

Four Pillars of manufacturing knowledge

*what's in it for manufacturing
education?*

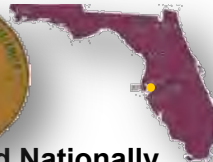


Marilyn Barger, Ph.D., P.E.
Florida Advanced Technological Education
Center of Excellence
Executive Director and P.I.
813.259.6578 | barger@fl-ate.org



Karen Birch Ph.D.
Regional Center for Next
Generation Manufacturing Center
Executive Director and P.I.
karenlee@snet.net

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Our VISION

FLATE will be Florida's leading resource for education and training expertise, leadership, projects, and services to promote and support the workforce in the high performance production and manufacturing community.



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Regional Center for Next Generation Manufacturing (RCNGM)

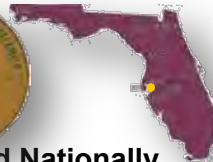
MISSION

The RCNGM, a NSF Center of Excellence, will provide leadership and resources along with its partners and stakeholders to create a 21st Century workforce in advanced manufacturing.



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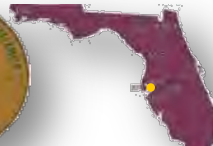
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NSF Advanced Technological Education



***Partners with Industry
for a New American Workforce***

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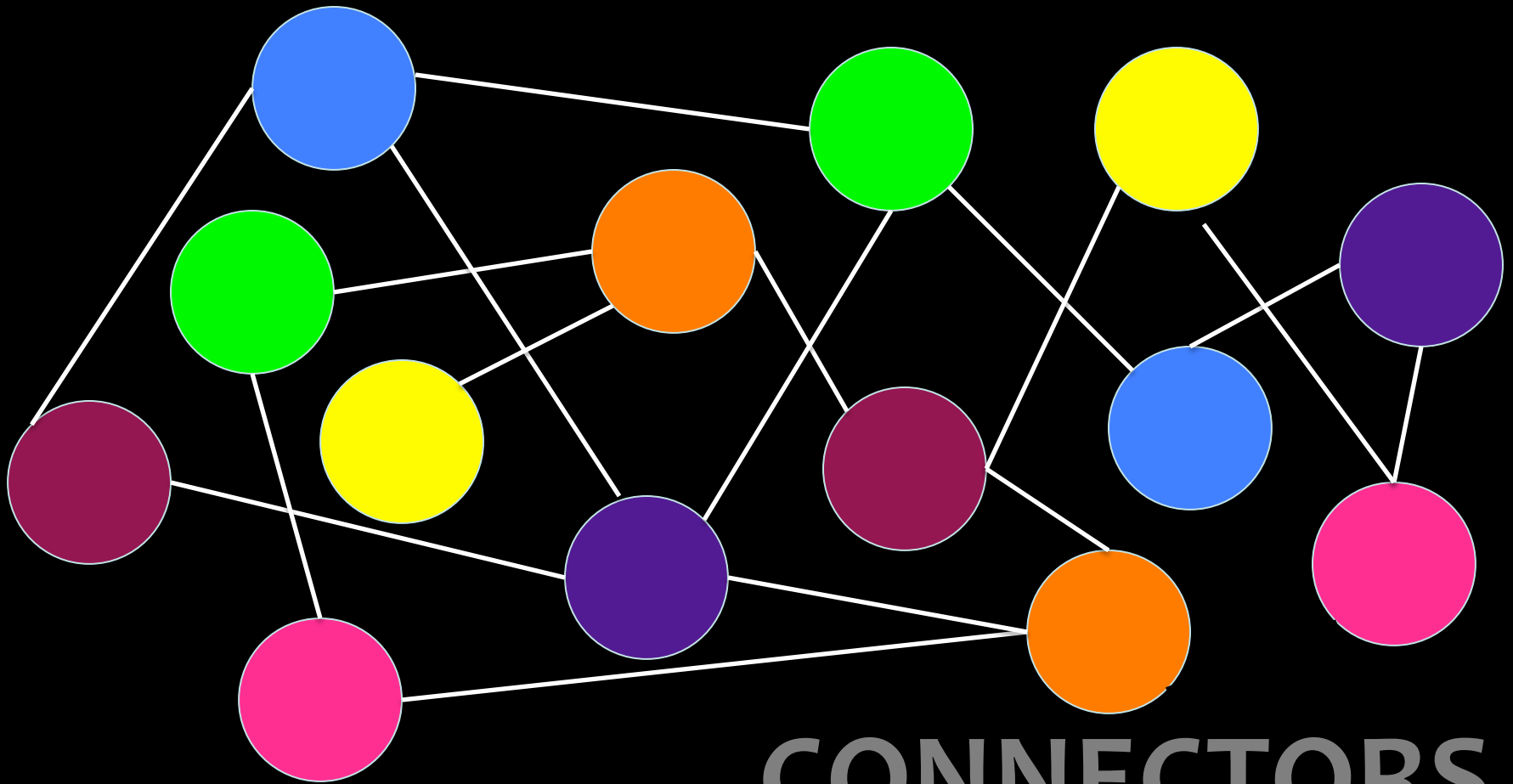
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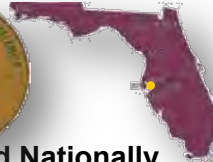
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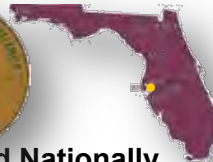
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ATE strategies



