

Florida's Advanced Manufacturing (AM) Pathways

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Our Vision



FLATE will drive
Florida's world-class
manufacturing
workforce

IMPACT LOCALLY - LEAD NATIONALLY

FLATE'S Work

GOAL 1. Provide state-of-the-art workforce curriculum

GOAL 2. Inform and recruit students

GOAL 3. Support world-class educators and faculty



**Curriculum Reform
and Development**



**Outreach and
Student Recruitment**



**Professional
Development
for Educators**



**Technician
Education Research**

FLATE, an NSF ATE Regional Center


- 2002 Regional Center Planning Grant awarded
- 2004 Regional Center fully funded for the state of Florida
- 2008 FLATE renewed
- 2012 FLATE renewed
- 2016 - 2020 No cost extension, supplemental funding
- 2016 - MOU with FloridaMakes for Manufacturing Day Outreach
- 2016 - 2020 - multiple partner projects with FloridaMakes
- 06/17/2020 FLATE NSF ATE Center closed
- 06/18/20 FLATE, a part of the FloridaMakes Network opens
- 09/01/20 FDOE grant to FloridaMakes to partially support FLATE

A satellite image of Earth showing several large, swirling storm systems over the ocean. The storms are characterized by dense, white cloud patterns spiraling outwards from a central eye. The background is a dark blue ocean with some whitecaps visible.

**Divergent Skill
Distributions**

**Demographic
Shifts**

**Changing
Economy &
Workforce**

- 
- A satellite image of Earth showing several large, swirling storm systems over the ocean. The storms are characterized by dense, white cloud formations with distinct eye-like centers. The background is a deep blue-green color, representing the ocean and the atmosphere. The overall image has a slightly grainy, high-resolution appearance typical of satellite imagery.
- **Covid Pandemic**
 - **Industry 4.0 technology adoption rate and focus on Diversity, Equity and Inclusion**

Florida Manufacturing Workforce Needs

Addressing the needs for skilled workers is a required, competitive and survival strategy for most manufacturers.

The Educational System must create a rigorous and relevant curriculum that:

- *Meets industry competency requirements*
- *Presents consistent offerings throughout the State of Florida*
- *Contains articulation pathways for secondary career and technical education students*
- *Includes transfer options to universities*


FL DOE Curriculum Frameworks for Workforce Education

- Define the student expectations for technical programs
- Organized by mapping to US DOL 13 Career Clusters
- Maintained by FLDOE; proposed/developed by academic institutions
 - Middle school career exploration & digital tools
 - High School CTE technical programs
 - Post Secondary Career Certificates (previously PSAV)
 - A.S. and A.A.S. Degrees
 - College Credit Certificates
 - Apprenticeship programs
 - Adult Education with career alignments

Framework analysis


This task served two purposes:

- it allowed the partner colleges to understand where industry felt the existing programs were working and where they fell short
- it allowed the industry stakeholders to see how competencies are formatted and serve to inform program frameworks



Demonstrate proficiency in integrating production equipment and area controllers

- design analog and digital control systems along with applicable software to specific manufacturing requirements
- chart and analyze ladder logic diagrams for manufacturing processes
- develop and analyze flow charts from ladder diagrams related process controls
- operate Programmable Logic Controllers with device drivers
- apply software to workcells and area controllers
- integrate control systems and equipment with production and production support mechanisms



Demonstrate proficiency in bar coding, automatic tracking systems for materials handling

- describe automatic inventory accounting and control system
- list the underlying principles and method of control in progress
- analyze product flow cycle
- describe warehouse throughput systems
- implement automated tracking in the laboratory environment
- describe machine vision applications
- maintain machine vision and sensing system equipment

MSSC

- Production
- Health, Safety, environment
- ⑤ Logistics & Inventory control
- Maintenance, installation & repair
- Production process dev.
- Quality

Many individuals, groups, organizations and institutions participated in the degree development. The lists below is a partial selection of participants.

INDUSTRY

Odyssey Manufacturing Company
Rocha Controls
Sypris Electronics
HTDCR Engineering
Municipal & Industrial Control Systems
Lear Tampa Plant
Commerce Controls, Inc
Sun Hydraulics Corporation
Haller Industries
Edwards Manufacturing, Inc.
Reimelt Corporation
Tampa Brass & Aluminum
Johnson Controls
Southern Manufacturing Co
Genesis Electronics Manufacturing
CF Industries-Phosphate complex
NDH Medical, Inc
TECO
Smithfield
Black and Decker
Jabil Circuits
A J O'Neal & Associates, Inc
TAW Custom Equipment
Nestle Waters (Zephyrhills Water)
Bioderm
Hunter Douglas
Packing Corp. of America
Aqua Cal
Jaeger Corporation
NDH Medical INC
Sun Hydraulics
Plastipak Packaging. Inc.
Tropicana North America
Linvatec
Universal Microwave Corp
Tom Thunder Lightning Protection
VLOC
Lumedyne
Aircraft Tooling & Design Group
Sims Machine
Alumi-Guard
BASF

