

# Assessing Demand and Training for Welders in the Southeast Wisconsin Region



*Photo: Milwaukee Area Technical College/Sue Ruggles*

*Prepared by the University of Wisconsin-Milwaukee Employment and Training Institute  
for the WOW Workforce Investment Board, Inc. and the Regional Workforce Alliance*



*Photo: Gateway Technical College/Mark Uttech*

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# **Targeted Survey of Welder Job Openings and Anticipated Needs in Southeast Wisconsin**

## **Background**

Under contract with the Waukesha-Ozaukee-Washington (WOW) Workforce Development, Inc., the University of Wisconsin-Milwaukee Employment and Training Institute conducted a targeted survey of welder job openings and anticipated needs among fabricated metal product manufacturing firms and other large manufacturing employers in the seven-county region of Southeast Wisconsin. The primary survey population was identified by the Regional Workforce Alliance and WOW Workforce Investment Board staff to include fabricated metal product manufacturing firms employing 20 to 249 workers. Based on the last five years of job openings surveys, the Employment and Training Institute proposed to add all manufacturing firms employing 250 or more workers, along with all companies who had reported job vacancies for welders in the UWM Employment and Training Institute-Private Industry Council annual job openings surveys, companies identified by the technical colleges as employing workers trained in welding, and firms listing current job openings on internet sites.

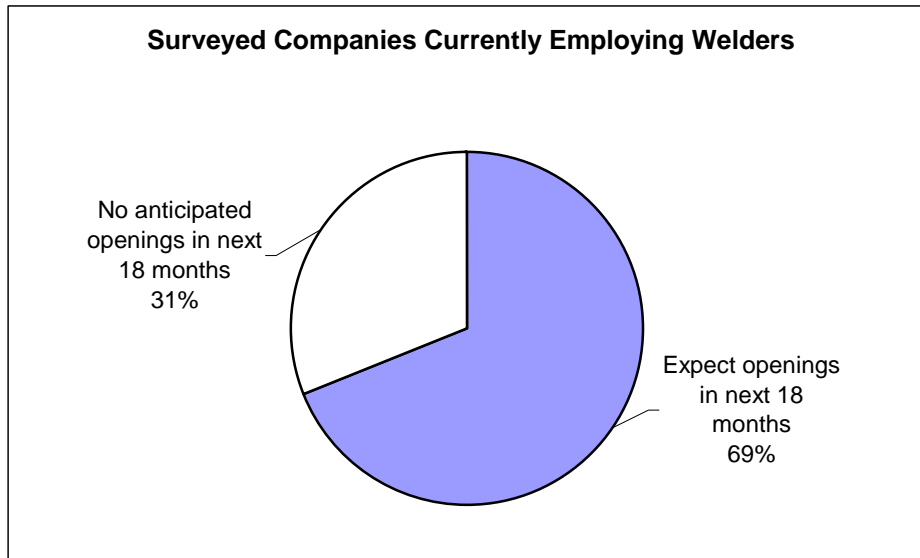
The Employment and Training Institute developed a survey instrument to solicit information on metal fabrication worker job openings and anticipated future need and to identify requirements and competencies needed for welding positions available. The four technical colleges were consulted in preparation of the matrix used in the survey. Information was also solicited on skill and experience gaps of current applicants for welder/fabricator openings and their incumbent workforce. The survey allowed for open-ended additions and observations from each company on perceived instructional and experience gaps of job applicants and incumbent workers. Employers were also asked about their interest in training and location/delivery preferences for such training.

The survey was introduced by the presidents of the four technical colleges serving the seven-county Southeast Wisconsin: Bryan D. Albrecht of Gateway Technical College, Darnell E. Cole of Milwaukee Area Technical College, Gayle Hytrek of Moraine Park Technical College, and Barbara Prindiville of Waukesha County Technical College. Companies were asked to document their current and anticipated demand for welders and the skills they expected from new employees. Each company was provided a one-page survey form requesting data on their present welder employees; anticipated demand for welders and metal fabricators (by job title) for the period from November 2007 through June 2009; type of certification, education or training required; skill gaps for present welder applicants; and their need for training of their current welder workforce and preferred location for such training.

## **I. Companies' Anticipated Demand for Welders**

**Seventy-two companies in the Southeast Wisconsin, currently employing 1,282 welders, reported their anticipated welder hiring needs for the next 18 months.**

- Two-thirds (69%) of the companies reported that they would be hiring new welders or replacement workers, while slightly less than a third (31%) expected no hires.



Eighteen companies reported current openings for 56 welders as of November-December 2007.

*Categories of welders were identified based on the official American Welding Society (AWS) definitions of the processes: Gas Metal Arc Welding – GMAW (previously known as Metallic Inert Gas-MIG), Gas Tungsten Arc Welding – GTAW (previously known as Tungsten Inert Gas-TIG), and Flux Cored Arc Welding-FCAW.*

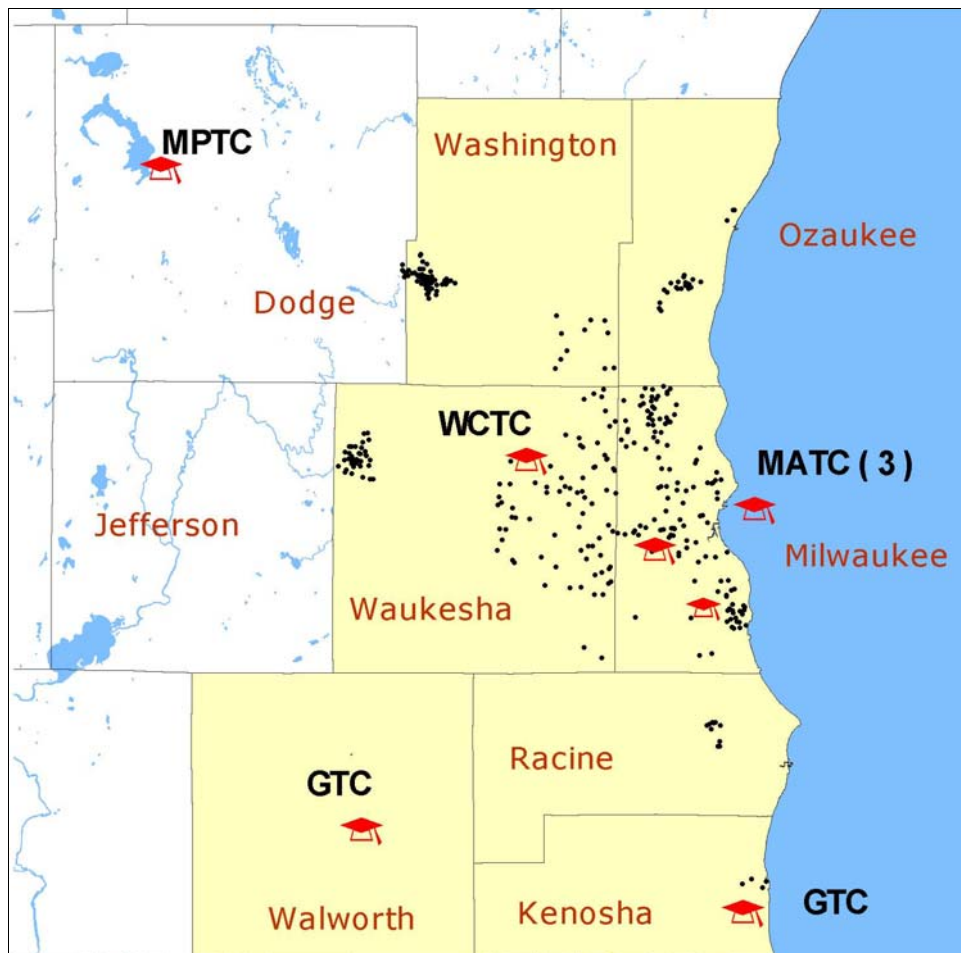
- Current welding openings included jobs for 19 MIG welders, 7 set-up welders, 6 TIG welders, 5 welder fabricators, 5 MIG/TIG/flux cored arc welders, 4 flux cored arc welders, 3 spot welders, 3 production welders, 2 MIG/TIG welders, 1 finish welder, and 1 certified welding inspector.
- Most of the openings were located in Waukesha, Washington and Milwaukee counties.

Fifty companies reported that they anticipate hiring welders during the next 18 months and completed a matrix identifying the type of welders needed by time period.

- Most companies provided a range of openings they might need in the next 18 months, and **these estimates were between 281 and 394 openings.**
- For the matrix of welders needed by type (completed by all but 2 companies), **firms reported specific estimated need for 370 welders.**

### Location of Current (Nov. 2007-June 2008) Job Openings for Welders

*Graduation caps show the technical college campuses with welding programs.*



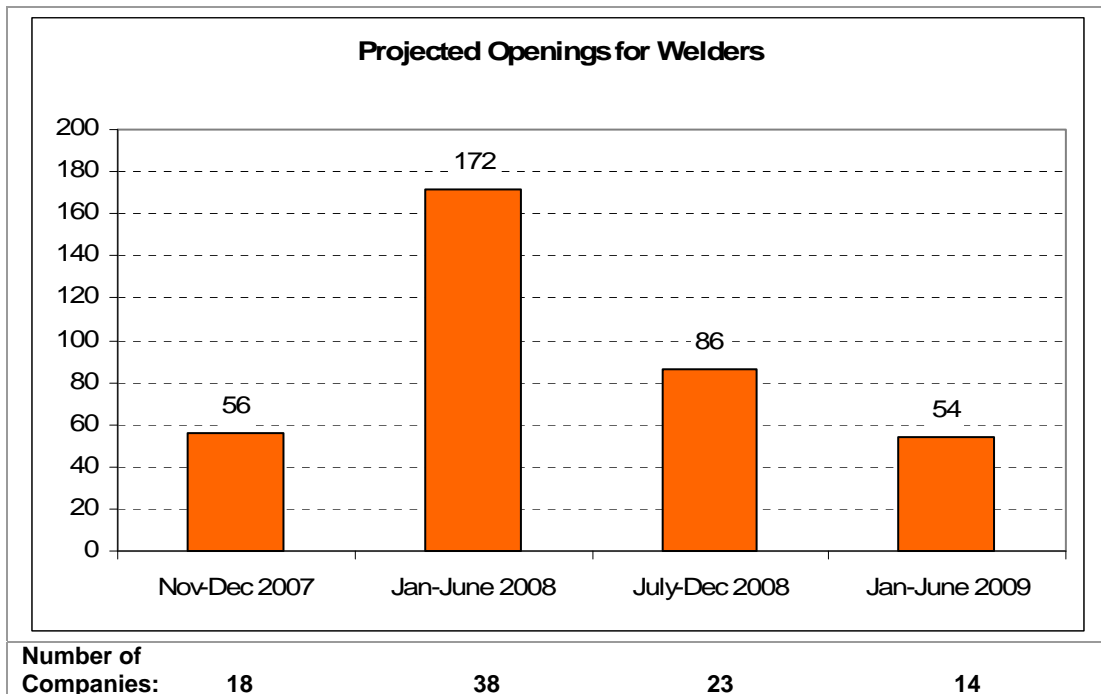
Source: Fifty companies reporting their hiring needs for welders projected from November 2007 through June 2009. **Targeted Survey of Welder Job Openings and Anticipated Needs in Southeast Wisconsin.**

In the first six months of 2008 (January-June), 38 companies anticipate demand for 172 welder hires.

- Expected openings were for 63 MIG welders, 25 flux cored arc welders, 20 TIG welders, 11 welder fabricators, 10 MIG/TIG/flux cored arc welders, 8 welder fitters, 4 production welders, 3 spot welders, 3 MIG/TIG welders, 2 MIG/flux cored arc welders, 2 plate and weld inspectors, 2 pipe welders, 2 MIG/TIG/welder fabricators, and 1 welder burner.

Fewer companies reported their job needs beyond the next six months.

- Of the 50 companies reporting anticipated openings within the next 18 months, 90% reporting openings for welders in the period from November 2007 through June 2008, but only half projected openings beyond June 2008. Consequently, the lower anticipated need for welder hires from July 2008 through June 2009 may indicate lower expected need as well as companies unable or unwilling to anticipate openings that far into the future.

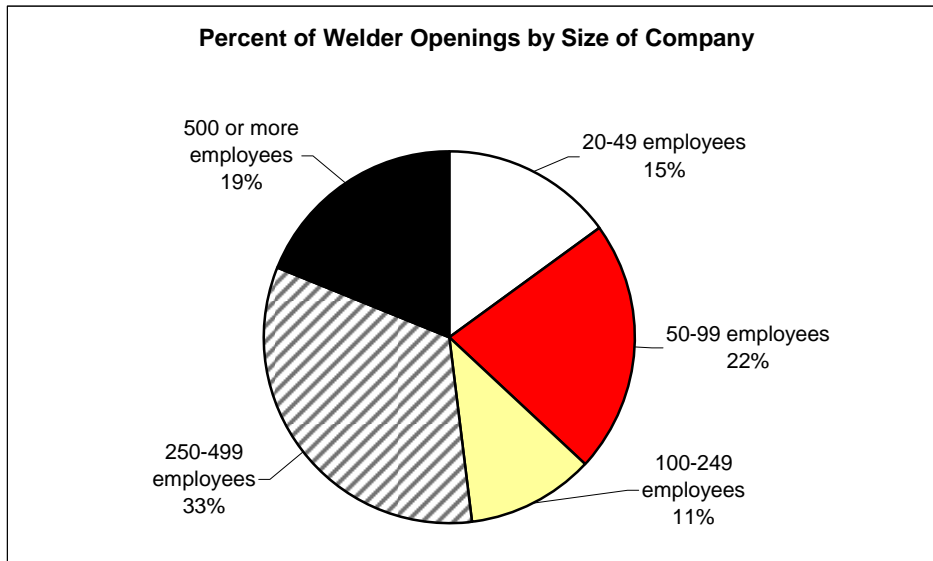


- In the next year (from July 2008 through June 2009) companies are anticipating hires of more than 50 flux cored arc welders, including anticipated openings for 39 flux cored arc welders, 12 openings for MIG/TIG/flux cored arc welders, and 2 openings for MIG/flux cored arc welders.

### Anticipated Openings for Welders through June 2009

<b>Anticipated Openings</b>	<b>Nov-Dec 2007</b>	<b>Jan-June 2008</b>	<b>July-Dec 2008</b>	<b>Jan-June 2009</b>	<b>TOTAL</b>
MIG welder	19	63	16	12	110
Flux cored arc welder	4	25	20	19	68
TIG welder	6	20	13	4	43
Set up welder	7	16	6	4	33
Welder fabricator	5	11	7	7	30
MIG/TIG/flux cored arc	5	10	6	6	27
Welder fitter	0	8	2	0	10
Spot welder	3	3	3	1	10
MIG/TIG	2	3	2	3	10
Production welder	3	4	2	0	9
MIG/flux cored arc	0	2	0	2	4
Welder burner	0	1	1	1	3
Plate and weld inspector	0	2	1	0	3
Pipe welder	0	2	0	0	2
Finish welder	1	0	0	0	1
Other:	1	2	4	0	7
<b>TOTAL WELDERS</b>	<b>56</b>	<b>172</b>	<b>83</b>	<b>59</b>	<b>370</b>

- Over half of the anticipated openings reported for welders were with companies having 250 or more employees, while 37% were with companies employing less than 100 workers.



- Over the next 18 months the largest number of job openings for welders are expected to be in Milwaukee County (35% of anticipated openings), Waukesha County (30% of openings), and Washington County (22% of openings).

## II. Job Requirements for Welder Openings

Many of the anticipated openings for welders required or preferred certification.

### Examples of Certification Requirements Job Openings for Welders: November 2007 – June 2009

Job Title	Type of Certification, Other Experience, Education or Training Required
Flux cored arc welder	State certified, expect some growth.
Flux cored arc welder	Cert. training ("WPS- FC5, FC6, FC7")
MIG welder	State certification in MIG and FCAW
MIG welder	Qualified (or capable of training) to AWS 1F, 2F, 3F, 1G, FE 7 ga + 10 ga
MIG welder	Certification program AWS D 1.3 welding code
MIG, TIG, welder fabricator	No certification required but it would be nice.
Plate and weld inspector	SCWI [AWS Senior Certified Welder Inspector] Certification
Production welder	GMAW all position, State of Wisconsin certified or demonstrated ability to pass tests.
Set up welder	State certification in MIG and FCAW
Set up, production, spot	Ability to certify to: ASME IX, MIL-248D, NAVSEA 59074
TIG welder	We certify our GTAW welders in accordance with AWS D17.1. Welders must pass fillet and butt weld tests in 8 alloy groups.
TIG welder	Skilled TIG complex blueprint reading, ability to be code-certified in 6G, weld thin- wall tubing + pressure vessels.
TIG welder	Certified welders with experience in titanium, stainless, aluminum, etc.
TIG welder	Certification program AWS D 1.3 welding code
Welder burner	Cert. training and 5 additional certs.
Welder fitter	AWS certifiable

For many of the openings, 1 to 3 years of experience (or more) was needed.

