

Industrial Maintenance Technician AAS Degree Program Proposal



Presented to the South Dakota
State Board of Education
January 2015
For Implementation
Fall 2015



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



Mitchell Technical Institute

Program Expansion: **Industrial Maintenance Technology**

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

Number of Students: **18**

Projected Start Date: **Fall of 2015**

Executive Summary:

Mitchell Technical Institute is requesting approval to offer an Associate of Applied Science degree in Industrial Maintenance Technology. Currently, a nine-month Industrial Maintenance Technology diploma is offered, but industry has indicated the need for further training in commercial heating and refrigeration, industrial controls, and advanced industrial controls.

Students who enroll in the program will range from recent high school graduates to older individuals desiring career advancement. Students may come from a variety of cultural, educational, and socioeconomic backgrounds. Current workforce development efforts statewide will provide additional recruitment strategies.

The projected job growth for Industrial Maintenance Technicians is 11-19% (2012-2022). Graduates will work in manufacturing plants, hospitals, schools, and private facilities.

Identification and Description of Program

The existing Industrial Maintenance diploma program is unique to the state and prepares graduates with basic skills in hydraulics, welding, motor controls, and facilities maintenance. The Associate of Applied Science degree curriculum will introduce industrial refrigeration and heating, industrial controls, automation controls, conveyors and pneumatics. An introduction to business economics course will provide students with a basic understanding of routine business concepts like budgets, capital outlay, ROI, and other common practices of any type of business.

Industrial Maintenance Technicians ensure the operation of machinery and mechanical equipment by completing preventive maintenance requirements on engines, motors, pneumatic tools, conveyor systems, and production machines. Instruction will include following diagrams, sketches, operations manuals, manufacturer's instructions, and engineering specifications; troubleshooting malfunctions. Students will learn how to locate sources of problems by observing mechanical devices in operation and using precision measuring and testing instruments. Daily lab activities will include maintaining equipment, drafting mechanical maintenance reports, and controlling supplies inventories.

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

- Machine Maintenance
- Maintenance Technician
- Robotics Maintenance
- Facilities Maintenance

Graduates may also enter the trades of Machine Repair and Machine Rebuilder. Graduates may advance to positions such as Maintenance Leadperson, Maintenance Supervisor, or Superintendent.

Maintenance technicians may also seek certification that may make them more competitive in the job market. The Certified Maintenance and Reliability Technician (CMRT) exam measures expertise in the area of maintenance and reliability and is offered by the Society for Maintenance and Reliability Professionals. Three additional industry recognized certifications are also available:

- Certificate in Industrial Electricity
- Certificate in Industrial Motor Controls
- Certificate in Programmable Logic Controllers

Objectives and Purpose of the Program:

The program will be dedicated to offering students the experience and overall education to become successful maintenance technicians. This program will provide attention to professionalism, communication and technical skills.

General Program Objectives:

- Technical maintenance skills in multiple areas
- Ability to diagnose, troubleshoot and repair manufacturing equipment
- Understanding and ability to perform repairs of basic electrical and mechanical systems
- Ensure a clean, safe environment and follow all safety protocols such as Lock Out Tag Out
- Demonstrate the ability to communicate industrial maintenance concepts effectively
- Analyze machine malfunctions and develop appropriate repair
- Monitor compliance of routine maintenance and repair
- Fabricate repair parts by using machine shop instrumentation and equipment
- Provide mechanical maintenance information by answering questions and requests
- Prepare mechanical maintenance reports by collecting, analyzing, and summarizing information and trends
- Work cooperatively
- Use computer technology within field of study
- Work safety
- Master competencies that lead to AWS Welding Certification

The Industrial Maintenance 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 hire instructors and, with assistance from an advisory committee, will finalize course syllabi, purchase equipment and supplies, and secure resource materials.

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

- Develop marketing materials and recruit students
- Recruit 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 students in finding fieldwork experiences
- 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

Description of the Needs Based on Labor Market Demands:

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. The need to keep increasingly sophisticated machinery functioning and efficient will drive demand for these workers. Job prospects for qualified applicants should be very good.

Employment of industrial machinery mechanics is projected to grow 19 percent from 2012 to 2022, faster than the average for all occupations. Increased adoption of sophisticated manufacturing machinery will require more highly-skilled mechanics to keep machines in good working order.