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ACADEMIA

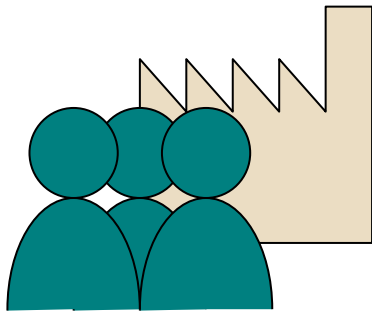
Hillsborough Community College
Brevard Community College
Central Florida Community College
Daytona Beach Community College
Florida Community College at Jacksonville
Gulf Coast Community College
Indian River Community College
Manatee Community College
Miami Dade College
Pensacola Junior College
Pasco-Hernando Community College
Polk Community College
Seminole Community College
Sinclair Community College - Ohio
St. Petersburg College
Valencia Community College
Florida Department of Education
USF College of Engineering
University of Central Florida
Lee County Public Schools
Nature Coast Technical High School
Pinellas Technical Education Centers

ASSOCIATIONS & COMMUNITY ORGANIZATIONS

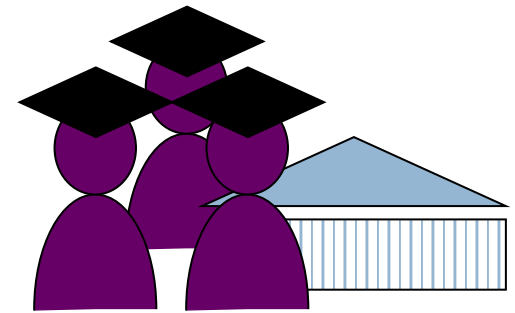
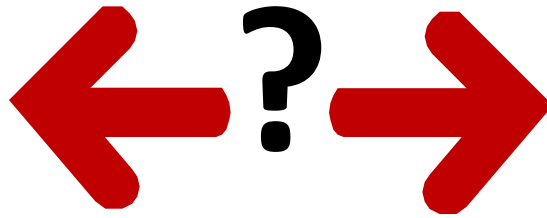
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Manufacturers Association of Florida
Florida - Manufacturing Extension Partnership
Society of Manufacturing Engineers
Sarasota Manatee Area Manufacturers Association
Sarasota County - Economic Development Corporation
Manufacturers Association of Central Florida
Bay Area Manufacturers Association
Tampa Chamber of Commerce
Pasco Economic Development Council

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INDUSTRY

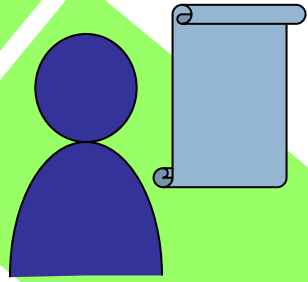


COLLEGE PROGRAMS

skilled workers

- outdated programs
- low enrollments
- confusing for students and industry
- equipment limitations
- duplication
- competitive

tech grads




State DOE

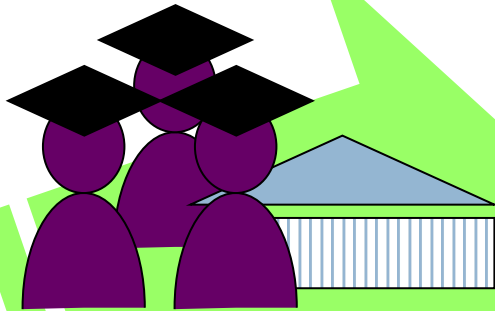


**Workforce &
Economic Agencies**

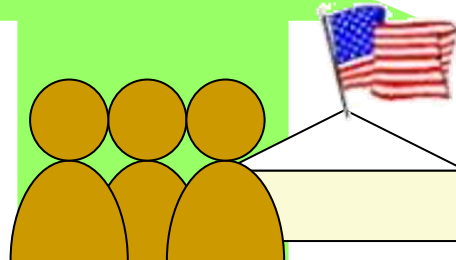


**External
Benchmarks**

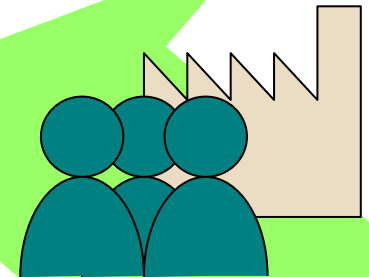
Florida's
Unified Education
System for
Manufacturing 