### Examples of Experience Requirements Job Openings for Welders: November 2007 – June 2009

Job Title	Type of Certification, Other Experience, Education or Training Required
Finish welder	Previous experience TIG welding, 1-3 years, blueprint reading
MIG welder	Prefer 1-3 years experience
MIG welder	Aluminum MIG exp
MIG welder	Prior MIG experience, 1-3 years preferred
Open table welder	AWS with prototype part experience
Plate and weld inspector	Experience in weld MIG and TIG. Computer skills, read drawings.
Set up welder	Print reading and set-up skills , 10 years experience
Spot welder	Resistance welding complying to AMS-W-6B5B. We have found that training in house or recruiting from competitors is the only means of filling these positions.
TIG welder	Bench/fitter experience required
TIG welder	Experienced. Job shop TIG welding rather than production welding
Welder	Hire should be able to do MIG, TIG, welder fabricator, finish, spot, and open table welder.
Welder fabricator	Some welding experience, fork lift experience, grinder, arc-air experience
Welder fabricator	Nothing required but training or 1-2 years experience preferred
Welder fitter	Previous fitter experience preferred, 1-3 years experience, blueprint reading, previous state cert. also helpful

### **III. Companies Having Trouble Finding Qualified Applicants**

Companies employing welders were asked if they have trouble finding qualified applicants for their welder programs. A majority (85%) of companies with welder openings reported that they have trouble finding qualified applicants for welder programs.

- Two-thirds of the companies reported that job applicants **lacked specific experience or skills**. Among the experience and skills companies identified that “applicants should have but are missing” were:

- *At least one year of welding in a manufacturing setting, able to flux cored arc weld using 3/32 dia wire; weld 1” to 8” steel plates; weld in all positions; weld in confined spaces.*
- *TIG welding skills (stainless steel)*
- *TIG welders are hard to find - aluminum*
- *Thin-wall tube welding, high-quality TIG welds on SS.*
- *Ability to TIG weld steel (24, 22, 20 and 16 gauge), cosmetic appearance necessary; certification AWS D1.3 program*
- *Experience in MIG welding, experience in fabrications welding*
- *We require AWS certification for all positions with Open Table experience*
- *Certified welder inspectors (CWI)*
- *Qualified welders able to work with exotic materials under high loads.*
- *Welding with light-gauge materials*
- *We need welders capable of producing good welds, but also trained in identifying cause and effect of bad welds and procedures in remedying them through machine settings, etc.*
- *1/16" + 3/32" wire - multi-pass welds*
- *Need to be qualified for sanitary tubing/purged and willing to travel*

- A fourth of the companies with openings identified a need for welder applicants able to do blueprint reading and lay out jobs. Typical among the comments were the following:

- *We have a hard time finding experienced TIG welders who can read blueprints, lay out a job and fabricate it.*
- *Blueprint reading welding skills.*
- *Read blueprints, mechanical aptitude, knowledge of weld symbols.*
- *Blueprint reading - welding with light-gauge materials.*
- *Applicants from WCTC are great. Other applicants lack blueprint reading experience and formal welding experience.*
- *Blueprint reading - set weld machine to WPS and know why.*
- *Architectural quality welders, drawing interpretation.*

- Almost a fourth of companies with openings identified concerns with lack of work ethic among applicants. Among the good work habits identified were the following:

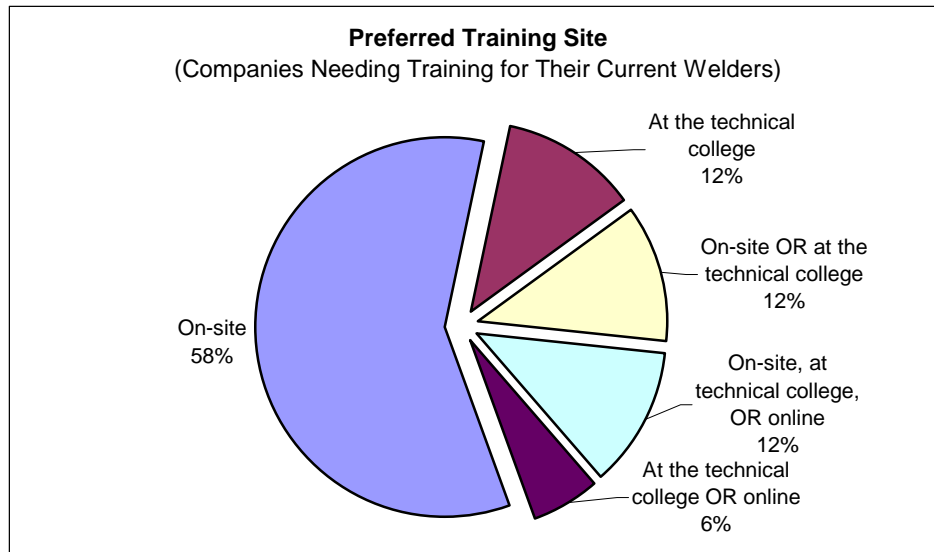
- *Strong work ethic*
- *Attitude, ability to show up for work.*
- *We need workers trained in arriving on time, ready to work, and who intend to be professionals in their work.*
- *Able to do quality work in an efficient manner and work 40 hours/week.*
- *Work ethic, solid job history.*
- *Basic math, basic reading/comprehension, average work ethic.*
- *Ability to show up every day on time, enthusiasm, drug and alcohol free.*
- *Ability to communicate in English, show up everyday.*

- Other concerns with the applicant pool included:

- *Not enough young people learning skilled trades.*
- *Math skills - geometry and trig.*
- *Set up skills -- cannot read basic measurements*

#### IV. Companies Needing Training for Welders They Currently Employ

Seventeen companies indicated a need for training for the welders they currently employ. Most companies preferred to have this training at their work site.



The following were listed as areas of training need for current workers.

- *MIG, TIG, Flux, production welding*
- *Aluminum wire welding*
- *Competence to pass a basic skills test for weld quality + weld.*
- *Weld symbols, weld defects, able to read fillet gauges, physical welding skill (technique)*
- *Refresher on GMAW basic to intermediate skills*
- *General weld test competencies*
- *Turnstyle welding flux cored/hardwire/set-up/print reading fabrication*
- *TIG welding training for newer, less experienced welders.*
- *MIG/TIG and print reading*
- *Various types of welds: MIG, stick, TIG on variety of materials*

## **V. Survey Methodology**

In December 2007 the Employment and Training Institute (ETI) administered the Welder Job Openings and Anticipated Needs Survey by mail to companies located in the seven counties of Southeast Wisconsin. The primary survey population was identified by the Regional Workforce Alliance and the WOW Workforce Investment Board staff to target small (20-49 employees) and mid-sized (50-249 employees) companies in the fabricated metal product manufacturing sector (i.e., with NAICS, North American Industry Classification System, codes 332xxx).<sup>1</sup> A second mailing was sent out to non-respondents. The response rate for this population (N=328 companies) was 39%.

In addition, the Employment and Training Institute proposed to examine the five prior years of job openings survey to identify sectors also likely to be hiring welders. All manufacturing establishments with 250 or more employees were added to the survey (N=66). Also added were companies who had reported job vacancies for welders in the UWM Employment and Training Institute-Private Industry Council annual job openings surveys, companies identified by the technical colleges as employing workers trained in welding, and firms listing current job openings on internet sites (N=29). With these additions, the survey population totaled 423, and the response rate was 41%.

In fact, the 66 large manufacturing companies added to the survey population by the Employment and Training Institute showed a 53% response rate. Of the 35 large company respondents, 17 companies reported that they currently employ 606 welders and 12 companies reported anticipated hires of up to 186 welders in the next eighteen months. The large manufacturing companies added to the survey accounted for almost half (47%) of anticipated welding jobs in the next 18 months.

**Note:** The targeted survey approach used for the Southeast Wisconsin welder survey differs significantly from the stratified sample methodology used for the annual job openings surveys administered by the UWM Employment and Training Institute (1993-2006). For the ETI annual job openings surveys methodology, all industrial sectors are surveyed, using a stratified selection process based on size and industrial sector. Weights are then used to estimate openings by sector and job titles. The last job opening survey conducted by the Employment and Training Institute for the week of May 24, 2006 for the seven-county region involved a sample of over 5,000 employers with surveys completed by 3,312 establishments. That survey reported 360 current openings for welders in the seven-county region in the week of May 24, 2006.

The December 2007 welding survey instrument and introductory letter are shown below.

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<sup>1</sup> Companies were asked to return the welder survey even if they did not employ welders and had no openings for welders, and 25 percent of 344 companies in the primary NAICS 332xxx sector survey sample reported no welders employed or expected to be hired.



Re: Southeast Wisconsin Welder/Metal Fabrication Manufacturing Survey

Dear Manufacturing Employer:

The four technical colleges and three workforce development boards in the 7-county Southeast Wisconsin region are working with manufacturers to increase the supply of qualified welders in welder/metal fabrication positions. While new programs are already being put in place, we need to document the current and anticipated demand for welders and the skills expected from new employees. We are requesting your cooperation in this effort by completing the enclosed survey.

This is an important opportunity for local companies to impact employment and training services provided in the region. Completing and returning the enclosed survey will ensure that your input is counted. The survey requests very brief data on your workforce and detailed information only for those welding and metal fabrication occupations in which you have current or anticipated job openings. The data will be summarized to identify the number and types of welder jobs available in southeastern Wisconsin.

**If you do not have any current or anticipated openings for welders, it is very important that you complete the first two questions and return the form.**

The University of Wisconsin-Milwaukee Employment and Training Institute is assisting us on this survey. If you have any questions please call ETI at (414)-227-3380 or email [eti@uwm.edu](mailto:eti@uwm.edu). Thank you very much for your cooperation.

Sincerely,

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Bryan D. Albrecht  
President  
Gateway Technical College

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Darnell E. Cole  
President  
Milwaukee Area Technical College

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Gayle Hytrek  
President  
Moraine Park Technical College

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Barbara Prindiville  
President  
Waukesha County Technical College

# 7-COUNTY SOUTHEAST WISCONSIN WELDER SURVEY

PLEASE RETURN BY DECEMBER 21, 2007

1. How many welders do you currently employ in southeast Wisconsin? \_\_\_\_ Please specify the number employed by type: \_\_\_\_\_

2. In the next 18 months, how many welders do you anticipate hiring? \_\_\_\_\_

If you answered "0" to questions #1 and #2, STOP and return the survey. If you employ welders or expect to hire welders, please continue.

3. Do you have trouble finding qualified applicants for welder programs? \_\_\_ No \_\_\_ Yes If yes, please describe what skills applicants should have but are missing.

4. Do you need training for the welders you now employ? \_\_\_ No \_\_\_ Yes If yes, please describe the training you need \_\_\_\_\_

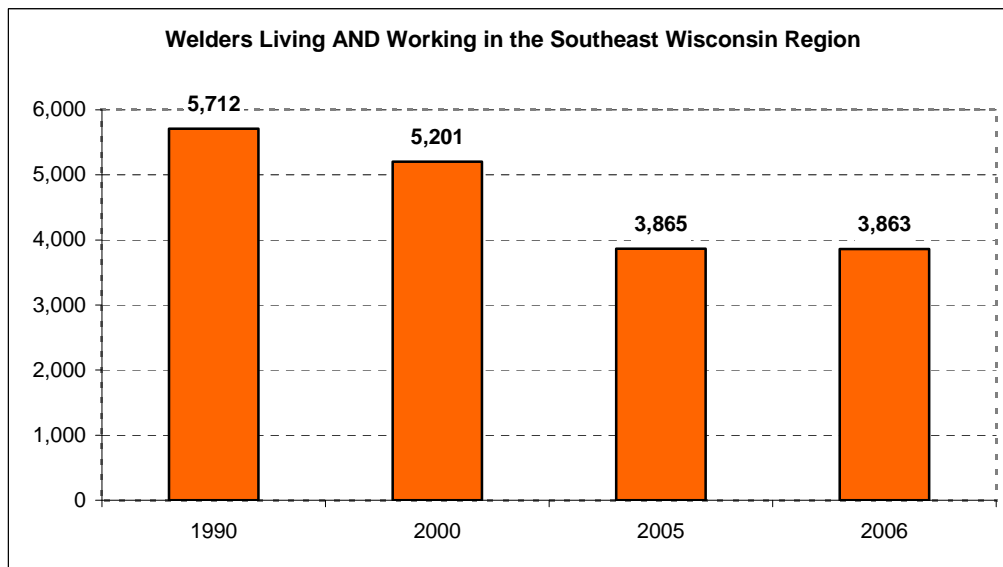
Where would you prefer the training to be held? \_\_\_ On-site \_\_\_ At a technical college \_\_\_ On-line

5. Please specify the number of welding hires you anticipate by title and location within southeast Wisconsin  
-- Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha counties.

<b>JOB TITLE</b>	<b>EST. NUMBER OF JOB OPENINGS:</b>				<b>ZIP code of place of work</b>	<b>SPECIFY: Type of certification, other experience, education or training required</b>
	<b>NOW Dec 2007</b>	<b>Jan-June 2008</b>	<b>July-Dec 2008</b>	<b>Jan-June 2009</b>		
MIG/welder						
TIG/ welder						
FLUX/ welder						
Welder fabricator						
Welder burner						
Finish welder						
Plate and weld inspector						
Set up welder						
Welder fitter						
Production welder						
Pipe welder						
Spot welder						
Open table welder						
Other:						
<b>TOTAL WELDERS</b>						

