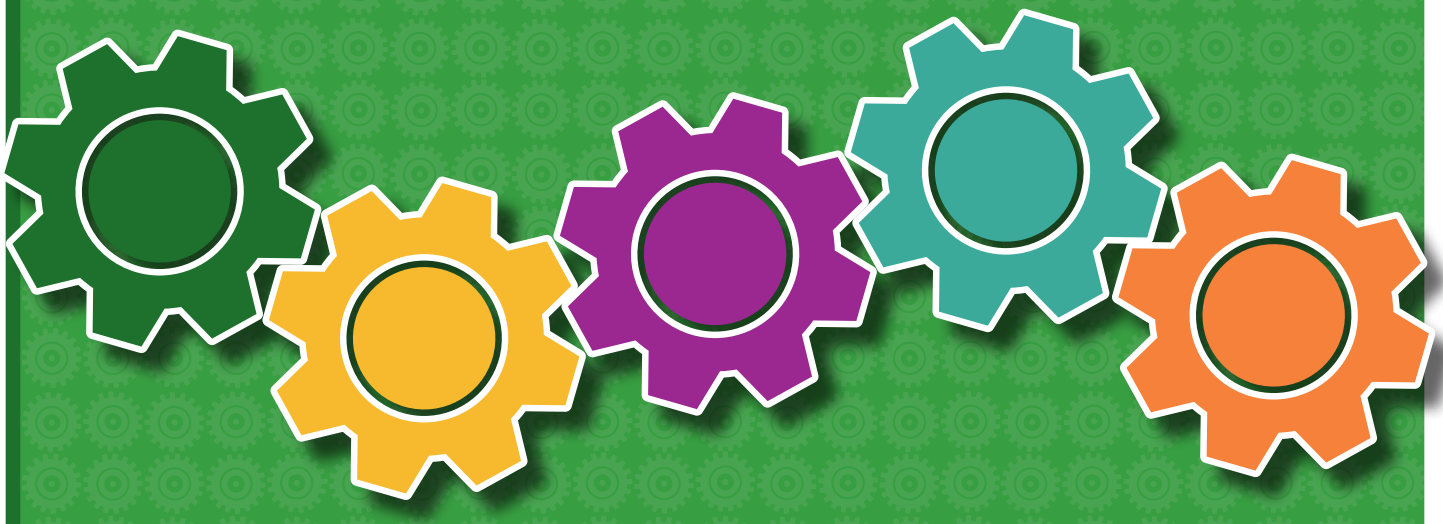
FORGING VALUABLE PARTNERS FOR MANUFACTURING EDUCATION



STRATEGIES FOR STARTING & SUSTAINING SCHOOL-INDUSTRY PARTNERSHIPS

A FLATE BEST PRATICES GUIDE

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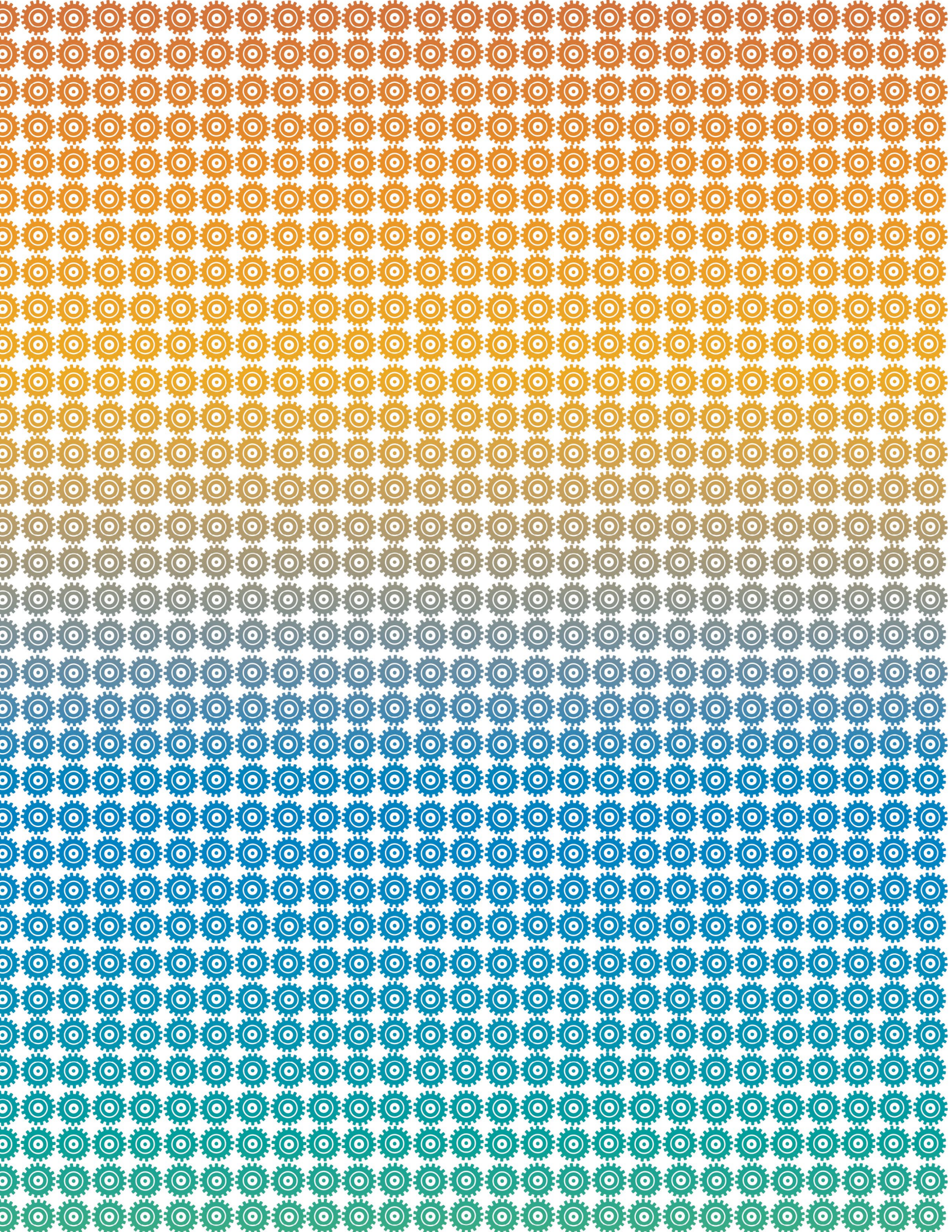

FLATE

FLORIDA ADVANCED TECHNOLOGICAL EDUCATION CENTER

PART OF THE FLORIDAMAKES NETWORK

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A NETWORK OF SUSTAINABLE PARTNERSHIPS

The **Florida Advanced Technological Education Center (FLATE)**, part of the FloridaMakes network, is committed to helping develop a skilled and qualified workforce for Florida's manufacturers. FLATE is committed to building a pipeline of workers for Florida's advanced manufacturing sector using a comprehensive, three-pronged approach that includes **curriculum reform, outreach** and **professional development**. In 2011, Florida industry expressed the need for partnerships with schools to develop a pipeline of STEM (Science, Technology, Engineering, Math)-educated employees and schools expressed a desire for this partnership, but both entities had a slow start forging this.