**State Colleges
Academic & Workforce
Programs**



School Districts



Manufacturers

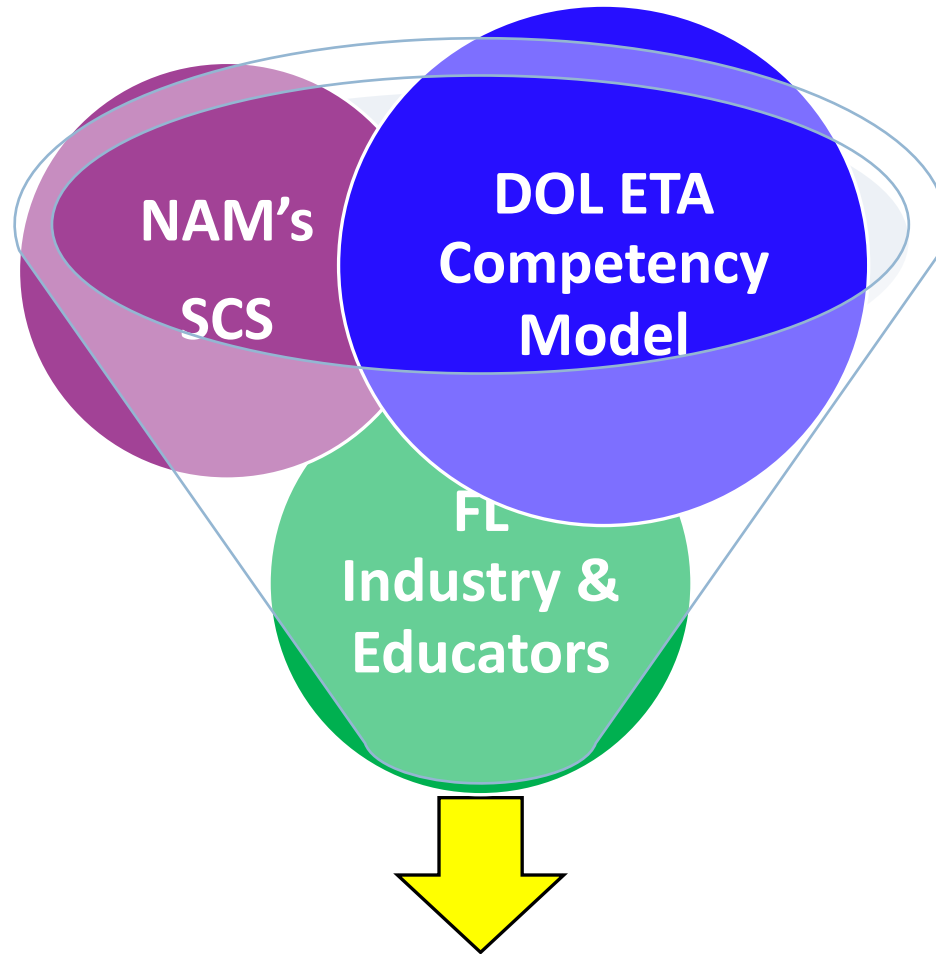
Desired Outcomes of the Florida Plan

- ✓ Increase enrollment in college programs
- ✓ Eliminate duplication
- ✓ Provide multiple entry and exit options in the pathway
- ✓ Unify marketing and recruitment efforts
- ✓ Meet industries' workforce needs for skilled technicians
- ✓ Align with national certification(s)
- ✓ Offer consistent programs statewide
- ✓ Develop statewide articulations
- ✓ Integrate industry into education process
- ✓ Define pathways from secondary through college



learn and earn

Florida ET Degree (60 credits)

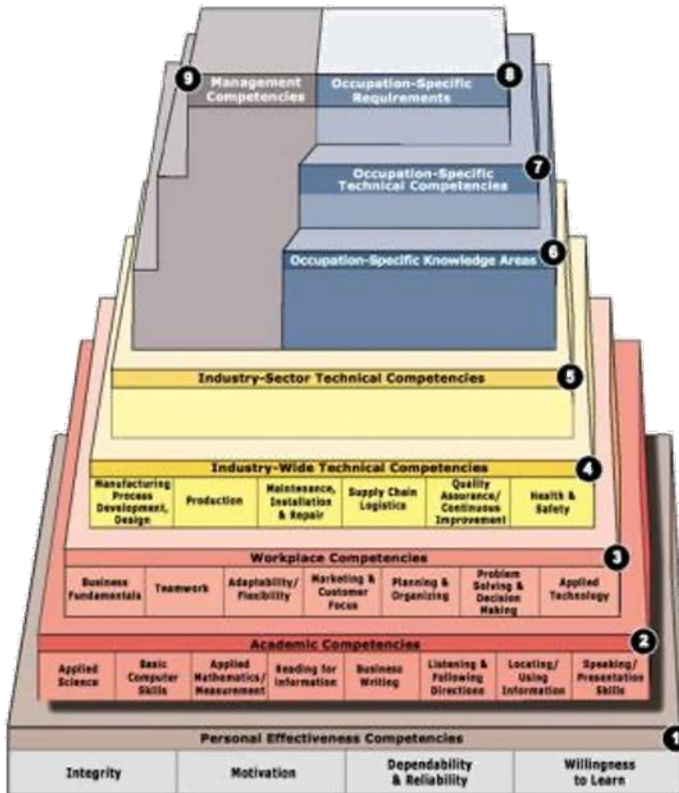


A.S. ET Curriculum Frameworks

NAM-Endorsed

Skills Certification System

Producing a High-Performance Manufacturing Workforce



Career Paths – Life Long Learning

High Quality Middle Class Jobs



ET Degree & Community



I. General Education – 15 - 18 credit hours

English Science
Math Social Science
Humanities

II. ET Core - 18 credit hours

Computer Aided Design Electronics
Manufacturing Processes & Materials Quality
Mechanics & Instrumentation Safety