## Labor Market Context for Assessing Demand for Welders in the Southeast Wisconsin Region

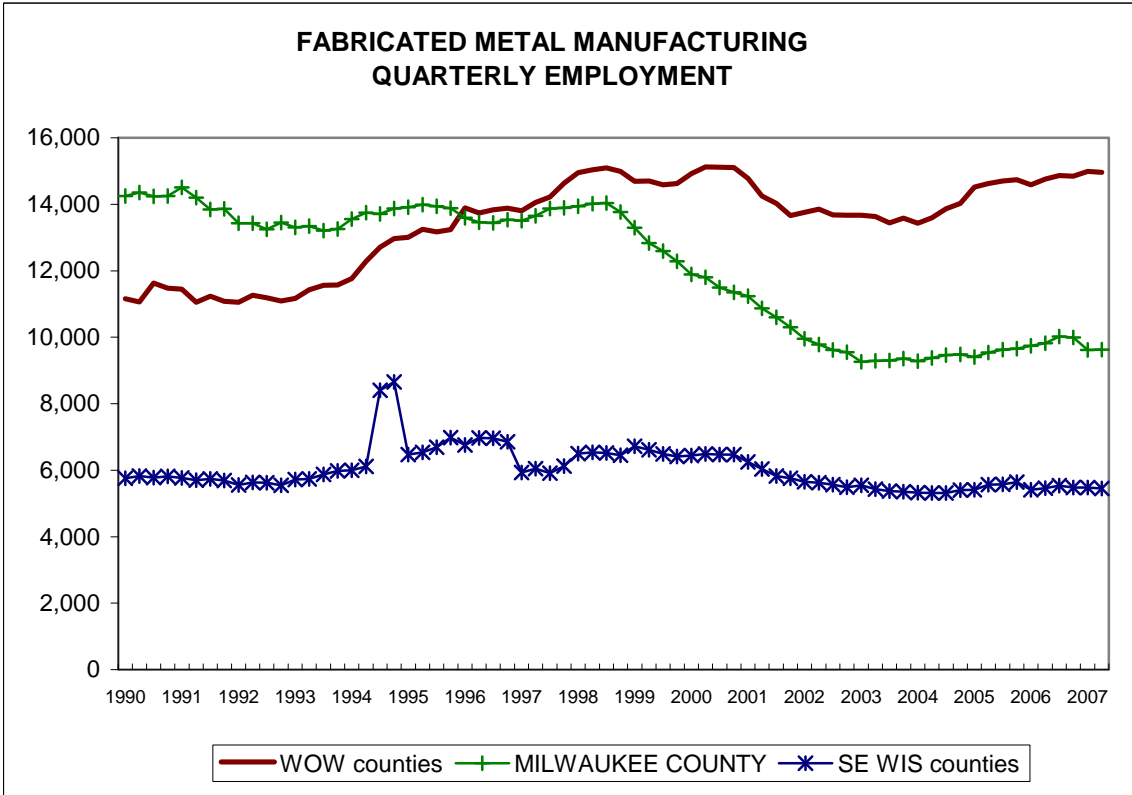
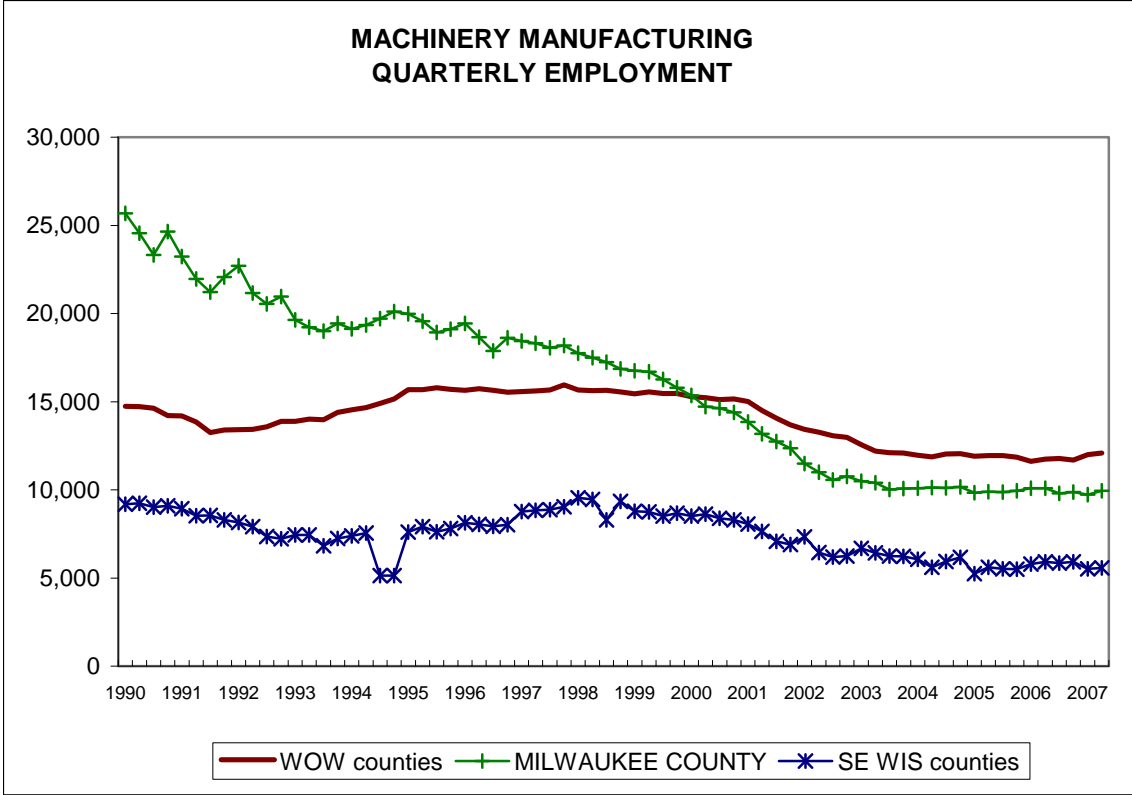
While the number of welders in Southeast Wisconsin has declined, the number of job openings suggests a labor shortage. In an attempt to better understand the supply demand for welders, a variety of federal and state databases are used to understand the labor market in Southeast Wisconsin. U.S. Census data shows that the number of welders employed and living in the seven-county Southeast Wisconsin region declined from 5,712 in 1990 to 5,201 in 2000. The Census reported further declines to 3,865 in 2005 with a leveling off to 3,863 in 2006.

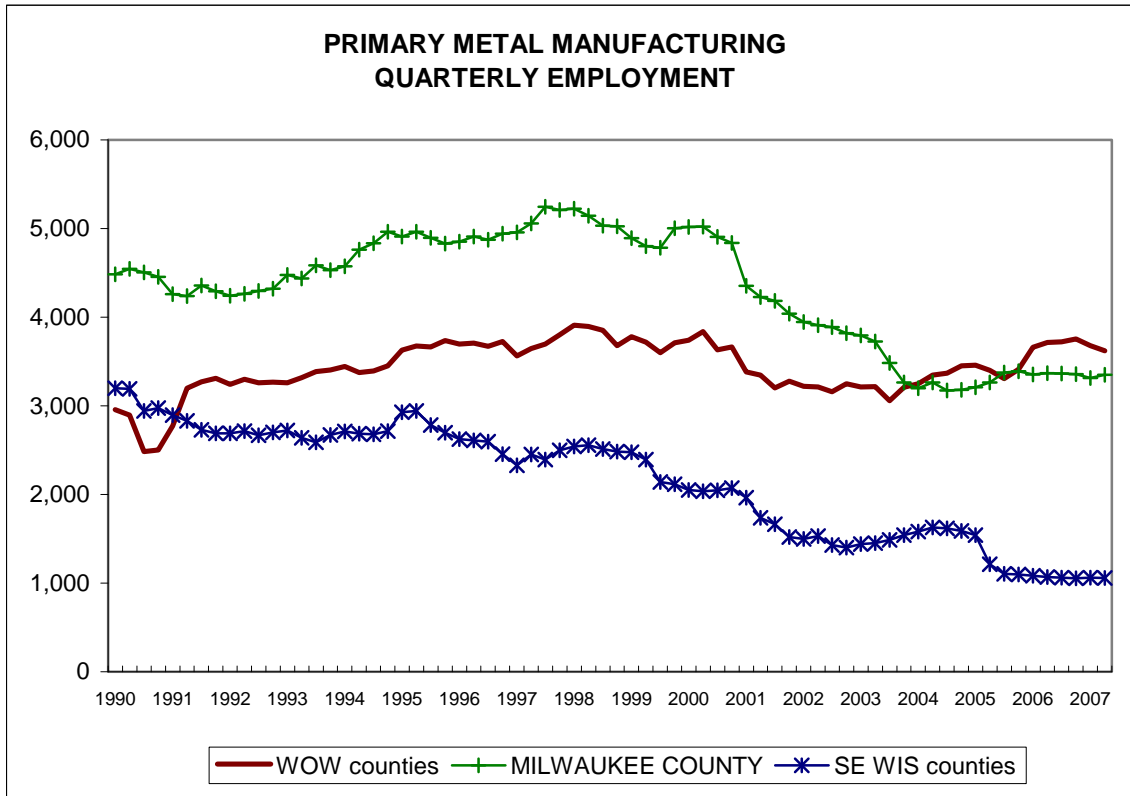


The decline in welding jobs is a direct result of changes in the manufacturing sector, where most welders (85%) in Southeast Wisconsin are employed. The type of manufacturing setting in which welders are employed varies by county and by industrial sector.

- In Milwaukee County most welding jobs are in transportation equipment manufacturing (25% of the total) and machinery manufacturing (24%) followed by fabricated metal production (14%) and primary metals manufacturing (10%). However, in Milwaukee County each of these sectors showed substantial declines.

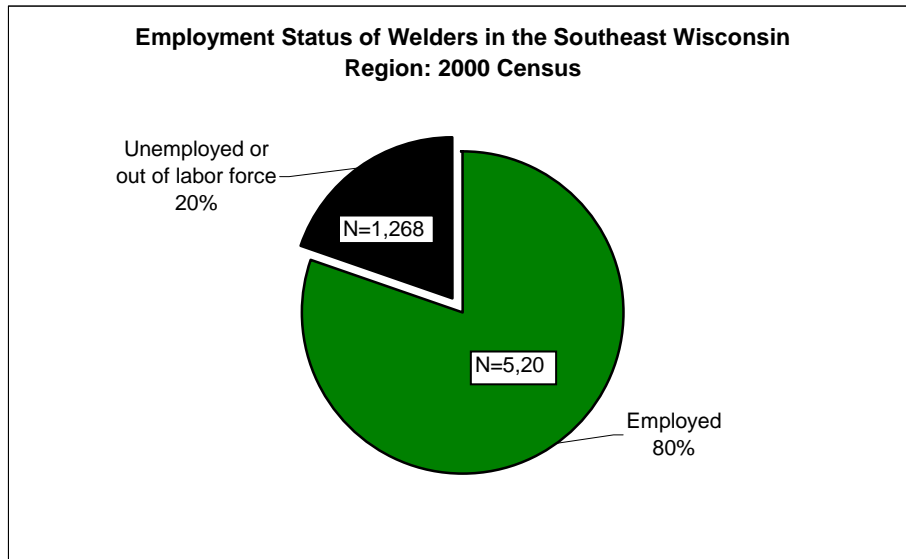
In the machine manufacturing sector overall employment totaled 25,684 in 1990, dropping steadily to 9,953 jobs in 2<sup>nd</sup> Quarter of 2007 for a job loss of 15,731. During the same period jobs in the fabricated metal product manufacturing declined by 4,621 jobs from 14,251 in 1990 to 9,630 in 2<sup>nd</sup> Quarter 2007. Transportation equipment manufacturing jobs in Milwaukee County rose to a high of 7,852 in 3<sup>rd</sup> Quarter 1997 and then fell to 4,183 in 2<sup>nd</sup> Quarter 2007 for a loss of 3,669 jobs. Primary metal manufacturing went from 4,482 workers in 1990 to 3,350 in 2<sup>nd</sup> Quarter 2007.





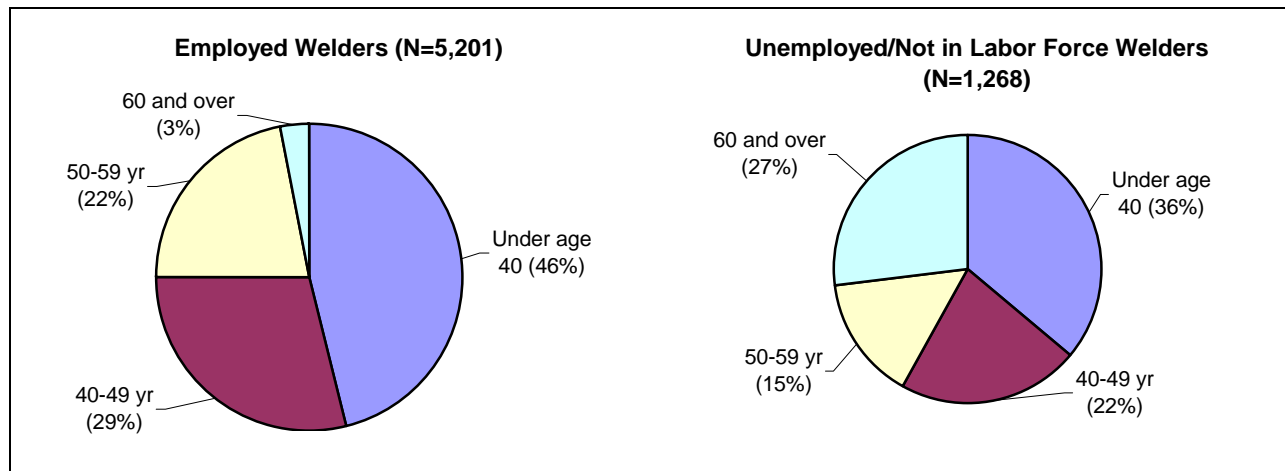
- In Waukesha County most welders are employed in fabricated metal production (27%) and machinery manufacturing (21%), followed by electrical equipment, appliance and computer production (13%). Manufacturing employment in Waukesha, Ozaukee and Washington (WOW) counties rose during this same period, showing growth in all sectors except machine manufacturing which lost 2,654 jobs.
- In Racine and Kenosha counties welding jobs were most heavily concentrated in machinery manufacturing jobs and fabricated metals sectors. Job losses were highest in machine manufacturing (a 3,607 decline) and primary metal manufacturing (a 2,140 decline).

The decline in welding jobs in the seven-county region from 1990 to 2000 can be seen in the numbers of welders (N=1,268) who were unemployed or no longer in the workforce in 2000. This population accounted for 20 percent of the total population of welders.



While some 42 percent of welders not employed in 2000 were aged 50 or older, about a fourth (23 percent) of employed welders were aged 50 or older. The remaining population of employed welders in 2000 were relatively young with 46 percent under age 40, 29 percent ages 40-49, and 22 percent ages 50 to 59 years.

**Welders in the Southeast Wisconsin Region: 2000 Census**

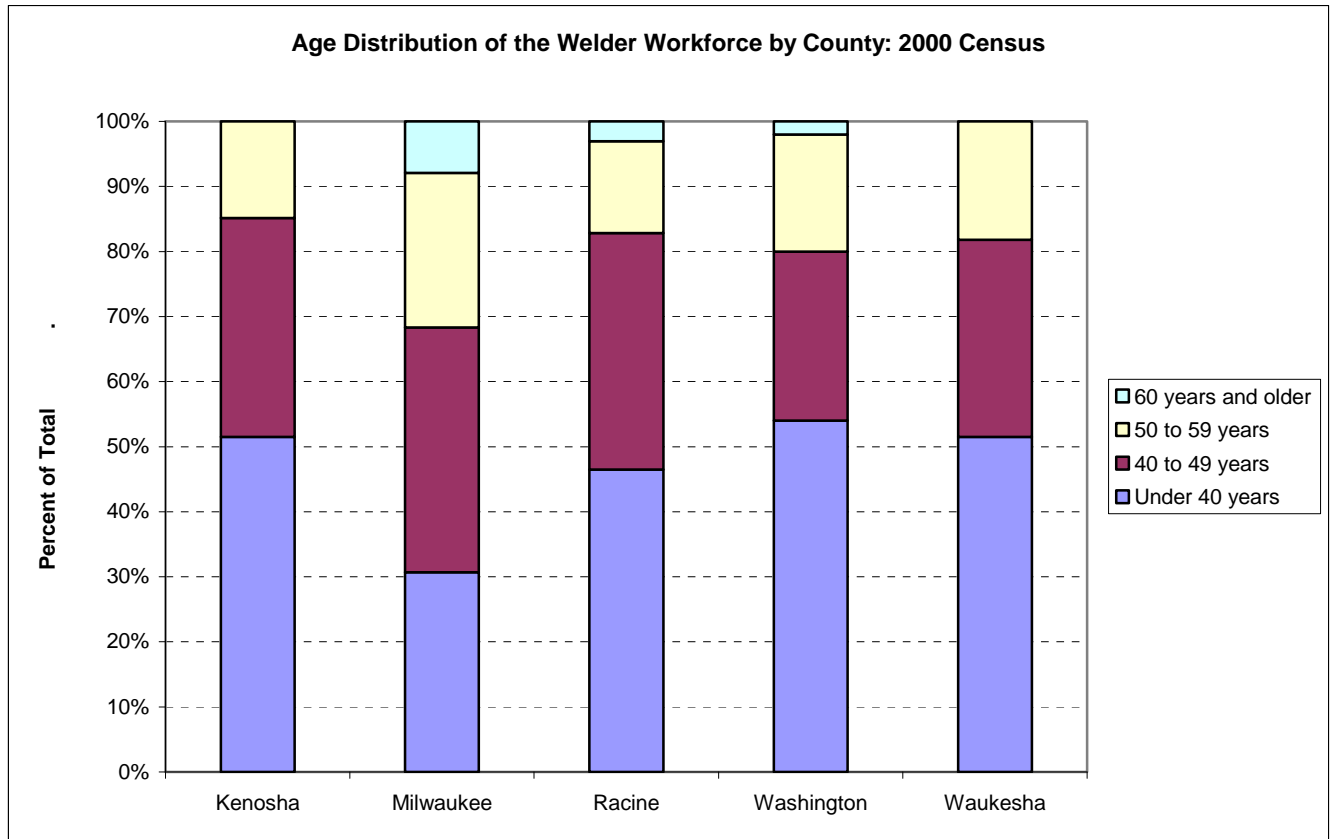


**I. Age of the Welder Workforce**

The population of welders was examined to assess the impact of age on future job openings. Age differences were most pronounced in Milwaukee County where 8 percent of welders were aged 60 or older and 24 percent were ages 50 through 59 years. In contrast, Kenosha, Washington and Waukesha counties have over half of employed welders under 40 years of age, compared to Milwaukee County where only 31 percent of welder are under age 40.