Unaware of the career growth and wage potential, too many people disregard manufacturing as a career. However, the image will not change unless manufacturers work together to change it. Providing an accurate image of manufacturing is imperative as many still view it as assembly lines of workers manually processing widgets all day. **This guide, produced in partnership with the FloridaMakes Network, outlines how partnerships between industry and educational institutions can help dispel commonly held misconceptions, inform students/parents about the world of modern manufacturing and outline strategies to build in-roads between industry and education.**

Each partnership will have many common and fundamental threads, but may not look alike. This guide serves as a vehicle to share lessons and best practices to create successful and sustainable school-industry partnerships. The guide explores and outlines strategies that schools and industry can mix-and-match to create "win-win" partnerships. It also offers tips for talking to students about aspects of manufacturing that they can relate to and/or be passionate about.

Although partnerships start on a one-on-one basis with a person at a school and/or at a company, it is imperative that partnerships expand to involve more stakeholders. **The ultimate goal is to build a network of sustainable partnerships.** If you have any questions, or need help facilitating a partnership, please reach out to FLATE.

To learn about FLATE and the statewide two year A.S. degree in Engineering Technology visit www.flate.org and www.madeinflorida.org.

Sincerely,

Marilyn Barger, Ph. D., P.E., CPT

SCHOOL & INDUSTRY PARTNERSHIP TOOLS

Industry-education partnerships are key to creating a steady pipeline of skilled workers. Partnerships can include a variety of interactions between the two organizations. This includes teachers, career counselors, educational administrators, human resource professionals, engineers, plant managers and training personnel. Some of the shared activities will be formal and others will not.

The list below represents interactions/ activities of a well-established partnership between a school and a company. Several items have been grouped together to simplify and show how these activities may be called different names.

- *Scholarships/Tuition Assistance/Reimbursement*
- *Internships/Externships/Work Experience*
- *Student/Faculty Mentoring*
- *Advisory Board Participation/Curriculum Development Help*
- *Industry Demo Projects/Facility Loan*
- *Funding/Access to Equipment*
- *Adjunct Faculty/On-site Courses*
- *Tours and Talks*

A strong and sustainable partnership is not only broad (includes a mix of interactions), but should also be deep, involving people from different parts of both organizations. Find industry/school district, school or college models that you can “borrow” and/or adapt to work for your own school/industry partnership. Some might refer to this as “adopt a school” or “manufacturing mentors”.

SCHOLARSHIP/ TUITION ASSISTANCE / REIMBURSEMENT

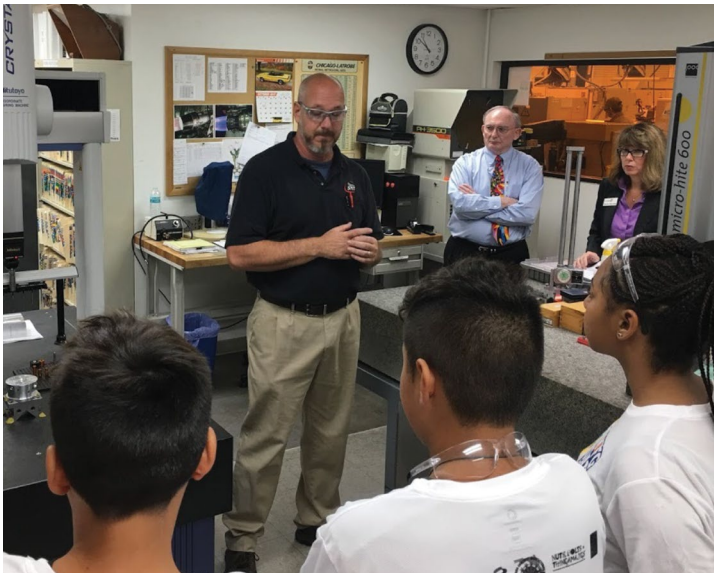
Scholarships provide students without financial resources with the support and opportunities to pursue a career in manufacturing through further education. Local companies/ professional organizations often have scholarships for local high school graduates that serve as a great way to create a "hook" for local talent and future workforce. Tuition assistance is often available only to current company employees and links them directly to education programs relevant to their industry. This allows incumbent workers to enjoy the benefits of advancing their education through academic degree programs endorsed by the company.

INTERNSHIPS / EXTERNSHIPS / WORK EXPERIENCE

Internships are supervised learning experiences with a defined beginning and end, and with defined learning objectives and goals. They are designed to be an extension of the classroom, allowing interns to apply their knowledge in "real-life" settings. They provide students with great hands-on exposure to future employers and educate them about pathways to employment in manufacturing companies. Internships can be part of technical high school or college-level programs.

For college, internships are often "credit-bearing" requirements for completion of technical programs and therefore require formal documentation of attendance and learning outcomes. In many cases internships are paid. For companies, interns provide a way for them to get an idea of what students are learning in educational programs. Internships can give companies the opportunity to work with schools to "mold" curriculum so that it is relevant to industry and provides students with workforce skills and knowledge. Internships also allow companies to preview potential employees and get needed help for special projects and tasks.

Externships are experiential learning opportunities, similar to internships, but generally not part of an academic program of study. They typically provide paid summer employment for a few days to several weeks, giving participants a short, practical experience in their field of study/ potential career field. Externs get real-life perspective of current industry workplace trends.



Practicing teachers can do an industry externship in a manufacturing company during the summer to gain deeper knowledge and understanding of their teaching field and how it translates into skills their students will need to excel in manufacturing careers. Externships may also provide faculty with opportunities to explore new content areas for curricula development and/or student workforce readiness and career preparation. They are great vehicles to give teachers real-world experiences that they can provide to students while also giving companies extra help during summer months.

STUDENT / FACULTY MENTORING

This high intensity, long-term, one-on-one strategy is very effective in preparing students for any workforce. **Mentors are important for students (especially girls, women and minorities in non-traditional career paths) and faculty participating in or pursuing STEM careers.** For manufacturing, mentoring can make a huge difference for students gaining knowledge about the field, dispelling myths, as well as developing self-confidence. Mentoring can be one-to-one or can be formalized through a class, teacher or school. Institutions can tap into online mentoring programs that virtually connect industry professionals to students (Example: www.mentorNet.org).

ADVISORY BOARD PARTICIPATION / CURRICULUM DEVELOPMENT

Every technical, career or occupational school program should be driven by an active Industry Advisory Board. **Industry's participation in advisory boards or committees is valuable in assisting educators design, implement and evaluate programs.** Through these committees, industry partners, with their experience and expertise, help tailor curricula to current industry needs and infuse specialized skills set beyond the traditional curriculum. Industry partners can request new topics like emerging technologies or more background practice in fundamental skills. Frequently a team of industry experts might provide content material to educators who develop lessons and learning activities. Industry would then review the newly developed material before it is used in classrooms.

