



Drafting and Machining Technology

Expansion of Existing Programs

State Submission

Mark Wilson, President
May 2013



TABLE OF CONTENTS

Executive Summary.....	2
Identification and Description of the Program	2
Objectives and Purpose of the Program	3
Methods of Attaining the Objectives of the Program	4
Population Served by the Program.....	5
Projected Three-Year Budget.....	5
Program Competencies and Entry and Exit Points	5
Statement of Non-Duplication.....	5
Curriculum Design.....	5
Wage Factor	6
Suggested CIP Code.....	6
Appendix	6
Appendix A.....	7
Appendix B.....	9
Appendix C.....	10

WESTERN DAKOTA TECHNICAL INSTITUTE (WDT)

Drafting and Machining Technology AAS Program

Expansion of Existing Programs

EXECUTIVE SUMMARY

Western Dakota Technical Institute requests approval to create an Associate of Applied Science degree in Drafting and Machining Technology. This new option would be created by combining already existing diploma programs in Computer-Aided Drafting and Precision Machining Technology and adding additional general education courses. WDT would continue to offer diplomas in Computer-Aided Drafting and Precision Machining Technology so students have multiple options and exit points.

WDT requests permission to begin offering the program in Fall 2013.

Labor market information for the state indicates that the demand for workers in the Computer-Aided Drafting and Machining fields is strong now and in the future.

- Through 2020, the number of mechanical drafters is expected to grow by 11.1 percent, according to the South Dakota Labor Market Information Center (LMIC). The number of architectural drafters is expected to grow at a less robust 1.7 percent.
- Through 2020, the number of machinists is expected to grow by 13.8 percent, according to the LMIC.

While a worker with formal technical training in one of those areas would make them a valuable employee to regional businesses, an employee with skills in both areas would be even more valuable. Graduates of this program will be able to seek employment in a variety of settings, including manufacturing firms, machine shops, and other related businesses.

The four-semester, two-year program will serve as an umbrella program for WDT's diploma programs in Precision Machining Technology and Computer-Aided Drafting. Students will be required to complete one of the diploma programs before moving on to complete the AAS degree program.

IDENTIFICATION AND DESCRIPTION OF THE PROGRAM

Many private companies complete both the design and manufacturing of equipment, parts, and related items. This program will graduate skilled technicians who are able to bring value to those employers in multiple ways because they will be skilled enough to participate in multiple areas of the business. These workers will be flexible and will be seen as a valuable asset by any of these employers.

In the drafting area, graduates will be able to meet the growing demand from industry for skilled technicians who can demonstrate skill and knowledge in 2D and 3D computer-aided drafting. In addition, graduates will leave the program prepared to apply the basic fundamentals of drafting and blueprint reading.

In the machining area, graduates will be able to set up and operate a variety of machine tools to produce precision metal parts, instruments, and tools. Machinists use machine tools that are either conventionally controlled or computer numerically controlled, such as lathes, milling machines, and grinders, to produce precision metal parts. Although they may produce large quantities of one part, precision machinists often produce small batches or one-of-a-kind items. The parts that machinists make range from simple bolts of steel or brass to titanium bone screws for orthopedic implants. Hydraulic parts, anti-lock brakes and automobile pistons are other widely known products that machinists make.

Graduates of the program will be able to accomplish the typical duties of drafters and machinists, including the following:

- Design and prepare plans for using computer-aided design and drafting (CADD) software
- Produce effective product designs by using their understanding of engineering and manufacturing techniques
- Add structural details to architectural plans from their knowledge of building techniques
- Prepare multiple versions of designs for review by engineers and architects
- Specify dimensions, materials, and procedures for new building projects or products
- Work under the supervision of engineers or architects
- Work from blueprints, sketches, or computer-aided design (CAD) or computer-aided manufacturing (CAM) files
- Set up, operate, and tear down manual, automatic, or computer numeric controlled (CNC) machine tools
- Calculate dimensions using measuring instruments
- Install, align, secure, and adjust cutting tools and workpieces
- Monitor the feed and speed of machines
- Turn, mill, drill, shape, and grind machine parts to specifications
- Measure, examine, and test completed products for defects
- Deburr all surfaces of parts or products to ensure that they conform to specifications

OBJECTIVES AND PURPOSE OF THE PROGRAM

The primary objective of the Drafting and Machining Technology program is to prepare students with the necessary skills to be successful in the drafting and machining fields. Students will take coursework in mill and lathe operation, advanced manufacturing, drafting fundamentals, architectural drafting, mechanical drafting, and other technical skills. This program also will provide education and training in soft skills such as communication and math.