III. 11 Specialization Tracks: 24 - 27 credit hours

Advanced Manufacturing Mechanical Design & Fabrication
Alternative Energy Systems Electronics
Biomedical Systems Digital Design & Modeling
Digital Manufacturing Supply Chain Automation
Advanced Technology Quality
Power Relay Substation

60 semester hours

Florida ET Degree (60 credits)



A.S. ET - Advanced Manufacturing Specialization Stackable Credentials

Advanced Manufacturing

Automation (12 CH)

Lean Manufacturing
(12 CH)

Hydraulics, Pneumatics,
Motors (12 CH)

Mechatronics (30 CH)

Aligned Industry Certs

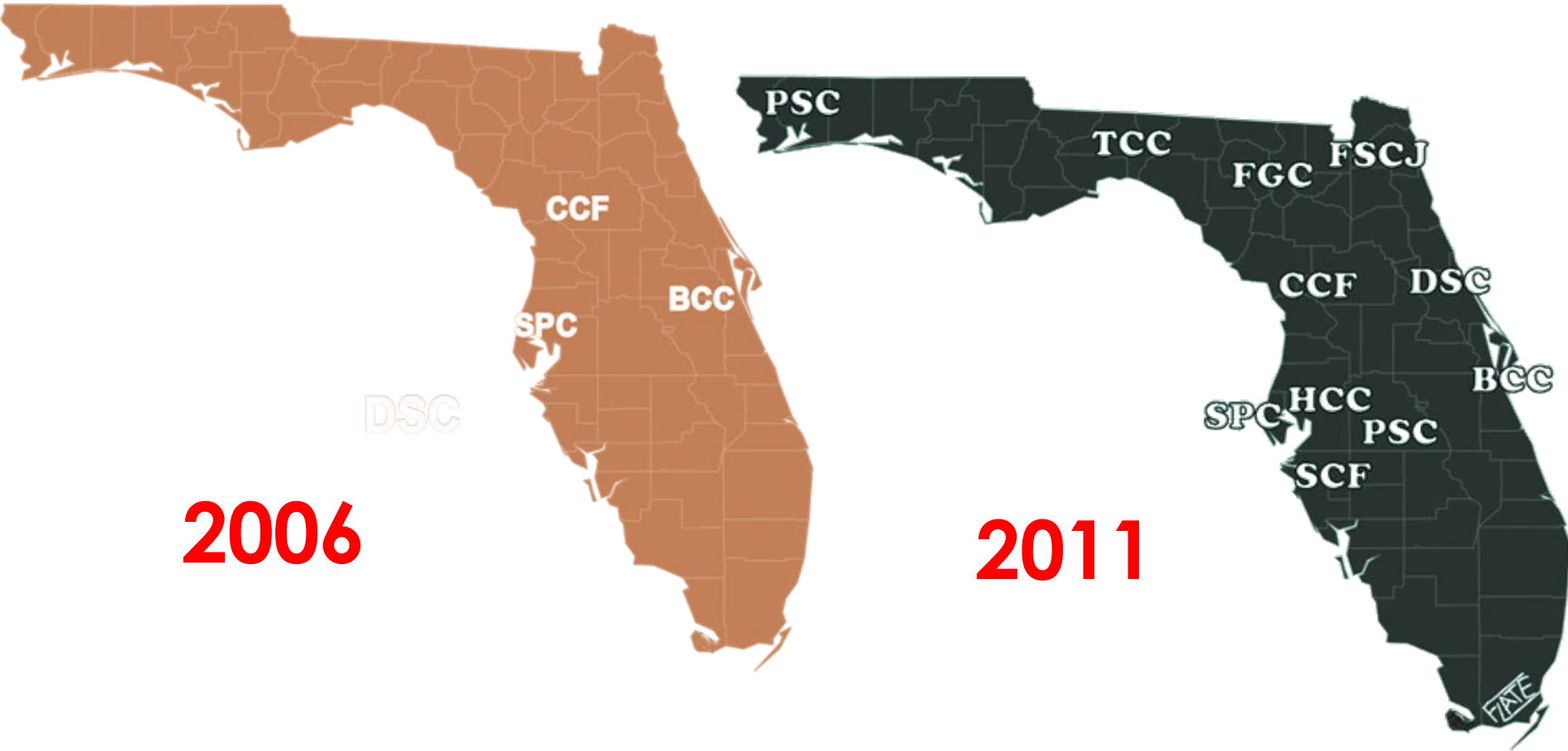
PMMI

SACA

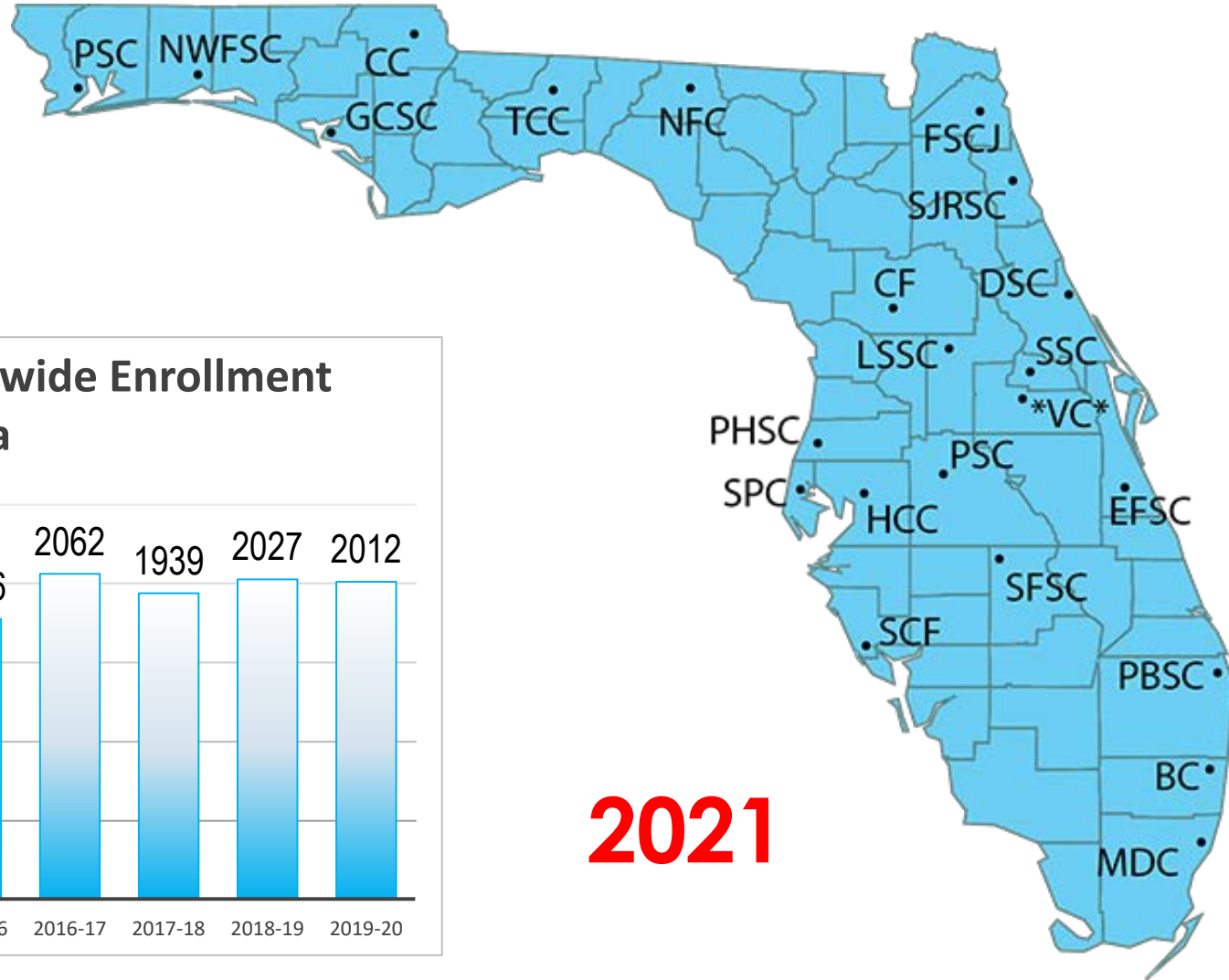
FANUC

FESTO (NC3)

ET Degree Network