Employment of machinery maintenance workers is projected to grow 11 percent from 2012 to 2022, about as fast as 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. Those that complete educational programs designed for industrial machinery repair should have the best job prospects.

The employment outlook in South Dakota is similar:

OC Code	Occupational Title	2012 Employment	2022 Employment	Numeric Change	Percent Change	Average Annual Demand for Workers
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	470	535	65	13.8%	16
49-9041	Industrial Machinery Mechanics	845	1,070	225	26.6%	46
49-9043	Maintenance Workers, Machinery	50	60	10	20.0%	2
49-9071	Maintenance and Repair Workers, General	2,695	2,890	195	7.2%	71
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	470	535	65	13.8%	16

Population Served:

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

Projected Three –Year Budget

	2013-2014	2014-2015	2015-2016
Salaries/Benefits	\$0	\$0	\$0
Equipment	\$15,000	\$5,000	\$5,000
Supplies	\$5,000	\$5,000	\$5,000
Travel	\$2,000	\$2,000	\$2,000
Marketing	\$2,500	\$2,500	\$2,500
TOTAL	\$94,500	\$89,500	\$94,500

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

Program Competencies and Entry and Exit Points

Entry point will be the fall of 2015. The exit point will be at the completion of coursework. Graduates will receive an Associate of Applied Science Degree in Industrial Maintenance Technology. Students must maintain an overall GPA of 2.0 to graduate. The curriculum is competency-based and will be reviewed and approved by a program advisory committee. Additionally, MTI will adhere to any future guidelines or certifications set by the industry.

Statement of Non-duplication

Mitchell Technical Institute is the only technical institute that offers an Industrial Maintenance Technology diploma. A second year Associate of Applied Science degree option is also unique to South Dakota.

Proposed Curriculum Design

The curriculum contains a core segment that focuses on industrial electricity, motors, and basic controls. Training encompasses theory in the classroom, which is then complimented through hands-on application in the maintenance lab. Students complete the core segment (which is currently the Diploma offering) and then move into an area of focus for the Associate of Applied Science degree. The two focus options are Electrical and Heating and Cooling.

In addition to training in the industrial maintenance content area, students will be introduced to interviewing skills, job-search methods, cover letters/resume development, interpersonal skills and computer skills. An introduction to business economics will discuss taxes, pricing, inventory and production of goods, decision making and profitability of investments.

Pathways are available for students who start their academic studies in Industrial Maintenance Technologies, Electrical Construction and Maintenance, or Heating and Cooling Technologies. The opportunity to earn two Associate of Applied Science degrees is appealing and provides potential career advancement.

FIRST SEMESTER

IMT	101	Electrical Fundamentals and Lab	6 credits
IMT	102	Basic Mechanical Drives	3 credits
IMT	103	Basic Hydraulics & Pneumatics	3 credits
IMT	104	Welding and Metal Work	1.5 credits
SSS	100	Student Success	1 credit
		Math Elective	3 credits

Total Semester Credits: 17.5 (Diploma)

SECOND SEMESTER

IMT	105	Intro to Industrial Motor Controls	3 credits
IMT	106	Programmable Logic Controls	3 credits
IMT	107	Heating and Cooling Concepts and Lab	3 credits
IMT	108	Facilities and Machines Operation & Maintenance	3 credits
CIS	105	Complete Computer Concepts	3 credits
OSHA	100	OSHA 10 Training	1 credit
		English Elective	3 credits

Total Semester Credits: 19 (Diploma)

Core segment complete-can opt for one-year diploma (36.5 credits) or return for a two-year AAS degree.