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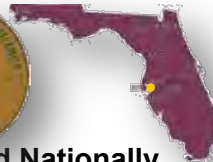


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how?

can **WE** improve education
& career pathways that
support **manufacturing** in our
colleges?

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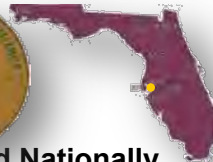
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why?

The US faces a chronic shortage in STEM competencies as the demand for STEM talents grows.

Answering workforce needs expressed by Florida's and Connecticut's advanced manufacturing industries is a relevant topic reaching from the White House to state and community colleges and to students.

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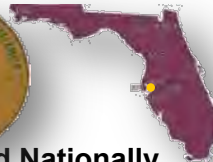
why?

The US faces a chronic shortage in STEM competencies as the demand for STEM talents grows.

People with lower levels of education in STEM make more than people with higher levels of education in non-STEM.

63% of Associate's degrees in STEM earn more than Bachelor's degrees in many *non*-STEM occupations.

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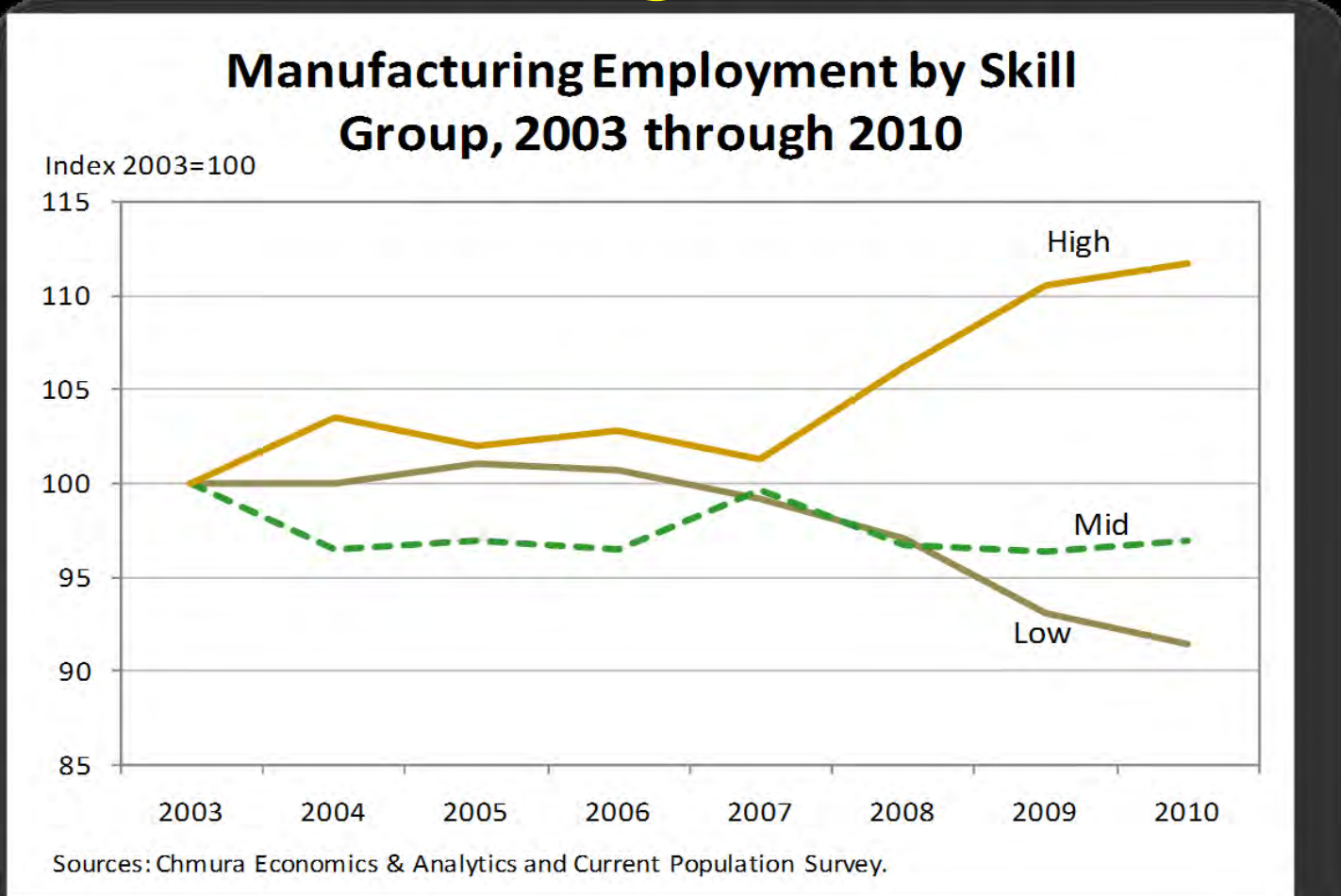
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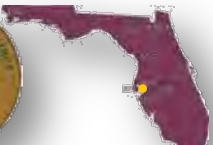


Why manufacturing?



manufacturing jobs require higher skills

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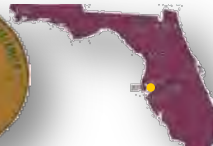
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Four Pillars of manufacturing knowledge

- A tool that describes the breadth of the field of Manufacturing Engineering
- A curriculum development tool for educators
- Developed by the Society of Manufacturing Engineers – Center for Education with:
 - SME Manufacturing Education & Research Community
 - SME Certification Committee
 - National Center for Manufacturing Education
- Initiated in January 2011; rolled out June 2011
- Included in SME white paper: *Curricula 2015*

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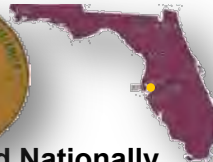


Four Pillars of manufacturing knowledge

ABET program criteria for manufacturing-named programs

- materials & manufacturing processes
- product, tooling & assembly engineering
- manufacturing systems and operations
- manufacturing competitiveness

