February 16, 2018

Cissy Proctor
Executive Director
Florida Department of Economic Opportunity
107 East Madison Avenue
Tallahassee, FL 32399

Peter Antonacci
President & CEO
Enterprise Florida, Inc.
101 North Monroe Street, Suite 1000
Tallahassee, Florida 32301

Dear Ms. Proctor and Mr. Antonacci:

On behalf of the FloridaMakes Board of Directors, we are pleased to submit our proposal, "Advanced Manufacturing Workforce: Creating a Certified Robotics Workforce", to the Florida Job Growth Grant Fund Initiative.

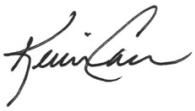
As an industry-led, statewide network for strengthening and advancing Florida's manufacturing competitiveness, our statewide board and regional boards are composed of manufacturers that ensure the services of FloridaMakes are uniquely tuned and responsive to the needs of Florida's manufacturing sector. With the mission of improving the productivity and technological performance of the state's over 20,000 manufacturing establishments, our focus is on advancing the manufacturing industry through talent development, technology adoption, and business growth. Our experience, based on our first 129 clients surveyed, is that FloridaMakes is creating or retaining 19 manufacturing jobs and $1.9M in economic impact per client served. These results have validated that our industry-driven, market-responsive business model.

As a Manufacturing Extension Partnership (MEP) Center funded by the National Institute of Standards and Technology, FloridaMakes is charged to promote and expand the certification systems offered through industry, associations, and local colleges when appropriate, including efforts such as facilitating training, supporting new or existing apprenticeships, and providing access to information and experts, to address workforce needs and skills gaps in order to assist small- and medium-sized manufacturing businesses. As manufacturers, our Board is enthusiastic about the progress that FloridaMakes has made toward advancing Florida manufacturers and the state's manufacturing economy.

Our proposal to the Jobs Growth Grant Fund, in partnership with the Florida Advanced Technical Education Center, is designed to specifically focus on better preparing Florida's available workforce for the industry's current and expected demands. This in turn will increase the state's manufacturing productivity in the long-term. Furthermore, working with the state-of-the-art Robotic Training Center at the College of Central Florida (CF) Ocala Campus will raise the expectations for the CF facility and generate alternative income streams for the school which ensures continued post project certification of faculty with Florida's public education system.

We appreciate your consideration in reviewing our proposal and welcome the opportunity to answer any questions or concerns that you may have with our approach. We look forward to working together and achieving the results we mutually desire.

Sincerely,



Kevin Carr
Chief Executive Officer
FloridaMakes

Bob Provitola
Chairman
FloridaMakes Board of Directors

Florida Job Growth Grant Fund
Workforce Training Grant Proposal

Proposal Instructions: The Florida Job Growth Grant Fund Proposal (this document) must be completed and signed by an authorized representative of the entity applying for the grant. Please read the proposal carefully as some questions may require a separate narrative to be completed.

Entity Information

Name of Entity: FloridaMakes, Inc.

Federal Employer Identification Number (if applicable): 288.075, F.S.

Contact Information:

Primary Contact Name: Kevin Carr
Title: CEO
Mailing Address: 800 N. Magnolia Ave. Suite 1850
Phone Number: 407 450-7206
Email: Kevin.Carr@floridamakes.com

Workforce Training Grant Eligibility

Pursuant to 288.101, F.S., The Florida Job Growth Grant Fund was created to promote economic opportunity by improving public infrastructure and enhancing workforce training. This includes workforce training grants to support programs offered at state colleges and state technical centers. Eligible entities must submit proposals that:

- Support programs and associated equipment at state colleges and state technical centers.
- Provide participants with transferable and sustainable workforce skills applicable to more than a single employer
- Are based on criteria established by the state colleges and state technical centers.
- Prohibit the exclusion of applicants who are unemployed or underemployed.

1. Program Requirements

Each proposal must include the following information describing how the program Satisfies the eligibility requirements listed on page 1.

A. Provide the title and a detailed description of the proposed workforce training.

Title: Creating a Certified Robotics Workforce
Details: see attached

B. Describe how this proposal supports programs at state colleges or state technical centers.

See attached.

C. Describe how this proposal provides participants transferable, sustainable workforce skills applicable to more than a single employer.

See attached.

D. Does this proposal support a program(s) that is offered to the public? ✔ Yes ☐ No

This project supports a large number (see attached) of CTE programs that are all offered to the public at state supported institutions.

E. Describe how this proposal is based on criteria established by the state colleges and state technical centers? ✔ Yes ☐ No

The Standards and Benchmarks for robotics skills associated with this project are included in the FLDoE Curriculum Frameworks for the CTE programs requiring these skills. See attached for more details.

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F. Does this proposal support a program(s) that will not exclude unemployed or underemployed individuals? ✔ Yes ☐ No

All CTE courses of study that will be enhanced by this proposed project have enrollment mechanisms that encourage unemployed and underemployed participation.

G. Describe how this proposal will promote economic opportunity by enhancing workforce training. Please include the number of jobs anticipated to be created from the proposed training. Further, please include the economic impact on the

community, region, or state and the associated metrics used to measure the success of the proposed training.

See attached.

2. Additional Information:

A. Is this an expansion of an existing training program? ☐ Yes ✔No

If yes, please provide an explanation for how the funds from this grant will be used to enhance the existing program.

B. Does the proposal align with Florida's Targeted Industries? ✔ Yes ☐ No

From Florida's Targeted Industries list this proposal aligns with: Cleantech, Life Sciences, Aviation / Aerospace, and Homeland Security / Defense. Other sectors supporting FLDoE programs include: Aircraft and Aircraft Parts Manufacturing, Energy Equipment Manufacturing, Space Vehicles and Guided Missile Manufacturing, Ammunition, Electronics, Military Vehicles, Food and Beverage, Plastics and Rubber, and Machine Tooling.

C. Does the proposal align with occupation(s) on the Statewide Demand Occupations List and/or the Regional Demand Occupations List?

✔ Yes ☐ No

If yes, please indicate the targeted industries with which the proposal aligns.
If no, with which industries does the proposal align?

