

# Welding & Manufacturing Technology *Program Proposal*



Presented to the South Dakota  
State Board of Education  
January 2012  
For Implementation  
Fall 2012



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



**New Program Proposal:           Welding & Manufacturing Technology**

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

**Number of Students:            24**

**Projected Start Date:           Fall of 2012**

**Executive Summary:**

It is the intent of Mitchell Technical Institute to offer the Welding & Manufacturing Technology program for an Associate of Applied Science Degree beginning the fall of 2012. Students will develop skills in the smooth and efficient production of quality welded and metal fabricated products.

Welders may work in a wide variety of industries; however, according to the Occupational Information Network, about two out of three jobs in this occupation are in the manufacturing industries. This data is supported by South Dakota manufacturing industries as well, and the program proposal is experiencing tremendous support by local manufacturers. Mitchell Technical Institute has collaborated with a number of manufacturing companies in Mitchell, Huron and Yankton in the development of the program and has worked to incorporate some of their welding standards into the new program curriculum. These industries will also be able to support the program to some extent by providing metal waste from their manufacturing processes that our program will be able to use for training, thereby helping to reduce the cost for expendables significantly.

The objectives of the program are to enable the student to meet entry-level requirements for employment and build a basis for further study and for lifelong learning in the metal working trades. Students will study both the theory and practice of a variety of welding processes. The skills they learn will encompass not only the manual skills required for welding, but the understanding of LEAN and other manufacturing processes. Students will gain a basic knowledge of robotics programming and a fundamental understanding of the companion skill of machining, plus the ability to read blueprints and to lay out and prepare metal for cutting and fabrication. Students enrolled in the program will be afforded the opportunity to receive the NCRC Certification, AWS Certification, and LEAN Certification.

# Mitchell Technical Institute

## Application Overview

**Program Title: Welding & Manufacturing Technology**

**Number of Students: 24**

**Projected Start Date: Fall of 2012**

## Identification and Description of Program:

Welders are skilled crafts persons who like to work with their hands. A welder can find work almost anywhere from a local shop to the largest industrial complex in large cities. This program will provide the opportunity for students to take classes that will enable them to meet entry-level requirements for employment and build a basis for further study and lifelong learning in the metal working trades.

Students will study both the theory and the practice of shielded metal arc welding, oxyacetylene welding, gas tungsten arc welding, gas metal arc welding and flux cored arc welding. Technical aspects of the above processes will be taught with emphasis on plate and pipe welding of mild steel, stainless steel and aluminum.

The program will include electrical theory of electrical circuits and components. Students will use this knowledge to design and build relay ladder logic and programmable logic circuits to simulate automated welding. Students will use their acquired electrical theory knowledge to troubleshoot welding power sources and accessories thus helping employers to reduce or eliminate future downtime caused by poor maintenance and equipment failure. Also, the students will have an overview of the robots used in the welding industry. Students will program robots to weld fixture parts using GMAW process.

## Objectives and Purpose of the Program:

The program will be dedicated to offering students the experience and overall education to become a successful Welding Technician. This program will provide attention to professionalism and communication skills, as well as the important mastery of technical skills.

General program objectives:

- Set-up and operate a welding power source
- Weld on various types and thicknesses of materials

- Weld in all positions
- Weld a test coupon in accordance to a written welding procedure which will pass the requirements of the specified welding code
- Weld with various non-traditional welding processes
- Interpret welding symbols
- Interpret shop drawings
- Set-up and operate manual and CNC metal cutting equipment
- Set-up and operate manual and CNC fabrication forming equipment
- Set-up and operate CNC contour cutting equipment
- Build products, from shop drawings, acceptable to industry standards
- Fabricate and repair parts using thermal cutting equipment
- Determine costs of welding
- Analyze best practice of weld design
- Understand electrical safety and theory as it relates to the welding industry
- Write welding procedures
- Qualify weld tests
- Write weld test reports
- Understand the metallurgy of welding
- Develop a working knowledge of welding alloys
- Program a robotic arc welding cell

## Methods of Attaining the Objective 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, arrange classrooms, develop schedules, secure resource materials, and interview staff to hire.