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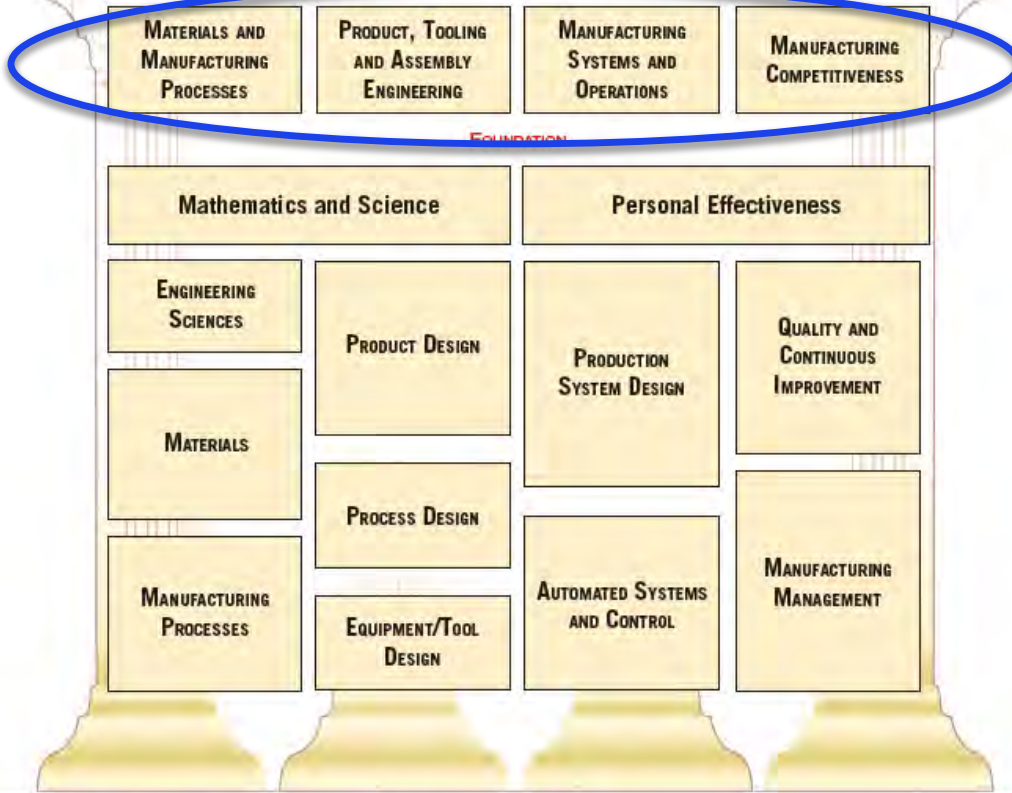


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FOUR PILLARS OF MANUFACTURING KNOWLEDGE

PRODUCT PRODUCING ENTERPRISE



THE FOUR PILLARS OF MANUFACTURING KNOWLEDGE PROVIDES A MODEL OF FUNDAMENTAL KNOWLEDGE FOR MANUFACTURING PRACTITIONERS.

WHAT IS IT?

Visually presents breadth of manufacturing engineering and technology based on accreditation criteria and the SME Certification Body of Knowledge. Across the top are the four proficiencies of the ABET Program Criteria for Manufacturing Engineering and Manufacturing Engineering Technology. The topics from the SME Certified Manufacturing Engineer and Technologist Body of Knowledge are shown aligned under each proficiency.

WHO SHOULD USE IT?

Industry professionals and engineering and technology education program leaders and faculty.

HOW CAN YOU USE IT?

