



ROBOTICS: A GUIDE FOR TEACHERS & COACHES

Helping you connect the dots and impact students for life!



Robotics are one of the very best ways to get students turned-on to high-tech manufacturing careers, but without manufacturer involvement, it's more difficult for your students to connect the dots. Here are some practical ways to get manufacturers connected to your program and increase student impact.



Learn more at mnmfg.org

Contact us for more information:

Jaimee Meyer • 218.755.2206 • Jaimee.Meyer@bemidjistate.edu

Director of Marketing and Outreach

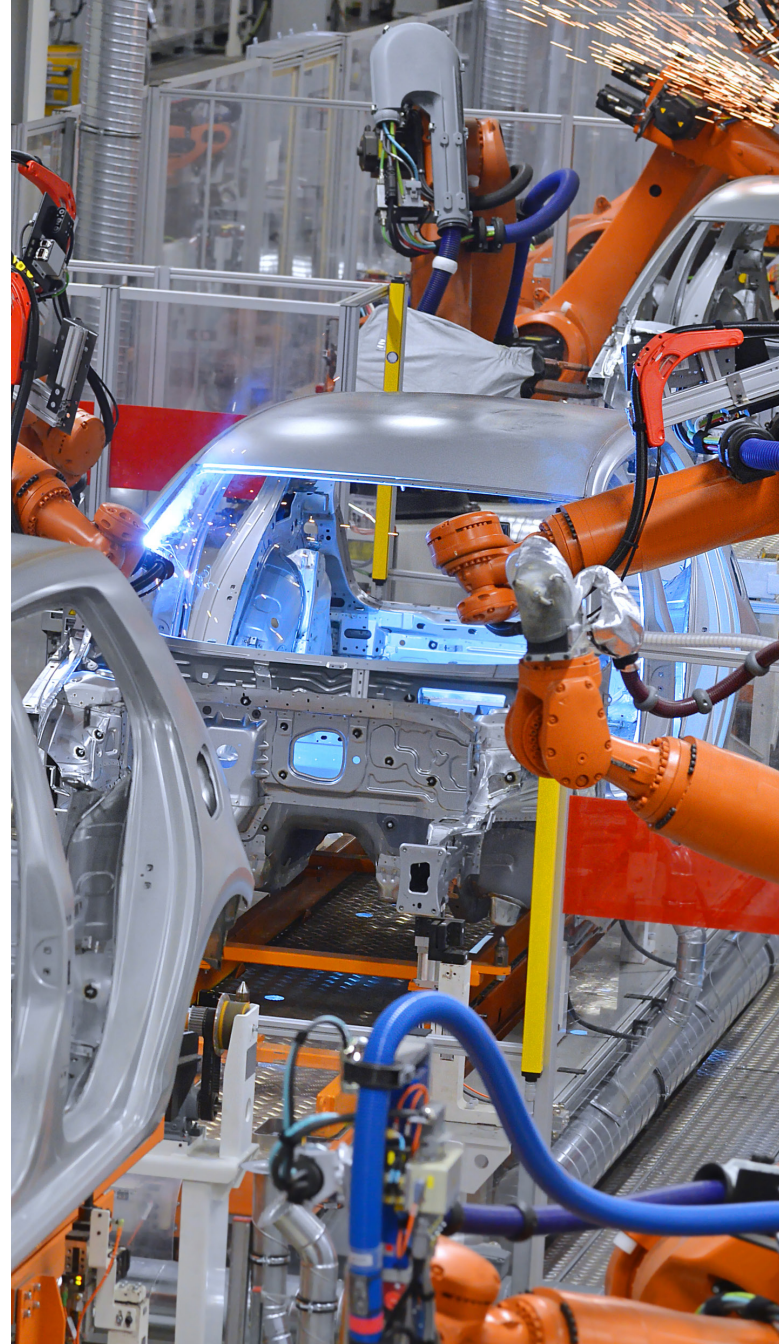
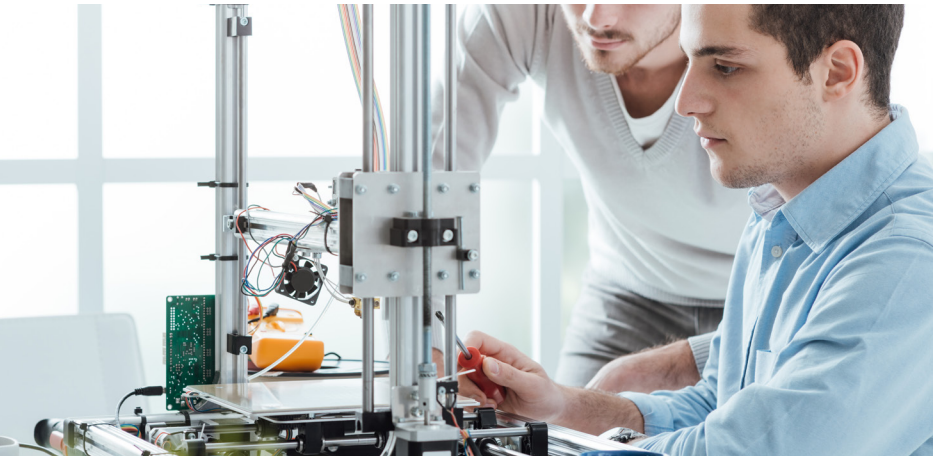
Minnesota State Advanced Manufacturing Center of Excellence | ATE Regional Center

