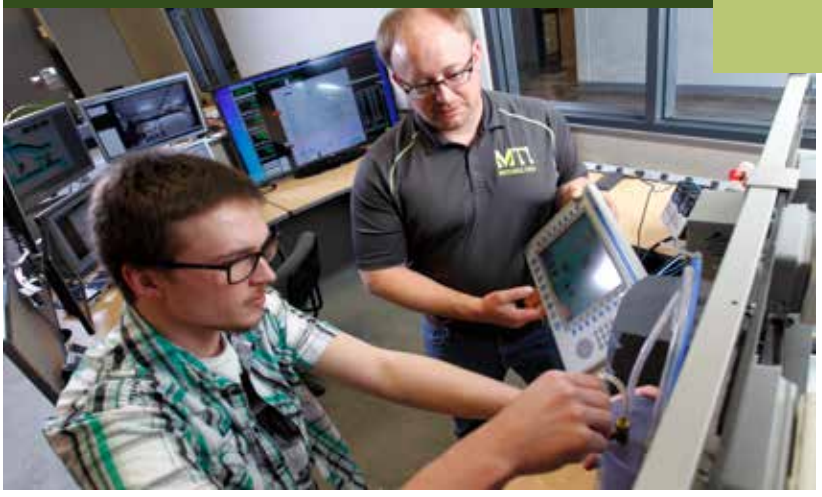
Automated Engineering Technology Program Expansion Proposal

Presented to the South Dakota
State Board of Education
May 2017
For Implementation
Fall 2017



Mitchell Technical Institute
1800 E. Spruce St. • Mitchell, SD 57301

Mitchell Technical Institute

Program Expansion: **Automation Controls/SCADA**
New Degree Option: **Automation Engineering Technology**

Length of Program: **Two-Year Associate Degree**

Number of Students: **18**

Projected Start Date: **Fall of 2017**

Executive Summary

Mitchell Technical Institute is requesting approval to expand the current Automation Controls and Data Acquisition (SCADA) program to include an Associate of Applied Science degree in Automation Engineering Technology. This expansion would maximize on the skills and abilities students gain from the SCADA program as well as the skills and abilities from the current Welding and Manufacturing program. It is a natural fit for students who wish to focus on the parts and processes of a machine rather than programming.

Automation Engineering Technicians are experts who have the ability and knowledge to design, develop, and manage systems within the manufacturing industry. The technician ensures quality, efficiency, and consistency through quality control analysis. They also provide maintenance and operational support, troubleshooting and problem resolution, install new equipment, implement control strategies and assist in commissioning and debugging complex machine applications.

This high-demand program combines current curriculum from both the existing and successful SCADA and Manufacturing programs. Graduates of the proposed Associate of Applied Science degree could return for a third year and earn an additional degree in either Welding and Manufacturing or SCADA. Mitchell Technical Institute will utilize current equipment, faculty, and support services for the initial cohort.

Industry partners are supportive of this program expansion and voiced both their recommendations for curriculum and their need for technicians in the field.

Identification and Description of Program Expansion

Two current programs at Mitchell Technical Institute offer students in-depth training in high-demand fields; welding and manufacturing and SCADA. Industry has indicated the immediate need for workers who are highly skilled in both of these fields. Mitchell Technical Institute will combine the second year curriculum from each of these programs to focus the skill training on quality, process, and procedure relating to machines and equipment. Students will learn how to operate machines making precise measurements to ensure quality, master advanced manufacturing techniques, automate processes, and perform high-level machine and system troubleshooting and repair.

Instruction will include following diagrams, sketches, operations manuals, manufacturer's instructions, and engineering specifications. Students will learn how to install, service, troubleshoot malfunctions, and document the needs of process/production robotic systems, CNC equipment, and other automation equipment in an industrial production environment. Daily lab activities will include maintaining equipment, drafting mechanical maintenance reports, controlling supplies inventories, solving complex electrical problems, and providing solutions to simulated manufacturing problems.

Graduates will be career-ready in a variety of capacities:

- Maintenance Technician
- Controls Designer
- Automation Technician
- Controls Technician
- Engineering Technician
- Robotics Maintenance
- Facilities Maintenance
- Machine Maintenance

Objectives and Purpose of the Program

The primary objective of this program expansion is to offer students the experience and overall education to become a successful automation engineering technician. This program will provide attention to professionalism and communication skills, as well as the important mastery of technical skills.