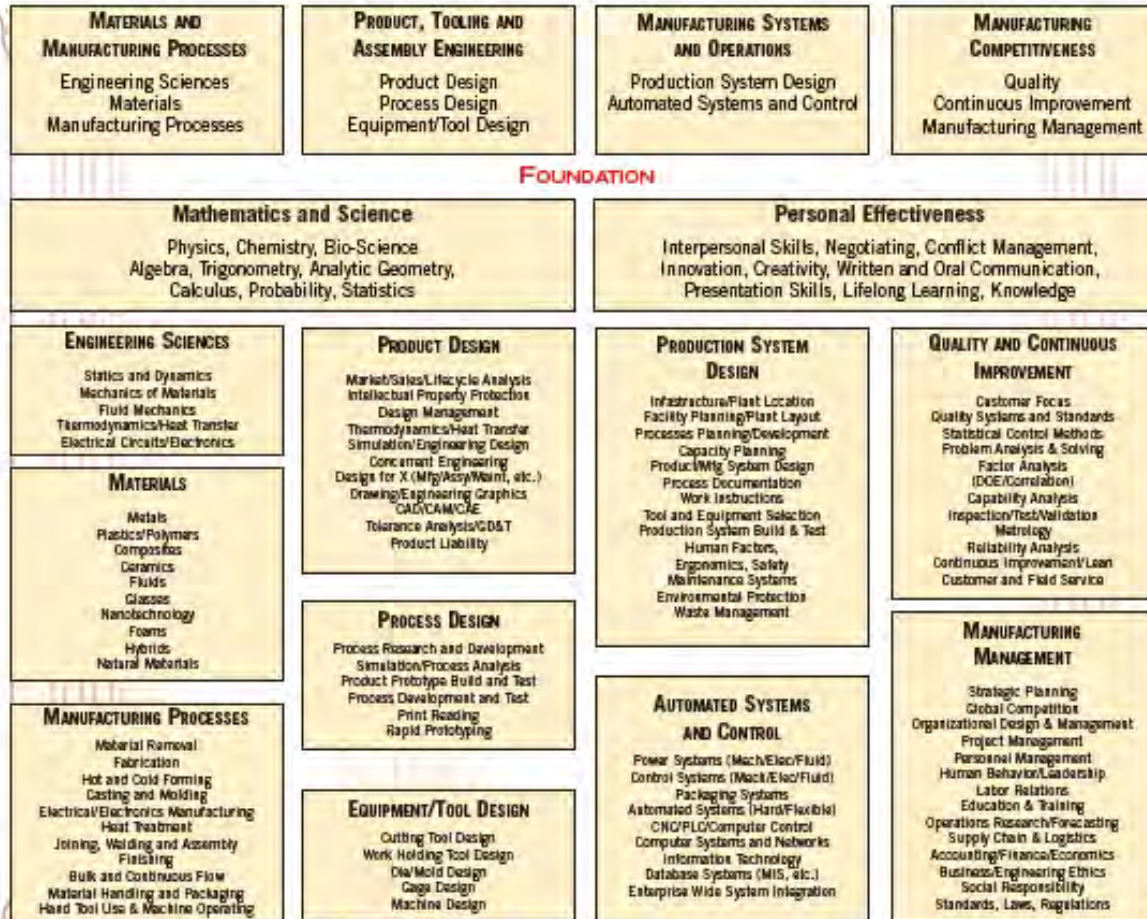
Help update manufacturing curricula. Review engineering and technology curricula for topics aligned to industry needs and determine depth of coverage needed. Encourage manufacturing content in non-named-manufacturing programs. Increase understanding of capabilities of manufacturing graduates. Describe manufacturing to attract students through better image. Communicate with media and the public about manufacturing programs.

THE EXTENT TO WHICH A CURRICULUM COVERS ANY INDIVIDUAL SUBJECT MATTER TOPIC DEPENDS UPON THE GOALS OF THE PROGRAM AND THE DEGREE LEVEL AT WHICH IT IS OFFERED.

FOUR PILLARS OF MANUFACTURING KNOWLEDGE

PRODUCT PRODUCING ENTERPRISE

Customer Focus - Quality & Continuous Improvement - Metrology - SPC - Problem Analysis (FMEA, DOE, etc.) - Capability Analysis - Reliability Systems Thinking - Product Design - Manufacturing Processes - Production System Design - Measurement of Process Variables - Process Improvement



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Customer Focus - Quality & Continuous Improvement - Metrology - SPC - Problem Analysis (FMEA, DOE, etc.) - Capability Analysis - Reliability
Systems Thinking - Product Design - Manufacturing Processes - Production System Design - Measurement of Process Variables - Process Improvement

MATERIALS AND MANUFACTURING PROCESSES

Engineering Sciences
Materials
Manufacturing Processes

PRODUCT, TOOLING AND ASSEMBLY ENGINEERING

Product Design
Process Design
Equipment/Tool Design

MANUFACTURING SYSTEMS AND OPERATIONS

Production System Design
Automated Systems and Control

MANUFACTURING COMPETITIVENESS

Quality
Continuous Improvement
Manufacturing Management

FOUNDATION

Mathematics and Science

Physics, Chemistry, Bio-Science
Algebra, Trigonometry, Analytic Geometry,
Calculus, Probability, Statistics

Personal Effectiveness

Interpersonal Skills, Negotiating, Conflict Management,
Innovation, Creativity, Written and Oral Communication,
Presentation Skills, Lifelong Learning, Knowledge