Yes, this proposal aligns with the Statewide Demand Occupation List for the following Occupations in the manufacturing and production industries:
First-Line Supervisor of Production and Operating Workers; Industrial Engineering Technicians; Aerospace Engineering and Operations Technicians; Aerospace Engineering and Operations Technicians; Mechanical Engineering Technicians; Sales Representatives, Sales Wholesale and Manufacturing, Technical and Scientific Products; Electrical and Electronic Engineering Technicians; Electro-Mechanical Technicians; Engineering Technicians (Except Drafters); Electrical and Electronics Repairers, Commercial and Industrial Equipment; Industrial Machinery Mechanics; Machinists; Welders; and Electrical and Electronics Repairers, Powerhouse, Substation, and Relay.

D. Indicate how the training will be delivered (e.g., classroom-based, computer-based, other)

If in-person, identify the location(s) (e.g., city, campus, etc.) where the training will be available.

Train the trainer robotics certification for faculty will be delivered at the College of Central Florida. Certified faculty will deliver credential preparation for students at their own institutions using hybrid instruction. See attached for more detail.

If computer-based, identify the targeted location(s) (e.g. city, county, statewide) where the training will be available.

Preliminary on-line learning modules will be completed by educators enrolled in the robotic training prior to the 5-day face to face training to be conducted on Fanuc robots installed in the College of Central Florida (CF) Ocala campus Robotic Training Center. Targeted participants for this pilot will be from the Florida west central region and include educators from Technical Colleges, Community colleges and possibly High Schools. See attached for more detail.

E. Indicate the number of anticipated enrolled students and completers.

See attached.

F. Indicate the length of program (e.g., quarters, semesters, weeks, etc.), including anticipated beginning and ending dates.

See attached for timeline.

G. Describe the plan to support the sustainability of the proposal.

See attached.

H. Identify any certifications, degrees, etc. that will result from the completion of the program. Please include the Classification of Instructional Programs (CIP) code if applicable.

See attached.

I. Does this project have a local match amount?

☐ Yes ✔ No

If yes, please describe the entity providing the match and the amount

J. Provide any additional information or attachments to be considered for the proposal.

3. Program Budget

Estimated Costs and Sources of Funding: Include all applicable workforce training costs and other funding sources available to support the proposal.

See attached.

A. Workforce Training Project Costs:

Equipment	$	
Personnel	$	
Facilities	$	
Tuition	$	
Training Materials	$	
Other	$	Please Specify:
Total Project Costs	**$**	

B. Other Workforce Training Project Funding Sources:

City/County	$	
Private Sources	$	
Other (grants, etc.)	$	Please Specify:
Total Other Funding	$	
Total Amount Requested	$	

Note: The total amount requested must equal the difference between the workforce training project costs in 3.A. and the other workforce training project funding sources in 3.B.

C. Provide a detailed budget narrative, including the funding, how equipment purchases will be associated with the training program, if applicable, and any other pertinent budget-related information

See attached.

4. Approvals and Authority

A. If entity is awarded grant funds based on this proposal, what approvals must be obtained before it can execute a grant agreement with the Florida Department of Economic Opportunity (e.g., approval of a board, commission or council)?

None

B. If approval of a board, commission, council or other group is needed prior to execution of an agreement between the entity and the Florida Department of Economic Opportunity:

i. Provide the schedule of upcoming meetings for the group for a period of at least six months.

ii. State whether that group can hold special meetings, and if so, upon how many days' notice.

C. Attach evidence that the undersigned has all necessary authority to execute this proposal on behalf of the entity. This evidence may take a variety of forms, including but not limited to: a delegation of authority, citation to relevant laws or codes, policy documents, etc.

I, the undersigned, do hereby certify that I have express authority to sign this proposal on behalf of the above-described entity.

Name of Entity: FloridaMakes

Name and Title of Authorized Representative: Kevin Carr, CEO

Representative Signature: 

Signature Date: 02.16.2018

Florida Job Growth Grant Proposal

Advanced Manufacturing

Creating a Certified Robotics Workforce

February 16, 2018

Prepared for the

Florida Department of Economic Opportunity and Enterprise Florida, Inc.

FloridaMakes

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FloridaMakes
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Florida's Manufacturing Competitiveness

In 2015, Florida's manufacturing competitiveness ranked 38th among all U.S. states, well below both national and regional averages. Measured in terms of value-added per employee, or productivity, Florida produced $132,906 in value (GDP) per employee as compared to a $166,685 average for the Southeast region and a $175,959 average for the Nation.[1] If Florida performed at either the southeast or national average, it would contribute roughly $62B or $65B respectively to Florida's economy versus its 2015 level of $45.6B; a full $20B increase in the State's economy at its current manufacturing employment level of 373,900.[2] Table 1 illustrates the top 10 most productive states as a basis for comparison to Florida's standing in terms of manufacturing competitiveness.

2015		Manufacturing GDP ($Billions)	Manufacturing Employment	Value-Added Per Employee (Productivity)
Rank	Area	2015	2015	2015
1	Louisiana	$51,074	143,889	$354,954
2	Texas	$230,514	879,369	$262,136
3	Oregon	$47,759	185,647	$257,257
4	Wyoming	$2,264	9,765	$231,848
5	California	$281,099	1,294,660	$217,122
6	North Carolina	$100,023	461,934	$216,531
7	Washington	$58,681	291,104	$201,581
8	Maryland	$20,727	103,643	$199,985
9	Massachusetts	$47,879	249,631	$191,799
10	Indiana	$98,244	519,478	$189,121
	United States	$2,170,275	12,334,000	$175,959
	Southeast	$495,821	2,974,595	$166,685
38	Florida	$45,615	343,213	$132,906

Table 1 – Ranking of Manufacturing Productivity by State
Source: U.S. Bureau of Economic Analysis

This measure of productivity is particularly relevant to any discussion over the health and welfare of Florida's manufacturing economy. More importantly, it speaks to the sustainability of Florida's manufacturing industry and the value of its contribution to the state's economy in the

[1] U.S. Bureau of Economic Analysis
[2] U.S. Department of Labor, Bureau of Labor Statistics, Current Employment Statistics Program, released January 19, 2018.

long-term. More simply, it's not enough to count jobs and manufacturing establishments—both important indicators of growth—but more significant to measure Florida's success by the *value* of what we produce given the inputs—in this case, *employment*—provided.