Proposed Curriculum (continued)



Electrical Emphasis

THIRD SEMESTER

ECM	252	Industrial Controls	3 credits
ECM	255	Industrial Controls Lab	1.5 credits
IC	104	Industrial Wiring	2 credits
ECM	251	Industrial Wiring Lab	4 credits
ECON	220	Business Economics	3 credits
PSYC	100	Intro to Psychology	3 credits

Total Semester Credits: 16.5 (AAS)

FOURTH SEMESTER

ECM	253	Advanced Control Systems	2.5 credits
ECM	257	Advanced Control Lab	2 credits
SD	204	Programmable Automation Controllers	3.5 credits
ECM	244	VFD/Motor Drives	1 credit
EC	167	IT Essentials	3 credits
SOC	100	Introduction to Sociology	3 credits

Total Semester Credits: 15 (AAS)

AAS Degree = 68 credits



Heating and Cooling Emphasis

THIRD SEMESTER

HV	111	Heating Fundamentals	3 credits
HV	121	AC/Refrigeration Fundamentals	4 credits
HV	151	AC/Heating/Refrigeration Lab	5 credits
ECON	220	Business Economics	3 credits
PSYC	100	Intro to Psychology	3 credits

Total Semester Credits: 18 (AAS)

FOURTH SEMESTER

HV	132	Heating and Refrigeration Theory	4 credits
HV	142	HV Controls and Heat Pumps	3 credits
HV	152	AC/Heating/Refrigeration Lab II	4 credits
SD	204	Programmable Automation Controllers	3.5 credits
SOC	100	Introduction to Sociology	3 credits

Total Semester Credits: 17.5 (AAS)

AAS Degree = 72 credits

National Wage Factor

The median annual wage for industrial machinery mechanics and maintenance workers was \$43,770 in May 2012. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$29,020, and the top 10 percent earned more than \$69,990.

In May 2012, median annual wages for industrial machinery mechanics and maintenance workers were as follows:

- \$46,920 for industrial machinery mechanics
- \$40,620 for machinery maintenance workers

Most industrial machinery mechanics and maintenance workers are employed full time during regular business hours. However, mechanics may be on call or assigned to work evenings, nights, or weekends. Overtime is common, particularly for mechanics.

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics

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

South Dakota Wage Factor

Average Wage: represents the arithmetic mean of the wage data collected, calculated by dividing the estimated total wages for an occupation by the number of workers in that occupation. The average wage is also referred to as the mean wage.

Number of Workers: represents an estimate of the total wage and salary workers in an occupation across all industries. For certain occupations, the number of workers statistic may not be available because of disclosure concerns or reliability issues.

Occupational Title	Workers	Annual Wage
Installation Maintenance and Repair Workers All Other	140	\$45,797
Maintenance and Repair Workers General	2,650	\$34,547
Industrial Machinery Mechanics	870	\$43,465
Maintenance Workers Machinery	60	\$29,757

Source: SD Labor Market Information Center

<http://apps.sd.gov/ld54lmicinfo/WAGES/OWLSTPUBA.ASP>

CIP Code: 46.0401

Industrial Maintenance Tech

A program that prepares individuals to apply technical knowledge and skills to keep a building functioning, and to service a variety of structures including commercial and industrial building. Includes instruction in the basic maintenance and repair skills required to service building systems, such as air conditioning, heating, plumbing, electrical, major appliances, and other mechanical systems.

Letters of Support



December 10, 2014

Greg Von Wald
President, Mitchell Technical Institute
1800 E Spruce Street
Mitchell, SD 57301

Dear President Von Wald,

I am writing this letter of support on behalf of Kalins Indoor Comfort for Mitchell Technical Institute to develop and implement an Associates of Applied Science (AAS) degree and 2nd year program option for their Industrial Maintenance Technology (IMT) Program.

Kalins Indoor comfort has been in business for 93 years and serves the tri-state area. We find it a real challenge to fill industry positions for Service Technicians and Installers. There is a tremendous shortage as more folks are retiring than entering our industry. We need good trade schools and welcome Mitchell Technical Institute's efforts to overcome this workforce skills gap.

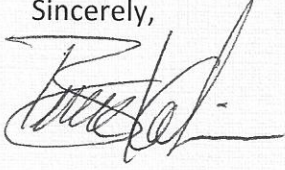
Over the past four years we have witnessed the start-up and growth of the one-year Industrial Maintenance Technology diploma program at the Regional Technical Education Center (RETC) in Yankton. The program provides graduates with basic skills in a variety of areas ready for entry level industrial maintenance positions. Further development and expansion of this program with additional electrical, motor control, programmable logic control, pneumatic, and mechanical training will certainly contribute to the depth of knowledge for those students choosing the 2nd year option and provide graduates an additional stackable credential that will be recognized by employers.