General program expansion objectives:

- Assist engineers to design, develop, and test industrial machinery or other equipment
- Prepare specifications, designs, or sketches for machines, components, or systems
- Design specialized or customized equipment, machines, or structures
- Provide technical support regarding mechanical design, fabrication, testing, or documentation
- Inspect and test mechanical equipment
- Conduct failure analyses, document results, and recommend corrective actions
- Assemble or disassemble complex mechanical systems
- Prepare cost and materials estimates or project schedules
- Test machines, components, materials, or products to determine characteristics such as performance, strength, or response to stress
- Prepare equipment inspection schedules, reliability schedules, work plans, or other records
- Assist mechanical engineers in product testing
- Oversee, monitor, or inspect mechanical installations or construction projects
- Apply testing or monitoring apparatus to operating equipment
- Perform routine maintenance on equipment
- Work cooperatively
- Use computer technology within field of study

The Automation Engineering Technology program provides hands-on training and the curriculum is supported by industry standards. Students will be prepared to meet the competencies required for employment in today's highly competitive world.

Methods of Attaining the Objectives of the Program

Pending approval, MTI will develop marketing materials and recruit students. MTI will utilize existing faculty, and, with approval from an advisory committee, will finalize course syllabi.

MTI provides assurance that it possesses the resources and staff necessary to:

Develop marketing materials and recruit students

Retain and supervise qualified staff

Assess the abilities of students for good program and course placement

Develop and administer budgets

Make available textbooks and other instructional resources

Evaluate programs and staff

Assist student in finding jobs

Secure input from industry through advisory committees

Maintain membership in professional organizations

Provide time and fiscal resources for professional development

Provide financial aid and scholarships

Provide services to disabled and nontraditional students

Provide a variety of general education courses

Provide a typical two-year technical institute climate

Assist students with housing

Graduation Requirements

Graduates of the program must complete all prescribed coursework, earn a cumulative GPA of 2.0 and not have a failing grade in program courses.

Description of the Needs Based on Labor Market Demands

Employment in South Dakota of industrial machinery mechanics, machinery maintenance workers, and industrial engineers is projected to grow 12-16 percent from 2014 to 2024, much faster than the average for all occupations. The need to keep increasingly sophisticated machinery functioning and efficient will drive demand for these workers. Job prospects for qualified applicants should be good.

According to the Occupational Outlook Handbook, employment of industrial machinery mechanics and maintenance workers is projected to grow nationally up to 17 percent from 2012 to 2022, faster than the average for all occupations.

Increased automation, including the use of many new computer-controlled machines in factories and manufacturing plants, should spur demand for maintenance workers in order to keep machines operating well.

Overall, applicants with a broad range of skills in machine repair should have very good job prospects. Faster-than-average employment growth and the need to replace many older workers who are expected to retire over the coming decade should result in numerous job openings.

Occupational Title	SOC Code	Employment, 2014	Projected Employment, 2024	Change, 2014-24	
				Percent	Numeric
Industrial machinery mechanics	49-9041	332,200	391,900	+18	59,700
Maintenance workers, machinery	49-9043	91,200	98,700	+8	7,400

https://www.bls.gov/ooh/installation-maintenance-and-repair/industrial-machinery-mechanics-and-maintenance-workers-and-millwrights.htm#tab-6

United States	Employment		Percent Change	Projected Annual Job Openings
	2014	2024		
Industrial Engineers	241,100	243,200	+1%	7,280
South Dakota	**Employment**		**Percent Change**	**Projected Annual Job Openings**
	2014	**2024**		
Industrial Engineers	470	520	+12%	20

https://www.careerinfonet.org/occ_rep.asp?next=occ_rep&Level=&optstatus=011000000&id=1&nodeid=2&stfips=46&jobfam=17&soccode=172112#SectionOp3

Population Served by the Program

The proposed program will draw its students from South Dakota and surrounding states, and the opportunities for employment will favor that same geographical area. This program will be appealing to traditional-age college students, older adults seeking career changes, and incumbent workers looking to change or enhance their skills.