Additionally, an industry partner might teach new topics as a guest lecturer. Although curriculum may be a focal point of Industry Advisory Boards and committees, members are called on to participate in recruitment events, host plant tours, arrange student work experience and other activities. Advisory board participation provides opportunities for industry members, educators and students to build strong, sustainable and powerful partnerships to support and increase student success.

INDUSTRY DEMO PROJECTS / FACILITY LOAN

Industry demonstration projects offer opportunities to involve students in the world of modern manufacturing in a hands-on, real-life context. By opening up their manufacturing facilities either for tours, camps or workshops, manufacturing industry partners can provide schools with the opportunity for on-site learning, allowing students to be fully immersed in the manufacturing world.

FUNDING / ACCESS TO EQUIPMENT

Industry partners can provide financial assistance and/or equipment to schools that teachers and students would otherwise be unable to utilize. Technical schools just don't have the fiscal capability to stay abreast of the continuously evolving and changing technology now found in manufacturing facilities. Through funding and making equipment available to schools via donations, industry can provide students with the opportunity to familiarize themselves with high-tech machinery necessary for many manufacturing careers. Volunteering teaching hours for a couple of sessions on the equipment, either on-site, at a training facility or at the school, industry partners can ensure students get the basic training and experience they need when they start a new job.

ADJUNCT FACULTY / ON-SITE COURSES

Industry experts possess current, specialized knowledge and skills which make them invaluable assets as adjunct faculty members for many college technical programs. **Students connect well with instructors who have hands-on, grass roots experience in their subject area.** One bonus for adjunct faculty instructors is that they get to really know potential candidates for their own workforce during the extended period of the course. Holding classes on-site at an industry partner's manufacturing facility can also provide opportunities to expose students to the exciting world of manufacturing.

TOURS & TALKS

A national poll of teenagers conducted by Nuts, Bolts & Thingamajigs (NBT) and the Foundation of the Fabricators and Manufacturers Association (FMA) revealed that 61 percent of teens have never set foot in a factory or other type of manufacturing facility. This is unfortunate as industry tours have proven to be an effective mechanism in exposing students to manufacturing. **Tours also emphasize the importance of STEM and its connections to manufacturing.** Industry guest speakers are also very valuable in addition to, or as an alternative to, tours (if tour logistics cannot be worked out).

TOURS: VALUE-ADDED EXPERIENCE

Face-to-face experiences provide students with a chance to see the application of STEM subjects come to life in a high-tech world. **Modern manufacturing industry tours can be especially important for high school students, where they have the opportunity to see, hear and learn about different jobs and careers that people have in high-tech industries.** For high school students, plant tours have the potential to provide a "spark" to set off a future high-tech career and give them a point of contact for summer jobs and internships. Industry employers hosting the tour have the chance to make a connection not only with the teacher and students, but with the touring school for recruiting, job shadowing and externship opportunities.

Virtual tours are a great way to prepare a class before a real tour, review after a tour or serve as an alternative when a tour isn't possible. There are many virtual tours available online on company websites, or on outreach websites including FLATE's "Made in Florida" site www.madeinflorida.org. FLATE's Industry Tours Best Practices guide is another invaluable resource for both instructors taking tours, and industry professionals hosting student tours in their facilities. This guide is available online at www.fl-ate.org as a virtual flip book, or in print-ready format.

TIPS FOR TOURS & TALKS

- ***Give a preview to the educator/chaperone*** *if possible before the student tour*
- ***Find out what kind of class/course will be visiting and what age***
- ***Remember "tabula rasa" -*** *they know little about what you take for granted*
- ***Outline*** *both your introductory remarks as well as tour highlights*
- ***Develop a list of questions*** *(possibly with the teacher) to ask students during the tour*
- ***Talk about the process as well as the flow***
- ***Have something they can touch*** *and/or hold, or a hands-on demonstration*
- ***Talk about careers and technical jobs*** *in the plant*
- ***Talk about the importance/relevance of education***
- ***"Giveaways"*** *for students and/or educators are great (could be different)*
- ***Give students an "assignment" -*** *something to research, etc.*
- ***Follow up*** *with the educators afterwards to see if there are more questions*
- ***Consider what you would do differently the next time***

FLATE's Tour Resource Site: www.flate.pbwiki.com

Successful partnerships begin with mutual respect and an education process on both sides. All stakeholders in the partner school must know what the manufacturing industry is really like. By contrast, the manufacturer has to have an understanding of the school's needs, the mindset of students, teachers and administrators and how schools "work." Collectively, both entities must ensure that the old stereotypes of dirty, hot work conditions and monotonous, mindless, back-breaking conditions are removed. The previous sections provided partnership ideas and opportunities. This section addresses how these misconceptions can be erased and replaced with positive, proactive actions.

TARGETING ADVANCED MANUFACTURING'S SOFTER SIDE

Advanced Manufacturing as a:

- *Green Profession*
- *Helping Profession*
- *Creative Profession*
- *Hands-On Profession*
- *High-Tech Profession*
- *Lucrative Career*

Targeting Girls & Young Women

Targeting the Future Workforce (K-12)

Targeting Parents

Targeting the School's Community

Educating About Manufacturing in Florida: Manu-Facts

FLATE's "Made in Florida" online resource provides many avenues to explore these lines of thought with students. It showcases manufactured items and companies. It also highlights career pathways that enable industry and educators to project the role manufacturing plays in improving quality of life, and the high-tech and creative jobs in manufacturing.

Manufacturers have characteristics that students, teachers and school administrators need to know. Students will find modern manufacturing practices amazing and a world away from their current "iPod" view of high technology. Showcasing hard-core manufacturing processes either in classrooms or at the plant will make a long-term, "gee whiz" impression on students. Discussing technology will certainly broaden students' perspective about manufacturing. **To appeal to a broader audience, consider highlighting the 'softer sides' of manufacturing.** Some of these characteristics are outlined here and represent great talking points, as well as avenues to build partnerships with a school and its students.

ADVANCED MANUFACTURING AS A "GREEN" PROFESSION

It is easy to bring sustainability into conversations while discussing modern manufacturing. Unfortunately, the fact that manufacturing is a "green" industry is news to students. Discussing the "green" aspects of manufacturing may trigger school partnership projects, while highlighting the softer side of manufacturing. Discussion topics could include:

Waste Reduction: Emphasize manufacturers' "lean production" approach to waste reduction. This approach reduces waste streams as well as total manufacturing costs. Facility recycling programs reuse materials and lower the burden on landfills.

Energy Efficiency: Minimizing energy use as a way to reduce costs is a common practice for Florida manufacturers. Introducing students to the challenges of this task will increase their respect for manufacturing as well as connect technical careers to the greening process. Energy efficiency includes both the building envelope (insulation, shade, closures, etc.) and the inside where production equipment consumes a considerable amount of power. Both aspects are important to manufacturing facilities. Combined with recycling and other sustainability efforts, energy efficiency supports LEED building recognition for industry as it does for educational institutions.

