and seniors and interested students had to fill out an application, but Bertalot and Lund thought offering scholarships might motivate students next year.

"If you are giving the students a really boring project to work on, they won't be engaged," said Bertalot, who said he is learning toward business over engineering as a result of taking the course. "Can we still grow it? Of course. . . . This class is really unique. The teachers wanted us to tell them what we want to do. They took the training wheels off. It was an awesome experience."

Other challenges included varying degrees of quality and people who wanted to purchase items but didn't have children in the District could only pay by cash or check.

"We got to see first-hand how a business works and first-hand what works and what doesn't work," said Lund, who plans to go to college and enter business management. "I loved the class."

"Our mission is to create unique and quality products that are functional and fun to use," junior Susannah Murdoch said about taking the class.

Junior Piper Bailey said she took the class hoping to gain real-world experience and further her education in the STEM field.

Visit the Cardinal Enterprise website at <https://susannahmurdunk.wixsite.com/cardinalenterprise> to learn more.

www.mcpasd.k12.wi.us
(608) 829-9000



Neenah Joint School District "Future Forward Neenah"

Spring/Summer 2016

For most high school students, community service is something that takes place outside the classroom. But for students in Neenah High School's Manufacturing and Engineering program, being community minded is simply part of their regular school day. A second-year program called "Future Forward Neenah" is helping students become more connected with their community. The capstone course offers in-depth experience for students in the design and manufacturing fields.

Among the projects students have completed is a renovation of the school's Mercury Commons. A local foundry provided replica manhole covers that the students welded into tables and chairs for a distinctive study and relaxation area that serves the entire school of over 1,900 students. A group of 20 students with manufacturing and engineering, art and business education backgrounds combined

their skill sets to create the communal space located just outside the school's library. "We saw an opportunity for our students to make an impact in their community through what they are doing on an everyday basis in the classroom," technology education teacher Travis McDonough said. "It's gratifying for them to apply their learning and see the fruits of their labor well past graduation."

Neenah has gone from four courses in welding and manufacturing to nine. The School District provided funding for a new welding lab and the construction area has been converted to a manufacturing area. One of the primary goals of Neenah's manufacturing and engineering program has been to instill confidence in the students as they graduate and head into the workforce, whether in the manufacturing field or a different field. With the community partnerships flourishing and the number of new classes being added to the curriculum, there's lots of reason for excitement. "We have accomplished a lot in recent years,



but I still feel like we are just getting started and can achieve much more," technology education department chair Mike Elkin said. "Just like any manufacturing process, we will continue to evaluate where we can improve and look to get better and better each year."

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Plymouth School District

LTC-Plymouth Science & Technology Center Trains Students, Adults



learn metal fabrication in a professional welding training facility.

The state-of-the-art equipment in the facility allows students to collaborate with local businesses. For example, students from the Introduction to Engineering & Design and the Computer Integrated Manufacturing classes worked with a local manufacturer to print parts using the school's three-dimensional printer, which the manufacturer then used to develop prototypes for its clients. In return, the company brought its portable FARO Arm to show students how the coordinate-measuring device provides highly accurate measurements and quick reverse engineering.

PHS technology and engineering students aren't the only ones to experience what the facility has to offer. LTC offers classes for adults in the evening; especially popular

is the Welding Basics & Beyond course, which includes extended practice with welding and cutting systems.

PHS students can supplement what they learn in class by participating in the PHS Technology Education and Engineering Club. The club takes on different projects each year. One recent example is Project Grill. In 2014 PHS was paired with a local manufacturer to build a trailer, two grills and a food preparation station for use by Three Guys and a Grill, the first time a team in the competition had an actual "client." The competition requires a grill capable of cooking 10 brats at once; this one can handle 350. "This was a real-world example of taking a project from conception to completion, and was a great extension of the concepts and goals we cover in our classes daily," Mr. Sherman said of the Project G.R.I.L.L. experience.