**Age of the Employed Welder Workforce: Census 2000<sup>1</sup>**

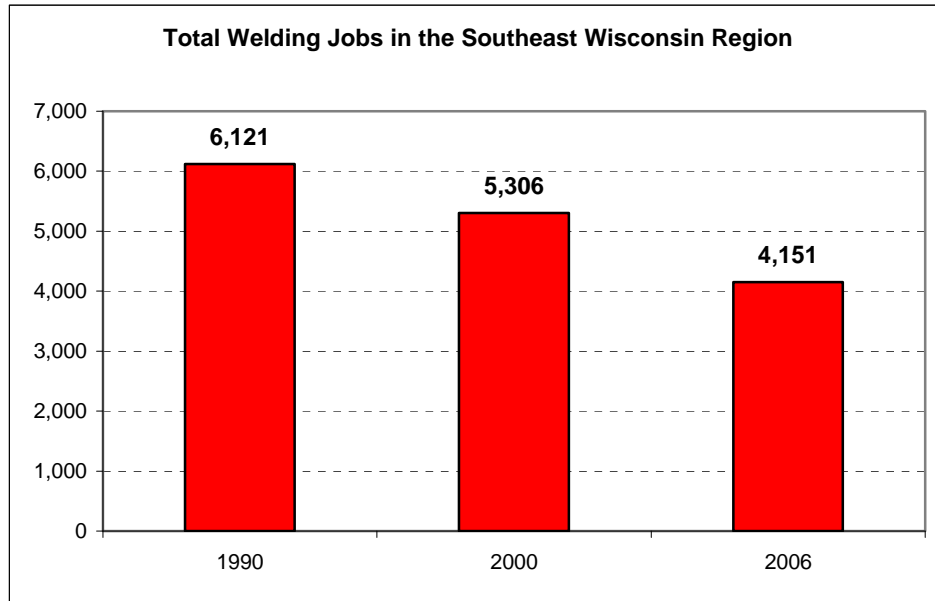
<b>5 Southeast Wisconsin Counties:</b>	<b><u>Kenosha</u></b>	<b><u>Milwaukee</u></b>	<b><u>Racine</u></b>	<b><u>Washington</u></b>	<b><u>Waukesha</u></b>
Total employed and at work	100%	100%	100%	100%	100%
Under 40 years	52%	31%	46%	54%	51%
40 to 49 years	34%	38%	36%	26%	30%
50 to 59 years	15%	24%	14%	18%	18%
60 years and older	0%	8%	3%	2%	0%



<sup>1</sup> Data not reported for Ozaukee and Walworth counties.

## II. Gain/Loss in Welding Jobs

The number of welders working in the region (regardless of place of residence) dropped from 6,121 in 1990 to 5,306 in 2000, with much of the loss of welding jobs in Waukesha County. By 2006, the number of welding jobs located in the seven-county Southeast Wisconsin Region was at 4,151.



During the 1990s an increasing number of welders living in the Southeast Wisconsin region were going outside the region for employment, with the number of welders commuting outside the region rising from 25 in 1990 to 1,448 in 2000. Most of the shift took place in Washington County where 238 welders (or 46 percent) worked outside the region and in Waukesha County where 198 welders (or 14%) worked outside the region.

### Number of Welders Living or Working in the Southeast Wisconsin Region

<u>Census Year</u>	<u>Welders Living AND Working in the Region</u>	<u>Welders Commuting into the Region for Jobs</u>	<u>Welders Commuting out of the Region for Jobs</u>
1990	5,721	400	25
2000	5,201	105	1,448
2006	3,575	576	380

At the same time, approximately 108 welders commuted into the region for jobs in 2000 and an estimated 288 welders commuted into the region for jobs in 2006.

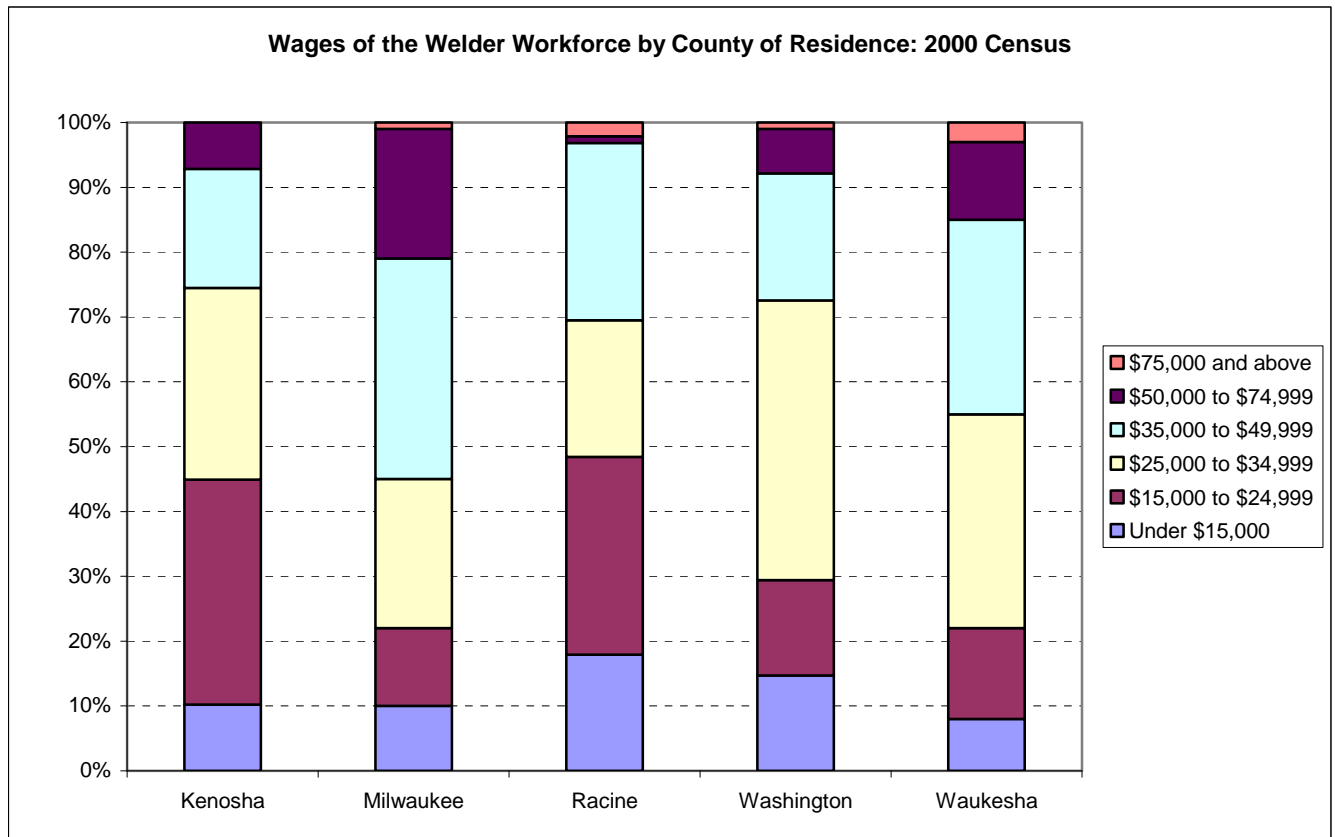
### III. Wages Paid Welders

The aging Milwaukee County population of welders is also reflected in the higher wages earned by older workers, with 21 percent earning \$50,000 or more, compared to 7 percent in Kenosha County, 3 percent in Racine County, 8 percent in Washington County, and 15 percent in Waukesha County earning \$50,000 or more. (The Census did not report earnings of welders by category in Ozaukee and Walworth counties due to suppression because of the small cell sizes.)

On the lower end of the wage scale, welders with less than \$25,000 in earnings accounted for 46 percent of the population in Racine County, 45 percent in Kenosha County, 29 percent in Washington County, but only 21 percent in Waukesha County and 22 percent in Milwaukee County.

**Annual Wages of the Employed Welder Workforce: Census 2000**

5 Southeast Wisconsin Counties	County of Residence:				
	Kenosha	Milwaukee	Racine	Washington	Waukesha
Total employed and at work	100%	100%	100%	100%	100%
Under \$15,000	10%	10%	17%	15%	8%
\$15,000 to \$24,999	34%	12%	29%	15%	14%
\$25,000 to \$34,999	29%	23%	20%	44%	33%
\$35,000 to \$49,999	18%	34%	26%	20%	30%
\$50,000 to \$74,999	7%	20%	1%	7%	12%
\$75,000 and above	0%	1%	2%	1%	3%

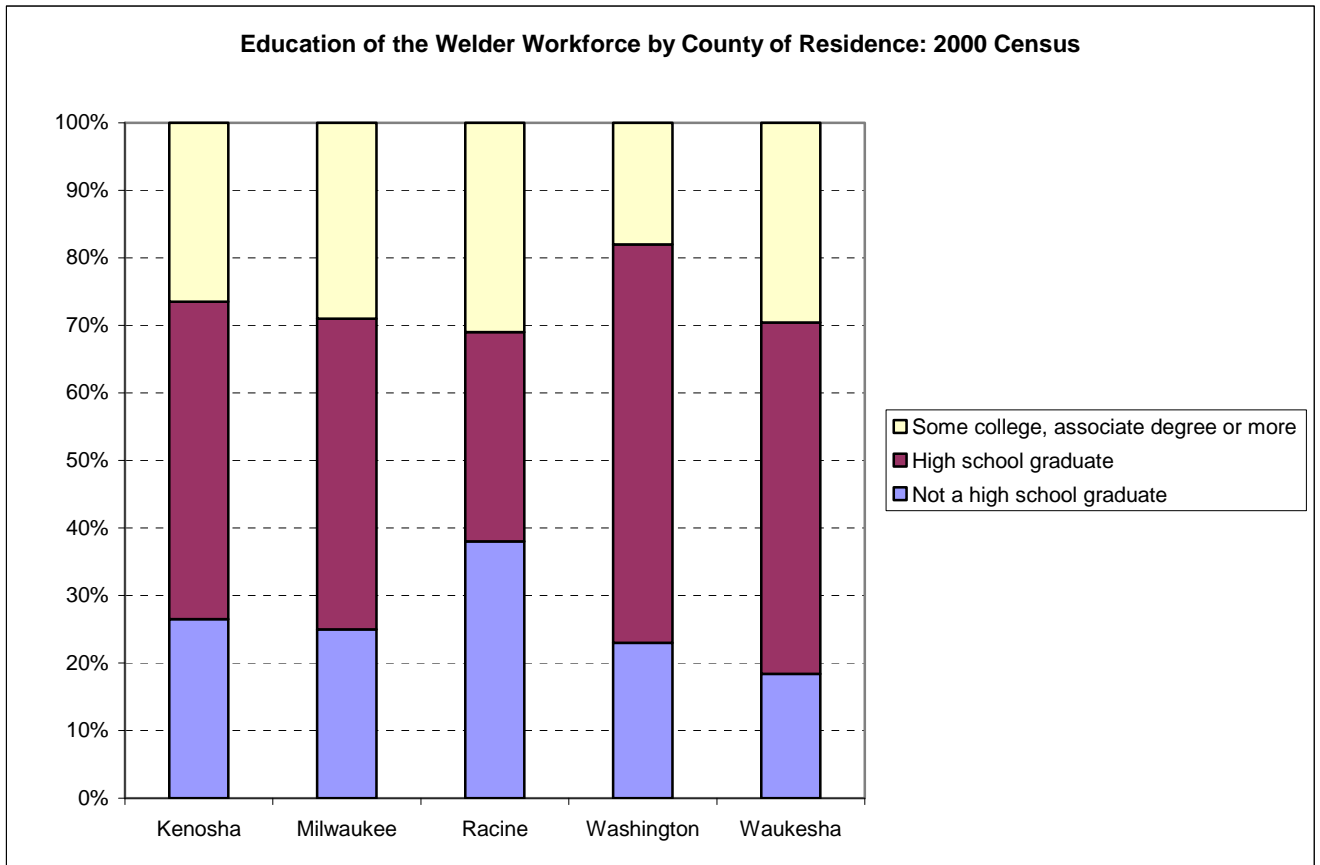


**IV. Education of the Employed Welder Workforce**

Overall, 24 percent of welders in the seven-county region had less than a high school degree, 48 percent had completed high school or a GED, and 28 percent had some college, a associate degree or higher. Racine County had the highest percentage without a high school diploma (38 percent), but also the highest percentage with some college, an associate degree or above (31 percent).

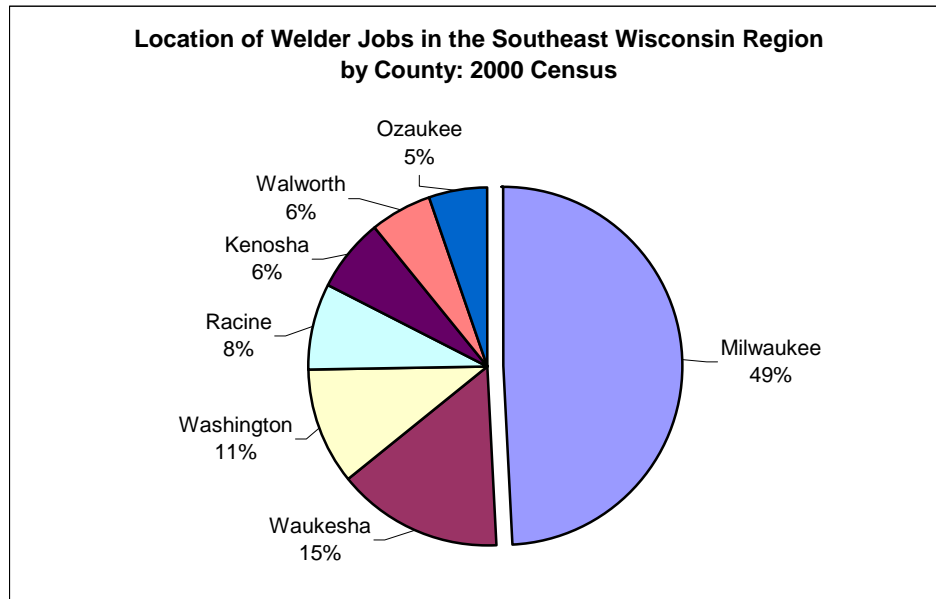
**Education Level of the Employed Welder Workforce: Census 2000**

<b>5 Southeast Wisconsin Counties</b>	<b>Kenosha</b>	<b>Milwaukee</b>	<b>Racine</b>	<b>Washington</b>	<b>Waukesha</b>
Total employed and at work	100%	100%	100%	100%	100%
Not a high school graduate	27%	25%	38%	23%	18%
High school graduate	48%	46%	31%	59%	51%
Some college or associate degree	27%	28%	28%	18%	28%
Bachelor's degree	0%	1%	3%	0%	1%



## V. Location of Welding Jobs

Welding jobs are most heavily concentrated in Milwaukee County (49%) and Waukesha County (15%), followed by Washington County (11%), Racine County (8%), Kenosha County (6%), Walworth County (6%), and Ozaukee County (5%), according to the 2000 Census.



Most welders work in the same county in which they reside or in an adjoining county. In all, 79 percent of welders living in Milwaukee County also work there. Similarly, 77 percent of welders from Walworth County work in the same county, as do 72 percent of welders from Ozaukee County, 68 percent of welders from Racine County, 65 percent of welders from Kenosha County, and 64 percent of welders from Waukesha County. For Washington County, however, only 46 percent of the welders live and work in the county.