The program will articulate appropriate high school credits whenever possible, and there could be dual enrollment possibilities for high school students.

The Drafting and Machining Technology graduate will be able to:

- Demonstrate knowledge and hands-on competences in manufacturing/mechanical production, computers, machining instrumentation systems, and mechanical CAD
- Apply critical thinking to technical problems
- Understand ethical/social responsibility and a commitment to quality, timeliness, and continuous improvement
- Apply basic concepts of math, blueprint reading inspection, and knowledge of machining and manufacturing while producing quality products that meet customer specifications
- Work in a safe and efficient manner
- Demonstrate knowledge of drafting and blueprint reading
- Apply CAD software to develop basic architectural, civil, and mechanical drawings
- Understand best practices related to architectural, civil, and mechanical designs
- Engage in professional dialogue to effectively convey and receive technical information

METHODS OF ATTAINING THE OBJECTIVES OF THE PROGRAM

WDT will provide students with skill-based development in classroom and lab settings on the WDT campus. The classroom and lab instruction will be augmented with guest speakers and other experiences that will prepare students for the workforce.

As with all WDT programs, a variety of services and support are available to students in the Drafting and Machining Technology program. This includes expanded tutoring and office hours provided by full-time program faculty and at WDT's Academic Success Center. Access to current technical reference materials and resources is available via WDT library services.

The Drafting and Machining Technology program will work closely with an industry advisory board composed of representatives who are from drafting and machining businesses and others in the field. The Advisory Board will approve the curriculum, discuss and recommend equipment purchases, and assist in forming partnerships to help WDT with innovative curriculum, internships, and presentations.

As indicated in the letters of support that accompany this proposal, industry is supportive of this program expansion. Future employers of program graduates have stated this program is necessary because they want employees who have skills in multiple technical areas. This program will meet that need. Graduates with skills to serve industry as a computer-aided drafter and machinist will be more flexible and more valuable to their employers. In addition, adding general education courses will provide students with the additional math, English, and communication skills employers are seeking.

The program will include classroom and laboratory instruction, guest speakers, and internship opportunities.

The Drafting and Machining Technology program will work closely with an industry advisory board composed of representatives who are from manufacturing and drafting businesses and

others in the field. The Advisory Board will approve the curriculum, discuss and recommend equipment purchases, and assist in forming partnerships to help WDT with innovative curriculum, internships, and presentations.

POPULATION SERVED BY THE PROGRAM

The Drafting and Machining Technology program will be available to all interested individuals who successfully meet the WDT admissions criteria established for the program. The program will be open to full-time and part-time students. All applicants must be high school graduates and take an admissions test to establish reading, writing, and math abilities. No restriction will be made regarding race, creed, gender or age. The program will draw students primarily from South Dakota. The opportunities for employment in the field will be primarily in western South Dakota.

The program also will appeal to people already in the workforce who have a diploma in one of these fields and are seeking additional training so they can increase their skills level and become prepared for additional job opportunities in these growing career fields.

PROJECTED THREE-YEAR BUDGET

This program will be staffed by current WDT instructors. Adjunct instructors with industry experience may be used to teach some courses. The projected budget is as follows:

Expenses	Year One	Year Two	Year Three
Instructors	\$10,000	\$10,000	\$10,000
Equipment	\$0	\$0	\$0
Supplies	\$10,000.00	\$10,000.00	\$10,000.00

PROGRAM COMPETENCIES AND ENTRY AND EXIT POINTS

Entry point: Fall Semester

Exit point: After completion of all coursework

Job titles: See Appendix A

STATEMENT OF NON-DUPLICATION

Western Dakota Tech is proposing this program to meet regional industry needs for technicians skilled in both drafting and machining. While there are other machining-related and drafting-related programs in South Dakota, there are no programs that combine these two fields.

CURRICULUM DESIGN

See Appendix B for Curriculum Sequence.