ROBOTICS & MANUFACTURING

Manufacturing is experiencing another industrial revolution in the 21st century, thanks to industrial robots. Although robots have been around for a while, they are becoming less expensive, smarter, and increasingly taking on tasks that require dexterity, memory, and trainability. This means that people working in the field must be smarter—and better trained—than the robots they are programming. Manufacturing jobs today are very high-tech and well-compensated careers that today's youth need to be aware of, and training for.

How do manufacturers benefit from robotics?

- Competitive edge
- Increased productivity
- Increased efficiency
- Ability to grow



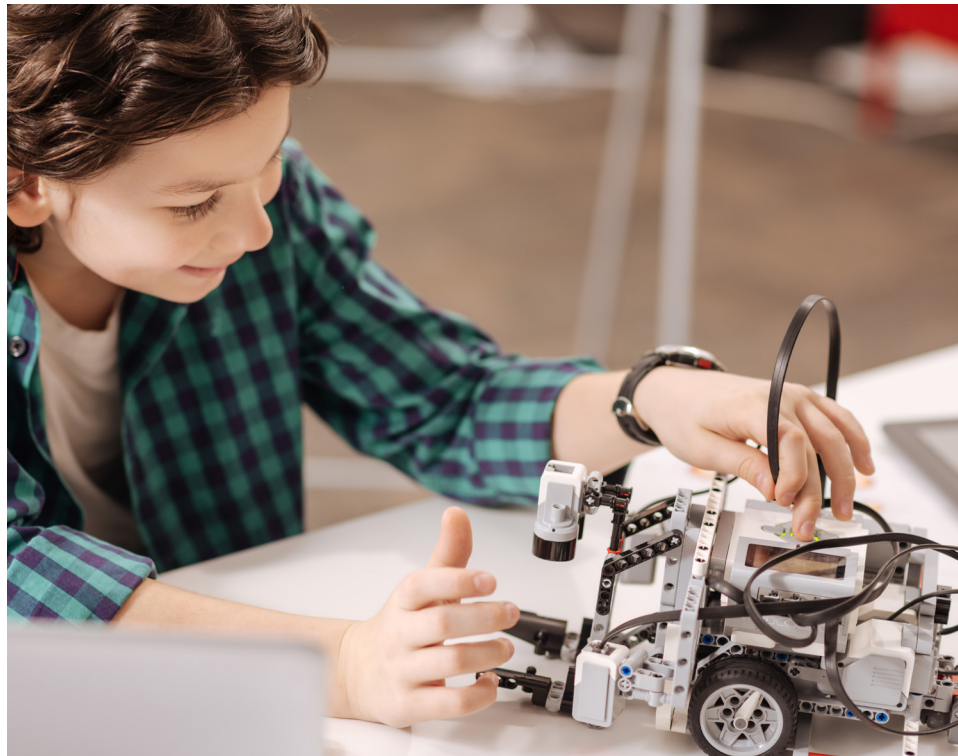
ROBOTICS & EDUCATION

The world currently faces an unprecedented need for new innovators, thinkers, and problem-solving leaders. We already need double the number of qualified workers needed to fill open Science, Technology, Engineering, and Math (STEM) positions, and that gap will only continue to increase over time. Industry leaders, government agencies, educators, and parents alike, are all searching for ways to get more students excited and prepared for the high-tech careers of today and tomorrow.