ADVANCED MANUFACTURING AS A HELPING PROFESSION

Part of the paradigm shift needed to promote manufacturing/school partnerships includes taking a closer look at manufacturing as a helping profession. Raising awareness that manufacturing is also a helping industry is particularly important when recruiting women and girls to advanced manufacturing careers. Discussing the fact that manufacturing includes the development and production of health aids, bionics, medical and safety devices and surgical robots, as well as many other products to help people lead safe, productive lives, is important to students focused on social responsibility. Highlight the fact that manufacturing companies continuously improve their products to make them safer, easier to use, less costly and more durable.

ADVANCED MANUFACTURING AS A CREATIVE PROFESSION

Creativity and artistic ability are other aspects of manufacturing that you can use when talking to students about the industry. Young people are full of fresh, new ideas and want to express them. Manufacturers can emphasize the many creative aspects of initial product design and development, production processes and post-production packaging, marketing and sales.

Relating manufacturing activities to creative thinking will be news to students. Point out the fact that manufacturing careers include ample opportunities to work on product improvement, resulting in products that are safer, more environmentally "friendly" and better matched to their intended function. Other career options also include identifying and testing the most durable, strongest, safest and most environmentally friendly materials for products. Remind students that problem-solving and critical thinking skills come into play frequently! **Another new message we need to communicate to students is the underappreciated role that the design process plays in manufacturing.** Teachers need to know that creative minds are called for here! Designing successful, innovative and usable products that meet the needs of the customer is obviously a big part of manufacturing, but that will not be apparent to educators and students. Finally, building a partnership with your local school to promote manufacturing as a career path includes "bragging rights". Make it a point to let everyone in your partner school know that careers in manufacturing require dedicated, creative professionals, and that you are proud of your product and the people that make it!

ADVANCED MANUFACTURING AS A "HANDS-ON" PROFESSION

Today's manufacturing industry continues to highly value employees' ability to work with their hands. For the work in the early decades of the 21st century, the word "hands-on" has a very different meaning than it has in the past. **Today there are still many manufacturing jobs that primarily involve skilled, technical, hands-on work, but that work is performed in modern clean, organized, neat, climate-controlled and well-lit facilities.** Additionally, since some, if not all, equipment is now partially or fully automated (controlled by computers), we have to redefine "hands-on" for manufacturing and high-tech industries and re-educate the public accordingly.

One “hands-on” challenge manufacturers need to address is summarized in a Nuts, Bolts and Thingamajigs (NBT) poll. The results demonstrated that young people are “non-tinkerers” and 60 percent of the respondents indicated they avoid major household repairs, preferring instead to hire others to complete them. The poll also reported that 58 percent of respondents had never made or built a toy, and 57 percent indicated that they had average or below average skills at fixing things around the house. The data clearly shows that teens don’t have enough role models to encourage them to repair and build things themselves, nor have they experienced the pride of building or repairing something useful.

Industry partners can support school programs by working with the teacher to develop, and ultimately deliver, a hands-on activity that reflects the company’s products or one of its high-tech operations. Also popular and always a big hit with students are brief “show-and-tells”, with a product to demonstrate how it is made or tested, or how two components are joined. The students will ask questions and want to touch and try whatever you can bring!

ADVANCED MANUFACTURING AS A HIGH-TECH PROFESSION

A great partnership action is to beat down the dull and dirty stereotypes once and for all. **To maintain a globally competitive edge, modern manufacturers use the most advanced and automated equipment available.** Technicians program, operate and maintain robotic systems to perform process and logistics steps. They help develop elaborate control schemes to maintain product quality and material movement for just-in-time manufacturing operations. Students often think the military services develop the most cutting-edge technologies, but it is manufacturers that make those technologies a reality. If students want to work at technology’s leading edge, they should work in manufacturing.

Although today’s youth live in an electronic world and have some sense of computer programming, directing these students onto a manufacturing career path requires a push that you can provide. They have little understanding of the tremendous computing power in manufacturing that connects office computing, cyber security and manufacturing operations together in a common, virtual space. Students that are keenly interested in information technology will find many opportunities in manufacturing.

ADVANCED MANUFACTURING AS A LUCRATIVE CAREER

It goes without saying that high school students don't totally understand the value of money; but they certainly have an appreciation of what a "comfortable" lifestyle is. The partnership effort on this front is straightforward, with the bonus that it is also a wonderful "bragging" opportunity. Manufacturing companies offer good-to-high salaries. **Most jobs in manufacturing are considered "high-wage," meaning they pay significantly above the average worker's salary in all fields.** Data supporting this position is available on the "Made in Florida" website. Manufacturers also offer good benefits including medical insurance, retirement plans, and tuition reimbursement for work-related education. Manufacturing companies offer many opportunities to move within the company to other work areas, allowing employees to find a good fit for themselves and the company, as well as the best opportunities for future career advancement. It's important for all of us to help our youth understand that there are good wages and benefits, and therefore great life-styles available in manufacturing at many different positions.

TARGETING GIRLS AND YOUNG WOMEN

Mentors are especially important for girls and women participating in or pursuing STEM careers, particularly in manufacturing. Girls and women are an untapped resource to fill Florida's manufacturing jobs. In a research study conducted by FLATE, over 70 percent of responses received from high school students were from girls. **Women engineers and technicians can make a big impact on middle and high school girls via in-class and career day presentations and by mentoring students. Industry partners can help meet this need by connecting with school partners.** Targeting the softer side of STEM careers like those that require creativity, focus on sustainability and green aspects, or focus on helping people, can be a very effective recruitment strategy. Women and girls can explore a variety of careers in the manufacturing industry that offer good wages, full benefits (medical insurance, retirement plans, tuition reimbursement, etc.) and the opportunity for career advancement. Manufacturing companies encourage movement within the company, allowing flexibility to find the most fulfilling work environment.

TARGETING THE FUTURE WORKFORCE (K-12)

It is essential to provide youngsters with an accurate picture of the manufacturing world early on, before their image of manufacturing is distorted by misconceptions and misinformed views of the industry. **Starting young is an important component in the partnership arena.** It's important to get kids involved in STEM curriculum at an early age and to keep them interested all the way through high school and beyond.

Manufacturing is a perfect example of a fully integrated STEM business sector. Manufacturing integrates science, technology, engineering and math in most aspects of the company. In research and product development, science and math might dominate. On the production floor, technology and engineering might be the focus. Ultimately, science, technology, engineering and math have to be integrated to produce products more efficiently.

Middle school is the typical starting point, but elementary school is not too soon. **In either target environment, the most important thing to remember is to deliver an age-appropriate message.** A presentation targeted for high school won't work well with middle or elementary school students. The educator pages of www.madeinflorida.org have information and links to FLATE's Industry-connected curriculum materials.