Admissions Requirements

The program is available to any applicant who has successfully completed the admission requirements set by MTI. Mitchell Technical Institute does not discriminate in its educational programs on the basis of race, color, creed, religion, age, sex, disability, national origin or ancestry. Applicants must be at

least 16 years of age or older, provide proof of US legal residency, have a high school diploma or GED, and complete entrance examinations.

Projected Three –Year Budget

	2017-2018	2018-2019	2019-2020
Salaries/Benefits	$0	$0	$0
Equipment	$5,000	$5,000	$15,000
Supplies	$5,000	$5,000	$5,000
Travel	$2,000	$2,000	$2,000
Marketing	$2,500	$2,500	$2,500
TOTAL	**$14,500**	**$14,500**	**$24,500**

NOTE: No salaries/benefits projected due to the use of existing courses for the AAS degree

Program Competencies and Entry and Exit Points

The entry and exit points are for that of a traditional two-year AAS degree. Students will be accepted each fall beginning in 2017 and can begin in either discipline (Manufacturing or SCADA). The exit point will be at the completion of all coursework and graduates will have an accumulated GPA of 2.0 or higher. The curriculum will have defined and assessed learning outcomes in accordance with the guidelines set by the Higher Learning Commission. These outcomes will be reviewed and approved by a program advisory board and evaluated annually.

Statement of Non-duplication

This Automation Engineering Technician program is nonduplicative of robotics programs in the state. Automation engineers will apply basic engineering and programming principles in identifying and resolving production problems.

Proposed Curriculum Expansion Design

The proposed curriculum is designed with existing courses from the manufacturing pathway of the Welding and Manufacturing program and from the second year of the SCADA program. Each year is unique and independent from the other program's competency/skill mastery thereby allowing students to start the program with either curriculum.

The courses are all approved by the respective program advisory board and assessment tools are in place. Students are introduced to machining, networking, process controls, logic controllers, and robotics. A general education core is also required.

First Semester			
WMT	201	Quality & Productivity	2
WMT	230	Robotic Lab	3
WMT	231	Manual Machining	3
WMT	240	Manufacturing Programming	3
Math	151	Technical Math	3
CIS	105	Complete Computer Concepts	3
			17
Second Semester			
WMT	250	Laser Cutting	3
WMT	251	CNC Machine Station	3
WTT	112	Electronics Theory	4
SD	120	Intro to Motor Controls	3
ENGL	110	Elective English	3
			16
Third Semester			
SD	159	Programmable Logic Controllers	3
SD	225	Intro to SCADA Software	4
SD	229	Networking Concepts I	3
OSHA	100	OSHA 10 Training	1
SOC	110	Industrial Relations	3
			14
Fourth Semester			
SD	205	Process Controls	3
SD	239	Networking Concepts II	3
SD	270	SCADA Testing and Control Lab	7
PSYC	110	Psychology	3
			16
		Total Credits to graduate	**63**

Instructor Credentials

Instructors for the proposed Automation Engineering Technology program will have a minimum of 6,000 hours of industry experience, complete an approved Career and Technical Education methods course, participate in a peer mentoring program, and hold at least one industry-recognized certification.

National Wage Factor

Automation technicians may have a variety of job titles, depending on their specific duties and the industry in which they work. The U.S. Bureau of Labor Statistics (BLS) does not collect wage and employment data for automation engineering technicians. However, industry sources suggest that the annual wage is was approximately $50,000, which is closely related to engineering technician occupations (*Occupational Outlook Quarterly,* 2010).

In 2015, median annual wages for industrial engineers were as follows:

- $83,500 nationally
- $72,600 in South Dakota

Location	Pay Period	2015				
		10%	25%	Median	75%	90%
United States	Hourly	$25.63	$32.06	$40.13	$49.85	$61.02
	Yearly	$53,300	$66,700	$83,500	$103,700	$126,900
South Dakota	Hourly	$26.18	$29.71	$34.92	$42.20	$54.16
	Yearly	$54,500	$61,800	$72,600	$87,800	$112,700

https://www.careerinfonet.org/occ_rep.asp?next=occ_rep&Level=&optstatus=011000000&id=1&nodeid=2&stfips=46&jobfam=17&soccode=172112#SectionOp3

According to the BLS, the median annual wage for industrial machinery mechanics and maintenance workers was $48,410 in 2015.