Robotics is one of the best ways to expose students to STEM and get them involved in pursuing high-tech careers. There is unambiguous evidence showing that students who participate in robotics are more than twice as likely to be interested in STEM-related learning and careers.

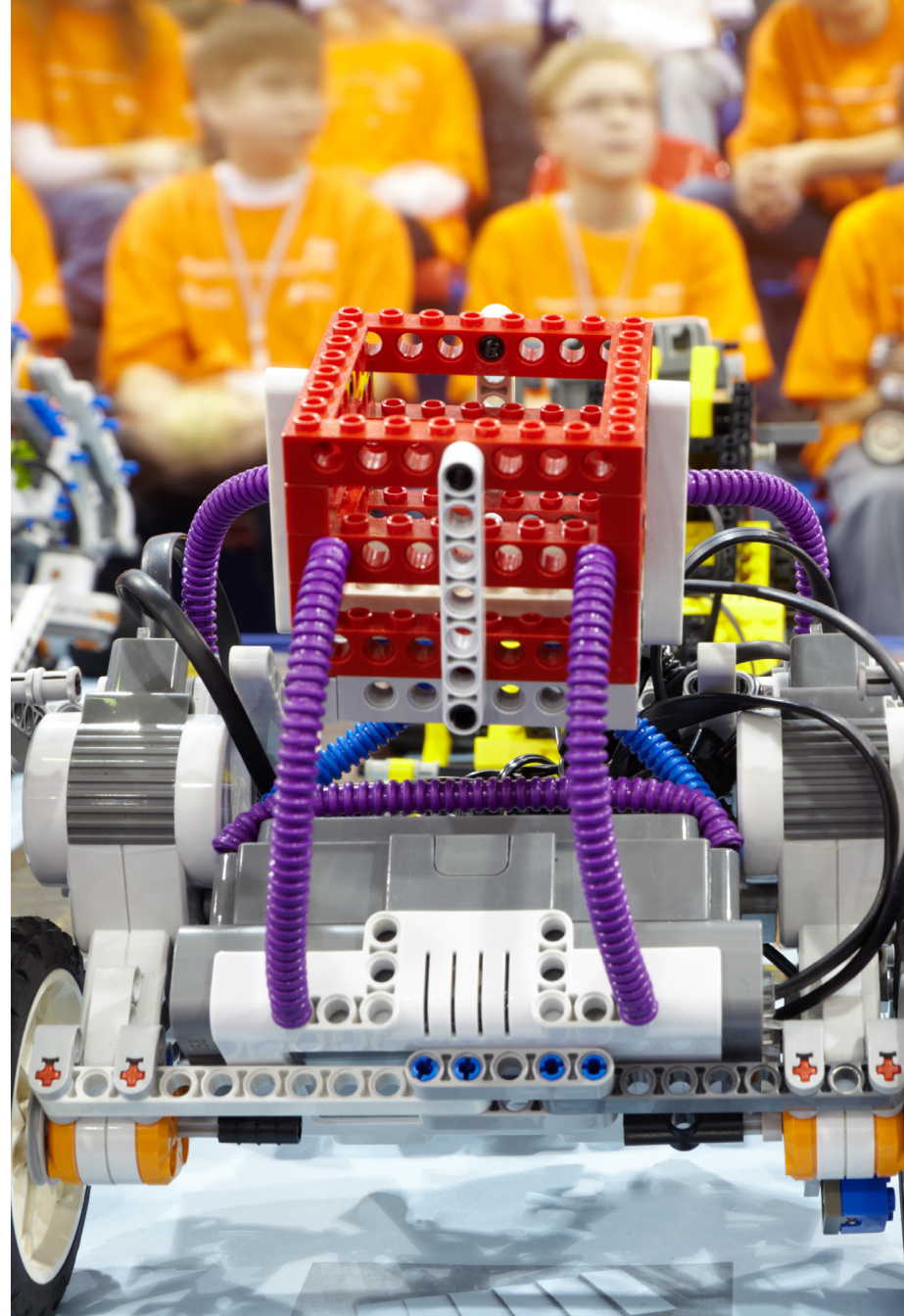
Students who participate in robotics programs are introduced to several important skills:

- Manufacturing design process
- Problem-solving process
- Understanding of circuits and electronics
- Understanding of programming



COMPETITIVE ROBOTICS

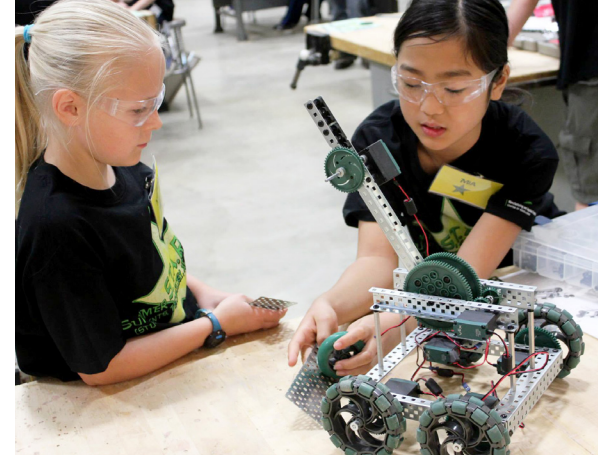
Students who participate in robotics competitions receive many of the same benefits as they would from any extracurricular activity: social development, improved self-esteem, stronger college application, and a sense of belonging, to name a few. However, robotics competitions do even more. They inspire young people to pursue STEM careers and become leaders in science and technology, positioning themselves to succeed in the 21st century.



THERE ARE MANY RESOURCES AVAILABLE!

These resources help you create a successful robotics program, whether it be a competition, in-class learning, or an extracurricular activity:

- **REC FOUNDATION**—nonprofit seeking to increase student interest in STEM. They provide curriculum-based robotics engineering programs around the world, through partnerships with K-12 education, higher education, and others. They offer program support and workshops focused on technology and professional development for educators.
- **VEX ROBOTICS**—an organization that understands the connection between STEM, robotics, and high-tech careers. They provide tools for educators and mentors to create a robust robotics program or a successful team competition.
- **GIRL-POWERED INITIATIVE**—a global effort to get more girls involved in STEM through robotics. There is no shortage of boys in robotics. More girls need to get engaged in STEM careers to close the skills gap and create equal opportunities.
- **ONLINE CHALLENGES**—there are numerous opportunities to be found online. Each challenge is unique, but the end goal is the same—to engage students in STEM learning and increase awareness of high-tech careers.
- **ENGINEERING NOTEBOOKS**—help robotics teams acquire real world life skills that will benefit them in their academic and professional future. These notebooks help teams to understand the engineering design process as they practice a variety of critical life skills including project management, time management, brainstorming, and teamwork.



ENGAGING MANUFACTURERS

Reaching out to a business and educating them about robotics is an important aspect to the success of your program. Businesses want to be involved, they just don't know how to start. They simply need to understand what it is that you are doing and what the impact is for the students. Doing a demonstration for a company and discussing all aspects of your robotics team will allow them to see the benefits first hand.



HERE ARE A FEW WAYS TO ENGAGE MANUFACTURERS IN YOUR ROBOTICS PROGRAM:

- Start with a phone call. Explain that you are calling to ask for their help with your robotics program.
- Have a few talking points prepared that clearly identify the connection between your robotics program and their business. Be succinct, but don't downplay the value or the impact. (See the sidebar for a few great talking points.)
- Ask if you can bring some students to their facility to do a robotics demonstration. Let the students do the talking.
- Invite them into your classroom for a demonstration or to view the students working on their robots.
- Show them your team's engineering notebook.
- Most importantly—provide them with some concrete ways they can partner with you to increase student impact. (See page 6 for ideas.)
- Follow-up and close the deal. Don't assume that your student demonstration or introduction will lead to action without further work on your part. Call back and ask them if they have made a decision. If they haven't, ask them to take some action, whether it be talking to your team about manufacturing careers at their company or attending a robotics competition. Keep the lines of communication open. Manufacturer engagement is not a one and done deal. It is a continuum of relationship building and mutual benefit that needs to be nurtured.

TALKING POINTS...