ENGINEERING SCIENCES

Statics and Dynamics
Mechanics of Materials
Fluid Mechanics
Thermodynamics/Heat Transfer
Electrical Circuits/Electronics

PRODUCT DESIGN

Market/Sales/Lifecycle Analysis
Intellectual Property Protection
Design Management
Thermodynamics/Heat Transfer
Simulation/Engineering Design
Concurrent Engineering
Design for X (Mfg/Assy/Maint, etc.)
Drawing/Engineering Graphics
CAD/CAM/CAE
Tolerance Analysis/CD&T
Product Liability

PRODUCTION SYSTEM DESIGN

Infrastructure/Plant Location
Facility Planning/Plant Layout
Processes Planning/Development
Capacity Planning
Product/Mfg System Design
Process Documentation
Work Instructions
Tool and Equipment Selection
Production System Build & Test
Human Factors,
Ergonomics, Safety
Maintenance Systems
Environmental Protection
Waste Management

QUALITY AND CONTINUOUS IMPROVEMENT

Customer Focus
Quality Systems and Standards
Statistical Control Methods
Problem Analysis & Solving
Factor Analysis
(DOE/Correlation)
Capability Analysis
Inspection/Test/Validation
Metrology
Reliability Analysis
Continuous Improvement/Lean
Customer and Field Service

MATERIALS

Metals
Plastics/Polymers
Composites
Ceramics
Fluids
Glasses
Nanotechnology
Foams
Hybrids
Natural Materials

PROCESS DESIGN

Process Research and Development
Simulation/Process Analysis
Product Prototype Build and Test
Process Development and Test
Print Reading
Rapid Prototyping

AUTOMATED SYSTEMS AND CONTROL

Power Systems (Mech/Elec/Fluid)
Control Systems (Mech/Elec/Fluid)

MANUFACTURING MANAGEMENT

Strategic Planning
Global Competition
Organizational Design & Management
Project Management
Personnel Management
Human Behavior/Leadership

MANUFACTURING PROCESSES

Material Removal
Fabrication
Hot and Cold Forming

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Statistical Control Methods
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Factor Analysis
(DOE/Correlation)
Capability Analysis
Inspection/Test/Validation
Metrology
Reliability Analysis
Continuous Improvement/Lean
Customer and Field Service

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Metals
Plastics/Polymers
Composites
Ceramics
Fluids
Glasses
Nanotechnology
Foams
Hybrids
Nanofabrication

PROCESS DESIGN

Process Research and Development
Simulation/Process Analysis
Product Prototype Build and Test
Process Development and Test
Print Reading
Rapid Prototyping

AUTOMATED SYSTEMS AND CONTROL

Power Systems (Mech/Elec/Fluid)
Control Systems (Mech/Elec/Fluid)
Packaging Systems
Automated Systems (Hard/Flexible)
CNC/PLC/Computer Control
Computer Systems and Networks
Information Technology
Database Systems (MIS, etc.)
Enterprise Wide System Integration

MANUFACTURING MANAGEMENT

Strategic Planning
Global Competition
Organizational Design & Management
Project Management
Personnel Management
Human Behavior/Leadership
Labor Relations
Education & Training
Operations Research/Forecasting
Supply Chain & Logistics
Accounting/Finance/Economics
Business/Engineering Ethics
Social Responsibility
Standards, Laws, Regulations

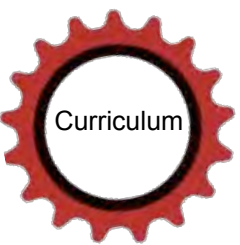
MANUFACTURING PROCESSES

Material Removal
Fabrication
Hot and Cold Forming
Casting and Molding
Electrical/Electronics Manufacturing
Heat Treatment
Joining, Welding and Assembly
Finishing
Bulk and Continuous Flow
Material Handling and Packaging
Hand Tool Use & Machine Operating