Robotics competitions are all the rage and the new "sport" has trickled down from high school to middle and elementary schools using age-appropriate robots. Robots provide a "hook" that gets kids interested in advanced manufacturing and other advanced technologies. Camp and club involvement often lead to robot competitions, but student teams need adult technical advisors and/or mentors. Industry partners can financially support a robotics summer camp, after-school club or a competitive robotics team. They can also participate as team technical advisors or as competition judges. These early experiences foster real interest in STEM education and technical career pathways.

TARGETING PARENTS

It is essential to provide youngsters with an accurate picture of the manufacturing world early on, before their image of manufacturing is distorted by misconceptions and misinformed views of the industry. Starting young is an important component in the partnership arena. It's important to get kids involved in STEM curriculum at an early age and to keep them interested all the way through high school and beyond.

TARGETING THE SCHOOL'S COMMUNITY

Most people have a limited understanding of what manufacturing encompasses. They are largely unaware of the many varied, high-tech, high-wage careers available in the field. **Educating the public via schools and other support groups is a great way to begin to change the perception of manufacturing.** It's important to send the message to the entire school population, including the school's support infrastructure, that every day they enjoy things they don't realize were made in Florida. The more the public becomes aware that behind every product and technology lies the somewhat hidden world of manufacturing, the more likely their image of manufacturing will change.

Finally, don't forget your local school board. School boards are bombarded with requests to respond to perceived important needs. However, manufacturers usually don't focus the message about their workforce education needs to their school boards. Proactive messages to your school board can and will make a difference.

MANUFACTS

- *As of March 2021, there were **380,500 manufacturing jobs in Florida***
- *Employment in the manufacturing industry is c**oncentrated in the southeast, central and northeast part of Florida***
- *Miami-Dade manufacturing employment totaled **over 41,000** jobs. Orange, Pinellas counties contributed **over 30,000** jobs each, while Hillsborough, Broward, Brevard, Duval and Palm Beach counties contributed **over 20,000** jobs each.*
- *The average annual wages for the manufacturing sector in Florida is **$63,870***
- *As of 2020 there were **21,577** manufacturing establishments across Florida*
- ***Occupations with the most employment in manufacturing included:** team assemblers, first-line supervisors of production and operations, packaging and filling machining operators and tenders, electrical and electronic equipment assemblers and sales representatives, wholesale and manufacturing, nontechnical.*
- *Manufacturers in Florida account for **5.39%** of the total output in the state and employ approximately **4.24%** of the state's workforce.*
- ***Top 10 Florida manufacturing sectors include:** computer and electronics, food, beverage and tobacco products, chemicals, aerospace and other transportation equipment, miscellaneous manufacturing, fabricated metal products, nonmetallic mineral products, machinery, primary metals and paper manufacturing.*
- *Manufacturers help drive Florida's economy with **$51.38 billion in manufactured goods exported in 2019**, or **91.63% of total goods exports**.*
- ***Top five export markets include:** Brazil, Canada, Mexico, Colombia and Chile*

Sources: National Association of Manufacturers, FloridaMakes, EnterpriseFlorida, Florida Chamber of Commerce.

VALUABLE PARTNERS FOR MANUFACTURING

Manufacturers across the state have called for a one-stop-shop where they can access contact and other information they need. FLATE has this ready for you on the Made In Florida website. FLATE prides itself for its “Baldrige Sterling-rated” customer service to its stakeholders and will answer questions to help make the special industry connections you need. FLATE also offers support to help develop and implement MSSC-aligned educational programs as well as outreach models. FLATE has the resources, knowledge, skills and ability to weave together our award-winning “Synergy in the Sunshine State.” Opportunities for help abound in Florida. We are fortunate to have partners with the insight and expertise to strengthen and build Florida’s ready-to-work education system and who are ready and willing to help. The following list provides information and websites where you can learn more about these useful and varied resources.

FLORIDAMAKES

www.floridamakes.com

FloridaMakes is committed to strengthening Florida’s high-wage manufacturing sector through the deployment of a variety of tools and services that are geared to help your companies identify its capabilities and effectiveness, benchmark with other companies, pinpoint challenges impeding its growth and sustainability, and determine its ability to quickly adapt to disruptions. From enterprise assessments to workforce training and sustainability, FloridaMakes works with companies/manufacturers to help foster improvements that can be implemented across all aspects and levels of your business.

ASSOCIATION OF FLORIDA COLLEGES (AFC)

https://www.myafchome.org

FLATE is active in AFC’s Occupational and Workforce Commission. Participation in AFC provides opportunities for FLATE to focus and share outreach and college recruitment within the occupational and workforce context of Florida Colleges. AFC hosts several meetings each year and provides an excellent opportunity to meet like-minded colleagues and vendors, attend relevant workshops, and learn from Exemplary Practice presentations.

FLORIDA ASSOCIATION FOR CAREER AND TECHNICAL EDUCATION (FACTE)

http://www.facte.org

FACTE is a non-profit organization committed to the development of education that will prepare both young and adult Floridians for successful careers. FACTE's role is one of leadership and support for CTE teachers, administrators, and students by working towards the growth of CTE students, staff, materials, information, communication and funding. The organization facilitates professional leadership and partnerships essential for the successful preparation of individuals to participate in a world class workforce. FACTE also encourages the development of local associations to promote advocacy and professional development for career and technical education.

FLORIDA CAREER PATHWAYS NETWORK (FCPN)

http://floridacpn.org/

FCPN is a membership organization for educators and employers involved in the advancement of Career Pathways, Tech Prep, and related education reform initiatives. FCPN is Florida's leading career pathways organization and serves as a network where members share and discover best practices for secondary, post-secondary, adult education, and military career pathways. It provides an avenue to middle and high school manufacturing programs, focusing on the pathway from middle school to college. FLATE is a member of the FCPN Board.

MANUFACTURING USA INSTITUTES

https://www.manufacturingusa.com

Manufacturing USA® is a national network created to secure U.S. global leadership in advanced manufacturing through large scale public-private collaboration on technology, supply chain and workforce development. The 16 manufacturing innovation institues (sponsored by either the U.S. Department of Commerce, Defense, or Energy) bring together member organizations from manufacturers of all sizes, academia and government to work on major research and development projects relevant to industry and train people on advanced manufacturing skills.

GET THERE!

http://www.getthere.com

Get There, an exciting new initiative from the Florida Department of Education, serves to educate Floridians about the state's Career and Technical Education offerings available at the 76 state and technical colleges. By aligning a student's interest with potential career pathways, it also seeks to increase enrollment in valuable workforce training programs by connecting them directly to their local institution.

NATIONAL ASSOCIATION OF MANUFACTURERS (NAM)

http://www.nam.org

NAM is the nation's largest industrial trade association, representing small and large manufacturers in every industrial sector and in all 50 states. Developed by NAM, the goal of the Dream it! Doit! campaign is to help young adults find careers that they can be passionate about in one of manufacturing's many exciting sectors. NAM provides a national lens through which to view Florida manufacturing -related activities, providing a valuable outside perspective.