South Dakota Wage Factor

The table below shows the annual employment and hourly/annual wage data for Industrial Machinery Mechanics in South Dakota in 2015.

Employment	25th %	Mean	75th %
1,050	$17.68 $36,774	$21.23 $44,158	$23.86 $49,629

Source: Labor Market Information Center, SD Dept. of Labor & Regulation
The mean wage is also known as the average wage. The mean wage is calculated by dividing the estimated total wages for an occupation by the number of workers in that occupation. 25th % and 75th % wage rates represent the 25th and 75th percentile of the wage distribution, respectively.
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Manufacturing Engineering Technology/Technician. A program that prepares individuals to apply basic engineering principles and technical skills to the identification and resolution of production problems in the manufacture of products. Includes instruction in machine operations, production line operations, engineering analysis, systems analysis, instrumentation, physical controls, automation**,** computer-aided manufacturing (CAM), manufacturing planning, quality control, and informational infrastructure.

https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=87322

Works Cited

http://www.bls.gov/ooh/installation-maintenance-and-repair/industrial-machinery-mechanics-and-maintenance-workers-and-millwrights.htm

Letters of Support

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www.fanucamerica.com

April 10, 2017

Mr. Mark Wilson, President
Mitchell Technical Institute
1800 E. Spruce St.
Mitchell, SD 57301

Re: FANUC America Corporation Letter of Support

Dear Mr. Wilson,

FANUC America Corporation, a subsidiary of FANUC Corporation, provides industry-leading robotics, CNC systems, and factory automation. FANUC's innovative technologies and proven expertise help manufacturers in the Americas maximize efficiency, reliability and profitability. FANUC Certified Education Training (CERT) Programs, are aligned with STEM initiatives to support technical education and engineering career paths. CERT education programs in robotics and advanced manufacturing, collaborate with industry and education to deliver occupational certifications based on industry needs for the workforce of today, and the pipeline of tomorrow.

On behalf of FANUC America Corporation, CERT Education, I am pleased to offer this organizational commitment, to provide all of the following assets and activities in support of Mitchell Technical Institute.

In cooperation with our Education Authorized Reseller, Moss Corporation, FANUC America will extend the following academic services and support:

- Provide CERT Academic Pricing (discount) to Mitchell Technical Institute. The standard CERT program equipment for educational institutions represents savings of roughly 40% off standard industry costs.
- All robots purchased for education through our CERT program are delivered with a special software bundle at no cost. This bundle includes, Advanced DCS (Dual Check Safety), Collision Guard, and 4D Graphics.
- Our commitment to a gift-in-kind of one CERT program to each new academic institution which has an industry value of $360,340. This CERT program includes: Instructor training, certification, and instructor perpetual software licenses, 25 student licenses of ROBOGUIDE Simulation Software, and curriculum via 25 sets of three eLearn online training courses for students.

We are fully committed to support Mitchell Technical Institute in its efforts to provide advanced manufacturing training to students throughout the Midwest. Over the course of the last few years, the need for highly skilled and trained technicians has grown considerably. According to the 2015 Job Skills Manufacturing Report, 67% of manufacturing facilities are experiencing a severe shortage in qualified workers. As the leading global supplier of Industrial Automation, FANUC America understands the importance of highly trained skilled technicians and engineers in manufacturing.

Should you have any questions or would like to discuss FANUC America Corporation's support for Mitchell Technical Institute, please do not hesitate to contact me directly.

Best Regards,

Paul Aiello

Paul Aiello
Director
CERT Education
FANUC America Corporation
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HENDRICKSON
The World Rides On Us®

April 7, 2017

Mr. Mark Wilson, President
Mitchell Technical Institute
1800 E. Spruce St.
Mitchell, SD 57301

Dear Mr. Wilson:

On behalf of Hendrickson Trailer Commercial Vehicle Systems I would like to lend my support to the efforts of Mitchell Technical Institute to implement an Automated Engineering Technology program.

Hendrickson faces challenges finding qualified graduates to fill our employment needs. We often turn to MTI as we know their graduates are well prepared in the areas from which we hire. We support the development of a program that builds on MTI's strengths and will provide us with another source for qualified employees.