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
- Provide tutoring for students needing extra academic help
- Provide access to library materials and computer labs
- Develop and administer budgets
- Make available textbooks and other instructional resources
- Provide career and personal counseling to students
- Evaluate programs and staff
- Assist students in finding jobs
- Secure input from industry through advisory committees
- Maintain membership in professional organizations and provide time and fiscal resources for professional development
- Provide financial aid and scholarships

- Provide a typical two-year technical institute climate
- Assist students with housing and provide daytime food service
- Provide services to disabled and nontraditional students
- Provide classrooms and laboratories
- Provide a variety of general education courses

## Description of Labor Market Demand:

According to Ray Shook, the executive director of the American Welding Society, for the past few years, the metal fabrication and construction industries have faced a challenge in finding skilled welders. With approximately 500,000 welders in the workforce, the average welder today is in his or her mid-50s and nearing retirement. With welders retiring at twice the pace of new welders coming into the field, it's anticipated that in the years to come, we will have a significant shortfall of qualified welders. Since welding is the most common way to join metals—which is critical to manufacturing, construction, energy and infrastructure—it is vital to rebuild our welding workforce. Recently, a survey was taken of manufacturers in Yankton, Mitchell and Huron and they are currently short 250 welders and anticipate that number to be over 500 within two years.

Automation will affect welding positions and welding machine operations. Semi-automated or automated welding machines can be used for many types of welds but welders still will be needed to operate the machines and to inspect the weld and make adjustments. In addition much of the work in custom applications is difficult or impossible to automate.

Job prospects will vary with welder's skill level. Prospects will be good for welders training in the newest technologies. Welding schools report that graduates have little difficulty finding work, and many welding employers in South Dakota report they have difficulty finding properly trained welders.

**South Dakota Employment Projections  
for Occupations for which Postsecondary Education and Related Work Experience,  
or Long-term On-the-job Training is Recommended  
and with Higher-than-Average Projected Demand  
2008-2018**

<b>Occupational Title</b>	<b>2008 Base Number of Jobs</b>	<b>2018 Projected Number of Jobs</b>	<b>Actual Change</b>	<b>Percent Change</b>
Welders, Cutters, Solderers & Brazers	2200	2615	415	18.9%
Fabricated Metal Product Manufacturing	3355	3965	610	18.2%

Source: Labor Market Information Center, SD Department of Labor, December 2010

## 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 not only be targeted at traditional-age college students, but will also be appealing to career changers and older workers looking to change or enhance skills.

## Projected Three Year Budget:

	2011-2012	2012-2013	2013-2014
Salaries/Benefits	\$25,000	\$60,000	\$60,000
Equipment	\$582,180	\$5,000	\$5,000
Supplies	\$55,000	\$55,000	\$55,000
Travel	\$1,500	\$1,500	\$1,500
Marketing	\$2,000	\$2,000	\$2,000
Total	\$665,680	\$123,500	\$123,500

## Program Competencies and Entry and Exit Points:

Entry point will be the fall of 2012. MTI will offer all students the option to receive the 18 month Associate Degree. Students will also be provided the opportunity to exit after nine months with a diploma. 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 Nonduplication:

While this program does duplicate programs conducted by other technical institutes, it is deemed necessary in order to rapidly fill industry demands.

## Proposed Curriculum Design:

### First Semester Fall

Fabrication Techniques	3
Manufacturing Processes	3
Cutting Processes	3
SMAW Techniques I	3
OSHA General Industry Safety	1
Computer Applications	3
Math Elective	3
Student Success	1
	20 Credits

### Second Semester Spring

GMAW Techniques I	3
FCAW Techniques	3
Welding BPR & Symbols	3
Welding Metallurgy	3
Communications Elective	3
Social Science Elective	3
	18 Credits

### Third Semester Fall

SMAW Techniques II	3
GMAW Techniques II	3
GTAW Techniques	3
Welding Codes & Testing	3
Welding Processes, Design, & Costs	3
Psychology	3
	18 Credits

### Fourth Semester Spring

Weldability of Materials	3
Welding NDE	3
Robotic Welding	3
Electrical Theory & Maintenance of Welders	3
Internship	6
	18 Credits

### Electives

Fabrication Techniques II	2
Pattern Drafting Processes	2
Manufacturing Enterprise	2

## Wage Factor:

Mean wage estimates for this occupation in South Dakota:

<b>Occupational Title</b>	<b>Median</b>	<b>Mean</b>	<b>Mean Annual</b>
Welders, Cutters, Solderers & Brazers	\$14.53	\$14.84	\$30,870
Welding, Soldering, Machine Setters, Operators & Tenders	\$15.47	\$15.41	\$32,050

Source: South Dakota Wage Information

## CIP Code 15.0614

Welding Engineering Technology/Technician.

Definition: A program that prepares individuals to apply basic engineering principles and technical skills to the design and engineering of welding and joining systems and the implementation of welding processes. Includes instruction in materials science; computer-aided design; welding design; welding processes; welding metallurgy; automation and robotics; and codes, inspections, testing, and quality assurance.

# Appendix A



Date: 12/5/11

Mitchell Technical Institute  
Attn: Greg Von Wald, President  
1800 E. Spruce St.  
Mitchell, SD 57301

Dear President Von Wald:

This letter is in support of your efforts to develop a welding and manufacturing program at MTI.