- 94% of robotics competition coaches report gains in interest in science and technology among the students they coach.
- Students who previously had an undiscovered aptitude for STEM (Science, Technology, Engineering, and Math) curriculum are flourishing in growing numbers, due to getting involved in a robotics program.
- Thousands of students, worldwide, are being inspired to pursue STEM-related education and career paths in fields like advanced manufacturing, thanks to participating in robotics.
- Robotics is a powerful platform to attract and hold the attention of today's multi-tasking, connected youths.
- Robotics represents the perfect storm of applied physics, mathematics, computer programming, digital prototyping and design, integrated problem solving, teamwork and thought leadership.
- Skills students learn through robotics—such as software programming and automation—translate into skills needed by today's advanced manufacturers.

MANUFACTURING PARTNERSHIPS

Building partnerships with your local manufacturers takes time and effort, but will bring tremendous value and impact for your robotics team.

Ways for manufacturers to partner with you include:

- Serve as a team mentor
- Cash donation to sponsor robotics team(s) and or tournament
- Invite robotics team members to participate in a job shadow
- Create internship opportunities for robotics team members
- Hire students for summer or after school jobs
- Invite robotics team to tour business
- Participate in the Minnesota Manufactured Statewide Tour of Manufacturing
- Provide scholarships for robotics team members who pursue post-secondary manufacturing degree in return for agreeing to work in the company post-degree



ENGAGE YOUR COMMUNITY

Your community needs to know about the impact robotics can have on youth. They need to understand the importance of getting youth involved at an early age. They also need to understand the importance of engaging girls in robotics. Robotics increases the confidence of girls in STEM fields and opens doors to careers which they would likely not have considered before.

Robotics messages you should share with your community:

- Robotics prepares students for the real world
- Robotics fosters interest in learning at all levels
- Robotics increases interest and confidence in STEM
- Students who participate in robotics are more likely to consider a high-tech career in manufacturing



FUNDRAISING IDEAS

Robotics programs cost money. But don't let that stop you! There are many ways to raise support for a robotics program in your community. The first step is to set a fundraising goal. From there, you will need to outline a few strategies that will help you meet your goal.

Specific strategies include securing sponsorships from local businesses or organizations, holding a fundraising event, or selling products. You might want to establish levels of giving—gold sponsor, silver sponsor, etc., as an example. You may also want to consider setting up a Go Fund Me account (or something similar) and connect it to social media to get the community excited about what you are doing and keep them apprised of your progress.

You are the expert in your own community, even if you don't feel like it. Take a look at what has worked well in the past and how other organizations have successfully raised money in your community.

And don't forget—one of the side benefits of any fundraising effort is that it also raises community awareness of what you are doing.

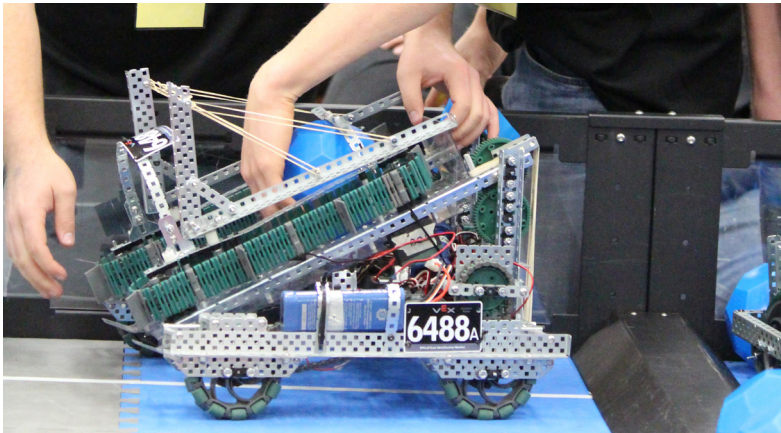


FUNDRAISING BENEFITS

There are many expenses associated with a robotics program. You may already have the basics covered, but sometimes, a little extra funding helps you grow a shoestring program into one that really makes an impact!

Additional fundraising can help your team pay for:

- Parts, supplies, & equipment
- Team & tournament registration costs
- Shirts for your team(s)
- Travel expenses to attend events
- Coaching stipend(s)
- Advertising and/or print materials such as programs
- Expenses relating to hosting a regional tournament



ROBOTICS DIGITAL BADGES

Badges have been around for a long time, but digital badges are gaining recognition as the new way to recognize learning and achievements. Beginning in 2018, students can earn digital badges as they progress along the Minnesota Manufactured Digital badge pathway. We've created several badges for students who participate in robotics. Once they get started by earning a couple of robotics badges, they can continue learning by exploring other badges related to STEM and high-tech manufacturing careers, helping them make the connection between robotics and the world of work.