Figure 1 further illustrates this importance of productivity, particularly as it relates to the current economy. The figure highlights the successful recovery of U.S. manufacturing since the 2009 low caused by the recession. Overall this is good news for manufacturing in the U.S. and for Florida. However, the other key observation in the figure is how U.S. manufacturing output has significantly risen yet manufacturing employment has not nearly grown at the same rate, indicating *manufacturing productivity* has and continues to grow significantly. Meaning, in short, the U.S. is producing more valued-goods with less people.

The popular narrative of recent years has been that this is a "jobless recovery" and, more specifically within manufacturing, that "we've lost many jobs to overseas competitors." Yet Figure 1 would clearly suggest otherwise: U.S. productivity is among the highest it has ever been. This pattern of increased productivity is due in large part to advancements in technology, and can be seen across many industries.

Therein lies the challenges Florida faces in maintaining and growing a robust, vibrant and high-value manufacturing economy for the 21st century:

1. The ability to develop and deploy a highly-skilled and adaptive workforce, including leadership, with the knowledge and abilities to understand, embrace, and employ ever-evolving next generation technology necessary to support their production.
2. The ability to identify and incorporate advanced manufacturing technologies, as necessary, to exploit advanced materials and processes embedded in current and future manufactured goods and services.
3. The *speed* at which an individual firm or regional economy responds to the above challenges—continuously—will define its level and ability to participate in the future manufacturing economy.

Productivity is and will always remain the defining factor in which nations or states will truly be a competitive participant in the manufacturing economy worldwide.

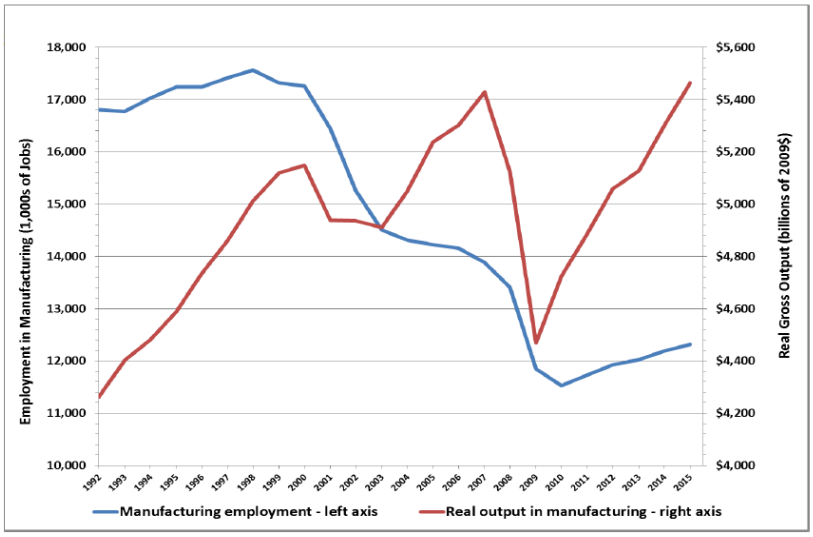


Figure 1
Trends in U.S. Manufacturing and Employment
Source: IHS Markit, 2016

Florida's Manufacturing Workforce

Florida's manufacturing employment has grown steadily over the last 84 months after a rapid decline in the 4 years prior. In December 2017, manufacturing had 373,900 jobs in Florida, an increase of 16,200 jobs over the year.[3] These jobs are spread across 20,554 manufacturing establishments, also increasing steadily over the past several years.[4] It is also important to note that 57.8 percent of all production workers in Florida are employed in the manufacturing sector.[5] These facts bode well for the State's manufacturing economy in that Florida has slightly outpaced the rest of the nation in manufacturing job creation.

In 2017, Florida can consider itself both blessed and cursed by achieving what could essentially be considered full employment, with an unemployment rate of less than 4 percent. Other than the many new citizens moving into Florida daily, manufacturers and workforce training boards struggle to find the people to train. Most of the available unemployed or underemployed have criminal records; are unable to pass drug screening; lack the basic skills, hard and soft, to successfully complete basic training; or are unable to obtain security clearances. Combine that with a retiring workforce and the workforce skills gaps widen even farther.

[3] U.S. Department of Labor, Bureau of Labor Statistics, Current Employment Statistics Program, released January 19, 2018.
[4] Florida Department of Economic Opportunity, Bureau of Labor Market Statistics, Quarterly Census of Employment and Wages Program. The most recent data available are for 2017 Q2.
[5] IHS Economics, West Central Gulf Coast Regional Manufacturers Associations Manufacturing Sector Profile, August 2016, https://www.floridamakes.com/core/fileparse.php/140/urlt/West-Central-Gulf-Coast-FINAL-Integrated-0117.pdf

The fourth industrial revolution we are living in today, Industry 4.0, is being led by advances in several areas impacting advanced manufacturing technology: smart manufacturing, **robotics,** artificial intelligence and the Internet of Things (IoT). While robotics may be perceived as reducing jobs, it is also creating opportunities for new jobs with a re-trained workforce.[6] Technology can and will buffer the widening availability of skilled workers, but to exploit those technologies requires an ever-increasing demand for STEM-related skill development in Florida's middle- and high-schools. As well as, a constant and continuous refresh of the curricula at Florida's career academies, state technical centers, and state colleges.

There is still, however, a high demand for additional high- and medium-skilled workers throughout the state. In Florida, like most other states, there are four primary reasons that conspire to create a lack of skilled workers and continuously expand the gap of talent needed to maintain and increase manufacturing competitiveness:

- **Limited pipeline** – There has been a decline in people pursuing Science, Technology, Engineering and Math (STEM) education as younger generations are less drawn to a career in manufacturing.
- **Retiring workforce** – As baby boomers are hitting retirement, valuable experience and skills go with them. The oldest baby boomers turned 65 on January 1, 2011. Every day since and for the next 19 years, about 10,000 more will hit that milestone nationally.
- **Changing pace of technology** – At no other time has technical innovation moved so quickly. This is great news for growing companies, but it can be a challenge for workers who are unable to keep pace and fall behind.
- **Reshoring** – This movement to bring manufacturing back to the U.S. creates an even bigger demand for jobs.[7]

Proposed Initiative

This proposal, in partnership with the Florida Advanced Technological Education Center (FLATE) through the College of Central Florida (CF) Ocala campus Robotic Training Center, intends to hone-in on increasing the available workforce certified in robotics. This proposed project is sharply tuned to reducing the skills gap by creating and executing a statewide approach that supports the development of robotic assisted manufacturing workforce at all levels in Florida. It is designed to particularly address the state's long-term vision of reducing the skills gap, in this case, as it relates to robotics and automation in manufacturing.