EQUIPMENT/TOOL DESIGN

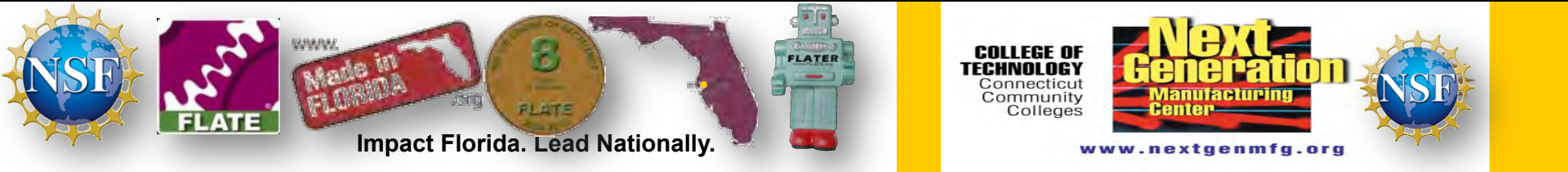
Cutting Tool Design
Work Holding Tool Design
Die/Mold Design
Gage Design
Machine Design

Florida Engineering Technology education

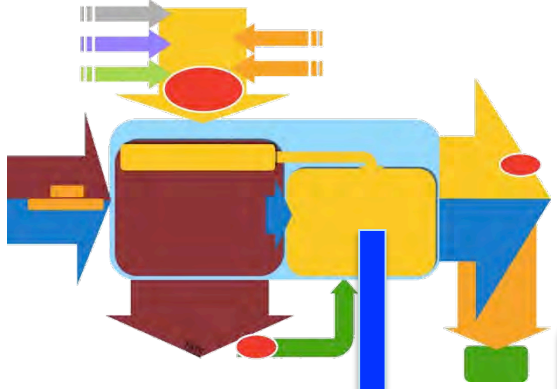


- ❁ Statewide K-20 career pathways
- ❁ 2 year degrees & college certificates
- ❁ Statewide articulation agreements
- ❁ Online resources & courses
- ❁ Aligned to MSSC CPT & NAM Stackable Credentials

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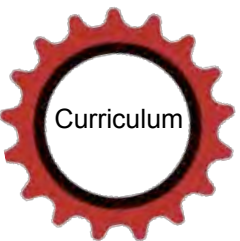


Florida Engineering Technology education



- Advanced manufacturing
- Advanced technology
- Alternative energy systems
- Biomedical systems
- Digital design & modeling
- Digital manufacturing
- Electronics
- Industrial energy efficiency
- Mechanical design & fabrication
- Quality

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CT's College of Technology

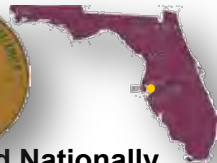
All 12 CT Community Colleges

Seamless Pathway 2 + 2 + 2

Two degrees and Credit
Credentials

- Engineering Science
- Technological Studies
- Credit Certificates

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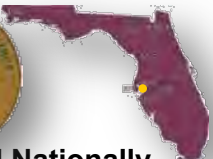
Recruitment resources



tours
talks
videos
camps
awards
career paths
lessons plans
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engineering Expos
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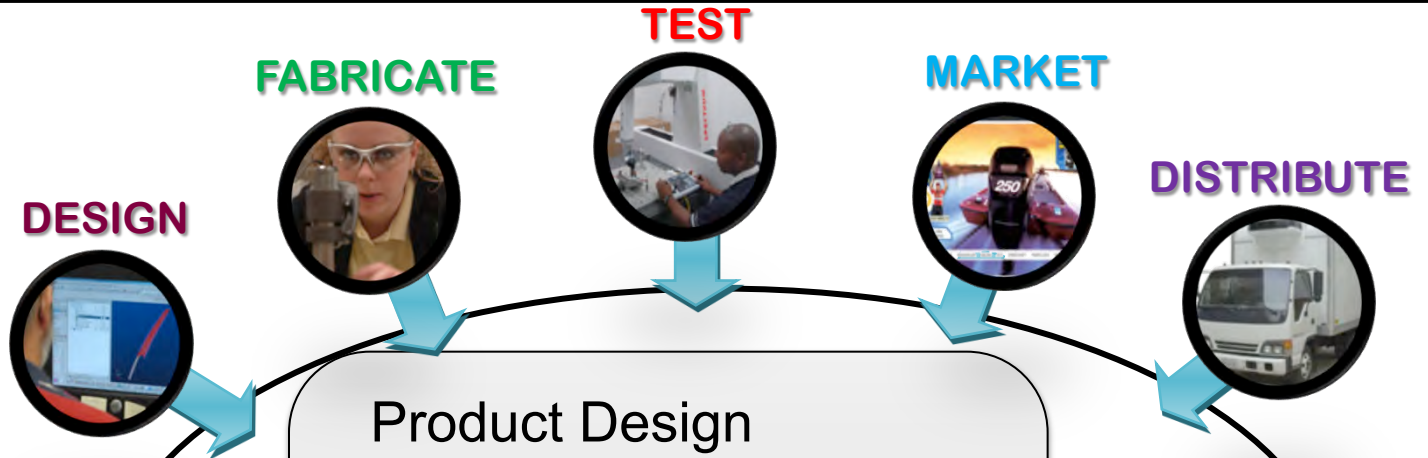
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What is manufacturing?