The badge pathway is open to students in grades 7-12 and there is never any cost for a student to earn a badge. Students who earn a requisite number of badges are eligible to earn a Minnesota Manufactured Education scholarship valued at \$4,000.

DISCOVER IT. EARN IT. SHARE IT.

Minnesota Manufactured digital badges are a fun and terrific way to tell the world what you have accomplished!

WHAT IS A MINNESOTA MANUFACTURED DIGITAL BADGE?

It is a digital representation of your accomplishment combined with a verifiable description of what you did to earn it. A digital badge is easy to share online or in a digital backpack that you can share with friends, teachers, and future employers.

OPEN BADGES



WHAT IS THE VALUE OF A DIGITAL BADGE?

- It shows the world the activities, knowledge, and skills you have demonstrated to earn a badge from Minnesota Manufactured, a verified issuer.
- It is easy to share your accomplishments on social media, in a digital backpack, or almost any other digital platform!
- A digital badge cannot be faked. Credentials are embedded inside—your name, what you did to earn the badge, who issued the badge (Minnesota Manufactured) and the issue date.

Students who complete the Digital Badge Pathway can apply for one of four Minnesota Manufactured education scholarships, valued at \$4,000 each to use at a partnering college of your choice.



Get started earning badges and working toward a **MINNESOTA MANUFACTURED EDUCATION SCHOLARSHIP TODAY!**
Learn more at mnmfg.org/students/badge-pathway



Learn more about badges, robotics, and Minnesota Manufactured by visiting our website mnmfg.org.



MINNESOTA MANUFACTURED

YOUR FUTURE
IS MADE IN
MANUFACTURING

@MNManufactured



Learn more at
mnmfg.org/students/badge-pathway



MINNESOTA STATE

Advanced Manufacturing
Center of Excellence

ATE Regional Center

BADGE PATHWAY

Earn a Scholarship. Open Doors.

Discover Manufacturing Career Opportunities



MINNESOTA MANUFACTURED
IGNITER

Earn a minimum of five Igniter badges as you get started learning about today's high-tech manufacturing through a variety of activities.



MINNESOTA MANUFACTURED
HAPPY CAMPER

Earn a minimum of two Happy Camper badges as you attend manufacturing-related summer camps and labs.



MINNESOTA MANUFACTURED
TITAN

Earn a minimum of three Titan badges as you unleash the power of teamwork by participating in robotics competitions.



MINNESOTA MANUFACTURED
ADVENTURER

Earn a minimum of three Adventurer badges as you attend a career expo, visit a campus, and tour a manufacturing facility.



MINNESOTA MANUFACTURED
CRACKERJACK

Earn a minimum of six Crackerjack badges as you explore manufacturing careers and apply manufacturing knowledge.



MINNESOTA MANUFACTURED
INSIDER

Earn a minimum of five Insider badges as you gain career success skills and real manufacturing experience.

Earn all six medals and apply for a
MINNESOTA MANUFACTURED SCHOLARSHIP

FEMALE RECRUITMENT FOR ROBOTICS

Robotics is a great way to introduce the manufacturing world to young girls and show them that a future in modern manufacturing is both challenging and rewarding.

Five reasons women & girls should be encouraged to pursue a career in manufacturing:

- Great salaries
- Job security
- Innovative and collaborative
- High-tech
- Clean, safe environment

Advanced manufacturing careers provide opportunities to work with others and create change in the world. To do so, you need to develop both technical and interpersonal skills. Increasingly, women are finding rewarding careers in everything from production and middle management, all the way to CEO!

MINNESOTA MANUFACTURED
YOUR FUTURE IS MADE IN MANUFACTURING

Introducing the MINNESOTA MANUFACTURED BADGE PATHWAY

SAVE THE PLANET. CHANGE LIVES. INNOVATE.

WE ARE IGNITER

Learn about modern manufacturing & career opportunities at mnmfg.org/students/badge-pathway

MINNESOTA MANUFACTURED BADGE PATHWAY

There's Data Inside!