Fall/Winter 2016

Plymouth High School students and community members are better prepared for a number of engineering and technical careers, thanks to the LTC-Plymouth Science & Technology Center. "The facility allows us to provide a higher level of curriculum," said PHS technology education instructor Greg Gritt (the 2015 Tech Ed Career Pathmaker Award winner). "We are teaching the students a lot more application, using many different skills to perform tasks that they would not have been able to use before." The \$1.2 million facility gives PHS students experience with all phases of the design process, taking projects from conception to completion. They design projects using industry-standard CAD programs, then create three-dimensional models and finally produce and finish projects using high-tech mills and a lathe. They also can

Project G.R.I.L.L.

Continued from Page 4

estimates, I have had no less than 100 students involved in "G.R.I.L.L." over those six years and more than 75% have either chosen a career related to the program or have gone to work for one of the partner manufacturers we were paired with. The opportunity to work hand in hand with real world manufacturers and the chance to tour each of their facilities is about as good as it gets for helping students choose a career pathway. The pride that my students take in their accomplishment at the unveiling is one of the best experiences an educator can experience. Project G.R.I.L.L. has been and will continue to be one of the most valuable experiences my students have had the opportunity to be a part of."

The program will culminate on Friday, May 11, 2018 in the parking lot of Festival Foods in Fond du Lac for the 10th annual Unveiling Event. During this event students will display their fully functional grills with the opportunity for their team to win the Best in Show and/or Community Choice Awards. The program also offers two academic scholarships each year with the winners announced during the event.

Project G.R.I.L.L. is an initiative of Fond du Lac Works, a program of Envision Greater Fond du Lac. To learn more, contact Bernadette at bseefeld@envisiongreaterfdl.com or call (920) 921-9500.

Plymouth Tech Ed Students Put Core Skills into Action

Spring/Summer 2017

The PHS technology education program draws on skills learned in all core classes, especially math, science and English. As part of their master's degrees' action research project, Mr. Daniels along with math teacher Darren Munson and automotive technology instructor Beau Biller researched the need for better collaboration between technology and math education. As a result, a pair of semester-long College Technical Math classes through a nearby technical college were developed. "The new tech ed math classes will cover algebra and geometry topics with an emphasis on how these concepts are used specifically in CTE fields," Mr. Daniels said. "CTE math applications will play a large role in the coursework."

The classes will emphasize solving technical problems by using mathematical skills. Topics for the first class will include linear equations, graphing, percent, proportions, measurement systems, computational geometry, and right triangle trigonometry. Topics for the second class will include polynomial expressions, rational equations, systems of equations, and oblique triangle trigonometry. Both classes was designed for technical college-bound students and those interested in applied technical extensions of algebra and geometry. The classes follow the course outcomes required by the college, and students can earn advanced standing or possibly three credits from them for successfully completing each class.

www.plymouth.k12.wi.us
(920) 892-2661

Arrowhead Union High School District Arrowhead's Design Engineering Manufacturing Center

Spring/Summer 2017

Arrowhead has been making inroads at getting students trained for the next generation of manufacturing with their design engineering and manufacturing center. Laura Myrah, the superintendent of the school district, has been at the forefront of creating the center. "Arrowhead has had a strong engineering program for years and what we've heard and what we've



learned is that those students may be highly skilled in engineering and problem-solving and thinking skills, but they don't necessarily understand the hands-on, "how do we make" the product. So, the curriculum has been designed to include both. There's the problem-solving, the thinking, the creativity, but the students also then have to go make that product. The design engineering manufacturing centers are actually the culmination of a couple of years of work with Arrowhead staff, partnered with business partners," said Laura.

Arrowhead committed, in 2015, \$2 million for completely renovating and updating the current South Campus Tech Ed facilities. These renovations were completed in the fall of 2015. The 10,000 square foot facility includes two engineering labs, one manufacturing lab, one design lab, and one innovation lab.