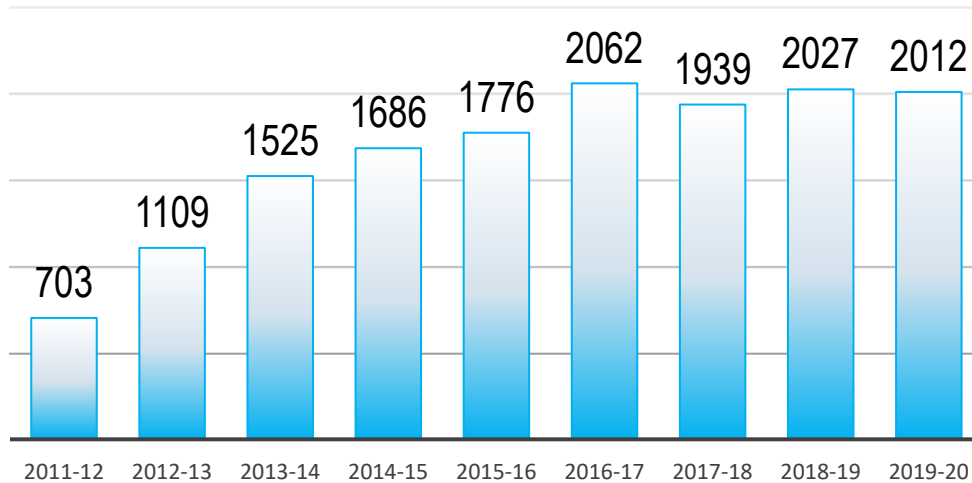


ET Degree Network



2021

Florida A.S. ET Statewide Enrollment Data



2017 Validating AS ET with Industry

20 Florida Manufacturing 17 Technician Competencies Survey

Obtaining feedback from industries is vital to reviewing curriculum content of schools preparing a competent workforce to meet industries' needs. The survey was developed by FloridaMakes in partnership with Polk State College (PSC), the Florida Forum for Engineering Technology (ET Forum) and FLATE (Florida Advanced Technological Education Center of Excellence). It was designed to define curriculum content of schools preparing competent workforce to meet manufacturers technician workforce needs.