**Welder Jobs in Southeast Wisconsin: 2000 Census**

	Kenosha County	Milwaukee County	Ozaukee County	Racine County	Walworth County	Washington County	Waukesha County
Welding jobs in the county	343	2,615	278	411	303	573	783
% of welders who live and work in the same county	65%	79%	72%	68%	77%	46%	64%

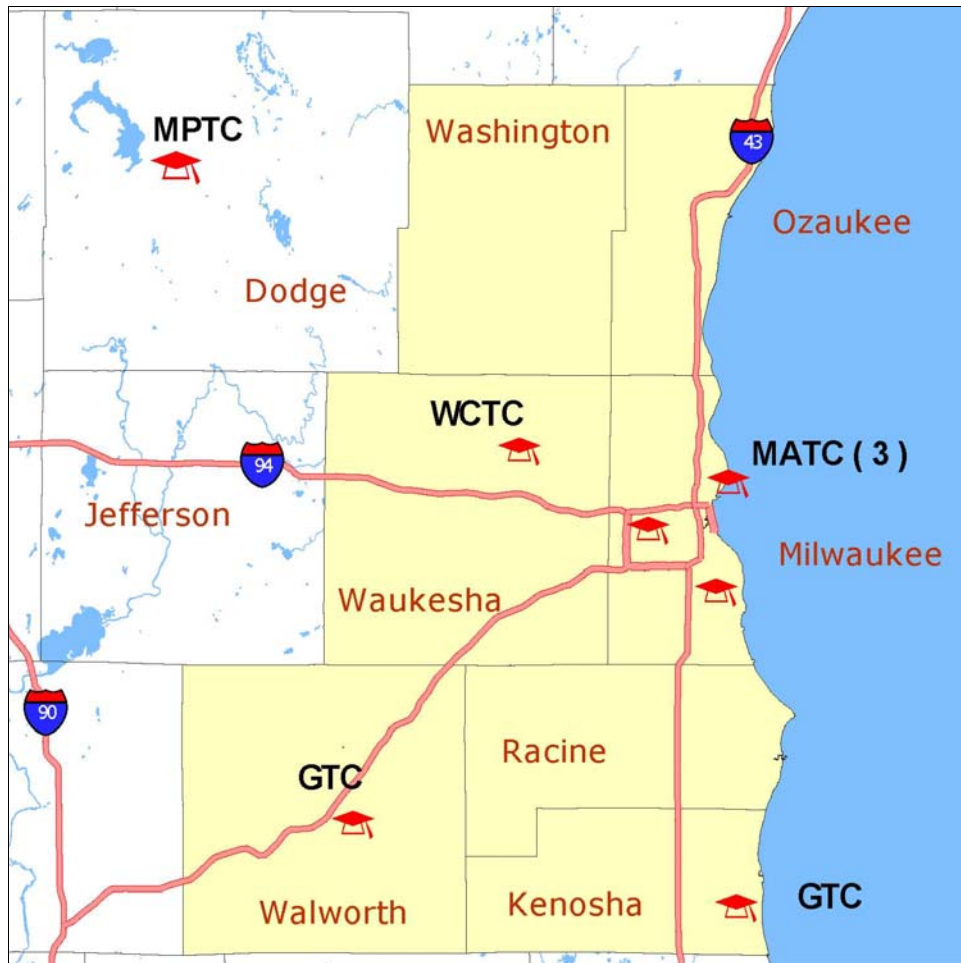
## Technical College Welder Training

The four technical colleges in the Southeast Wisconsin region were contacted to identify the locations, course offerings, and enrollment capacity for welding associate degree, diploma and certificate programs.

Each of the technical colleges has increased or is anticipating enhanced welding offerings. Waukesha County Technical College expanded its program by adding a new session in Fall of 2007. Moraine Park Technical College and Gateway Technical College have both operated “boot camp” programs. The Gateway Technical College president has committed to acquiring new space for the welder program. Milwaukee Area Technical College added an “Express Ramp” 12-week training program.

Below are short summaries of the technical college welding programs. Individual course descriptions and times of classes are posted online each semester.

### Location of Technical College Campuses with Welding Programs



## Gateway Technical College 1-Year Welding/Maintenance & Fabrication Diploma Program

Website: [www.gtc.edu/workplace/welding.asp](http://www.gtc.edu/workplace/welding.asp)

### Kenosha Campus

Contact: Mark Uttech [uttechm@gtc.edu](mailto:uttechm@gtc.edu)  
Location: 3520 30<sup>th</sup> Avenue, Kenosha, WI 53144  
Enrollment: 10 sessions are offered with a capacity of 16 per session; 4 sessions are held in both the a.m. and p.m.; 2 sessions are held on Friday night and Saturday.  
Capacity: 160

### Elkhorn Campus

Contact: Kenneth Karwowski [karwowskik@gtc.edu](mailto:karwowskik@gtc.edu)  
Location: 400 County Road H, Elkhorn, WI 53121  
Enrollment: 56 in evening sessions; 20 in daytime sessions  
Capacity: 76 (overbooked)

Enrollment in the welding program at the Kenosha Campus of Gateway Technical College was a full capacity (160 students) for Fall 2007, has a waiting list of 90, and is currently fully enrolled for the Spring 2008 semester.

A technical diploma in welding is offered with the options of pipe welding, robotics, and advanced welding. Also offered is a welding/maintenance and fabrication diploma program. The biggest problem cited for students who are enrolling is lack of basic tool skills. Also cited as a problem is the wage differential for welders who can often earn \$10 more per hour in Illinois than in Kenosha. Additionally, a number of students enroll in welding classes who need to be full time students to remain on their parents insurance. Some have no intention of pursuing welding as a career.

Employer involvement is crucial in the training of welders, given the lack of vocational training in local high schools and the increasing emphasis placed on computer-related occupations. Gateway staff at the Kenosha Campus are currently unable to expand training classes to address the waiting list due to lack of physical space and funding. College President Brian Albrecht has committed to acquiring “new space” to house the Kenosha Campus welding program.

The Elkhorn Campus is at full capacity and has a waiting list of 12 for the evening sessions and 2 for the daytime sessions. Enrollment at the Elkhorn Campus includes many students who are not in the diploma program. This is primarily an issue in evening sessions with only 10-12 (out of the 56 enrolled) in the welding diploma program. Others enroll to upgrade skills or to try out the welding program. In day sessions 12 (out of 20) are enrolled to pursue the welding diploma.

Elkhorn also offers a “Youth Options Program” dual enrollment option which allows high school students to obtain technical college credits in the welding program. Expanding the program at Elkhorn is limited by physical capacity. Staff would like to expand the metal fabrication emphasis to increase the employability, skills and wages for students.

Both campuses offer Youth Options programs, access to the welding Boot Camp, and heavy plate welding for entry level to Bucyrus Erie and P&H and have successfully placed students in these two industries.

## **Milwaukee Area Technical College Welding Technical Diploma and Welding Technology Associate Degree Programs**

Contact: Mark Koehler [KoehlerM@matc.edu](mailto:KoehlerM@matc.edu)  
Location: Downtown Milwaukee Campus (700 West State Street, Milwaukee, WI 53233)  
West Allis Campus (1200 South 71st Street, West Allis, WI 53214)  
Oak Creek Campus (6665 South Howell Avenue, Oak Creek, WI 53154)  
Capacity: 80 (20 per session, morning and afternoon at the Downtown Milwaukee Campus and West Allis; 12 at Oak Creek Campus)

The Milwaukee Area Technical College welding program is close to full capacity and has no waiting list. Those who cannot enroll at the West Allis Campus can usually enroll at the Milwaukee Downtown Campus. New enrollments take place in August and January in 8-week sessions. The Oak Creek Campus Center for Energy Conservation and Advanced Manufacturing offers flux core and metal arc welding certificates.

MATC offers the only heavy plate welding program in the region and graduates are typically employed at the Manitowoc Company, Bucyrus International, and P&H Mining. Currently, employers need high level advanced pipe welding. Graduates from the program are employed in a range of welding jobs from basic handwire welding to heavy plate to the most difficult and highest paying TIG welding typically doing stainless steel welding. Setup welders are also among the higher paid positions and need blue print reading skills. AWS guidelines are used for entry-level, intermediate and advanced certificates.

## **Moraine Park Technical College 1-Year Diploma Program in Welding/Metal Fabrication**

Contact: Larry Clark [lclark@morainepark.edu](mailto:lclark@morainepark.edu)  
Location: Beaver Dam Campus (700 Gould Street, Beaver Dam, WI 53916)  
Some introductory apprentice courses are held at the Fond du Lac Campus  
(235 N. National Avenue, Fond du Lac, WI 54936)  
Enrollment: Two sections are offered: 1 in the evening, 1 during the day.  
Sessions start quarterly throughout the regular school year.  
Capacity: 28 (14 in each section)

The welding program at Moraine Park Technical College is offered at the Beaver Dam Campus where a day section and an evening section accommodate 14 students each. Courses are offered on a quarterly basis with a competency based curriculum focus. August and January enrollments are the highest with 10-12 students while October and March enrollments have 3-4 students.

While some of the sections at MPTC are full, they have accommodated more students as of Fall 2007. The August and January sessions typically have 10 to 12 enrollees while the October and March sessions see fewer with 3 to 4 students per quarter starting the welding program. MPTC staff cite as a problem with enrolling more students is the perception that jobs in welding may not be there and are increasingly replaced by robotics.

Staff at MPTC see most openings for welders due to retirements and replacements. Employers' biggest concern is in the area of work ethic and soft skills. While most students who complete the 1-year diploma program are placed in welding positions, some are enrolled who are already working in order to upgrade their skills and others are enrolled who take courses for their own enrichment and are not interested in a welding job.

## **Waukesha County Technical College 1-Year Diploma Program**

Contact: Michael Shiels, [mshiels@wctc.edu](mailto:mshiels@wctc.edu)  
Location: Main Campus, 800 Main Street, Pewaukee, WI 53072  
Capacity: 40  
Status: Full

Waukesha County Technical College offers a one-year diploma in metal fabrication/welding with an enrollment of 40 students, 20 per section. The one-year diploma program at WCTC has a MIG focus and facilities are not set up for heavy plate welding. Given the cost of set up for heavy plate welding, it makes sense that one of the schools in the region be responsible for that area of instruction.

In August 2006 the second section was added due to an increase in the welding diploma and a waiting list. The two sections are now filled, but there is the capacity to add a third section if the introductory position was funded. While the welding program is at full capacity, there is no waiting list as December 2007.

In addition an evening program accommodates those who need to improve their skills for certification. Each semester 80 to 100 individuals sign up for the welding class of which 60% are enrolled to be certified or re-certified, 30% are enrolled who are not in a welding job but want to upgrade skills to secure a welding job, and 10% are enrolled as a hobby or for other non-employment related reasons.

95% of those who complete have a job placement in welding occupations. There is, however, a 15-20% attrition rate. Most job placements and openings at WCTC are due to retirements.

## **Technical College Welder Training Appendix A**

### **Gateway Technical College**

Welding Courses

Welding Boot Camp Curriculum

List of Certificate Programs Available in Welding/Maintenance & Fabrication

Pipe Welding Option Area: Welding (31-442-1C) Technical Diploma Curriculum

Welding/Maintenance & Fabrication (30-442-2) Technical Diploma Curriculum

Robotics Option Area: Welding (31-442-1A) Technical Diploma Curriculum

Advanced Welding Option Area: Welding (31-442-1B) Technical Diploma

## Gateway Technical College Welding Courses

(from [www.gtc.edu/workplace/welding.asp](http://www.gtc.edu/workplace/welding.asp))

- [442-101](#) Welding Basics

Credits: 1.00

This lab course covers the fundamentals of welding. Welding, soldering, brazing, and fabrication of various metals are included.

- [442-102](#) Introduction to Welding

Credits: 2.00

This course provides the theory and practical experience for arc and gas welding techniques. An emphasis is placed on basic safety, equipment usage, and proper procedures. The welding of ferrous and non-ferrous metals will be explored.

- [442-302](#) Metal Fabrication I

Credits: 3.00

This course is an introduction to basic metal fabrication, including safety, measuring, hand tools, layout, and applications with shearing, drilling, bending, tack welding, and inspection of final projects.

- [442-314](#) Welding/Fundamentals of

Credits: 2.00

This course covers the four main welding processes of gas metal ARC (mig wire) shielded metal arc (stick) gas tungsten arc (tig, heliarc) and oxyacetylene weld, cut and braze. Ideal course for beginners, home welders or apprentices.

- [442-321](#) Welding/Gas Metal Arc Welding

Credits: 3.00

(GMAW; MIG; Short-Arc; Wire. Instructs in basic safety, equipment usages and procedures with various filler metal in four basic welding positions. Instruction in plasma arc cutting of various metals. Provides considerable hands-on experience as well as technical information.

- [442-322](#) Welding/Shielded Metal Arc Welding

Credits: 3.00

(SMAW, Stick, Stick-Arc) Instructs in basic safety, equipment usages and procedures with five basic welding electrodes in four basic welding positions. Provides considerable hands-on experience as well as technical information. Allows for simulated structural steel welding certification opportunity.

- [442-323](#) Welding/Gas Tungsten Arc Welding

Credits: 3.00

(GTAW, TIG, Heli-Arc, Tungsten) Instructs in basic safety, equipment usages and procedures with various filler rods in three basic welding positions. Provides considerable hands-on experience as well as technical information.

- [442-324](#) Weld Printreading and Fabrication Procedures

Credits: 2.00

Instructs in basic graphic communication relating to the welding field. Provides for hands-on application of fabrication from blueprints. Follows American Welding Society welding symbol format.

- [442-329](#) Welding/Advanced Oxyacetylene

Credits: 2.00

Provides advanced welding applications in O-A welding, torch cutting and fitting of structural steel and brazing of alloy materials. Includes Gateway Technical College small pipe weld certification.

- [442-330](#) Welding/Advanced Shielded Metal Arc Welding

Credits: 3.00

Provides advanced welding applications in SMAW welding with small (1/16 inch) and large (5/32 inch 3/16 inch) electrodes hardface, aluminum, structural and pipe applications.

- [442-332](#) Welding/Advanced Gas Metal Arc Welding

Credits: 3.00

Provide advanced welding applications in GMAW welding using various size and types of electrodes of hard and soft wires on structural applications. Includes Gateway Technical College flux cored weld certification.

- [442-333](#) Welding/Advanced Gas Tungsten Arc Weld

Credits: 3.00

Provides advanced welding applications in GTAW welding using stainless steel, aluminum and mild steel. Includes Gateway Technical College aluminum tensile certification and steel plate certification.

- [442-334](#) Welding/Oxyacetylene

Credits: 3.00

(O-A; Gas) Instructs in basic safety, equipment usage and procedures with steel and braze filler rods in the four basic welding positions. Instructs in O-A cutting; providing considerable hands-on experience as well as technical information.

- [442-342](#) Welding/Pipe Oxyacetylene Fitting

Credits: 1.00

Provide cutting and fitting of basic pipe joints. Includes pipe layout.

- [442-343](#) Welding/Pipe Shielded Metal Arc Welding

Credits: 2.00

Provide open butt SMAW welding with E6010 in 2G, 5G and 6G positions.

- [442-344](#) Welding/Pipe Shielded Metal Arc Certification

Credits: 2.00

Provide open butt SMAW welding with E6010 root, E7018 fill i 2G, 5G and 6G positions. Includes Gateway Technical College pipe certification.

- [442-345](#) Welding/Pipe Gas Tungsten Arc Welding

Credits: 2.00

Provide open butt GTAW with ER70S-2 filler and E7018 filler in 2G, 5G, 6G positions.

- [442-346](#) Welding/Pipe Gas Tungsten Arc Certification

Credits: 2.00

Provide open butt GTAW root and fillers with ER70S-2 in 2G, 5G and 6G positions. Provides Gateway Technical College welding certification.

- [442-347](#) Welding/Pipe Gas Metal Arc Welding

Credits: 2.00

Provides open butt GMAW in 2G, 5G and 6G positions.

- [442-407](#) Welding

Credits: 0.90

Fundamentals of both arc and oxyacetylene welding of mild steel in the downhand, vertical and overhead position. Limited instruction in brazing, cast iron welding, manual flame-cutting and manual arc-cutting.

- [442-410](#) Welding for Sheet Metal

Credits: 1.15

For more information on this course, call: Apprenticeship Office Racine Campus 631-7404

- [442-424](#) Art of Welding/Advanced

Credits: 1.00

This course is for the student who has completed the beginners course or who has a background in welding. This course will expand the students' artistic abilities in art welding.

## **Welding Boot Camp Curriculum**

### **Welding/Gas Metal Arc Welding - 442-321 - 3 credits**

GMAW; MIG; Short-Arc; Wire welding. Instruction in basic safety, equipment usages and procedures with various filler metal in four basic welding positions. Instruction in plasma arc cutting of various metals. Considerable hands-on experience as well as technical information.