Technology and Engineering Teacher and

Department Coordinator, Tom Whelan has some advice for school boards and technical colleges looking to help create talent pipelines from high school to the work force. "Help market to the school boards and the community members, and help them understand how important it is. For our school, in particular Arrowhead, to be so-called college-bound is what most people have an indication of what we do. For our school board to take this on, that's pretty powerful. We really had the idea that our community and our school board wanted to have this manufacturing component because they saw the need for it."

www.arrowheadschoools.org
(262) 369-3611

Monroe High School Getting Things Done Cheesemaker Style

Fall/Winter 2017

Monroe High School's Technology & Engineering Department offers 20 widely diversified courses. One item our Technology Education staff is most proud of is the department's ability to prioritize and complete the myriad of projects asked of them by the community and other staff members in the school district. Members of the department along with their students are being asked time and again to engineer, build, repair, and donate products to various community organizations

and the school district. This, in turn, gives students real world problem solving skills, manufacturing skills and soft skills to complete the projects presented to them. These projects come to life in the school's extensive manufacturing and construction labs.

As with all districts, budgets are tight. The department and students take on the task of helping with district facilities, classroom projects, and maintenance needs. Some of the projects the metals manufacturing classes have tackled include, track carts, softball carts, utility trailer, rebuilding district snow blower



Mass production stations in the Woods Manufacturing Lab

units, classroom stools, handrail systems, performing arts racks and multiple smaller repair jobs. The Woods manufacturing classes and construction classes have also been given their share of work around the district. The Woods Manufacturing classes have built various types of bookshelves and student storage cubbies for the schools in the district.

Our goal for the future is to continue to provide the community and our district with the products and services from our program. This is one of the best ways to build the tech-

nical skills in manufacturing and give the students a sense of pride when done. Real life jobs and projects that make an impact in our school district and the community we live in.

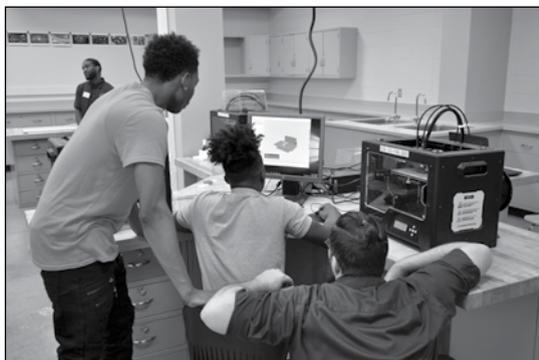
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Milwaukee Public Schools \$25,000 Fab Lab Unveiled at MPS High School

Fall/Winter 2017

Milwaukee Public Schools has unveiled a new digital fabrication laboratory, known as a "fab lab," aimed at exposing students to high-level technology that develops creativity and innovation. Fab Labs are small workshops equipped with high-tech, computer-controlled technology that allows the creation of a wide array of 3-D items such as a model of a house or wooden display sign. The equipment at Washington High School of Information Technology was purchased using a \$25,000 grant from the Wisconsin Economic Development Corporation.

Incorporating Fab Labs into educational programs of study has been shown to increase student engagement by providing hands-on opportunities to solve real world problems. In Fab Labs, students learn because they want to, they develop technical skill that builds



pride in mastery, improves teamwork, teaches critical thinking, persistence and other 21st Century employability skills. MPS plans to create more Fab Labs within the district.

mps.milwaukee.k12.wi.us
(414) 475-8393

Pulaski High School Raider Products

Spring/Summer 2015

Two years ago the Technology and Engineering department here at Pulaski High School recognized a need for advancement in some of the programs. A number of the student body had taken all of the classes in the metals area and were ready for more advanced and complex projects. With this need recognized we as a department, with the help of administration, began to research other self-sustaining fabrication school shops around the state. What we are trying to accomplish with this program is to give more opportunity for the students to gain real world experience in manufacturing. This is the pilot year for this program, and what typically happens is that a project is brought to us; a team of students is formed to analyze and price the project, essentially bid it. Then, if the customer likes what they come up with, the students manufacture the project. There are currently five students on the manufacturing end of the spectrum each with their own strengths in the different metal



working fields and one student who runs the books and billing aspect of "Raider Products". All six of the students benefit not only through the experiences that they are part of but also any profits that "Raider Products" produces is put into a scholarship fund for the students that participate. "Raider Products" turning into a regular class we here at Pulaski High School are hoping to continue to offer unique learning experiences to a whole new set of students.