The 15-minute survey was distributed to manufacturers in Florida via (a) FloridaMakes; (b) Florida Regional Manufactures Associations (RMA's); and (3) State and Community college offering A.S. ET Degrees. The survey was open for 2 weeks in November 2017. Eighty-eight respondents from across Florida completed the survey during that time period.

Section 1 of the survey focused on Technical Skills and requested two responses for each item: one for the importance of the item and the second for the frequency performed. For each importance item, respondents were asked to rank the importance responses using a scale from 1 to 5, with 5 being "Most Valuable" and 1 being "Least Important." Respondents could also select "N/A" (Not Applicable) as an option if appropriate. For frequency performed, respondents were asked to select one of three choices: "Never", "Sometimes" or "Always". If N/A was selected for the importance response, respondents were asked to select "Never" for the frequency response.

Section 2 was for personal and teamwork skills. Section 2 requested responses for only the level of importance and used the same 1-5 scale as that used for the technical skills in section 1.



Competencies/Learning Objectives Descriptions Competency Descriptions (1-20)	Frequency of Use	Knowledge Levels	Specialized Skills Levels
Technical Skills: A highly skilled employee at this plant is expected to have in-depth technical knowledge, critical thinking and judgement abilities, and systems thinking abilities in order to:	Never Sometimes Always	1-8 Level of credentials Ranked highest at 1-5 of importance	1-8 Level of credentials Ranked highest at 1-5 of importance
1. Implement all related safety codes and regulations in industrial working environments	2% 24% 74%	L 3 Rank 5 @ 70%	L 3
2. Perform tasks in a specialized technical area.	1% 41% 58%	L 4 Rank 5 @ 46%	L 3
3. Work with computer aided drafting and create geometric part files.	21% 52% 27%	L 3 Rank 3 @ 25%	L 3
4. Work at the entry level with traditional materials removal machines (milling, lathe, drill press, cut-off-saws).	22% 55% 24%	L 1 Rank 4 @ 26%	L 1
5. Understand mechanical and process characteristics of common materials.	6% 58% 37%	L 4 Rank 4 @ 58%	L 2
6. Operate materials testing tools and equipment.	8% 67% 25%	L 4	L 5 Rank 4 @ 31%
7. Operate, maintain, and repair mechanical, hydraulic and pneumatic systems.	18% 58% 24%	L 3	L 3 Rank 4 @ 27%
8. Operate AC electric-powered tools, and equipment	8% 47% 45%	L 2	L 2 Rank 5 @ 31%
9. Operate DC electric-powered tools and equipment.	18% 52% 30%	L 2	L 2 Rank 3 @ 30%
10. Operate electronic sensors, switches, and controls.	9% 50% 41%	L 2	L 2 Rank 4 @ 29%
11. Operate programmable logic controllers and use systems schematics.	14% 59% 27%	L 3	L 3 Rank 4 @ 33%
12. Diagnose causes and troubleshoot systems operations, using schematics and ladder logic diagrams.	17% 61% 21%	L 7	L 5 Rank 3 @ 25%
13. Report total quality improvements of a unit and the entire systems operation.	19% 63% 18%	L 8	L 7 Rank 3 @ 34%
14. Evaluate the results of tasks performed in accordance with standard operating procedures (SOPs).	8% 43% 49%	L 4	L 3 Rank 4 @ 34%
15. Perform root cause analysis and recommend corrective actions.	7% 58% 35%	L 7	L 7 Rank 4 @ 35%
16. Participate in planning and evaluating processes.	5% 70% 25%	L 7	L 7 Rank 3 @ 37%
17. Compare and contrast process alternatives.	14% 66% 20%	L 7	L 7 Rank 3 @ 34%
18. Recommend new solutions and consider effects on various processes even in circumstances where requirements are subject to frequent changes.	7% 62% 31%	L 8	L 8 Rank 5 @ 31%
19. Demonstrate a high level of independent judgment in a range of technical functions and articulate significant challenges involved.	3% 43% 54%	L 7	L 7 Rank 5 @ 42%
20. Participate in the development of an existing and/or new product and/or operation.	11% 56% 33%	L 8	L 8 Rank 5 @ 34%