### **Welding Printreading & Fabrication Procedures - 442-324 - 2 credits**

Instruction in basic graphic communication relating to the welding field. Hands-on application of fabrication from blueprints. Follows American Welding Society welding symbol format.

### **Applied Mathematics - 804-370 - 2 credits**

This is a review of the four basic mathematical operations on whole numbers, fractions and decimals. Also covers basic algebra and trigonometry related to technical fields.

### **Workplace Safety- 623-146 - 2 credits**

This course introduces the student to safety and loss prevention in the workplace with an emphasis on the workers awareness for maintaining a safe, productive environment. The student will study safety concepts, hazards controls, developing safety and health programs and Federal and State mandated regulations. This course will also focus on specific content in the MSSC Safety module.

### **Lean Operating Techniques - 182-150 - 1 credit**

This course investigates how to improve quality, eliminate waste, reduce manufacturing lead time and inventory, and develop productive customer and supplier relationships. Also discussed are cycle time, kanban, demand-pull, and order push techniques to reduce inventory in an organization's supply chain.

Gateway Technical College

**List of degrees, diplomas or certificates available in this program area:**

**WELDING/MAINTENANCE & FABRICATION – Technical Diploma**

**WELDING - Technical Diploma**

**Certificates Available:**

OXY/FUEL WELDING  
ADV. OXY/FUEL WELDING  
PIPE/OXY/FUELWELDING  
GMAW WELDING  
ADV. GMAW WELDING  
PIPE GMAW WELDING  
SMAW WELDING  
ADV. SMAW WELDING  
PIPE SMAW WELDING  
PIPE SMAW CERT.  
GTAW WELDING  
ADV. GTAW WELDING  
PIPE GTAW WELDING  
PIPE GTAW CERT.  
WELD PRINTREADING AND FABRICATION PROCEDURES  
WELDING BASICS  
WELDING FUNDAMENTALS

Note that there is a Robotics Option offered on the Elkhorn Campus within the Welding technical diploma.



# WELDING (31-442-1C)

## Technical Diploma

Effective 2007/2008  
Academic Year

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn and Kenosha Campuses. General Education courses may be taken at all Gateway Campuses.

Course Number	Course Title	Credits	Hrs / Wk Lec - Lab	Suggested Sequence
<b>Occupational Specific</b>				
442-321	* Welding/Gas Metal Arc Welding	3	(2-4)	1st
442-322	* Welding/Shielded Metal Arc Welding	3	(2-4)	1st
442-323	* Welding/Gas Tungsten Arc Welding	3	(2-4)	1st
442-324	* Weld Printreading & Fabrication Procedures	2	(2-2)	1st
442-334	* Welding/Oxyactylene	3	(2-4)	1st
442-342	* Welding/Pipe Oxyacetylene Fitting (Prereq. 442-334)	1	(0-2)	2nd
442-343	* Welding/Pipe Shielded Metal Arc Welding (Prereq. 442-322)	2	(2-2)	2nd
442-344	* Welding/Pipe Shielded Metal Arc Welding Certification (Prereq. 442-322)	2	(2-2)	2nd
442-345	* Welding/Pipe Gas Tungsten Arc Welding (Prereq. 442-322, 442-323)	2	(2-2)	2nd
442-346	* Welding/Pipe Gas Tungsten Arc Welding Certification (Prereq. 442-323)	2	(2-2)	2nd
442-347	* Welding/Pipe Gas Metal Arc Welding (Prereq. 442-321)	2	(2-2)	2nd
<b>Total Required</b>		<b>25</b>		
<b>Occupational Support</b>				
801-301	Writing Principles (See Note 1)	1	(2-0)	1st
804-350	Essential Mathematics	2	(4-0)	1st
<b>Total Required</b>		<b>3</b>		
<b>Program Total Required</b>		<b>28</b>		

### Pipe Welding Option Area

#### ADMISSION REQUIREMENTS

1. Students must complete reading, writing, and pre-algebra placement testing.
2. Students must submit an application & \$30 fee.

#### GRADUATION REQUIREMENTS

1. 28 Credits with an average of 2.0 or above.
2. \*Average of 2.0 ("C") or above for these major courses.

#### NOTES

1. A satisfactory placement test score (or successful remediation) is required prior to enrollment in Writing Principles (801-301). See a counselor for details.
2. Safety glasses are required in labs. If prescription glasses are required, allow a minimum of 90 days.
3. A hand calculator capable of trigonometric functions is recommended for 442-324; the cost is approximately \$20.
4. Students are required to have an arc welding helmet, oxy-acet goggles, chipping hammer, and welding gloves (leather); the cost is approximately \$20. Students must be prepared to pay for this equipment on the first day of class (or bring their own equipment).
5. Any course may be taken prior to entry in the program, assuming prerequisites and corequisites have been satisfied (or waived with department approval).

*For a complete list of course descriptions (and possible online courses) for this program, please consult our webpage at [www.gtc.edu](http://www.gtc.edu).*

### CORE ABILITIES

Gateway believes students need both technical knowledge and skills and core abilities in order to succeed in a career and in life. The following nine core abilities are the general attitudes and skills promoted and assessed by all Gateway programs. All Gateway graduates should be able to:

1. Act responsibly.
2. Communicate clearly and effectively.
3. Demonstrate essential computer skills.
4. Demonstrate essential mathematical skills.
5. Develop job seeking skills.
6. Respect themselves and others as members of a diverse community.
7. Think critically and creatively.
8. Work cooperatively.
9. Value learning.



# WELDING (31-442-1C)

## Technical Diploma

Effective 2007/2008  
Academic Year

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn and Kenosha Campuses. General Education courses may be taken at all Gateway Campuses.

**Program Description:** *Welding* provides concentrated instruction, primarily through practical experience, on various welding techniques. The following processes are covered: O-A-Oxyacetelene welding, brazing, and cutting; GMAW-gas metal arc welding (wire, mig, short arc); GTAW-gas tungsten arc welding (tig, heliarc); SMAW-shielded metal arc welding (stick, arc), including plasma arc cutting; and robotic welding and cutting.

### PROGRAM LEARNING OUTCOMES

Graduates of the Welding Technical Diploma Program should be able to:

1. Prepare three groups of metal (stainless steel, aluminum, and mild steel) for a butt joint.
2. Use correct filler wire on welding machines.
3. Use and demonstrate proper safety gear and equipment.
4. Prepare pipe coupons for welding land and bevel on 2" XX H pipe.
5. Use a WPS for D1.1 and ASME.
6. Correctly program housekeeping codes for processes used.
7. Have robots perform operations with 100% accuracy.

**Aptitudes and Interests:** Use independent judgement in planning work; move hands and fingers accurately; work within standards and specifications; visualize objects from drawings, sketches or blueprints. Workers should be able to organize work rapidly; be able to adjust to repetitive and short-cycle operations; be interested in work requiring accuracy and meeting prescribed standards; be willing to work under pressure; be able to follow prescribed procedures carefully.

**Physical Requirements:** Employers may place physical requirements on various jobs in this career field. Gateway Technical College strongly encourages you to investigate these physical requirements with employers to determine your employability before entering into this program.

**Helpful High School Courses:** Mathematics, Mechanical Drawing, Blueprint Reading, Welding Method.

**Additional Information:** You may call Student Services at (262) 767-5300 (Burlington), (262) 741-8300 (Elkhorn), (262) 564-2300 (Kenosha), or (262) 619-6300 (Racine) for additional information.

### JOB MOBILITY

**Concurrent Occupations for program students:**

1. Chipper
2. Tacker
3. Welder's Helper
4. Production Welder

**Occupations for Technical Diploma Graduates:**

1. Arc Welder
2. Production Welder
3. Tig Welder
4. Mig Welder
5. Oxy-Acet Welder

**Advanced Occupations for Technical Diploma graduates with extra training or experience:**

1. Apprentice Welder
2. Certified Welder
3. Shop Welder
4. Combination Welder
5. Weld Supervisor
6. Set-up Welder
7. Welding Inspector
8. Welding Technician

**Occupations for those with higher level degrees (such as a bachelor's degree):**

1. Welding Engineer
2. Welding Instructor
3. Welding Technician

Gateway Technical College reserves the right to modify curriculum requirements for students who interrupt enrollment for a period of two years or take over seven years to complete. Tuition & material fees are determined by the Board of the Wisconsin Technical College System. Consult the Master Class Schedule for exact fee amounts.

Occasionally, the District may offer a particular course out of published sequence. By doing so, the District does not obligate itself to offer succeeding courses out of published sequence.

EQUAL OPPORTUNITY/ACCESS EDUCATOR / EMPLOYER  
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# WELDING/MAINTENANCE & FABRICATION (30-442-2)

Effective 2007/2008  
Academic Year

## Technical Diploma

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn and Kenosha Campuses. General Education courses may be taken at all Gateway Campuses.

Course Number	Course Title	Credits	Hrs / Wk Lec - Lab	Suggested Sequence
<b>Occupational Specific</b>				
442-321	* Welding/Gas Metal Arc Welding	3	(2-4)	1st
442-322	* Welding/Shielded Metal Arc Welding	3	(2-4)	1st
442-323	* Welding/Gas Tungsten Arc Welding	3	(2-4)	1st
442-324	* Weld Printreading & Fabrication Procedures	2	(2-2)	1st
442-334	* Welding/Oxyactylene	3	(2-4)	1st
<b>Total Required</b>		<b>14</b>		
<b>Occupational Support</b>				
801-301	Writing Principles (See Note 1)	1	(2-0)	1st
804-350	Essential Mathematics	2	(4-0)	1st
<b>Total Required</b>		<b>3</b>		
<b>Program Total Required</b>		<b>17</b>		

### ADMISSION REQUIREMENTS

1. Students must complete reading, writing, and pre-algebra placement testing.
2. Students must submit an application & \$30 fee.

### GRADUATION REQUIREMENTS

1. 17 Credits with an average of 2.0 or above.
2. \*Average of 2.0 ("C") or above for these major courses.

### NOTES

1. A satisfactory placement test score (or successful remediation) is required prior to enrollment in Writing Principles (801-301). See a counselor for details.
2. Safety glasses are required in labs. If prescription glasses are required, allow a minimum of 90 days.
3. A hand calculator capable of trigonometric functions is recommended for 442-324; the cost is approximately \$20.
4. Students are required to have an arc welding helmet, oxy-acet goggles, chipping hammer, and welding gloves (leather); the cost is approximately \$20. Students must be prepared to pay for this equipment on the first day of class (or bring their own equipment).
5. Any course may be taken prior to entry in the program, assuming prerequisites and corequisites have been satisfied (or waived with department approval).

*For a complete list of course descriptions (and possible online courses) for this program, please consult our webpage at [www.gtc.edu](http://www.gtc.edu).*

### CORE ABILITIES

Gateway believes students need both technical knowledge and skills and core abilities in order to succeed in a career and in life. The following nine core abilities are the general attitudes and skills promoted and assessed by all Gateway programs. All Gateway graduates should be able to:

1. Act responsibly.
2. Communicate clearly and effectively.
3. Demonstrate essential computer skills.
4. Demonstrate essential mathematical skills.
5. Develop job seeking skills.
6. Respect themselves and others as members of a diverse community.
7. Think critically and creatively.
8. Work cooperatively.
9. Value learning.



# WELDING/MAINTENANCE & FABRICATION (30-442-2)

Effective 2007/2008  
Academic Year

## Technical Diploma

Major courses (\*) in this program are taught at Gateway Technical College-**Elkhorn** and **Kenosha** Campuses. General Education courses may be taken at all Gateway Campuses.

**Program Description:** *Welding/Maintenance & Fabrication* provides concentrated instruction, primarily through practical experience, on various welding techniques. The following processes are covered: O-A-Oxyacetylene welding, brazing, and cutting; GMAW-gas metal arc welding (wire, mig, short arc); GTAW-gas tungsten arc welding (tig, heliarc); and SMAW-shielded metal arc welding (stick, arc), including plasma arc cutting.

### PROGRAM LEARNING OUTCOMES

**Graduates of the Welding: Maintenance & Fabrication Technical Diploma Program should be able to:**

1. Set up welding machines to operate on proper polarity.
2. Adjust welding machines to operate at various amperages for various fillers.
3. Weld flat position using proper fillers.
4. Weld horizontal position beads on plate using two diameters of E7018 electrodes.
5. Weld vertical position using proper fillers.
6. Weld overhead position using proper fillers.

**Physical Requirements:** Employers may place physical requirements on various jobs in this career field. Gateway Technical College strongly encourages you to investigate these physical requirements with employers to determine your employability before entering into this program.

**Additional Information:** You may call Student Services at (262) 767-5300 (Burlington), (262) 741-8300 (Elkhorn), (262) 564-2300 (Kenosha), or (262) 619-6300 (Racine) for additional information.

Gateway Technical College reserves the right to modify curriculum requirements for students who interrupt enrollment for a period of two years or take over seven years to complete. Tuition & material fees are determined by the Board of the Wisconsin Technical College System. Consult the Master Class Schedule for exact fee amounts.

Occasionally, the District may offer a particular course out of published sequence. By doing so, the District does not obligate itself to offer succeeding courses out of published sequence.

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# WELDING (31-442-1A)

## Technical Diploma

Effective 2007/2008  
Academic Year

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn Campus. General Education courses may be taken at all Gateway Campuses.

Course Number	Course Title	Credits	Hrs / Wk Lec - Lab	Suggested Sequence
<b>Occupational Specific</b>				
442-321	* Welding/Gas Metal Arc Welding	3	(2-4)	1st
442-322	* Welding/Shielded Metal Arc Welding	3	(2-4)	1st
442-323	* Welding/Gas Tungsten Arc Welding	3	(2-4)	1st
442-324	* Weld Printreading & Fabrication Procedures	2	(2-2)	1st
442-334	* Welding/Oxyactylene	3	(2-4)	1st
442-326	* Welding/Robotic Advanced GTAW (Coreq. 442-335)	4	(4-4)	2nd
442-327	* Welding/Robotic Advanced GMAW (Coreq. 442-335)	4	(4-4)	2nd
442-328	* Welding/Robotic & Plasma Welding (Coreq. 442-335)	2	(2-2)	2nd
442-335	* Welding/Robotic Program & Plasma Cutting (Prereq. 442-321, 442-322, 442-323, 442-334)	2	(4-0)	2nd
<b>Total Required</b>		<b>26</b>		
<b>Occupational Support</b>				
801-301	Writing Principles (See Note 1)	1	(2-0)	1st
804-350	Essential Mathematics	2	(4-0)	1st
<b>Total Required</b>		<b>3</b>		
<b>Program Total Required</b>		<b>29</b>		

### Robotics Option Area

#### ADMISSION REQUIREMENTS

1. Students must complete reading, writing, and pre-algebra placement testing.
2. Students must submit an application & \$30 fee.

#### GRADUATION REQUIREMENTS

1. 29 Credits with an average of 2.0 or above.
2. \*Average of 2.0 ("C") or above for these major courses.

#### NOTES

1. A satisfactory placement test score (or successful remediation) is required prior to enrollment in Writing Principles (801-301). See a counselor for details.
2. Safety glasses are required in labs. If prescription glasses are required, allow a minimum of 90 days.
3. A hand calculator capable of trigonometric functions is recommended for 442-324; the cost is approximately \$20.
4. Students are required to have an arc welding helmet, oxy-acet goggles, chipping hammer, and welding gloves (leather); the cost is approximately \$20. Students must be prepared to pay for this equipment on the first day of class (or bring their own equipment).
5. Any course may be taken prior to entry in the program, assuming prerequisites and corequisites have been satisfied (or waived with department approval).

*For a complete list of course descriptions (and possible online courses) for this program, please consult our webpage at [www.gtc.edu](http://www.gtc.edu).*

### CORE ABILITIES

Gateway believes students need both technical knowledge and skills and core abilities in order to succeed in a career and in life. The following nine core abilities are the general attitudes and skills promoted and assessed by all Gateway programs. All Gateway graduates should be able to:

1. Act responsibly.
2. Communicate clearly and effectively.
3. Demonstrate essential computer skills.
4. Demonstrate essential mathematical skills.
5. Develop job seeking skills.
6. Respect themselves and others as members of a diverse community.
7. Think critically and creatively.
8. Work cooperatively.
9. Value learning.