THE MANUFACTURING INSTITUTE

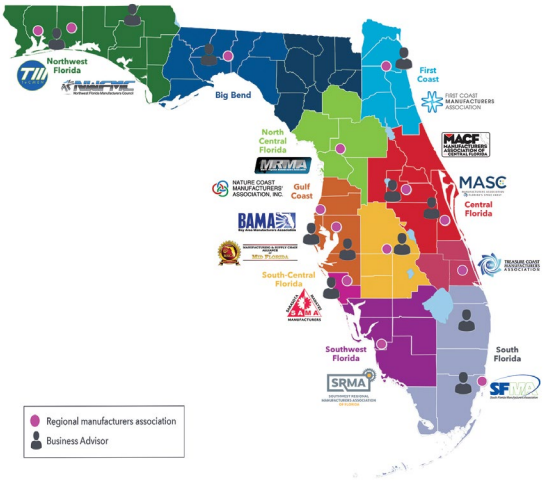
http://www.themanufacturinginstitute.org

Jennifer McNelly, president of The Manufacturing Institute, the non-profit affiliate of the National Association of Manufacturers (NAM), drives an agenda focused on improving and expanding manufacturing in the United States through education, innovation, and research. The institute leadership is a member of FLATE's National Visiting Committee and FLATE serves on the Education Council of the Manufacturing Institute. The two organizations share expertise and collaborate on projects with similar goals. The Manufacturing Institute has resources for a variety of education and credentialing initiatives.

CAREERSOURCE FLORIDA

https://careersourceflorida.com

CareerSource Florida is the statewide workforce policy and investment board of business and government leaders charged with guiding workforce development for the state of Florida. CareerSource Florida provides oversight and policy direction for talent development programs administered by the Department of Economic Opportunity, Florida's 24 local workforce development boards and their 100 career centers. Together, the CareerSource Florida network connects employers with qualified, skilled talent and Floridians with employment and career development opportunities to achieve economic prosperity.



REGIONAL MANUFACTURING ASSOCIATIONS (RMAS)

https://www.floridamakes.com/who-we-are/regional-manufacturers-associations.stml

This network of fourteen Regional Manufacturers Associations (RMAs) across the State of Florida provides manufacturing companies with a wealth of assets to support their businesses – from plant tours, networking and educational events to regional manufacturing awards and manufacturing advocacy efforts.

VENDORS AS PARTNERS

"Relevant, practical, hands-on, real-life lessons" are what manufacturers repeatedly say is what they are looking for from the classroom experience. FLATE maintains a close relationship with vendors of technical education and industrial equipment, software packages, books and other resources. Bringing vendors "into the loop" is another effective way to give students a "big picture" of the manufacturing industry.

PARTNERSHIP TOOLS

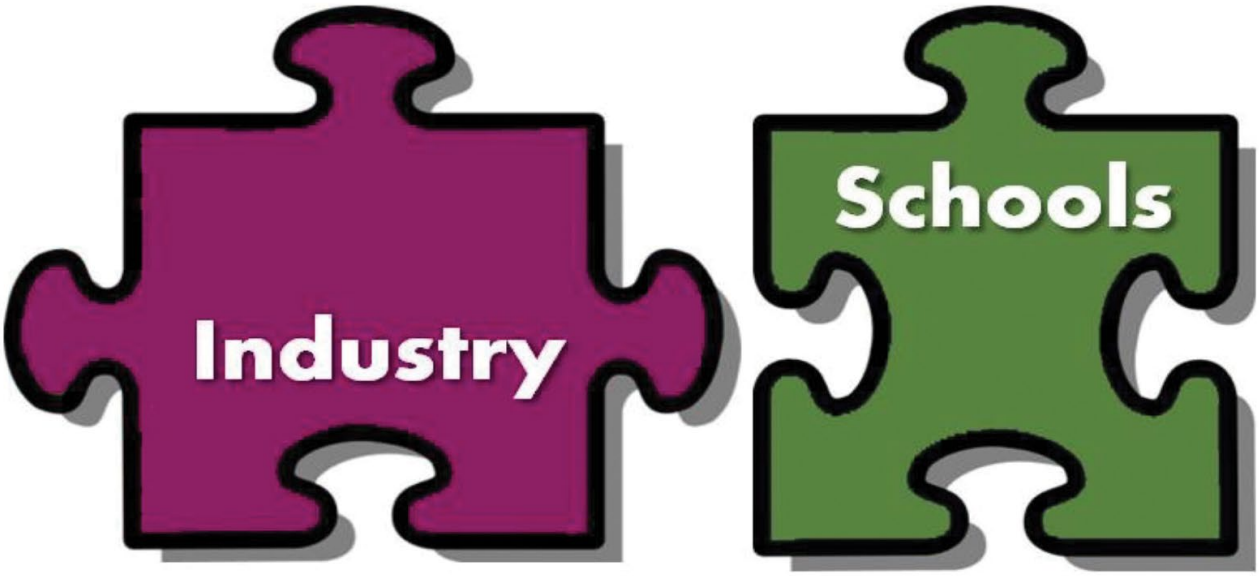
INDUSTRY/SCHOOL PARTNERSHIP CHECKLIST

What they can do with/for you

- ☐ *Make presentations to classes*
- ☐ *Bring students something to touch*
- ☐ *Participate in college program events*
- ☐ *Support STEM school projects/teams*
- ☐ *Provide technical guidance/mentoring*
- ☐ *Provide resources (time, talent, tokens)*
- ☐ *Serve on STEM advisory teams*
- ☐ *Host student and educator tours*
- ☐ *Be an adjunct teacher/instructor*
- ☐ *Review curriculum*
- ☐ *Support Student Projects*
- ☐ *Provide industry trends*

What you can do with/for them

- ☐ *Help navigate CTE education locally*
- ☐ *Plan their future workforce*
- ☐ *Provide visibility*
- ☐ *Respond to unexpected urgent needs*
- ☐ *Up-skill their workforce*
- ☐ *Define skills sets they need*
- ☐ *Facilitate student interactions*
- ☐ *Promote their companies*
- ☐ *Share students and program news*
- ☐ *Keep in touch*



TRACKING PARTNERSHIPS

Sections marked N/A are partnership opportunities that only apply to colleges or, in the case of internships, to high schools and colleges. For illustration, the abbreviated grid has been completed for existing partnerships at the secondary school and college levels.

The grid below is an example tracking tool that reinforces a line from our introduction—that no two partnerships are the same. What works for one partnership might not work for another. You are encouraged to try activities that you think will work for you and your partners. Talk to your colleagues to see what works for them. All are good, all are important and all are about building relationships and mentoring students.