Rank 3
Rank 4
Rank 5

Competencies/Learning Objectives Descriptions Competency Descriptions (1-20)	Frequency of Use	Personal Skills Level	Social Skills
Personal & Team Skills: Index factors for personal and team skills are based on self-sufficiency, responsibility, and self-awareness, and reflectiveness. In addition, team skills are measured based on communication, involvement, work ethic, character, adaptability, problem solving, critical observation, teamwork, and leadership. Employees should be able to demonstrate the ability to:	% Ranked @ the most important. WEIGHTED AVERAGE xx/5.0	1-8 Level of credentials Ranked highest at 1-5 of importance	1-8 Level of credentials Ranked highest at 1-5 of importance
1. Use required learning guides and request learning guidance when needed.	53.4% WA 4.4	L 2	
2. Use initiative to set their own enhanced learning objectives related to daily tasks and performance.	38.7% WA 4.1	L 3	
3. Evaluate personal strengths and weaknesses of knowledge and performance related activities.	27.3% WA 3.9	L 4	
4. Define objectives for new simple applications and establish tasks to accomplish the objectives.	25.0% WA 3.8	L 4	
5. Share with team members alternative ideas and strategies to define the objectives of complex applications.	46.6% WA 4.2		L 3
6. Express the mission, goals, and objectives of the workplace.	39.8% WA 4.1	L 3	
7. Take responsibility for work environment.	81.8% WA 4.8	L 5	
8. Demonstrate interpersonal communication.	60.2% WA 4.5		L 1
9. Follow rules and regulations in the workplace.	87.5% WA 4.8	L 2	
10. Execute team assignments competently.	70.5% WA 4.6		L 3
11. Listen effectively.	80.7% WA 4.7		L 2
12. Effectively participate in a diverse work environment	63.6% WA 4.5		L 3
13. Communicate clearly, timely, and relevant information on processes and results at all levels.	62.5% WA 4.5		L 4
14. Conduct, analyze, interpret, and present complex facts and provide solutions.	27.3% WA 3.9	L 8	L 6
15. Take appropriate corrective actions based upon provided feedback.	59.1% WA 4.5	L 5	
16. Build consensus from group discussions.	27.3% WA 3.9		L 3
17. Demonstrate the ability to transfer information and specialized skills to others.	36.4% WA 4.1		L 6
18. Set short-term and long-term goals.	33.0% WA 4.0	L 4	
19. Represent the organization in a professional manner.	71.6% WA 4.6		L 8
20. Demonstrate appropriate social skills.	59.1% WA 4.5		L 6

Rank 3
Rank 4
Rank 5

Knowledge Levels

1. Demonstrates General Knowledge.
2. Demonstrates and uses basic knowledge.
3. Demonstrates and applies extended knowledge for predictable problems.
4. Demonstrates comprehensive theoretical & technical knowledge.
5. Demonstrates integrated & special professional knowledge.
6. Demonstrates broad integrated knowledge regarding scientific principles & practical application of scientific subject.
7. Demonstrates specialized knowledge in subject, & can involve in professional activities.
8. Demonstrates specialized knowledge in adjoining disciplines including knowledge in a new discipline or profession.

Specialized Skills Levels

1. Demonstrates basic cognitive & practical skills to perform tasks within stipulated rules.
2. Demonstrates skills needed to establish correlations among functions and tasks.
3. Demonstrates cognitive & practical skills for perform tasks & problem solve.
4. Demonstrates ability to select alternative actions based on reciprocal effects on other functional areas.
5. Plans and evaluates processes while considering alternatives and impacts.
6. Develops & evaluates new solutions & considers effect on various criteria.
7. Demonstrates technical & conceptual skills to analyze, consolidate, and synthesize knowledge toward strategic activities.
8. Demonstrates comprehensive skills in R&D or innovations in profession

The level indicators were taken from work of the Lumina Foundation and assigned to the program competencies by the educators in partnership with industry. Over 150 competencies were defined for the Advanced Manufacturing in the Engineering Technology A.S. degree program. These were grouped to the 40 items in the industry survey and the indicators carried forward to the combined competencies. The cognitive indicators were not included/visible in the industry survey.

Personal Skill Levels

1. Takes responsibility for learnings.
2. Uses stipulated learning guides and seeks guidance if needed
3. Sets one's own learning & work objectives
4. Initiates planning & designing technical learning objectives.
5. Takes responsibility for overall actions and outcomes.
6. Exercises autonomy & responsibility for planning and development of processes that support substantial changes.
7. Defines objectives for new applications reflecting on societal, economic, & cultural implications.
8. Selects appropriate means & develops new ideas & processes.

Social Skills Levels (Associates)

1. Respects others' actions & accepts critique and feedback.
2. Listens effectively & uses comprehension skills to receive direction & information
3. Helps shape the work within a heterogeneous, working /learning group.
4. Communicate solutions to moderately complex, controversial, sensitive matters.
5. Demonstrates advanced interpersonal abilities to convey complex facts to cross-disciplinary audiences.
6. Demonstrates ability to work with and lead expert groups.
7. Demonstrates ability to lead expert debates, build consensus, & promote professional development of others.
8. Leads groups in complex or interdisciplinary tasks, promotes organizational goals.