FLATE is the go-to organization for manufacturing and advanced technical education, best practices and resources supporting the high-performance skilled workforce for Florida's manufacturing sectors. CF is currently in its end stage of becoming one of 5 strategically

[6] World Economic Forum, 5 trends for the future of manufacturing, 22 June 2017

[7] Using Competency Models to Drive Competitiveness and Combat the Manufacturing Skills Gap, Society of Manufacturing Engineers/Tooling U, Cleveland, OH

located national FANUC USA training facilities that will also train non-FANUC personnel. This status raises the expectations for the CF facility and generates alternative income streams for the school which ensure continued post project certification of faculty with Florida's public education system.

The first round for this program will promote economic opportunity by enhancing workforce training in the West Florida region. Research shows the skills gap in this region is expected to increase. This research, conducted by IHS and commissioned by FloridaMakes in partnership with CareerSource Florida and the state's regional manufacturing associations, revealed the labor market in the west central gulf coast region of Florida to be substantially tighter than at either the state or national level. This means wage rates will rise eventually and yield a shortage of skilled workers. The same study stated that almost 50 percent of the manufacturing industry employment in the region is in the advanced manufacturing subsectors.[8] Robotics is an advanced manufacturing technology which is critical in supporting electronics, power system (electric, pneumatic, and hydraulic), biomedical, defense, pharmaceutical, aviation, and the three major sectors of the commercialized space (ground support equipment manufacturing, the "launch" industry, and satellite manufacturing) industries. Additionally, these sectors are expected to employ more highly skilled workers and pay higher wages than other manufacturing sectors.

In most cases, robots are used to complete jobs which are deemed unsafe or impossible for humans. Consequently, having a workforce trained in robotics makes these robots a complement to, not a replacement for, human workers. The use of robotics will increase the economic output[9] of any company. Therefore, a more prepared workforce will lead these companies to increase the number of jobs created which require these skills.[10]

Furthermore, robotics and automated systems, as implemented in manufacturing processes are critical components for Florida's manufacturers. Currently, Florida's High School, Post-Secondary, Technical College, and State College systems do not and cannot produce the number of trained robotics workers needed to support these industries. This project addresses a skills gap issue that is critical to manufacturers that are and have implemented advanced manufacturing processes to increase their national and international competitiveness. The technical colleges and other CTE curriculum providers within the public education system are not able to address this gap with their current instructional knowledge, equipment and practices. This project will directly address this situation.

This is a particularly challenging situation for Florida's small to mid-size manufacturer's supporting these sectors. The additional workers created to remove this skills gap not only allow these companies to excel in the production of high quality national and worldwide

[8] IHS Economics, West Central Gulf Coast Regional Manufacturers Associations Manufacturing Sector Profile, August 2016, https://www.floridamakes.com/core/fileparse.php/140/urlt/West-Central-Gulf-Coast-FINAL-Integrated-0117.pdf

[9] World Economic Forum, 5 trends for the future of manufacturing, 22 June 2017

[10] See Appendix A for a current partial list of companies who currently use the robots we plan on offering through this program.

competitive products but also attenuates a counterproductive competitive struggle to acquire this talent pool.

The "Creating a Certified Robotics Workforce" pilot program will serve as a model that can be scaled to serve other areas across the State of Florida through additional grant funding as a response to Florida's manufacturer workforce skill requirements. This proposal will use its awarded funds to improve Florida's Education System's production of credentialed workers for the manufacturing sector through the following objectives.

1. Increase the number of robotics certified instructors within the Florida Department of Education (FLDoE) system.
2. Support robotics instruction which is defined by specific standards and benchmarks within the current FLDoE Curriculum Frameworks.

About FloridaMakes

FloridaMakes is a statewide, industry-led, public-private partnership with the sole mission of strengthening and advancing Florida's economy by improving the productivity and technological performance of its manufacturing sector, with an emphasis on small- and medium-sized firms. It accomplishes this by providing services focused on three principle value streams: technology adoption, talent development, and business growth. In Florida, 80% of all manufacturing firms employ less than 20 people, over 99% are classified as small businesses.

FloridaMakes operates principally as a network of the state manufacturing associations and other local providers and deploys in these locations manufacturing business advisors who engage directly with regional firms. These advisors typically provide business assessments that benchmark organizational excellence and business value seeking to identify opportunities and challenges particular to that firm.

FloridaMakes accomplishes its mission by:

- Delivering customer-centric services driven by the specific challenges and opportunities of a particular firm, sub-sector, or region; not as a hammer looking for a nail.
- Leveraging and accelerating the use of the state's public and private assets including research, educational and training institutes, private-sector training providers, workforce development boards, and economic and business development programs and providers.
- Contributing to the accessibility and performance of Florida's manufacturing ecosystem.
- Focusing on firms that are willing to invest in themselves.

As a Manufacturing Extension Partnership (MEP) Center funded by the National Institute of Standards and Technology, FloridaMakes operates in accordance with 15 USC 278k, which includes the following among its objectives for Centers:

- The provision to community colleges and area career and technical education schools of information about the jobs skills needed in manufacturing companies, including small and medium-sized manufacturing businesses in the regions they serve;
- The promotion and expansion of certification systems offered through industry, associations, and local colleges when appropriate, including efforts such as facilitating training, supporting new or existing apprenticeships, and providing access to information and experts, to address workforce needs and skills gaps in order to assist small- and medium-sized manufacturing businesses; and
- The growth of employment and wages at United States-based small- and medium-sized companies.