WAGE FACTOR

See Appendix A

SUGGESTED CIP CODE

WDT will use the CIP Code for Machine Tool Technology/Machinist for this program because WDT expects more graduates to enter that field after graduation from the program.

48.0501 **Machine Tool Technology/Machinist.** A program that prepares individuals to apply technical knowledge and skills to plan, manufacture, assemble, test, and repair parts, mechanisms, machines, and structures in which materials are cast, formed, shaped, molded, heat treated, cut, twisted, pressed, fused, stamped or worked.

APPENDIX

- A. Wage factor and job titles
- B. Curriculum Outline
- C. Letters of Support

APPENDIX A

South Dakota Employment Projections 2010-2020 and Wage Data for Related Occupations

SOC	Occupational Title	2010 Base Number of Jobs	2020 Projected Number of Jobs	Percent Change	Average Annual Demand
17-3011	Architectural and Civil Drafters	300	305	1.7	6
17-3013	Mechanical Drafters	135	150	11.1	4
51-4041	Machinists	760	865	13.8	20

South Dakota Wage Estimates for SD, Rapid City, and West					Percentile				
AREA	SOC CODE	Occupation	Workers	Avg. Wage	10 th	25 th	50 th	75 th	90 th
Statewide	17-3011	Architectural and Civil Drafters	270	18.17	13.50	15.32	17.67	20.93	23.46
Rapid City MSA	17-3011	Architectural and Civil Drafters	60	17.94	13.52	15.28	17.69	20.61	22.82
West	17-3011	Architectural and Civil Drafters	20	14.35	12.54	13.14	14.14	15.15	17.33
Statewide	17-3013	Mechanical Drafters	140	18.11	14.18	15.91	17.81	20.53	22.80
Rapid City MSA	17-3013	Mechanical Drafters	N/A	19.06	14.25	16.84	19.71	21.93	23.25
West	17-3013	Mechanical Drafters	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Statewide	51-4041	Machinists	760	17.35	13.24	15.19	17.17	19.38	22.23
Rapid City MSA	51-4041	Machinists	70	17.61	14.15	15.66	17.23	18.82	22.31
West	51-4041	Machinists	N/A	N/A	N/A	N/A	N/A	N/A	N/A

United States Employment Projections 2010-2020 and Wage Data for Related Occupations

SOC	Occupational Title	2010 Base Number of Jobs	2020 Projected Number of Jobs	Percent Change	Average Annual Demand
17-3011	Architectural and Civil Drafters	92,700	95,700	3.2	20,900
17-3013	Mechanical Drafters	67,400	74,900	11.1	20,500
51-4041	Machinists	370,400	401,900	8.5	99,500

Wage Estimates for United States				Percentile				
SOC	Occupational Title	2012 Workers	Avg. Wage	10th	25th	50th	75th	90th
17-3011	Architectural and Civil Drafters	83,410	24.30	15.31	18.72	23.01	28.79	35.60
17-3013	Mechanical Drafters	63,220	25.61	15.72	19.28	24.21	30.31	37.96
51-4041	Machinists	388,370	19.65	11.70	14.97	18.99	23.53	28.75

APPENDIX B

First Semester		Credits
MATH104	Technical Math	3
MACHXXX	Machine Shop Procedures	3
MACHXXX	Turning Theory and Operation I	3
MACHXXX	Milling Theory and Operation I	3
MACHXXX	Mechanical Blueprint Reading	3
CIS105	Microcomputer Software Applications	3
	TOTAL CREDITS	18
Second Semester		Credits
PSYC103	Human Relations in the Workplace	3
ENGL201	Technical Writing	3
MACHXXX	Materials Applications	3
MACHXXX	Turning Theory and Operations II	3
MACHXXX	Milling Theory and Operations II	3
MACHXXX	Applied CAD Fundamentals	3
	TOTAL CREDITS	18
Third Semester		Credits
MATH100	Elementary Algebra	3
CAD101	Drafting Fundamentals	3
CAD132	Introduction to 2D CAD	3
CAR216	Blueprint Reading	3
ECON202	Principles of Macroeconomics	3
	TOTAL CREDITS	15
Second Semester		Credits
CAD111	Architectural Drafting I	3
CAD140	Advanced 2D CAD	3
CAD214	Introduction to Civil Drafting	3
CAD232	Mechanical Principles	3
CAD255	Introduction to 3D CAD	3
	TOTAL CREDITS	15

APPENDIX C



SOUTH DAKOTA ASSOCIATION

OFFICE OF THE
EXECUTIVE VICE PRESIDENT
ken.phcc@midconetwork.com

OF PLUMBING • HEATING • COOLING CONTRACTORS, INC.