# WELDING (31-442-1A)

## Technical Diploma

Effective 2007/2008  
Academic Year

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn Campus. General Education courses may be taken at all Gateway Campuses.

**Program Description:** *Welding* provides concentrated instruction, primarily through practical experience, on various welding techniques. The following processes are covered: O-A-Oxyacetelene welding, brazing, and cutting; GMAW-gas metal arc welding (wire, mig, short arc); GTAW-gas tungsten arc welding (tig, heliarc); SMAW-shielded metal arc welding (stick, arc), including plasma arc cutting; and robotic welding and cutting.

### PROGRAM LEARNING OUTCOMES

**Graduates of the Welding Technical Diploma Program should be able to:**

1. Prepare three groups of metal (stainless steel, aluminum, and mild steel) for a butt joint.
2. Use correct filler wire on welding machines.
3. Use and demonstrate proper safety gear and equipment.
4. Prepare pipe coupons for welding land and bevel on 2" XX H pipe.
5. Use a WPS for D1.1 and ASME.
6. Correctly program housekeeping codes for processes used.
7. Have robots perform operations with 100% accuracy.

**Aptitudes and Interests:** Use independent judgement in planning work; move hands and fingers accurately; work within standards and specifications; visualize objects from drawings, sketches or blueprints. Workers should be able to organize work rapidly; be able to adjust to repetitive and short-cycle operations; be interested in work requiring accuracy and meeting prescribed standards; be willing to work under pressure; be able to follow prescribed procedures carefully.

**Physical Requirements:** Employers may place physical requirements on various jobs in this career field. Gateway Technical College strongly encourages you to investigate these physical requirements with employers to determine your employability before entering into this program.

**Helpful High School Courses:** Mathematics, Mechanical Drawing, Blueprint Reading, Welding Method.

**Additional Information:** You may call Student Services at (262) 767-5300 (Burlington), (262) 741-8300 (Elkhorn), (262) 564-2300 (Kenosha), or (262) 619-6300 (Racine) for additional information.

### JOB MOBILITY

**Concurrent Occupations for program students:**

1. Chipper
2. Tacker
3. Welder's Helper
4. Production Welder

**Occupations for Technical Diploma Graduates:**

1. Arc Welder
2. Production Welder
3. Tig Welder
4. Mig Welder
5. Oxy-Acet Welder

**Advanced Occupations for Technical Diploma graduates with extra training or experience:**

1. Apprentice Welder
2. Certified Welder
3. Shop Welder
4. Combination Welder
5. Weld Supervisor
6. Set-up Welder
7. Welding Inspector
8. Welding Technician

**Occupations for those with higher level degrees (such as a bachelor's degree):**

1. Welding Engineer
2. Welding Instructor
3. Welding Technician

Gateway Technical College reserves the right to modify curriculum requirements for students who interrupt enrollment for a period of two years or take over seven years to complete. Tuition & material fees are determined by the Board of the Wisconsin Technical College System. Consult the Master Class Schedule for exact fee amounts.

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# WELDING (31-442-1B)

## Technical Diploma

Effective 2007/2008  
Academic Year

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn and Kenosha Campuses. General Education courses may be taken at all Gateway Campuses.

Course Number	Course Title	Credits	Hrs / Wk Lec - Lab	Suggested Sequence
<b>Occupational Specific</b>				
442-321	* Welding/Gas Metal Arc Welding	3	(2-4)	1st
442-322	* Welding/Shielded Metal Arc Welding	3	(2-4)	1st
442-323	* Welding/Gas Tungsten Arc Welding	3	(2-4)	1st
442-324	* Weld Printreading & Fabrication Procedures	2	(2-2)	1st
442-334	* Welding/Oxyactylene	3	(2-4)	1st
442-329	* Welding/Advanced Oxyacetylene (Prereq. 442-334)	2	(2-2)	2nd
442-330	* Welding/Advanced Shielded Metal Arc Welding (Prereq. 442-322)	3	(4-2)	2nd
442-332	* Welding/Advanced Gas Metal Arc Welding (Prereq. 442-321)	3	(4-2)	2nd
442-333	* Welding/Advanced Gas Tungsten Arc Welding (Prereq. 442-323)	3	(2-4)	2nd
<b>Total Required</b>		<b>25</b>		
<b>Occupational Support</b>				
801-301	Writing Principles (See Note 1)	1	(2-0)	1st
804-350	Essential Mathematics	2	(4-0)	1st
<b>Total Required</b>		<b>3</b>		
<b>Program Total Required</b>		<b>28</b>		

### Advanced Welding Option Area

#### ADMISSION REQUIREMENTS

1. Students must complete reading, writing, and pre-algebra placement testing.
2. Students must submit an application & \$30 fee.

#### GRADUATION REQUIREMENTS

1. 28 Credits with an average of 2.0 or above.
2. \*Average of 2.0 ("C") or above for these major courses.

#### NOTES

1. A satisfactory placement test score (or successful remediation) is required prior to enrollment in Writing Principles (801-301). See a counselor for details.
2. Safety glasses are required in labs. If prescription glasses are required, allow a minimum of 90 days.
3. A hand calculator capable of trigonometric functions is recommended for 442-324; the cost is approximately \$20.
4. Students are required to have an arc welding helmet, oxy-acet goggles, chipping hammer, and welding gloves (leather); the cost is approximately \$20. Students must be prepared to pay for this equipment on the first day of class (or bring their own equipment).
5. Any course may be taken prior to entry in the program, assuming prerequisites and corequisites have been satisfied (or waived with department approval).

*For a complete list of course descriptions (and possible online courses) for this program, please consult our webpage at [www.gtc.edu](http://www.gtc.edu).*

### CORE ABILITIES

Gateway believes students need both technical knowledge and skills and core abilities in order to succeed in a career and in life. The following nine core abilities are the general attitudes and skills promoted and assessed by all Gateway programs. All Gateway graduates should be able to:

1. Act responsibly.
2. Communicate clearly and effectively.
3. Demonstrate essential computer skills.
4. Demonstrate essential mathematical skills.
5. Develop job seeking skills.
6. Respect themselves and others as members of a diverse community.
7. Think critically and creatively.
8. Work cooperatively.
9. Value learning.



# WELDING (31-442-1B)

## Technical Diploma

Effective 2007/2008  
Academic Year

Major courses (\*) in this program are taught at Gateway Technical College-Elkhorn and Kenosha Campuses. General Education courses may be taken at all Gateway Campuses.

**Program Description:** *Welding* provides concentrated instruction, primarily through practical experience, on various welding techniques. The following processes are covered: O-A-Oxyacetylene welding, brazing, and cutting; GMAW-gas metal arc welding (wire, mig, short arc); GTAW-gas tungsten arc welding (tig, heliarc); SMAW-shielded metal arc welding (stick, arc), including plasma arc cutting; and robotic welding and cutting.

### PROGRAM LEARNING OUTCOMES

Graduates of the Welding Technical Diploma Program should be able to:

1. Prepare three groups of metal (stainless steel, aluminum, and mild steel) for a butt joint.
2. Use correct filler wire on welding machines.
3. Use and demonstrate proper safety gear and equipment.
4. Prepare pipe coupons for welding land and bevel on 2" XX H pipe.
5. Use a WPS for D1.1 and ASME.
6. Correctly program housekeeping codes for processes used.
7. Have robots perform operations with 100% accuracy.

**Aptitudes and Interests:** Use independent judgement in planning work; move hands and fingers accurately; work within standards and specifications; visualize objects from drawings, sketches or blueprints. Workers should be able to organize work rapidly; be able to adjust to repetitive and short-cycle operations; be interested in work requiring accuracy and meeting prescribed standards; be willing to work under pressure; be able to follow prescribed procedures carefully.

**Physical Requirements:** Employers may place physical requirements on various jobs in this career field. Gateway Technical College strongly encourages you to investigate these physical requirements with employers to determine your employability before entering into this program.

**Helpful High School Courses:** Mathematics, Mechanical Drawing, Blueprint Reading, Welding Method.

**Additional Information:** You may call Student Services at (262) 767-5300 (Burlington), (262) 741-8300 (Elkhorn), (262) 564-2300 (Kenosha), or (262) 619-6300 (Racine) for additional information.

### JOB MOBILITY

**Concurrent Occupations for program students:**

1. Chipper
2. Tacker
3. Welder's Helper
4. Production Welder

**Occupations for Technical Diploma Graduates:**

1. Arc Welder
2. Production Welder
3. Tig Welder
4. Mig Welder
5. Oxy-Acet Welder

**Advanced Occupations for Technical Diploma graduates with extra training or experience:**

1. Apprentice Welder
2. Certified Welder
3. Shop Welder
4. Combination Welder
5. Weld Supervisor
6. Set-up Welder
7. Welding Inspector
8. Welding Technician

**Occupations for those with higher level degrees (such as a bachelor's degree):**

1. Welding Engineer
2. Welding Instructor
3. Welding Technician

Gateway Technical College reserves the right to modify curriculum requirements for students who interrupt enrollment for a period of two years or take over seven years to complete. Tuition & material fees are determined by the Board of the Wisconsin Technical College System. Consult the Master Class Schedule for exact fee amounts.

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## **Technical College Welder Training Appendix B**

### **Milwaukee Area Technical College**

Welding Technology Associate Degree Program

Welding Technical Diploma Program

“Express Ramp” – Flux Core Welding Certificate Program

Flux Core Welding Certificate Program

Gas Metal Arc Welding Certificate Program

Certified Welding Inspector Advanced Technical Certificate

**Student**

2007-2008  
Welding Technology A.A.S.  
Degree

[Back to degrees](#)

*At a Glance*

## **Welding Technology**

**Technology and Applied Sciences Division  
Associate Degree**

**Campus Choices:**

West Allis (day program): 414-456-5310  
Some courses offered evenings and online

**Start Dates:** August/January

**Special Admission Requirements:** Algebra

**Program Code:** 10-621-1

**Detailed Program Information:**

[2007-08 Course Requirements](#)

[2008-09 Course Requirements](#)

The Welding Technology associate degree program offers comprehensive training in welding fabrication, testing and inspection. The major welding processes - manual, semiautomatic and automatic - are covered. Automation courses provide hands-on experience in setting up, programming, operating and troubleshooting computer-controlled cutting equipment and sensory-equipped welding robots. Program graduates typically find employment as welding technicians, robotic welding technicians, welding inspectors, technical sales reps and weld test conductors. This program is offered full time during the day, or part time in the evening to accommodate full-time day employment. Core skills include the ability to follow instructions, visualize finished products based on blueprints, and work independently. Good eyesight and mechanical skills are important.

For more information, e-mail [info@matc.edu](mailto:info@matc.edu)

**[<< Admissions Mainpage >>](#)**

*Call the Admissions Information Office at 414-297-6000 if you have questions about MATC programs.*

 [Register for Classes \(Requires Login\)](#)

**Student**

2007-2008

Welding Technology

[Back to degrees](#)**Welding Technology****(Official WTCS title: Industrial Welding Technician)****Associate in Applied Science Degree – West Allis Campus****Program code: 10-621-1**

This curriculum goes into effect starting with the summer 2008 semester.

This page was last updated in July 2007.

**Overview** — Welding Technology is an associate degree program that combines practical, theoretical and technical training in welding fabrication. Manual, semiautomatic and automatic processes using oxy fuel and arc processes are covered. Advanced courses deal with application of welding codes to develop the expertise needed to become a Certified Associate Welding Inspector or Certified Welding Inspector. Automation courses allow hands-on experience in setting up, programming, operating and troubleshooting computer-controlled cutting equipment and sensory-equipped welding robots. This program is also offered in the evening to accommodate full-time day employment.

**Career Outlook** — Program graduates typically find employment as welding technicians, robotic welding technicians, quality assurance inspectors, technical sales reps and weld test conductors. As such, they are responsible for one or more of the following: welding metal alloys; fabricating metals to specifications; inspecting weldments to assure conformance to specifications; testing and qualifying welders and procedures; troubleshooting faulty weldments; writing procedures; interpreting conventional and computer-aided prints; setting up, programming, operating and troubleshooting arc welding robots and automated cutting machines; and selling and servicing equipment.

**Career Preparation and Expected Learning Outcomes** — Employers expect you as a program graduate to be able to:

- Weld industrial alloys with arc processes
- Interpret and apply codes and specifications
- Interpret conventional and CAD-generated prints
- Inspect and test welders and welding procedures
- Set up, program, operate and troubleshoot automated equipment

**Preparation for Admission** — The following are required for admission to the program:

- A high school diploma or GED
- One year of high school-level algebra
- Demonstration of proficiency in basic skills through a course placement assessment

The ability to follow instructions, visualize finished products based on prints, and work independently are key. Good eyesight and mechanical skills are important.

**Future Opportunities** — Graduates of the program usually pass the AWS Certified Welding Inspector exam on their first attempt.

**This program will transfer to one or more four-year institutions.**

**Possible Careers:**

Quality Assurance Inspector  
Robotic Welding Technician  
Welding Technician

## Weld Test Conductor

### Related Program:

Welding

For more information, call 414-456-5310.

Curriculum effective 2008-2009.

### TECHNICAL STUDIES

			Credits
( ) = Semester Order for Full-Time Students			
(1)	WELDTC-101	Welding Theory 1	2
(1)	WELDTC-107	Fabrication Graphics	3
(1)	WELDTC-111	Welding Practice 1	4
(1)	WELDTC-181	Welding Technology Orientation	1
(2)	WELDTC-102	Welding Theory 2 †	3
(2)	WELDTC-105	Weldability of Materials †	3
(2)	WELDTC-112	Welding Practice 2 †	4
(3)	MATRLS-102	Material Testing	3
(3)	WELDTC-113	Welding Techniques 1 †	3
(3)	WELDTC-140	Manufacturing Applications for Robots	4
(4)	WELDTC-114	Welding Techniques 2 †	3
(4)	WELDTC-135	Automated Welding Processes †	4

### GENERAL STUDIES

ECON-195	Economics	3
OR	<i>Any 200-series ECON course</i>	
ENG-151 and	Communication Skills 1 †	3
ENG-152	Communication Skills 2 †	3
OR	<i>ENG-201 and any 200-series ENG or SPEECH course</i>	
MATH-115	College Technical Mathematics 1 †	5
OR	<i>MATH-113 and MATH-114</i>	
MATH-116	College Technical Mathematics 2 †	4
NATSCI-137	Comprehensive Technical Physics †	4
PSYCH-199	Psychology of Human Relations	3
OR	<i>Any 200-series PSYCH course</i>	
SOCSCI-197	Contemporary American Society	3
OR	<i>Any 200-series SOCSCI or HIST or course</i>	

### ELECTIVE COURSES: Three Credits Required (Suggestions listed below)

GENST-103	College Success Strategies	2
PHYED-210	An Active Approach to Wellness and Fitness	3
MATRLS-103	Nondestructive Testing	3
MATRLS-151	Metallurgy and Material Science	3

### TOTAL CREDITS: 68

Program curriculum requirements are subject to change.

† Prerequisite Required.

NOTE: Students who have not been accepted, or have not decided on a program, may begin with the GENERAL STUDIES courses, if course prerequisites have been met.

For course descriptions, times and locations of classes, visit [INFOonline](#).

**Student**

2007-2008

Welding

[Back to diplomas](#)**Welding****Technical Diploma — Downtown Milwaukee and West Allis Campuses****Program code: 31-442-1**

This curriculum goes into effect starting with the summer 2008 semester.

This page was last updated in July 2007.

**Overview** — Welding is a two-semester technical diploma program designed to prepare you to perform production, maintenance and repair welding in the manufacturing and construction industries.

**Career Outlook** — There is an increasing demand for welders having current industry skills. Advances in welding and related processes create opportunities in manufacturing and construction.

**Career Preparation and Expected Learning Outcomes** — Program graduates will have skills for employment. Employers will expect you to:

- Maintain good attendance
- Practice industry safety standards
- Set up and operate all welding and related equipment
- Troubleshoot and maintain equipment
- Utilize math and blueprint-reading skills
- Communicate effectively
- Abide by daily work routine and regulations, and work cooperatively with co-workers
- Follow instructions and work with minimal supervision
- Have pride in workmanship
- Have a good work ethic

**Preparation for Admission** — The following are required for admission to the program:

- High school diploma or GED
- Demonstration of proficiency in basic skills through a course placement assessment

**Future Opportunities** — Graduates can receive advanced standing in Welding Technology (A.A.S.). Continued education can lead to careers in business ownership, quality assurance, engineering, sales and marketing, or education and training.