Further, 15 USC 278k outlines a core activity of an MEP Center to include:

- The facilitation of collaborations and partnerships between small and medium-sized manufacturing companies, community colleges, and area career and technical education schools to help those entities better understand the specific needs of manufacturers and to help manufacturers better understand the skill sets that students learn in the programs offered by such colleges and schools.

About FLATE

The Florida Advanced Technological Education Center (FLATE), a National Science Foundation (NSF) Center of Excellence in high-technology manufacturing, is the go-to organization for manufacturing and advanced technical education, best practices and resources supporting the high performance skilled workforce for Florida's manufacturing sectors, and a driving force behind the State's Career and Technical Education (CTE) curricula in manufacturing.

Nationally, FLATE is a recognized leader among NSF's Advanced Technological Education (ATE) Centers and is widely regarded in the manufacturing community. It remains a backbone in the coordination of that curriculum and in maintaining its currency. FLATE provides exemplary industry partnerships, workforce opportunity, and educational synergy throughout the state of Florida by connecting industry and workforce needs to targeted educational endeavors at 19 community and state colleges across Florida. It is unquestionably the leader in implementation of a statewide unified education system which positions manufacturing education as a convergent curriculum optimizing technician preparation in manufacturing and its enabling technologies.

The Engineering Technology (ET) degree and certificate programs conceived, engineered, and coordinated by FLATE are the first of their kind to offer a cohesive, comprehensive, fully articulated inter-institutional program. They focus on a set of core courses covering introductory computer-aided drafting, electronics, instrumentation and testing, processes and materials, quality and safety. These core skills support the Florida workforce, and align with the national Manufacturing Skill Standards Council (MSSC) Certified Production Technician certification, providing value-added benefits to industry. The Engineering Technology Core coupled with a second-year degree specialization prepares students for jobs in manufacturing and high-technology industries.

Among FLATE's most significant functions is the role it plays in providing an effective outreach and dissemination platform for Florida's high school, community college, industry and legislature for information related to the requirements for and impact of manufacturing education. Critical to that success is the promotion of manufacturing careers throughout Florida through *Made in Florida* outreach initiatives which have reached over 47,000 middle- and high-school students. And supporting that function, FLATE provides professional development opportunities for technical faculty and educators in STEM curriculum to develop, refine or certify their knowledge base within manufacturing and/or its related enabling technologies and educational pedagogies. No other entity in Florida is tasked with the specific mission of paving the way upstream for the advanced manufacturing workforce of tomorrow. This is, in fact, be the most significant function FLATE performs and why FloridaMakes has decided to partner with them on this project.

All of the technical facilities constructed, course offerings available, and high-tech manufacturing equipment procured is all for nothing if there is not an inspired next generation of students interested in manufacturing careers.

Objective 1: Increase the number of robotics certified instructors

Currently there are very few instructors within the Florida K-14 education system that hold a robotics instructor certification and have appropriate industrial robotics equipment. This meager resource severely limits the impact Florida's public institutions have on the preparation of a robotics credentialed workforce. It also prevents manufacturers from counting on the education system to provide a continuous supply for these skilled workers.

This proposal aims to conduct a pilot project that will result in a nationally recognized certification of eight full time faculty (four per year) within the K-14 system as robotics instructors per year. Faculty teaching in listed programs at Suncoast, Pinellas, Brewster, Manatee, and Ridge Technical colleges in west central Florida will be targeted for the first year's cohort. Upon completion of instruction and certification, each faculty member's

institution will receive a compact industrial robot[11] with its supportive operation and control systems. In addition, these faculty will be very familiar with the fundamental operation and maintenance of this state of the art equipment.

Furthermore, each of these faculty members, using the robot system provided through this pilot program, will prepare at least ten students per year after completing the training and successfully complete FCR-01 credential requirements. Over the 2-year project, eight educators will be credentialed plus 120 students will complete the program of study.

Increasing the number of certified robotics instructors increases the number of students per year that graduate from CTE programs across the state with this robotics credential. This directly impacts the number of new workers that can enter the manufacturing workforce at any facility for any company in Florida. For example, the Engineering Technology degree is resident in 20 community colleges in Florida with over 2,000 students pursuing the degree. Adding robotics credentials to the portfolio of these students generates workers with a robotics skill set available to all employers that hire ET degreed technicians.

The project will manage the process of an instructor certification (train-the-trainer) program in robotics on FANUC robots installed at the College of Central Florida (CF) Ocala campus Robotic Training Center. FANUC is a global leader in automation for manufacturing. Its robotic systems are common in Florida and U.S. manufacturing facilities. The 5-day workshop awarded certification, FCR-01 (FANUC Certified Robot Operator-1), is part of a series of FANUC credentials that meet the National Occupational Competency Testing Institute's (NOCTI) standards.[12]

Furthermore, the project will support a post faculty certification workshop meeting. Target objectives for this session include; discussion of robotic skill instruction that could be common among their programs; clear identification and understanding of the FLDoE framework standards and benchmarks that pertain to student acquisition of robotic skills; and shared practices that will unify robotic instruction statewide. Additionally, robotics certified faculty will support training of other educators in their area as well as providing access to their new robotic equipment.

Objective 2: Support robotics instruction

The current procedure for transferring robotic and automation skills to students within Florida's Career and Technical Education (CTE) related institutions is to distribute skill acquisition among various FLDoE Curriculum Frameworks governed courses of study. This project produces

[11] See Appendix B for a brochure of the FANUC robot each instructor will receive for their school.

[12] NOCTI is accredited by ICAC (the International Conformity Assessment Committee) and meets the requirement of ISO 17024. It is also a nationally recognized "third party" entity which supports credential assessments that meet Perkins fund expectations.

credentialed tenure track faculty as robotics skills instructors. The current practice of robotics education in Florida is not via a standalone course of study with an individual Classification of Instruction (CIP) code. However, robotic related skills for students are included as FLDoE's framework expectations of several courses of study. Although robotics is a critical element of CTE logistics curriculum, this project's effort will be on manufacturing related curriculum, content, and courses as identified in the following list:

- Advanced Manufacturing Technology (CIP Number 0615040605);
- Mechatronics Technology (CIP Number 0615049901);
- Advanced Manufacturing and Production Technology (CIP Number 615040606);
- Industrial Machinery Maintenance and Repair (CIP Number 0647030300);
- Industrial Machinery Maintenance (CIP Number 0647030304);
- Welding Technology-Advanced (CIP Number 0648059806);
- Engineering Technology Degree (CIP Number 1615000001);
- Electronics Engineering Technology (CIP Number 1615030301);
- Manufacturing Technology (CIP Number 1615061307); and
- Aerospace Technology (CIP Number 1615080100).