MANUFACTURING/SCHOOL PARTNERSHIPS IN FLORIDA			
School/Industry Partnership	XX College & A Industry	YY College & B Industry	ZZ College & C Industry
Scholarship	X	N/A	N/A
Tuition Assistance	X	N/A	N/A
Interships/Work Experience	X	X	N/A
Externships for Educators	-	X	-
Student Mentoring	X	-	X
Educator Mentoring	X	X	X
Advisory Board Participation	XX	XX	-
Industry Demo Project	-	X	-
Funding or Access to Equipment	-	-	X
Review Student Projects	X	-	-
Adjunct Instructors	-	N/A	N/A
Classroom Talks	X	X	S
Host Industry Tours	X	X	S

TIPS FOR SUCCESSFUL MANUFACTURING CTE PROGRAMS ADVISORY BOARDS

The full engagement of employers is essential to the success of all CTE and Career Pathways programs. In most cases, the engagement of employers takes the form of service on advisory boards or committees—groups of employers and employees who advise educators on the design, development, implementation, evaluation, maintenance, and revision of Career Pathway programs. To do that successfully and have robust programs many states provide a handbook to guide educators in getting started.

Here are some high-level tips:

- ***Establish a formal committee*** *or board with both industry and education leaders as co-chairs.*
- ***Engage all stakeholders of the CTE program*** *from employers to pathway partners.*
- ***Get to know the committee members*** *and what their workforce needs.*
- ***Meet regularly****.*
- ***Listen actively****.*
- ***Communicate regularly*** *with members.*
- ***Provide an agenda*** *with sufficient time for committee members to participate in discussions.*
- ***Establish a formal process for curriculum*** *(skills abilities and knowledge) review that includes all aspects of the program.*
- ***End with consensus or specific plans*** *for continued engagement.*
- ***Include student input****.*
- ***Share student success stories****.*

QUOTES FROM THE INDUSTRY

"It is tremendously rewarding to see the things that young adults are working on and to learn what gets them interested and excited. From a not-so-altruistic perspective, it also gives me the opportunity to network with younger adults and guide them into considering manufacturing careers."

"You cannot start the process when students reach their senior year. You have tocultivate these relationships as early as elementary school."

"Whenever I hear hiring managers complaining about a lack of skilled talent, or challenges filling positions, I always suggest they reach out to the local academic community. If graduating students do not know about local businesses, what businesses do and the kind of skills/talent hiring managers are looking for, then it's a failure on the part of both industry and education."

"The recruitment, training, placement and development of a modern manufacturing workforce is a critical element, perhaps the single most critical piece, in maintaining, sustaining and expanding this vital industry sector. Everyone in industry should be engaged with students in some way."

"I can think of no better way of ensuring my company's future workforce than being deeply engaged with our local schools manufacturing and STEM programs."

"I love seeing kids eyes light up when you show them how something works or is made! It's real magic!"

"I am engaged with students because I know the value of hands-on education and training as it gave me the opportunity to learn real life skills."

IN CLOSING

It is important to raise awareness of the many high-skilled manufacturing jobs that remain unfilled due to lack of qualified candidates. The need to fill these high-tech, high-wage jobs with well qualified, credentialed candidates is urgent. FLATE's goal, and that of the National Science Foundation's (NSF) and the Florida Department of Education investment in FLATE, is not only to help meet current workforce needs, but also to develop and implement long-term, sustainable strategies for building and maintaining attractive, relevant, strong and flexible career pathways to support Florida's manufacturers.

Clearly manufacturing has an "image problem" and changing the face of manufacturing and exposing students to the many good jobs waiting to be filled is extremely important. School and industry partnerships are the key to making this a reality.

FLATE's mission, as Florida's go-to organization for high-tech manufacturing and advanced technical education, is to provide leadership, best practices and resources supporting Florida's high-performance skilled workforce. Tangible results are not possible without the energy and forward-thinking perspectives of its partners.

Partnerships between educators and the manufacturing industry ensure the relevancy of educational programs. Through partnerships, students are connected to industry role models so they can gain an accurate understanding of the manufacturing industry and see that there is an eventual return on their investment of time and effort at school. Working together, school and industry partners can create a win-win situation, providing authentic, well integrated connections to the world of manufacturing, and attracting workers already equipped with the skills and knowledge that will ensure their success in the manufacturing workplace.

FLATE'S ONLINE RESOURCES

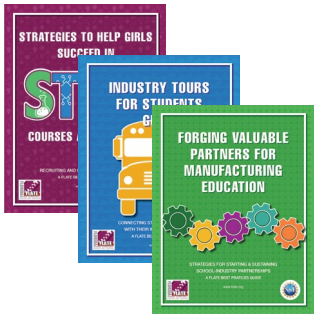
Utilizing a comprehensive curriculum both before and after the tour is the key to students making the most of the field trip experience. Supplementary materials support instructor goals and provide tangible products for students related to manufacturing and careers. FLATE provides a series of online lesson plans, handouts and virtual tours to use prior to the tour to start students thinking about manufacturing, and after the tour to keep the interest and enthusiasm going.

ONLINE EDUCATIONAL RESOURCES

Made in Florida (MIF) Lesson Plans are fun and hands-on classroom materials designed to enrich Science, Technology, Engineering and Mathematics (STEM) classes. These FREE instructional resources provide your students with real world scenarios relevant to manufacturers throughout Florida. MIF Lessons Plans are available at **www.flate.pbwiki.com**

The 2015 Made in Florida videos about manufacturing in the State of Florida is available on the web at: **http://madeinflorida.org/videos**

Women in Manufacturing **video and associated lessons**



FLATE Guide Booklets for manufacturing outreach and professional development in several downloadable resource booklets. Three are illustrated here. Available online, or for download at: **http://fl-ate.org/best-practices/**