The manufacturing industry is rapidly changing and the ability of technical institutes to respond to our needs is an important part of our continued success. We hope you will approve this program and allow MTI to continue providing technicians to South Dakota's workforce.

Hendrickson has been part of the Mitchell community for almost 30 years. Partnering with Mitchell Tech has been a big help to us finding great talent. Hendrickson annually supports Mitchell Tech with funding, employee scholarships, board members, and donations for their robotics clubs, welding competitions, etc. We have many employees who have gone through the SCADA program or welding program at Mitchell Tech. I have found that they are knowledgeable with have great attitudes and who are highly promotable.

Hendrickson is pleased to support the application for this program. Please know that we will be happy to provide any necessary assistance or information.

Sincerely,

Steven Limberg
Plant Manager
Hendrickson Trailer Commercial Vehicle Systems – Mitchell, SD

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April 20, 2017

Mr. Mark Wilson, President
Mitchell Technical Institute
1800 E. Spruce St.
Mitchell, SD 57301

Dear Mr. Wilson:

Jack Link's is pleased to support MTI's application to add a program in the area of Automated Engineering Technology as part of its educational offerings.

Manufacturers all across the region face the same problems that we do: finding qualified, skilled technicians to fill positions in our facilities. MTI has a long history of working with industries to develop programs that provide students with what they need to fill jobs in our region. Skilled manufacturing technicians like those who will graduate from this program will be in high demand. The field of automated engineering and manufacturing is one of the fastest growing occupations in the US today.

Jack Link's has long supported MTI's programs in the areas of SCADA and automation. Adding an option for students to learn skills like machine operation, installation of this equipment, troubleshooting and repair and advanced manufacturing techniques will allow our company to hire these graduates and to continue to compete and provide the products and services that our customers expect.

Jack Link's is an enthusiastic supporter of MTI's application for the Automated Engineering program. We will assist in any way we can.

Sincerely,

Human Resources Manager
Richard Edgeworth
Alpena, South Dakota

April 10, 2017

Mr. Mark Wilson, President
Mitchell Technical Institute
1800 E. Spruce St.
Mitchell, SD 57301

Dear Mr. Wilson:

On behalf of Kolberg-Pioneer, Inc., I would like to lend my support to the efforts of Mitchell Technical Institute to implement an Automated Engineering Technology program.

Kolberg-Pioneer, Inc. faces challenges finding qualified graduates to fill our employment needs. We often turn to MTI as we know their graduates are well prepared in the areas from which we hire: welders, manufacturing technicians, electricians, service technicians and more. We support the development of a program that builds on MTI's strengths and will provide us with another source of qualified employees.

The manufacturing industry is rapidly changing and the ability of technical institutes to respond to our needs is an important part of our continued success. We hope you will approve this program and allow MTI to continue providing technicians to South Dakota's workforce.

Kolberg-Pioneer, Inc. is pleased to support the application for this program. Please know that we will be happy to provide any necessary assistance or information.

Sincerely,

Rhonda J. Kocer
Human Resources Manager

TOSHIBA

TOSHIBA AMERICA BUSINESS SOLUTIONS, INC.
TONER PRODUCTS DIVISION

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April 12, 2017

Mr. Mark Wilson, President
Mitchell Technical Institute
1800 E. Spruce St.
Mitchell, SD 57301

Dear President Wilson:

This letter is in support of your proposal for an Automation Engineering Technology program to the South Dakota State Board of Education.

We have had a long and successful relationship with MTI and the Toner Products Division of Toshiba is familiar with the school's unique Automation Controls/SCADA program. We have been impressed with the progress that program has made over the years, preparing highly qualified graduates ready to work in sophisticated manufacturing environments such as ours.

This newly expanded program will give students experience in high-tech manufacturing processes including machining, automated processes, troubleshooting and repair of technical equipment. Graduates of this program will be in high demand by companies like ours, who regularly face a shortage of qualified workers.

I strongly support this application for the Automation Engineering Technology program and as I've done in the past with SCADA, I'll continue to offer support as you prepare to serve our industry with this new program.

Sincerely,

Jeffrey W. Clark
Director, Manufacturing Engineering
Toshiba America Business Solutions, Inc.
Toner Products Division