Robotics skill instruction is a component in each of these FLDoE frameworks and generates a challenge with respect to assuring that faculty have the latest skills and knowledge related to robotics and its interaction with automation and manufacturing processes. It is not uncommon for the FLDoE to distribute an expected skill set among various CIP framed courses of study. An excellent example relative to a set of skills manufacturers expect of their workforce is the set defined within the nationally recognized MSSC certificate. Manatee Technical College, for example, used the Advanced Manufacturing and Production Technology frameworks (now the Advanced Manufacturing and Production Technology frameworks- CIP Number 615040606) as their vehicle for MSSC instruction. However, this efficient mechanism was not possible before FLATE crafted and FLDoE approved the Automation Production Technology Framework Standards and Benchmarks.

Moreover, there is no current mechanism designed to generate the Community of Practice needed to bring all faculty together to focus on effective ways to acquire and distribute current robotics manufacturing applications and the accompanying skill and knowledge manufacturers now expect from their workforce. The following set of actions will be taken through this pilot program to bring faculty responsible for robotic skill and knowledge instruction together across all institutions responsible for this task.

a) Sponsor robotics professional development workshops for K-14 faculty involved in the identified CTE programs and first targeting Florida Technical colleges.
b) Provide and install industrial robots in workshop participants' institutions.
c) Generate and distribute a set of current recommended practices distilled from project workshops and FLDoE interactions.

d) Establish a communication link among affected CTE faculty with FloridaMakes and FLATE.
e) Create of a statewide Community of Practice for faculty involved in robotics.

In summary, the deployment of this pilot program will:

- Accelerate Talent Development.
    - Provides a scalable method to reduce the skills gap faster and increase the amount of a qualified (and certified) labor force capable of meeting the industry's needs in robotics.
    - Provides participants transferable, sustainable workforce skills applicable to more than a single employer. By its intent, design and activities, this project provides an accelerated worker development amplification factor. Creating more robotics certified faculty generates more workers with a nationally recognized robotics credential.
    - Increases the number of students per year that graduate from CTE programs across the state with this robotics credentials.
- Provide Certification.
    - Provide access to materials necessary to achieve industry recognized credentials and certifications by establishing the protocols and procedures for full time faculty responsible for robotics skills and knowledge instruction to receive a nationally recognized robotics instructor certification.
    - Demonstrate these protocols and procedures by conducting a pilot workshop that will result in four faculty acquiring the FANUC Certified Robot Operator-1 instructor certification.
- Develop a Community of Practice.
    - Conduct a follow-up faculty certification workshop using procedure and protocols developed in the pilot workshop.
    - Develop a statewide forum for technical college faculty to meet biannually to support robotics and automation skills related instruction.
    - Develop an interactive network among student credential holders and manufacturers associated with the appropriate Regional Manufacturing Association.
- Share Best Practices.
    - Publish recommended practices of robotics instruction.
    - Identify and share CTE frameworks related standards and benchmarks that are to be correlated to college credit in the Florida State College system technician creation programs.
    - It will support programs at state colleges or state technical centers by generating unifying practices and recommended procedures that will connect robotics instruction to CTE programs within and among these institutions offering FLDoE programs aligned to the Curriculum Frameworks abovementioned.

At the completion of this project FloridaMakes and FLATE will; be able to assess, with full cooperation of the Department of Education,[13] the status of robotics skill instruction within current framework practices; create a statewide Community of Practice for all faculty at all levels (secondary, and post-secondary technical, state and community colleges) involved in robotic skills education; and link robotics credential to college credit in CTE programs statewide.

This last project accomplishment, link robotics credentials to college credit, is particularly important for students that earn the credential. As a previous example of FLATE's effort on credential integration into FLDoE supported frameworks, the Engineering Technology Degree (CIP Number 1615000001) is a statewide uniform degree program that awards 15 credit hours toward completion of the degree at any of 20 state colleges to any person that holds the MSSC credential. FLATE will repeat this process with the FLDoE for the robotics credential. Thus, technical college students will have the credential that demonstrates their robotics skills for immediate employment in manufacturing plus transferable college credit applicable in their future pursuit of a related state college offered CIP degree. This offers a competitive advantage for the credentialed students, technical colleges and their recruitment strategy, state college program enrollments, and manufacturers that intend to develop their robotics credentialed employees into their long-term operations and/or supervisory management structure.[14]

Pilot Program Timeline

Year 1

Date	Activity
May 1, 2018	Project begins
August 2018	5-day pilot educator certification workshop
October / November 2018	Delivery and installation of robotic equipment at colleges
January 2019	Student programs begin at colleges
April 2019	Students become robotics certified

Year 2

Date	Activity
August 2019	5-day pilot educator certification workshop
October / November 2019	Delivery and installation of robotic equipment at colleges
January 2020	Student programs begin at colleges
April 2020	Students become robotics certified
May 1, 2020	Project end

[13] See Appendix C for a support letter from the Florida Department of Education.
[14] See Appendix A for a partial list of current companies who would benefit from this competitive advantage of an improved labor pool.

BUDGET

BUDGET TABLE

Creating a Certified Robotics Workforce project costs

Item	Amount
EQUIPMENT	$280,000.00
PERSONNEL	$150,000.00
FACILITIES	$-
TUITION	$25,600.00
TRAINING MATERIALS	$33,400.00
OTHER	$33,000.00
TOTAL PROJECT COSTS	**$522,000.00**
OTHER WORKFORCE TRAINING PROJECT FUNDING SOURCES	
CITY/COUNTY	$-
PRIVATE SOURCES	$-
OTHER (GRANTS, etc.) NIST MEP FEDERAL FUNDS	$100,000.00
TOTAL OTHER FUNDING	**$100,000.00**
TOTAL AMOUNT REQUESTED	**$422,000.00**

BUDGET NARRATIVE

The total budget for this pilot project is $522,000 for a two-year period. FloridaMakes is leveraging $100,000 of the Federal National Institute of Standards and Technology's (NIST) Manufacturing Extension Partnership (MEP) funding. The request for the Jobs Growth Grant Fund as presented is $422,000.