pulaskischools.org/high
(920) 822-6000

Kaukauna High School Youth Apprentices of Kaukauna High School

Spring/Summer 2014

Week after week the skills gap makes the news along with data that documents an aging workforce in the skilled manufacturing trades. In Kaukauna, a Fox Valley high school program provides part of the solution year after year. The steady growth of the machine tool and metal trades in the area means opportunity for the Youth Apprentices of Kaukauna High School.

Even during the worst of the economic downturn employers continued to hire 16-18 year old students through the CO-OP and YA program. Graduates of the program are now key employees with 16-17 years' experience. One time student trainees have founded their own machine tool companies and they now hire the next wave of high skill high pay trades people.

The secret of the continued success at KHS is based on a partnership with industry and a careful selection process. Students are eligible to apply for either the 1 or 2 year Youth Apprenticeship. They must be on track for graduation and have good attendance, but one of the keys is that these students are required to have completed a course in a related area such as Machine Tool 1. KHS offers a range of courses in metals, welding, construction, CAD

design, engineering, electronics, graphic arts, and automotive.

Partnerships Build Careers in Manufacturing Spring/Summer 2017

Moving into the 21st Century has meant that Kaukauna High School has built on a record of success in establishing careers in Manufacturing and Engineering. Partnerships with local manufacturing firms allow students to apply their learning in Youth Apprenticeships.

In the last three years KASD has leveraged grants and other assistance to remake the image of our manufacturing technology classes. The clean well-lighted work areas surprise visitors and evoke pride among students.

Students earn dual credit with the local technical college for Lathe Work, Measurement and Bench work, SolidWorks CAD, Embedded Systems, Programmable Logic Controllers, PC Hardware and Networking. The core areas at KHS have also gotten on board with Technical Math and English as dual credit classes. Mary Hansen, Director of K12 Partnerships at the college reported that "Kaukauna lead the region last year in dual credits with 427 students who



earned \$201,371 in free credits." This combination also helps explain the success of the KHS Youth Apprentices.

This year KHS Teacher Nels Lawrence piloted CAPP Engineering 101 in partnership with a nearby university. Students pay a reduced tuition for 2 college credits toward their Engineering Technology degree program. The university started their engineering technology program two years ago in response to the demand in the strong manufacturing so

important to the Fox Valley Region. This class will be featured at the WTEA convention as an option for schools across the state.

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Fox Valley Tool & Die supports Wisconsin's Youth Apprenticeship, Co-operative Education and other related school to work programs. We feel it is a responsibility of ours in being an engaged community partner. FVT&D has a history of internal training and "growing our own employees". We're always interested in recruiting experienced talent who could be an asset to our team and impact our manufacturing resources.

Green Bay Area Public School District

Green Bay Students Explore the Manufacturing Industry



Alliance and a local technical college, Bay Link Manufacturing® allows students to

earn high school and college credit upon completion of the program.

Bay Link Manufacturing® is a high-precision manufacturing learning lab located at Green Bay West High School. The lab is equipped to complete projects for local companies in the areas of industrial welding, machine fabrication, and metals. Through sales, marketing, accounting, project planning, bidding, purchase orders, and customer service, students also learn the business side

of manufacturing. After being a part of Bay Link Manufacturing®, students are prepared to attend a 2- or 4-year college in the fields of manufacturing and engineering. They may also be prepared to enter the workforce in an entry-level position.