Hendrickson has been part of the Mitchell community for almost 25 years. We manufacture trailer suspension systems for the heavy duty (class 8) trailer industry. We ship to over 300 different customers around the country and world including India, Australia, Japan, Mexico, and Canada. We also have numerous customers in the states surrounding South Dakota with two good customers right in Mitchell---Trail King and Dakota Manufacturing. We focus on providing suspension solutions for whatever trailer application the customer needs. We currently employ 108 employees with almost half of them being skilled welders. We work a first shift and a skeleton crew on a weekend shift so we have the equipment to double our volume.

Hendrickson has had difficulty over the past few years finding trained welders and those with skills needed in the manufacturing process. We are one plant out of five in the Hendrickson Trailer Division. In 2009, Hendrickson closed one of its plants in Canton, Ohio and moved those product lines to their other locations. We in Mitchell picked up about 30% more volume. Tie that in with our increased market share and our customer's growth, we have seen extraordinary growth. 2010 was up 90% over 2009; 2011 is going to end up about 70% over 2010. 2012 is expected to continue to be up another 10 - 20% with our 5-year projections being all positive growth.

Our company is in a growth mode and without more skilled entry level workers, the jobs created at Hendrickson will not be in South Dakota. We have already moved some product lines this year to another plant due to not enough skilled labor in Mitchell. As MTI is a prime provider of trained workers for industry in Mitchell and the James River Valley, we would support any efforts on MTI's part to develop a welding and manufacturing program that will provide us with workers. We believe that in the next two years, we will need approximately 30-40 new employees that have the general skills that this program will teach. Starting salary depends upon the skills and experience of the individual, but generally a starting salary for a trained entry level worker would be in the range of \$35,000 - \$40,000 per year.



The specific skills needed for our workers consist of welding, metal cutting and fabrication, CNC programming, blue print reading, and layout. We would be willing to partner with MTI in the development of the curriculum and defining the specific skills we are looking for in entry level employees. We currently partner with technical schools in other states in an effort to find welders. We would much rather find those people locally.

The development of this program is long overdue and we applaud your efforts to make this program a reality and will support you however we can in making it a reality.

Sincerely,

A handwritten signature in black ink that reads "Steve Limberg". The signature is written in a cursive, flowing style.

Steve Limberg  
[H] Mitchell Business Unit Manager



Address: 640 ARIZONA AVE NW  
HURON, SD 57350  
Phone Number: 605-352-1057  
Fax Number: 605-352-3989  
Email: [gary.beilke@hmmi-huron.com](mailto:gary.beilke@hmmi-huron.com)  
Website: [www.hmmi-huron.com](http://www.hmmi-huron.com)

December 5, 2011

Mitchell Technical Institute  
Attn: Greg Von Wald, President  
1800 E. Spruce St.  
Mitchell, SD 57301

Dear President Von Wald:

As we have spoken about previously, we would strongly support the development of a welding and manufacturing program at your institution.

Horizontal Machining & Manufacturing Inc. is centrally located in eastern South Dakota; specifically, Huron. We have built a modern 65,000 sq. ft. manufacturing facility with state of the art welding robots and cnc machining centers. HMMI uses all the newest software and manufacturing techniques to supply our customers with the best possible quality and cost in the industry. All dependent on a highly skilled work force to run and maintain.

For a number of years now, HMMI has had difficulty in finding trained welders, machinists and others skilled in the manufacturing processes we need. We are now faced with an expanded need for more workers because of a dramatic increase in business orders and this shortage of trained workers is preventing us from reaching our business potential. As MTI is a prime provider of trained workers for the Huron area, we would request that you expedite the development of a welding and manufacturing program that would help solve the trained worker problem for our company and others in the area.

The specific skills needed for our workers consist of welding, metal cutting and fabrication, machining, LEED concepts, CNC programming, blue print reading and layout. While it would be beneficial to have students AWS certified, we must do company certifications to comply with ISO processes anyway, so this certification is not critical to the success of the student.

We believe that in the next two years, we will need 20 new employees that have the general skills that this program will teach. Starting salary depends upon the skills and experience of the individual, but generally a starting salary for a trained entry level worker would be in the range of \$14.30 to \$20.00.

Again, we support your efforts to start this program and stand ready to help guide you in the program development.

Sincerely,

A handwritten signature in black ink that reads 'Gary Beilke'. The signature is written in a cursive, flowing style.