Equipment

The total equipment costs are $280,000 for 8 industrial robots, including installation. Upon completion of instruction and certification, each faculty member's institution will receive a compact industrial robot with its supportive operation and control systems.

Personnel & Fringe

The total Personnel costs are budgeted at $150,000 including associated fringe benefits (payroll taxes, pension contributions, medical benefits). These costs will fund 0.5 FTE project manager and 0.25 FTE FLATE Director.

Tuition

The total Tuition costs are budgeted at $25,600 for 8 instructors at $3,200 each. The project will manage the process of instructor certification (train-the-trainer) program in robotics on FANUC robots installed at the College of Central Florida (CF) Ocala Campus Robotic Training Center.

Training Materials

The total Training Materials costs are budgeted at $33,400 for tech centers.

Other

The total Other costs are budgeted at $33,000. These costs include ten percent indirect administrative costs on all expenses, excluding equipment; plus travel, lodging, meals for eight attendees, and the cost of the assessment to complete the FCR-01credential requirements for 128 completers (eight trained trainers and their 120 students).

APPENDIX A

Sample list of Florida companies using FANUC Robotics & CNC

- Bacardi
- Bausch & Lomb
- Chromalloy
- Coca-Cola
- Covidien
- Domino Sugar
- Jabil
- Kennedy Space Center
- Knight's Armament
- Lockheed Martin
- Navair – Jacksonville Fleet Readinesss Center
- Owens Corning
- Pepperidge Farms
- Pepsi Co.
- Pratt & Whitney
- Reddy Ice
- Saft Batteries
- Scorpion Performance
- Valpack
- WinCo

APPENDIX B

FANUC Robot Brochure

Education CERT Cart

FANUC LR Mate 200*i*D/4S FENCELESS CART (DCS/AB SCANNER)

Shown with optional Multi-Gripper, Battery & Pill PBL kits, and 2D *i*RVision with light kit

Optional Multi End-of-Arm Tooling package and *i*RVision hardware

Features

The NEW FANUC LR Mate 200*i*D/4S FENCELESS CERT Cart was developed from combining FANUC DCS Position and Speed Check software with an Allen Bradley SafeZone Mini Safety Laser Scanner. The result is FANUC's NEW FENCELESS Cart that will still fit through a standard door and runs off 110V power. The FENCELESS cart allows a greater work envelope and introduces students to the latest in integrated safety products from FANUC and Allen Bradley.

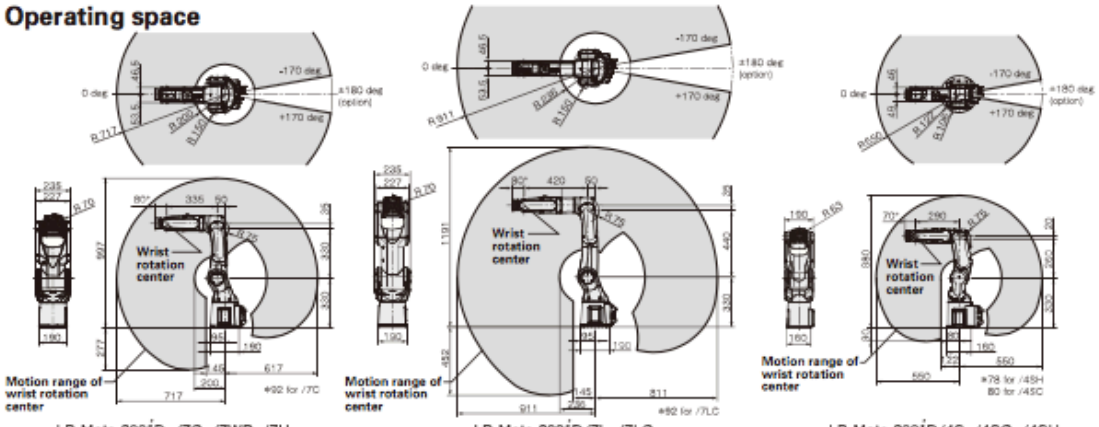
- Can accommodate either LR Mate 200*i*D or LR Mate 200*i*D/4S
- 180+ degree work envelope
- Space on worktable for all PBL kits: Including Shapes and optional PBL kits (Battery, Pill, and New Palletizing blocks)
- Part #'s for PBL printed on table top for easy ordering
- NEW Integrated Safety Stack light
- NEW 4.6 Gallon Ultra Quiet Air Compressor
- NEW Easy Rolling all direction locking Casters
- Standard: Gripper Fingers with embedded laser pointer for Shape outlines and other projects
- Optional: Multi End-of-Arm Tooling with suction cups
- Optional: Integrated Robot mounted 2D *i*RVision Camera
- Optional: 2D *i*RVision Light Kit

Safety Specifications

- RIA/ISO10218 Compliant
- Safely monitor the position or speed of the robot and shut down motor power when the defined safety parameters are exceeded
- DCS speed checking zones (slow speed 125mm/sec and zero speed) are OSSD safety rated inputs from the scanner