In February 2018, female students in the Green Bay area were invited to attend a DIY Lawn Art workshop held at Bay Link Manufacturing®. Mothers, grandmothers, older sisters, aunts, or female mentors were invited to join the students. During this workshop, students had an opportunity to use basic welding skills to create and design a lawn art project while learning about the manufacturing industry.

The workshop is part of a program called “This Girl Can,” which allows young women to explore non-typical female careers in the areas of manufacturing, computer science, and technology. Another workshop is planned for April 2018, and is geared towards computer science. Held at Preble High School, the Information Technology (IT) and Fashion Design workshop will teach students how computer

science and technology are used in the fashion industry. They will also build fashion-themed programs.

This is the second year that the Green Bay Area Public School District has held “This Girl Can” workshops to introduce young women to careers in the skilled trades. The program was so popular this year that a waiting list was created.

“This is the second year that the Green Bay Area Public School District has held “This Girl Can” workshops to introduce young women to careers in the skilled trades. The program was so popular this year that a waiting list was created.”

Bay Link Manufacturing® and “This Girl Can” are just two of many ways that Green Bay Area Public Schools are giving students opportunities to explore the manufacturing industry, and to become

college, career and community ready. To learn more about Bay Link Manufacturing®, visit gbaps.org/bay-linkmanufacturing.

www.gbaps.org
(920) 448-2000



Denmark High School

Denmark High School Technology Education and Engineering

Fall/Winter 2015

The Denmark High School Technology Education and Engineering department serves about 150 different students every year or about 30% of the high school population. As part of the student's experience they can take many manufacturing skill based classes. This past school year we worked closely with KI to provide the students with a real life manufacturing problem. During the installation of wheels on to chair blades, some of the wheels were cracking. That was the only information given to my class. They were given two sets of chair blades, 10 wheels, and were told to go build. Over the course of the next month and several failures they finally solved the problem. Their solution was to use a pneumatic cylinder to press the wheels on. Everything but the pneumatics were manufactured by the students.

Autumn Linzmeier was one of the students who was a part of the KI chair project. She is a 2015 graduate of Denmark High School. She took many Tech. Ed. classes over her four years.

“It was my freshman year in high school when I discovered that working in

the trades is for me. Clueless and lost, I signed up for a shop course not knowing what lies ahead. Being the only girl in the shop class did not intimidate me, it was all the planned projects that intimidated me. After completing all the projects without a problem, I realized working machines is enjoyable. Becoming highly interested in the machining trade, I researched and found some women are already in the trades. Inspired by these women, I decided becoming a machinist is my dream. Machining is my dream; working for that dream is the only option. I was accepted into a program as a junior called Youth Apprenticeship. Later, in my junior year, I entered the Youth Options program. These programs allowed me to take college courses and leave school early to work and gain experience in the machining trade. At the end of my Youth Apprenticeship, I was the top student, proving myself that I can do this. Being the only girl in most of my college courses, I drew odd looks from those who were not used to women working in the trades. Working in a male-dominated trade is not a change for me,



it's a change for those who are not used to a female working in this trade. I'm determined to reach my goal of being a great machinist no matter what struggles need to be faced.”

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Spring/Summer 2016

The manufacturing classes at Slinger High School (SHS) strive to offer relevant curriculum and rigorous learning activities that are emphasized through hands-on experiences. The close industry partnerships provide SHS students with unique opportunities. Numerous updates to equipment have been accomplished because of industry partnerships. These partnerships extend beyond just the equipment. SHS partnerships have led to some unique learning experiences for our students that go beyond the typical classroom. For the last 2 years students have had the opportunity to partake in an advanced fabrication project for a local fabrication company. They specialize in the design and fabrication of

hydraulic tanks that are used in the heavy equipment sector. Each semester 2nd year welding students test their welding skills to industry standards and qualifications. This is accomplished through a "training tank" project. Students fabricate the hydraulic tank to the company's specifications. From there the tank is pressure tested and evaluated by a team of professionals that include engineers, weld trainers, and quality control technicians. Throughout this process the students are learning directly from the professionals and are able to get a real understanding of what industry quality really looks like.