(605) 271-7255 • 1-800-640-7422 • 1000 N. WEST AVE. #200 • SIOUX FALLS, SD 57104

February 4, 2013

Mr. Mark Wilson, President
Western Dakota Tech
800 Mickelson Drive
Rapid City, SD 57703

Dear Mr. Wilson,

The South Dakota Association of Plumbing, Heating, Cooling Contractors is interested in a possible HVAC and Plumbing Technology Associate Degree Program to be offered by Western Dakota Tech.

The South Dakota PHCC represents about 70 contractor members in South Dakota and Sioux City, Iowa. Our members range in size from 150 employees to two or three employees.

Our members constantly seek qualified applicants and cannot find sufficient candidates to meet the demand. Some of our members have to actively recruit employees from out-of-state technical schools. Contractors in the Black Hills region would certainly welcome an appropriate training program in western South Dakota. Our industry is also facing a chronic, growing shortage of qualified professionals who have obtained appropriate training.

We offer this letter of support, and we offer an extensive apprenticeship program for students who want to advance their career once they've completed a formal HVAC and Plumbing Associate Degree Program curriculum. We would further help with guest speakers and supplemental information for the program and its students.

Thank you for your efforts to advance the p-h-c industry. We look forward to the development of this program.

Sincerely,

Ken Melius
Executive Vice President

Action Mechanical, Inc.

PLUMBING • HEATING • SHEET METAL • AIR CONDITIONING

1856 Lombardy Drive • P.O. Box 880
Rapid City, SD 57709-0880

Phone: (605) 348-5212
Fax: (605) 348-6984

February 4, 2013

Mr. Mark Wilson, President
Western Dakota Tech
800 Mickelson Drive
Rapid City, SD 57703

Dear Mr. Wilson,

Action Mechanical, Inc. of Rapid City is interested in a possible HVAC and Plumbing Technology Associate Degree Program to be offered by Western Dakota Tech.

Action Mechanical is one of the largest employers of mechanical professionals in the Black Hills area. We are constantly seeking qualified employees in plumbing and HVAC specialties. Contractors in the Black Hills region would certainly welcome an appropriate training program in western South Dakota. Our industry is also facing a chronic, growing shortage of qualified professionals who have obtained appropriate training.

We offer this letter of support, and we offer an extensive apprenticeship program for students who want to advance their career once they've completed a formal HVAC and Plumbing Associate Degree Program curriculum. We would further help with guest speakers and supplemental information for the program and its students.

Thank you for your efforts to advance the p-h-c industry. We look forward to the development of this program.

Sincerely,



Missy Sheesley-Johnson
President



WOLFF'S PLUMBING & HEATING, INC.

614 South 32nd Street - PO Box 97 - Spearfish, SD 57783
Ph - (605) 642-5755 - Fax - (605) 642-5757

February 7, 2013

Mr. Mark Wilson, President
Western Dakota Tech
800 Mickelson Drive
Rapid City, SD 57703

Dear Mr. Wilson,

As a Black Hills area business and employer, we are interested in a possible HVAC and Plumbing Technology Associate Degree program offered by Western Dakota Tech.

As a mechanical contractor, we employ many plumbing and HVAC professionals who work on large commercial projects or who provide services to individual residential customers. The plumbing and HVAC industries are fast-changing industries with constant technical changes requiring educated and well-trained employees who can master these disciplines.

We are always seeking qualified employees, and employees who have received formal training and education are an asset to our business. The P-H-C industry faces a critical shortage of trained employees entering our industry—both locally and nationally. We support efforts to increase structured training in our geographic area, there are currently no local programs to formally train those students who want to become plumbing or HVAC professionals. These skills are in high demand. Job security, plus pay and benefits, are above average for these professionals.

I hope this plumbing and HVAC program can be developed and our company would support your efforts to inform policy makers and the public of the great career opportunities available to graduates of your program.

Thank you.

Sincerely,



Greg Hartman
President