FANUC Robot LR Mate 200*i*D

Operating space



Specifications

Model		LR Mate 200*i*D LR Mate 200*i*D/7C LR Mate 200*i*D/7WP	LR Mate 200*i*D/7H	LR Mate 200*i*D/7L LR Mate 200*i*D/7LC	LR Mate 200*i*D/4S LR Mate 200*i*D/4SC	LR Mate 200*i*D/4SH
Controlled axes		6 axes	5 axes	6 axes	6 axes	5 axes
Reach		717 mm		911 mm	550 mm	
Installation (Note 2)		Floor, Upside-down, Angle mount				
Motion range (Maximum speed)	J1 axis	340°/360°(option) (450°/s) 5.93 rad/6.28 rad (option) (7.85 rad/s)		340°/360°(option) (370°/s) 5.93 rad/6.28 rad (option) (6.46 rad/s)	340°/360°(option) (460°/s) 5.93 rad/6.28 rad (option) (8.03 rad/s)	
	J2 axis	245°(380°/s) 4.28 rad (6.63 rad/s)		245°(310°/s) 4.28 rad (5.41 rad/s)	230°(460°/s) 4.01 rad (8.03 rad/s)	
	J3 axis	420°(520°/s) 7.33 rad (9.08 rad/s)		430°(410°/s) 7.50 rad (7.16 rad/s)	402°(520°/s) 7.02 rad (9.08 rad/s)	
	J4 axis	380°(550°/s) 6.63 rad (9.60 rad/s)	250°(545°/s) 4.36 rad (9.51 rad/s)	380°(550°/s) 6.63 rad (9.60 rad/s)	380°(560°/s) 6.63 rad (9.77 rad/s)	240°(560°/s) 4.19 rad (9.77 rad/s)
	J5 axis	250°(545°/s) 4.36 rad (9.51 rad/s)	720°(1500°/s) 12.57 rad (26.18 rad/s)	250°(545°/s) 4.36 rad (9.51 rad/s)	(Note 6) 240°(560°/s) 4.19 rad (9.77 rad/s)	720°(1500°/s) 12.57 rad (26.18 rad/s)
	J6 axis	720°(1000°/s) 12.57 rad (17.45 rad/s)		720°(1000°/s) 12.57 rad (17.45 rad/s)	720°(900°/s) 12.57 rad (15.71 rad/s)	
Max. load capacity at wrist		7 kg			4 kg	
Allowable load moment at wrist	J4 axis	16.6 N·m			8.86 N·m	
	J5 axis	16.6 N·m	4.0 N·m 5.5 N·m (option)	16.6 N·m	8.86 N·m	4.0 N·m 5.5 N·m (option)
	J6 axis	9.4 N·m		9.4 N·m	4.90 N·m	
Allowable load inertia at wrist	J4 axis	0.47 kg·m²			0.20 kg·m²	
	J5 axis	0.47 kg·m²	0.046 kg·m² 0.15 kg·m² (option)	0.47 kg·m²	0.20 kg·m²	0.046 kg·m² 0.083 kg·m² (option)
	J6 axis	0.15 kg·m²		0.15 kg·m²	0.067 kg·m²	
Repeatability		± 0.02 mm		± 0.03 mm	± 0.02 mm	
Mass (Note 3)		25 kg	24 kg	27 kg	20 kg	19 kg
Installation environment		Ambient temperature : 0~45°C Ambient humidity : Normally 75%RH or less (No dew nor frost allowed) Short term 95%RH or less (within one month) Vibration acceleration : 4.9m/s² (0.5G) or less				

Note 1) In case of short distance motion, the axis speed may not reach the maximum value stated.
Note 2) Angle mounting needs J1 and J2 axis motion range restriction according with the payload, except for LR Mate 200*i*D/4S, /4SC and /4SH.
Note 3) Without controller.
Note 4) The liquids that deteriorate the sealing members, such as organic solvents, acids, alkalis, and chloric coolants, must not be used.
Note 5) Cleanliness of the clean type (/7C, /7LC, /4SC) is class 10 (ISO class 4) with white paint, antirust surface and food grade grease.
Note 6) In case of /4SC, J5 motion range is restricted to 236° (4.11rad).

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APPENDIX C

FLATE's letter of support from the Florida Department of Education

Marilyn Barger, Ph.D, P.E., CPT
Florida Advanced Technological Education Center of Excellence
10414 East Columbus Drive
Tampa, Florida 33619

September 8, 2017

Dear Dr. Barger,

A cornerstone of the Florida Department of Education mission is to accomplish Florida's intent to create a seamless education system that delivers quality education and training to Florida's citizens for Florida's needs. As this intent shifts to reality, the challenge for Career and Technical Education (CTE) is its additional requirement to tangibly blend industries workforce requirements with the State's general education expectations. The Florida Advanced Technological Education Center, FLATE, is a major contributor to FDOE's mission by its extensive statewide contributions to manufacturing supportive technician skills and knowledge integration into our CTE platform.

FLATE's constructive contributions at the state level seem almost endless; the Florida State College System articulated A.S. Engineering Technology degree (ET) program, articulation of nationally recognized industry credentials to the ET program, proactive facilitator for FLDOE State Framework required program reviews, intense and focused professional development workshops for CTE faculty throughout Florida, the Florida ET Forum, Statewide summer camps for underrepresented students, unifying activities to promote A.S. degree programs with regional manufacturing associations and the State's 67 school districts. Each of these standalone efforts have had a statewide impact on technician education in Florida. Collectively, they represent a major CTE unification factor that is exactly in line with FLDOE's mission. Thus, the FLDOE Division for Career and Technical Education will continue its long time participation in FLATE's National Visiting Committee. We appreciate FLATE's work and recognize that FLATE driven activities must continue.

Placing FLATE's current and impressive accomplishments aside for a moment, the nature of technician education in support of a global manufacturing sector is dynamic. New technologies that support automation and systems integration are continually entering Florida's workplace with corresponding new and or revised knowledge and skills expectations for technicians in this sector. New technology is, by its nature, disruptive and drives the lag between the skills and knowledge technicians have and need. The Florida State Framework structure pushes CTE education toward identified industry needs however, new skills and knowledge sets must be identified and verified before that framework structure can serve its purpose. FLATE's demonstrated successes as well as its extensive technical and education systems expertise is an essential assist for Florida to identify the key new skills and knowledge that produce this new statewide technician workforce and reduce the current skilled jobs gap Florida manufactures currently face.

In addition to this clear trend toward a robotic and automation based manufacturing floor environment, Florida CTE will also have to address workforce issues that are triggered by the new manufacturing technologies that will emerge from the federal government supported National Network for Manufacturing Innovation. This 10 year national initiative will certainly alter Florida manufacturing and its supportive technician requirements in a currently unpredictable fashion. FLATE has the statewide credentials to effectively help Florida community colleges address this technician education challenge in the most timely manner possible. In summary, it is important to Florida CTE for FLATE to continue. Succinctly stated, FLATE listens to industry and we listen to FLATE.

Sincerely

Eric Owens Senior Education Program Director
Career and Technical Education Programs
Division of Career and Adult Education