LEARN ABOUT MODERN MANUFACTURING & EARN DIGITAL BADGES WHILE YOU DO IT!

Get started earning badges and working toward a **MINNESOTA MANUFACTURED EDUCATION SCHOLARSHIP TODAY!** EARN ALL SIX MEDALS TO RECEIVE YOUR SCHOLARSHIP

MINNESOTA MANUFACTURED SPONSORS

PRESENTING **MINNESOTA STATE** Advanced Manufacturing Center of Excellence | **ATC Regional Center**

GOLD: **MPMA** | **tristate** | **SILVER** | **m** | **tristate** | **tristate**

NSF

A member of Minnesota State, Saint Cloud State University is an affirmative action, equal opportunity employer and educator. The Minnesota State Advanced Manufacturing Center of Excellence | ATC Regional Center is not the employer for this program.

These programs are funded by a 501(c)(3) Program Center, award number 1500077. Recipients, mentors, and coordinators in implementation of this program are listed on the website and do not necessarily reflect the views of the National Science Foundation (www.nsf.gov).

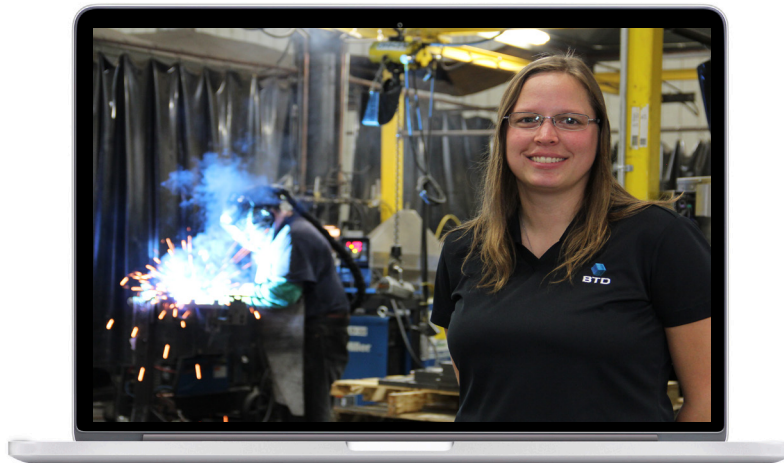
An affirmative action, equal opportunity employer and educator.

Learn more at
mnmfg.org/students/women-in-manufacturing

FEMALE RECRUITMENT RESOURCES

- Facts and information about Minnesota manufacturing companies
- Testimonials of employees working in the industry
- Minnesota manufacturing careers/opportunities
- Event calendar: Learn more about manufacturing or get involved
- YouTube videos: A day-in-the-life of a manufacturer
- Resources to explore positions in modern manufacturing
- Modern manufacturing career profiles

To learn more visit mnmfg.org/students/women-in-manufacturing



MINNESOTA MANUFACTURED
YOUR FUTURE IS MADE IN MINNESOTA

5 REASONS TO PURSUE A CAREER IN MANUFACTURING

- Great salaries
- Job security
- Innovative and collaborative
- High-tech
- Clean, safe environment

IGNITER Learn more at mnmfg.org

SAVE THE PLANET. CHANGE LIVES. INNOVATE.

WE ARE

Introducing the **MINNESOTA MANUFACTURED BADGE PATHWAY**
Learn about modern manufacturing, earn badges, and work toward a scholarship!



MINNESOTA MANUFACTURED SPONSORS



MINNESOTA STATE
Advanced Manufacturing Center of Excellence

ATE Regional Center

Minnesota Manufactured is a program of the Minnesota State Advanced Manufacturing Center of Excellence.

GOLD:



SILVER:



Contact us for more information:

Jaimee Meyer • 218.755.2206 • Jaimee.Meyer@bemidjistate.edu

Director of Marketing and Outreach

Minnesota State Advanced Manufacturing Center of Excellence | ATE Regional Center



A member of Minnesota State, Bemidji State University is an affirmative action, equal opportunity employer and educator. The Minnesota State Advanced Manufacturing Center of Excellence | ATE Regional Center is led by Bemidji State University.



These programs are supported by an NSF-ATE Program Grant, award number 1600927. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (www.nsf.gov).

An affirmative action, equal opportunity employer and educator.