APPENDIX

HIGHLIGHTING FLORIDA'S COMPREHENSIVE COLLEGE OPTIONS

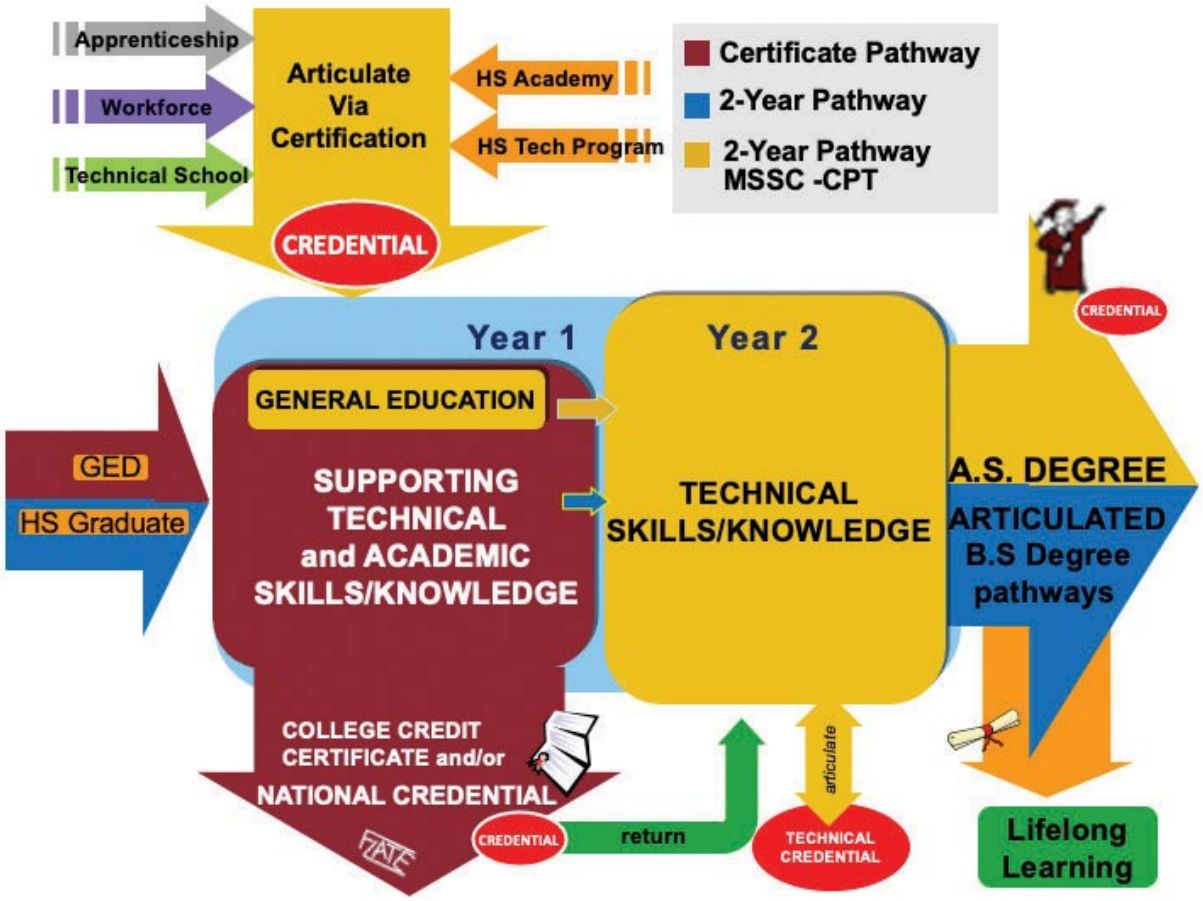
Great Jobs and Lifestyles Right Here!

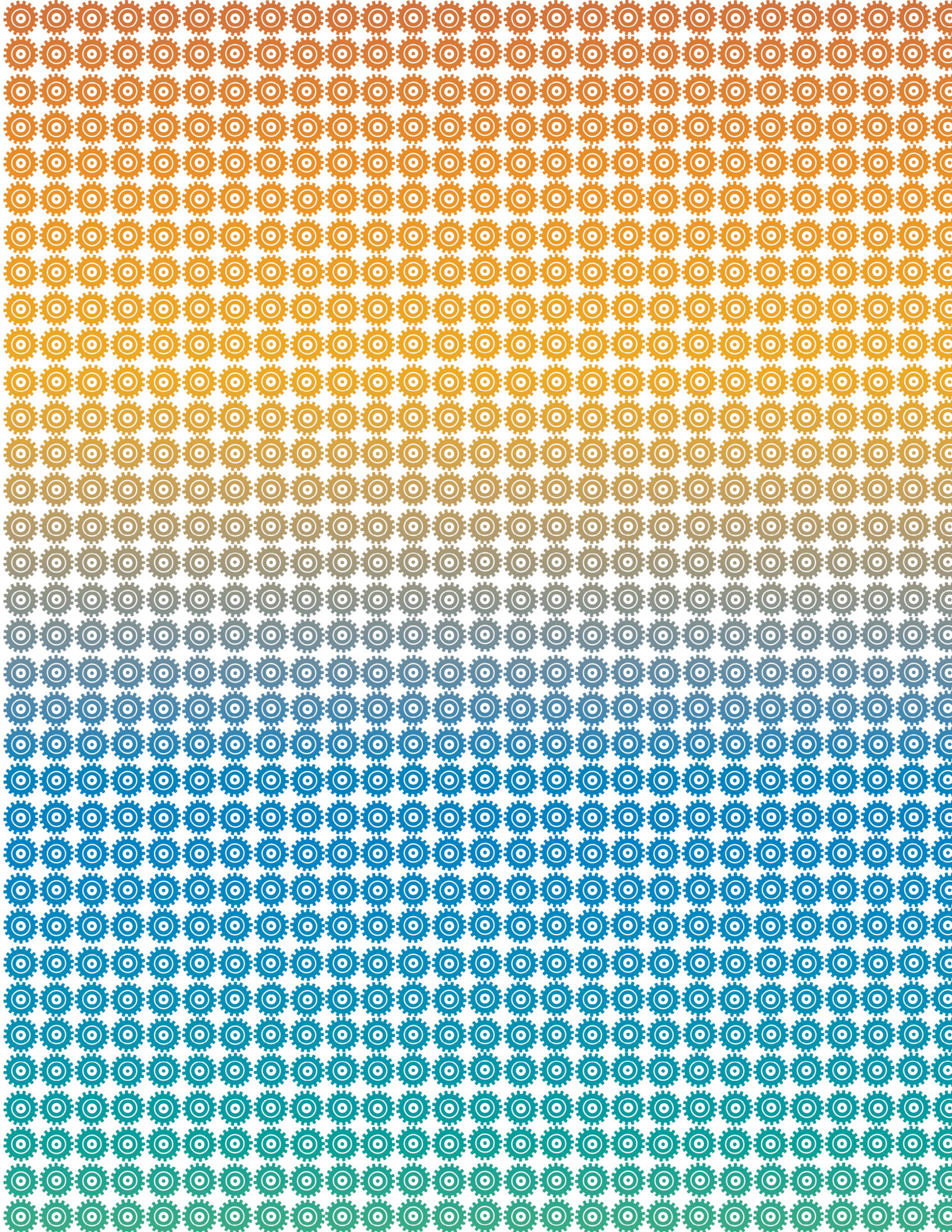
Today's high tech manufacturing positions usually require at least an Associate of Science degree. The FLATE-developed Engineering Technology (ET) degree program is available at 14 (and counting) colleges statewide. This flexible program has a built-in value-added benefit which employers have indicated is important: the ET degree core technical courses are fully aligned with the Manufacturers Skills Standard Certification (MSSC) Certified Production Technician (CPT) - www.msscusa.org.

In addition, high schools may wish to bring their tech programs into the future by offering the Automation and Production Technician program, where students have the option of becoming MSSC certified and earning 15 college credit hours towards the ET core. A number of other technical programs like welding, electronics or engineering technology also articulate to the A.S. ET, but with fewer credits.

Other Florida technical high school programs are also aligned to the MSSC CPT credential, and it only takes the credential to articulate credit to the Engineering Technology A.S. degree. MSSC certified students have many options. Their industry-endorsed MSSC skills allow them to compete for good jobs which may offer tuition reimbursement to not only complete a college program, but also grow as an employee. ET students have options to continue on to a B.S. degree in Engineering Technology in Daytona State College's online program and other degree programs around Florida. Other articulations are also available on a case-by-case basis. Developing Bachelor's degree and other post-secondary options and articulations is one of FLATE's initiatives.

ENGINEERING TECHNOLOGY PAHTWAYS SUPPORTING MANUFACTURING





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