LENNOX

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710 Cottage Avenue • P.O. Box 395 • Vermillion, South Dakota 57069 • (605) 624-5618

Our company enjoys working with Mitchell Technical Institute and we view this project as another opportunity to strengthen our partnership and build a highly trained and qualified future workforce.

Sincerely,

A handwritten signature in black ink, appearing to read "Bruce Kalin", with a stylized flourish at the end.

Bruce Kalin
President
Kalins Indoor Comfort



December 5, 2014

Mr. Greg Von Wald
President, Mitchell Technical Institute
1800 E. Spruce Street
Mitchell, SD 57301

Dear President Von Wald:

I am writing this letter of support on behalf of Kolberg-Pioneer, Inc. in Yankton, for Mitchell Technical Institute to develop and implement an Associates of Applied Science (AAS) degree and 2nd year program option for their Industrial Maintenance Technology (IMT) Program.

Kolberg-Pioneer is a 50-year manufacturer of large and heavy crushing, screening, washing, and conveying equipment for the rock, stone, sand and gravel industry. We currently employ 440 people and are continuously searching for ways to expand our workforce and maximize production output to increase our global market share. Our organization operates facilities and equipment that require maintenance personnel with a strong foundation in electrical, mechanical, and troubleshooting skills. Finding applicants with the needed background and training in these areas is a challenge, and we welcome Mitchell Technical Institute's efforts to overcome this workforce skills gap.

Over the past four years we have witnessed the start-up and growth of the one-year Industrial Maintenance Technology diploma program at the Regional Technical Education Center (RTEC) in Yankton. The program provides graduates with basic skills in a variety of areas ready for entry level industrial maintenance positions. Further development and expansion of this program with additional electrical, motor control, programmable logic control, pneumatic, and mechanical training will certainly contribute to the depth of knowledge for those students choosing the 2nd year option and provide graduates with additional stackable credentials that will be recognized by employers like us.

Our Company has a strong history of working with Mitchell Technical Institute and we view this project as another opportunity to strengthen our partnership and build a highly trained and qualified future workforce. Thank you for your consideration of this request.

Sincerely,

Rhonda J. Kocer
Human Resources Manager

KOLBERG-PIONEER, INC.
SALES: (800) 542-9311
SERVICE: (800) 766-9793
PARTS: (800) 532-9311

JOHNSON CRUSHERS INTERNATIONAL, INC.
SALES: (800) 314-4656
SERVICE: (866) 875-4058
PARTS: (888) 474-0115



December 2, 2014

Greg Von Wald
President, Mitchell Technical Institute
1800 E. Spruce Street
Mitchell, SD 57301

Dear President Von Wald,

I am writing this letter of support on behalf of Applied Engineering for Mitchell Technical Institute to develop and implement an Associates of Applied Science (AAS) degree and 2nd year program option for their Industrial Maintenance Technology (IMT) Program.

Applied Engineering, a manufacturer of precision machined aluminum components and assemblies located in Yankton, currently occupies 92,000 square feet of space. Our need to maintain our facility in a cost efficient and proactive manner is crucial to our ability to compete in both our national and international markets. Our organization operates facilities and equipment that require maintenance personnel with a strong foundation in electrical, mechanical, and troubleshooting skills. Finding applicants with an adequate background and needed training in these areas is a challenge, and we welcome Mitchell Technical Institute's efforts to overcome this workforce skills gap.

Over the past four years we have witnessed the start-up and growth of the one-year Industrial Maintenance Technology diploma program at the Regional Technical Education Center (RTEC) in Yankton. Further development and expansion of this program with additional electrical, motor control, programmable logic control, pneumatic, and mechanical training will certainly contribute to the depth of knowledge for those students choosing the 2nd year option and provide graduates an additional stackable credential that will be recognized by employers.

As a member of the Advisory Committee for the Mitchell Technical Institute Industrial Maintenance Technology Program and board member for the Regional Technical Education Center (RTEC) in Yankton, we have a history of working with Mitchell Technical Institute and we view this project as another opportunity to strengthen our partnership and build a highly trained and qualified future workforce.

Sincerely,

Rick Duimstra
Finance and Human Resources Manager