Responsibility, communication, accountability, time management, and organization are all qualities that SHS Tech Ed. tries to push onto the students. These qualities really get put to the

forefront when students are presented with a real world problem from a real company.

The days of gaining a job with solely a high school diploma are mostly gone, if not completely. Being able to show proof of skills and knowledge can go a long way in obtaining a job or at least getting your foot in the door. For the last two semesters SHS welding students have had the opportunity to earn welding credentials from the State of Wisconsin. 9 students in two semesters were able to pass the D1.1 structural steel welding test to earn the right to call themselves a "State Certified Welder". All tests were conducted under the watchful eye of a Certified Welding Inspector. These credentials show proof of the student's skill and knowledge. This is just one of many credentials that we offer to help lead students to a stable, engaging, and fulfilling career in manufacturing.

Spring/Summer 2017

Our industry partners help create and shape the curriculum that is passed on to our students. This ensures that we are teaching the most up to date processes and using the equipment to its fullest potential. SHS Tech Ed. is always trying to find opportunities for students that go beyond the typical classroom. Another great example of this came last year for machine tool students. Responsibility, communication, accountability, time management, and organization are all qualities that SHS Tech Ed. tries to push onto the students. These qualities really get put to the forefront when students are presented with a real world problem from a real company. The machine tool students were presented with a

great opportunity a local manufacturer that specializes in complex sheet metal fabrications. The project that the company presented was to modify an existing hinge that was being installed onto one of their fabrications. All of the qualities above came into play with this project. The hinges had to be modified with great precision. The precision was the first challenge. The 2nd challenge became the quantity. This led students to utilizing a fixture system that they designed, and a CNC program within a CNC machining center. The 3rd challenge became the timeframe. A first, the students had about 4 weeks, but that time frame quickly changed, and then changed again! Again, an experience in reality. Students were also responsible for quoting the job, which involved material estimation, labor estimation, tooling costs, etc. A valuable experience that had real repercussions. Ultimately the students rose to the occasion and completed the project. The day after the hinges were completed and delivered, they were then shipped to the customer. The customer happened to be located in Australia! Needless to say, the students were extremely excited. The lessons learned in responsibility, communication, accountability, time management, and organization were definitely felt by the students. It was a great experience that the students won't soon forget.

www.slinger.k12.wi.us
(262) 644-5261



Algoma School District Algoma Wolf Tech

Spring/Summer 2015

Algoma Wolf Tech (2013) and Lakeview Regional Technical Academy (2014) both call Algoma High School home. Wolf Tech is a student run business that specializes in CNC machining with the help of local businesses. Currently, we employ students on a full and part-time basis depending on our workload. Students apply for available positions within Wolf Tech and develop into level 1, 2, or 3 machinists responsible for programming and production of contracts. Wolf Tech operates after school hours and throughout the summer. Proceeds are managed by the students and contribute to the sustainability of the business.

Lakeview Regional Technical Academy (LRTA) students participating in the academy program have the opportunity to earn in excess of 20 dual credits as a direct conduit to a number of career pathways. Stu-

dents also have the option in taking NIMS (National Institute of Metal Working Skills) credentialing courses in various areas.

Wolf Tech and LRTA have had the privilege of building exceptional partnerships with local companies. These relationships have blossomed into career opportunities for our graduates with the benefit of paid post-secondary training in many cases. Both of these initiatives have proven to produce the well-rounded highly skilled employees necessary to drive further manufacturing growth. To date, 100% of our graduates have gained employment prior to graduation from high school. As a testament to the success of both Wolf Tech and LRTA, the Algoma School District just completed a 30,000 sq. foot expansion of the high school building which includes a new 10,000 sq. foot manufacturing lab equipped with the latest CNC machines.

Our goal of providing the workforce for



the future has exceeded all expectations and drives us to innovate even further in providing the best possible educational experience for our students.

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