Gary Beilke  
President of Operations



# TRAIL KING Industries, Inc.

300 East Norway Avenue  
Mitchell, SD 57301  
Fax: (605) 996-4727

2130 3rd Avenue NW  
West Fargo, ND 58078  
Fax: (701) 282-3039

December 2, 2011

Greg Von Wald  
Mitchell Technical Institute  
821 N. Capital  
Mitchell, SD 57301

RE: Welding Programs

Dear Mr. Von Wald:

I am the Director of Manufacturing at the Mitchell plant for Trail King Industries and am providing this letter in support of Welding Programs at MTI.

Trail King Industries is a leader in the manufacturing of specialized trailers. We were devastated by the national economic recession losing approximately 300 employees in the Mitchell area due to layoffs. Trail King has not yet recovered from the loss of our skilled labor force and continues to struggle to meet the increasing demands for our product. Not only does Trail King plan to hire back to the original numbers, we have an opportunity to double the size of the company. Trail King would hire an additional 200 trained welders today if we could find them.

Due to the lack of skilled welders in the local area, Trail King has found it necessary to recruit welders from all over the United States as well as from technical schools that offer a welding degree. Trail King has hired approximately 41 welding graduates from Tulsa Weld School in Tulsa, Oklahoma. However, retention of these employees has been a challenge due to the workers being displaced from their extended families. The financial impact of hiring, relocating, training and replacing employees has taken its toll on our bottom line. Trail King prefers to hire locally.

Welding is a respectable trade and can provide a stable income for residents of Mitchell and the surrounding communities. Partnering with MTI will raise awareness and provide great opportunities for high school graduates to obtain a degree with numerous job opportunities in the community upon graduation. Trail King Industries is currently working on a recruitment plan for high school seniors that will be extremely attractive to Mom and Dad's pocketbook as well as providing strong support to MTI. The chart below indicates what a graduate from the proposed MTI welding program could expect to earn with a career at Trail King Industries:

<u>Welder Type</u>	<u>Hourly Rate</u>	<u>*Annual Earnings</u>
New	\$14	\$39,000
Experienced	\$17	\$47,000
Senior	\$24	\$65,000

\*Calculation includes average overtime and annual bonus.

Trail King has at least three welding programs that we would like for you to consider. We would like to set up a meeting to discuss these with you as soon as practical.

Sincerely,

Ed Thompson  
Director of Manufacturing  
Trail King Industries, Inc.



555 Lincoln Avenue NW  
Huron, South Dakota 57350  
Tel: (605) 352-5283  
Fax: (605) 352-7141

December 7<sup>th</sup>, 2011

Mr. Greg Von Wald, President  
Mitchell Technical Institute  
1800 East Spruce Street  
Mitchell, South Dakota 57301

RE: Metal Fabrication/Welding Program

Dear President Von Wald,

We would like to offer this Letter of Recommendation on behalf of Trussbilt, the leading manufacturer of security and detention equipment in the US; and also as a founding member of the Huron Manufacturer's Group, to the Mitchell Technical Institute for their new Metal Fabrication and Welding program.

As a manufacturer of steel-related components for the security and detention industry, it is vitally important that we employ highly skilled metal workers specifically metal fabricators and welders. We cut, form and weld all types of steel (Hot-Rolled, Stainless Steel, Lead, and Aluminum) frames, doors, wall panels, and ceiling products. These products are used to keep some of the most violent criminals in the world incarcerated at jails and prisons all over the world. If a weld on one of our products does not meet the ASTM standards set forth in the product specifications, or a product is formed out of tolerance, it could lead to a criminal escaping from one of these facilities, and Trussbilt could be held liable. This risk for liability brings to light the importance of having a pool of skilled metal fabricators and welders available to hire at Trussbilt. However, more often than not, Trussbilt can not find these skilled workers and are forced to look out into the pool of unskilled workers to find potential candidates that we can provide with the skills to be successful. But, the need for in-house training is becoming a task that we as a company, and as a group of manufacturer's in Huron, can no longer tackle ourselves due to the demands for our products. We must now seek an outside source to provide these skilled workers, as our trainers have to be workers now, and we feel this new program at Mitchell Technical Institute can fill that void.

That is why today, we have the great pleasure of recommending to the State Board of Education that Mitchell Technical Institute be given the opportunity to start a metal fabrication and welding program for the 2012-13 school year. The need for metal fabrication workers or welders is not just a Trussbilt problem, or a Huron Manufacturers Group problem, but it is a statewide problem. There are metal manufacturers all across our state in need of more skilled workers especially in the areas of metal fabrication and welding.

If you have any questions or would like to discuss this recommendation in more detail, please do not hesitate to call or email anytime.

Sincerely,

A handwritten signature in black ink that reads 'Eric Christensen'.

Eric Christensen  
VP – Finance & Administration

Direct: (605) 554-2113  
Email: [echristensen@trussbilt.com](mailto:echristensen@trussbilt.com)