Product Design
Production Process
Manufacturing
Operations
Engineering
Fabrication
Automation and Control
Robotics
Materials Handling
Quality Assurance
Packaging Design
Logistics

What jobs interest you?



Do what you in a manufacturing career

**Aviation
& Aerospace**



**Packaging, Beverage
Food & Pharmaceutical**



**Medical Devices &
Equipment**



**Machining &
Product Fabrication**



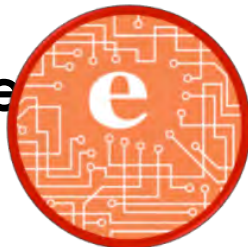
**Transportation
& Logistics**



**Leisure &
Entertainment**



**Electronics, Computer
& Electrical**



**Product Design &
System Integration**



advanced manufacturing education



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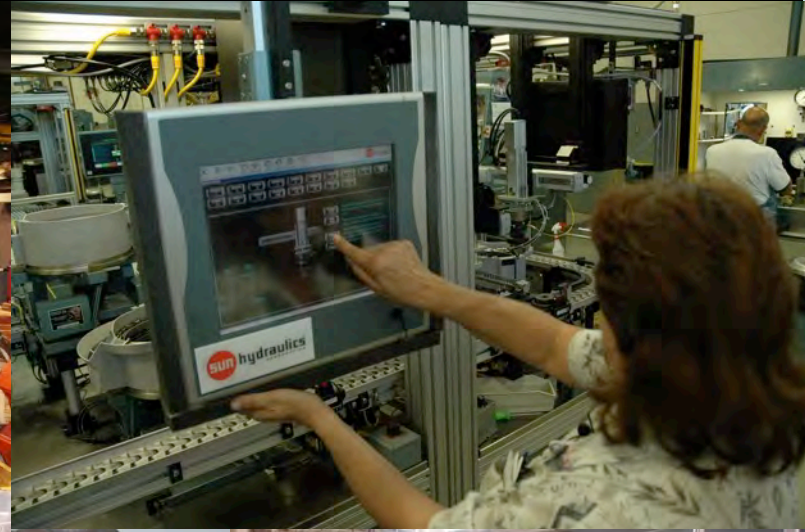


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July 21-24, 2013
Austin Renaissance

High Impact Technology Exchange Conference

HI-TEC is a national conference on advanced technological education where secondary and postsecondary educators, counselors, industry professionals, trade organizations, and technicians can update their knowledge and skills. Charged with Educating America's Technical Workforce, the event focuses on the preparation needed by the existing and future workforce for companies in the high-tech sectors that drive our nation's economy.



Educating America's Technical Workforce



HI-TEC is produced by a consortium of NSF ATE centers and projects. This national conference allows us the opportunity to present community college educators and stakeholders with professional development, educational materials, collaborative ventures, and insights into emerging market trends essential to developing and advancing the technical workforce of the 21st century.

- Call for workshop presentations opens January 14
- Call for session presentations opens February 1
- Call for poster sessions opens February 1

www.highimpact-tec.org



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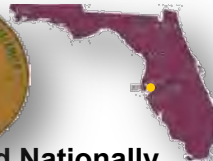
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