Future of Work Caucus

2021



Curriculum Partnerships



FORUM on Engineering Technology



- Florida Department of Education
- Industry Credentialing Agencies
- College & High School Programs
- Engineering Technology Forum
- Industry Subject Matter Experts
- Mechatronics Community Exchange
- B.S. Articulation & Technology Partners
- Equipment Vendors

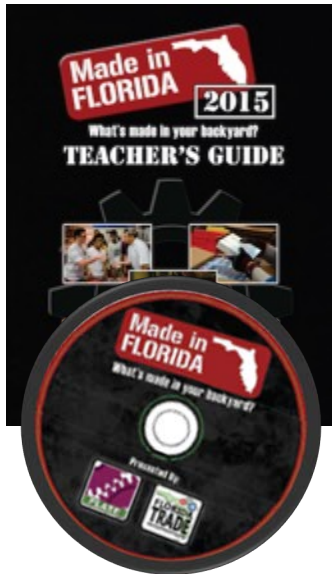
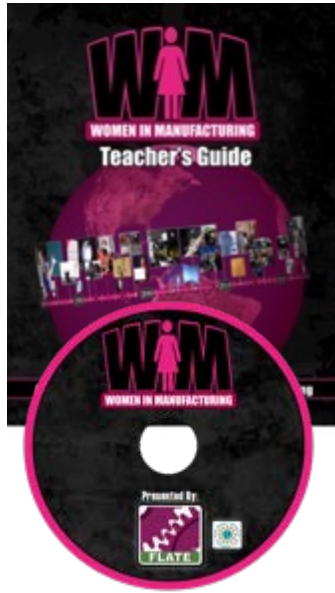
Professional Development

PD Venues

- Multi-day workshops at colleges or conferences
- Webinars, Presentations, Courses, mentoring
- ET Forums



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2020 FLORIDA MFG MONTH

FORUM

on Engineering Technology



FLATE's wiki
...full of great FREE RESOURCES for you!

FLATE GUIDES
BEST PRACTICE



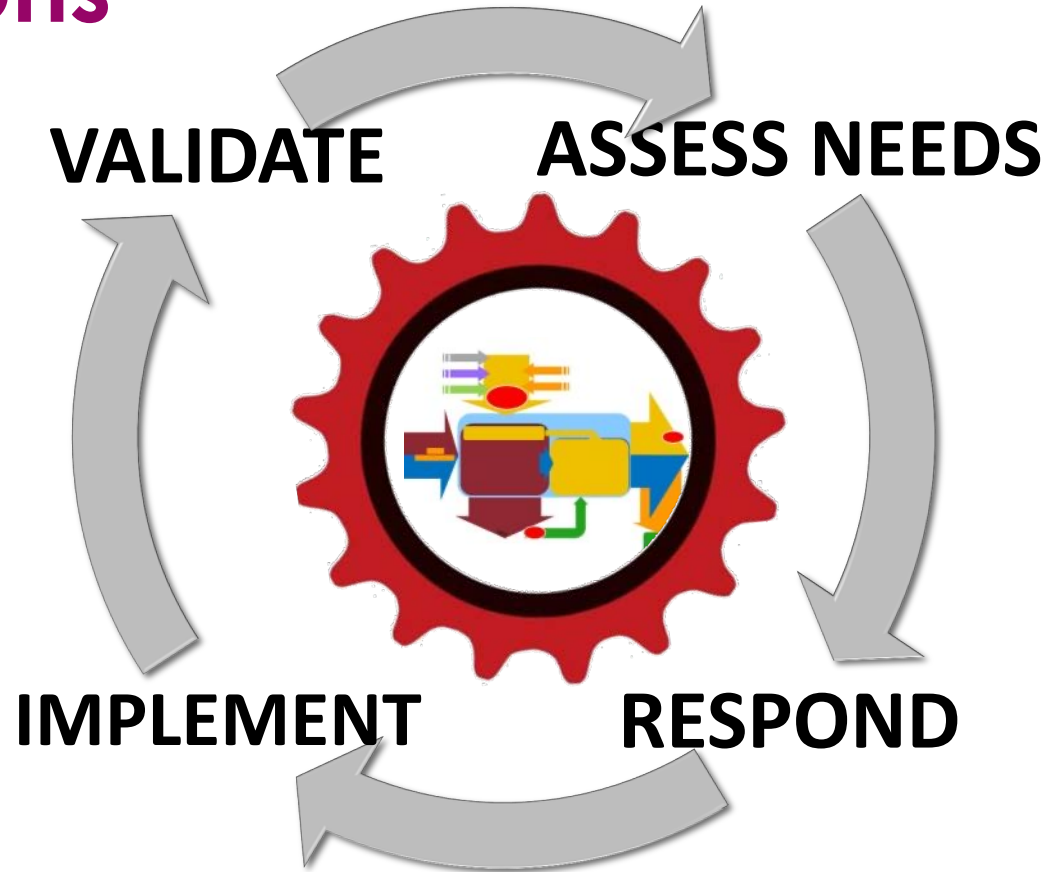
Reflections

do the "hard" stuff	seize opportunities	share the "win"
define a neutral working space	accept compromise	listen actively
"work with what you've got"	nurture relationships	recognize others
	build consensus	build a team
		laugh together
		engender trust



Florida's Engineering Technology Degrees
supporting Florida's manufacturing workforce needs

Reflections



Florida's Engineering Technology Degrees
supporting Florida's manufacturing workforce needs

Florida AM Pathways

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Florida Advanced Technological Education Center of
Excellence

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Thank you!