**Possible Careers:**

Quality Assurance  
Robotics Welding

**Related Program:**

Welding Technology

For more information, call:

Downtown Milwaukee Campus — 414-297-MATC  
West Allis Campus — 414-456-5310

Curriculum effective 2008-2009.

<b>EIGHT-WEEK TERMS</b>		<b>Credits</b>	<b>Hours</b>
WELD-305	Fundamentals of Oxyfuel Welding	1	4s
WELD-306	Fundamentals of Gas Tungsten Arc Welding (TIG) ‡	2	8s
WELD-307	Advanced Gas Tungsten Arc Welding (TIG) ‡	2	8s
WELD-350	Oxyfuel Welding Processes	1	4r
WELD-380	Welding Trades Mathematics	1	4r
WELD-300	Fundamentals of Arc Welding	1	4s
WELD-301	General Arc Welding ‡	2	8s
WELD-302	Specialized Arc Welding ‡	2	8s
WELD-351	Shielded Metal Arc Welding Processes	1	4r
WELD-361	Basic Blueprint Reading for Welders	1	4r
WELD-326	Fundamentals of Semi-Automatic Wire Welding	1	2s
WELD-327	Specialized Semi-Automatic Wire Welding ‡	2	4s
WELD-328	General Semi-Automatic Wire Welding ‡	2	8s
WELD-352	Gas-Shielded Arc Welding Processes	1	4r
WELD-362	Blueprint Reading/Welding Symbols	1	4r
ENG-347	Communications 2	1	4r
SOCSCI-330	Applied Economics and Human Relations	1	4r
WELD-353	Layout and Setup Techniques ‡	1	4r
WELD-363	Advanced Blueprint Reading for Welders ‡	1	4r
WELD-395	Layout and Setup for Welders 1 ‡	1	4s
WELD-396	Layout and Setup for Welders 2 ‡	2	8s
WELD-397	Layout and Setup for Welders 3 ‡	2	8s

**TOTAL CREDITS: 30**

Hours per Week: r = related, s = shop

Program curriculum requirements are subject to change.

‡ Prerequisite Required.

For course descriptions, times and locations of classes, visit [INFOnline](#).

**Student**

2007-2008

Express Ramp - Flux Core  
Welding Certificate[Back to certificates](#)**Complete Course Information****'Express Ramp' – Flux Core Welding Certificate  
Downtown Milwaukee and West Allis Campuses****Qualifications**

- GED or high school diploma preferred
- Minimum Accuplacer test scores in reading and math
- Welding experience desirable but not required

**Schedule**

The first class will start as soon as it fills (capacity: 12 students). Admission is on a first-come, first-served basis. Watch this website for future start dates and locations.

**Course Sequence (Flux Core Welding Certificate)**

WELD-404: Welding Processes and Applications (theory – 64 hours)  
WELD-429: Welding Out of Position (shop –160 hours)  
WELD-430: Flux Core Arc Welding Practices 1 (shop – 128 hours)  
WELD-431: Flux Core Arc Welding Practices 2 (shop – 128 hours)

**Topics**

Safety Orientation and Tool Use

**Processes**

- Flux core arc welding 3/32
- Flux core arc welding .052
- Gas tungsten arc welding
- Air carbon arc gouging
- Oxy-fuel cutter operation

**Procedures**

- Interpretation of documented procedures
- Set machine parameters
- Understand the effects of essential parameters
- Perform welds

**Weld symbols**

- Identify elements
- Interpret symbols
- Employ correct interpretation to welded plates

**Equipment**

- Identify system components
- Assemble
- Adjust
- Troubleshoot

**Use pneumatic grinding and chipping equipment with:**

- Attention to safety
- Task at hand
- Surface and angle requirements of part

**Inspection**

- Use of inspection and measuring tools
- Set up test plates per print
- Weld with attention to inter-pass temperature
- Demonstration of magnetic particle inspection

**For application information, please contact Cathy Adams, 414-456-5333.**

**Program counselors:**

Tom Wichert, 414-456-5451

Christine Litwin, 414-456-5351

TEXT ONLY

ESPAÑOL

PRIVACY

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## Flux Core Arc Welding Certificate (Project Express Ramp)

*Starting January 2008*

This intensive, accelerated series of courses teaches you the advanced welding skills involved in building monumental steel parts and structures. You must commit to 12 weeks of full-time training. Candidates are competitively screened for required aptitudes. Tuition is free if you qualify, thanks to underwriting from partners. Upon successful completion, you will qualify to be considered for an immediate job with companies that employ heavy plate welders. You also will be prepared to earn D1.1 AWS (American Welding Society) certification in flux core welding competencies.

### Courses taught at ECAM:

#### **WELD-429, Welding Out of Position (160 hours)**

- Develops the necessary manual and physical skills that will allow you to master semiautomatic arc welding guns that feed coiled, hard-steel wire and use carbon dioxide gas as shielding. You will practice equipment use in tight spaces and from awkward physical positions. Also covers equipment maintenance and technical instruction in semiautomatic welding processes.

#### **WELD-430, Flux Core Welding 1 (128 hours)**

- Hands-on instruction teaches the skills and techniques for welding various joints from various physical positions using various flux core wire diameters, in steel up to one inch thick. Also, you will learn carbon arc gouging for full penetration, and pre-heating techniques for welding to precise thicknesses.

#### **WELD-431, Flux Core Welding 2 (128 hours)**

- Further builds hands-on skills and conceptual understanding of welding techniques such as multiple pass fillets and groove welds. Using large-diameter, flux-core wire, you will make welds that meet D1.1 AWS standards.

#### **WELD-404, Welding Processes and Applications (64 hours)**

- Covers welding processes and principles and the application of weld symbols from drawings. Also: basic math concepts in whole numbers, fractions and decimals as it relates to reading simple blueprints.

[TEXT ONLY](#)[ESPAÑOL](#)[PRIVACY](#)

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**Student**

2007-2008  
Flux Core Welding

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**Flux Core Welding Certificate**

**MATC Oak Creek Campus**

**Center for Energy Conservation and Advanced Manufacturing (ECAM)**

Learn specialized skills involved in fabricating steel parts and structures through this hands-on certificate program. Classes are located at the new Center for Energy Conservation and Advanced Manufacturing, delivering innovative education and training that supports emerging energy and manufacturing methodologies. Credits in this certificate can count toward an MATC degree or diploma.

**Features:**

- 448 hours of training and practice, 14 credits
- 12 weeks (40 hours/week)
- Capacity - 12 students on a first-come, first-served basis

**Prerequisites:**

- Gas Metal Arc Welding (WELD-326 and WELD-327)
- Fundamental and General Semi-Automatic Welding, or two years welding experience (Gas Metal Arc Welding) or State Structural Welding Certified

<b>Courses</b>		<b>Credits</b>	<b>Total Hours</b>
WELD-328	Flux Core Arc Welding	2	64
WELD-329	Flux Core Arc Welding Practice 1	4	128
WELD-330	Flux Core Arc Welding Practice 2	4	128
WELD-352	Gas-Shield Arc Welding Process	1	32
WELD-361	Basic Blueprint Reading - Welders	1	32
WELD-362	Blueprint Reading - Welding Symbols	1	32
WELD-380	Welding Trades Mathematics	1	32

**TOTAL CREDITS: 14**

**For more information, please call 414-273-ECAM.**

**For course descriptions, times and locations of classes, see [INFOnline](#).**



[ECAM Main Page](#)

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[For-Credit Courses &  
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## Gas Metal Arc Welding Certificate

*Starting January 2008*

This five-credit sequence teaches basic skills for semiautomatic wire welding.

### Courses taught at ECAM:

**WELD-326, Fundamentals of Semi Auto Wire Welding (1 credit)**

- Develops fundamental knowledge and skills in the safe use of semiautomatic wire welding equipment. Topics include joint details and distortion control, GMAW weld faults, welding metallurgy and weld symbol interpretation.

**WELD-327, Specialized Semiautomatic Wire Welding (2 credits)**

- Skills are further developed through the use of semiautomatic solid and cored wire welding processes, such as gas metal arc, flux cored and submerged arc welding. Prerequisite: WELD-326.

**WELD-328, Flux Core Arc Welding (2 credits)**

- Continues the concepts and skills in wire welding learned in WELD-327. Emphasis is on out-of-position welding on common joints. Prerequisite: WELD-327.

**Student**

2007-2008  
 Certified Welding Inspector  
 Certificate Description

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**Certified Welding Inspector  
 Advanced Technical Certificate**

**West Allis Campus**

This page was last updated in October 2006.

Completion of an associate degree in Welding Technology, or equivalent work experience, or technical knowledge and skills as evaluated by the division, is a requirement for admission to this advanced technical certificate program. The certificate is designed to provide the requisite technical knowledge in inspection, judgment and documentation skills to pass the American Welding Society's certified welding inspector's exam. The knowledge and skills gained from this certificate will also give participants the ability to develop realistic and pragmatic quality systems within the metal fabricating/welding field.

Curriculum effective 2007-2008.

<b>COURSES</b>		<b>Credits</b>
WELDTC-115	Welding Quality Systems †	3
WELDTC-116	Procedure and Welder Qualification/Certification †	3
WELDTC-117	Weldment Documentation and Evaluation †	3

**TOTAL CREDITS: 9**

† Prerequisite Required

For information about specific courses, see Course Descriptions

For class times and locations or to register online, visit INFOnline.

## **Technical College Welder Training Appendix C**

### **Moraine Park Technical College**

Welding Technical Diploma

Welding Certification


# Welding

*Technical Diploma: 31-442-1*


*Campus: Beaver Dam*

Moraine Park's two-semester Welding technical diploma helps individuals develop welding and fabrication skills that are used in today's industries. Students gain skills in all position welding that can lead to welder certification through hands-on experience in a welding laboratory. Students learn gas metal arc welding, shielded metal arc welding, gas tungsten arc welding, and oxy-fuel cutting welding. The coursework also provides instruction in print reading, math and communications skills.

This program is a nontraditional occupation for women.

- Curriculum
- Outcomes
- Career Opportunities
- Admission Process
- Take a Program Tour 



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# Curriculum


## 2007-2008

Course Number	Course Title	Credits
<b>Core Courses</b>		
421-331	Welding Print Reading	2
442-309	Introduction to Welding Processes	4
442-310	Shielded and Gas Metal Arc Welding (SMAW/GMAW)	4
442-315	Gas Tungsten Arc Welding	4
442-316	Advanced Welding Techniques	4
442-345	Fabrication for Welders	4
<b>Technical Support Courses</b>		
801-310	Occupational Communication	2
804-106	Introduction to College Mathematics	3
890-125	Student Success	1
<b>Total:</b>		<b>28</b>

A Welding Exit Assessment (997-153) is a graduation requirement for this program.

Use the 06-07 Curriculum Flowchart or the 07-08 Curriculum Flowchart to aid you in scheduling classes.

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## Welding Certification

The Certified Welding Inspectors at our Beaver Dam facility have the credentials to certify welders in most available welding codes. Weld certification tests can be performed in our lab or arrangements can be made to test at a company site. We offer our program students one certification test as part of our advanced Welding course. State of Wisconsin tests are conducted once a month. Click on the following link for the current schedule of State of Wisconsin Structural Steel tests.

### Structural Welding Certification Exam Schedule

For a more detailed overview or a price quote, please contact Marcia Arndt.

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## **Technical College Welder Training Appendix D**

**Waukesha County Technical College**

Metal Fabrication/Welding Technical Diploma Program

# Metal Fabrication/Welding

## 30-credit Technical Diploma

### About the Program

Develop skills in interpreting blueprints; creating the exact shape of a part for cutting, fabrication and welding; and producing quality parts through the use of different techniques and materials. Learn to program and operate computer-controlled press brakes and shears, plasma arc cutting machines and microprocessor-based power sources. Welding techniques and joining methods are emphasized throughout the program.

Graduates may work in positions such as fabricator, laser operator, welder or welder/press operator.

### Potential Job Titles

- Fabricator
- Laser Operator
- Welder/Press Operator
- Welder

### Admission Process

- Fill out a WCTC application
- Send \$30 non-refundable application fee
- Send high school transcript or GED/HSED
- Send any previous college transcripts
- Complete Skills Assessment test (COMPASS)
- Begin pursuing Financial Aid options

For more information call 262.691.5200.

### Required Courses

#### First Semester

457-310	Blueprint Reading for Fabricators	2
457-320	Thermal Cutting Processes	2
457-350	Metal Fabrication Welding I	4
457-360	Metal Fabrication I	5
804-304	Industrial Math I	2+
809-345	Basic Workplace Psychology	1
<b>Total semester credits</b>		<b>16</b>

#### Second Semester

422-303	Metal Technology for Fabricators	1
457-321	Thermal Cutting Processes II	2
457-355	Metal Fabrication Welding II	4
457-365	Metal Fabrication II	5
801-311	Communication in the Workplace	2+
<b>Total semester credits</b>		<b>14</b>

+ Proficiency exam available

Curriculum is current as of catalog printing. The most current curriculum requirements for graduation will be provided upon admission to program, or review at [www.wctc.edu](http://www.wctc.edu).

### Metal Fabrication / Welding Required Courses

<b>422-303 Metal Tech-Fabrication</b>	<b>1</b>
Become familiar with the elementary principles governing the behavior of ferrous and non-ferrous metals and the effects of welding on them. Review materials composition, production, properties, applications, and weldability.	
<b>457-310 Blueprint Reading-Fab</b>	<b>2</b>
Learn basic orthographic projection, sketching, dimensioning, structural shape identification, weld symbols, welding joint geometry, and the interpretation of fabrication from prints.	
<b>457-320 Thermal Cutting Processes</b>	<b>2</b>
Learn manual and machine oxygen fuel, air carbon, plasma, and laser cutting. Visually inspect welds and cut edges.	
<b>457-321 Thermal Cutting Processes II</b>	<b>2</b>
In this advanced course, continue to build skills with manual and machine oxygen fuel, air carbon, plasma and laser cutting. Prerequisites: 457-320 (or concurrent)	
<b>457-350 Metal Fabrication Welding I</b>	<b>4</b>
Gain the knowledge and skills needed to safely perform fundamental gas metal arc (MIG) and gas tungsten arc (TIG) welding while studying welding specifications, welding procedures, tacking procedures, and basic joining methods.	
<b>457-355 Metal Fabrication Welding II</b>	<b>4</b>
Continue to develop gas metal arc (MIG) and gas tungsten arc (TIG) welding skills. Demonstrate safe and correct welding techniques through the completion of projects. Prerequisites: 457-350	

### **457-360 Metal Fabrication I** 5

Learn the basics of metal fabrication safety, production, measuring, hand tools, and layout. Learn how to use shears, forming, press brakes, box and pan brakes, and the hydraulic iron worker. Demonstrate proficiency in metal fabrication through related projects.  
Prerequisites: 457-310 (or concurrent)

### **457-365 Metal Fabrication II** 5

Apply layout, blueprint interpretation, and welding and fabrication machine set-up and operation skills to safely and correctly complete metal fabrication projects.  
Prerequisites: 457-360

### **801-311 Communication in the Workplace** 2

Expand level of awareness and skill in interpersonal communications, both oral and written, while focusing on securing and maintaining a job. Develop competencies in the area of listening, sending, and employability skills.

### **804-304 Industrial Math I** 2

Explore the topics of applied arithmetic and algebra during this course. Study concepts related to measurement, fractions, decimals, percents, ratio and proportion, signed numbers, formula substitution, solutions to equations, tapers and gears.

### **809-345 Basic Workplace Psychology** 1

Develop the skills needed for building positive relationships with others by taking part in unique workplace scenarios and exploring psychological concepts.

## Learning About the Welding Job Market in the Southeast Wisconsin Region



*Photo: Milwaukee Area Technical College/Sue Ruggles*

*Prepared by the University of Wisconsin-Milwaukee Employment and Training Institute  
for the WOW Workforce Investment Board, Inc. and the Regional Workforce Alliance*

## Learning About the Welding Job Market

*Welding jobs are in demand.*

*\$12.22: Starting wage for welders*

*\$18.53: For experienced welders*



*Welding student at Gateway Technical College.  
Photo: Mark Uttech*

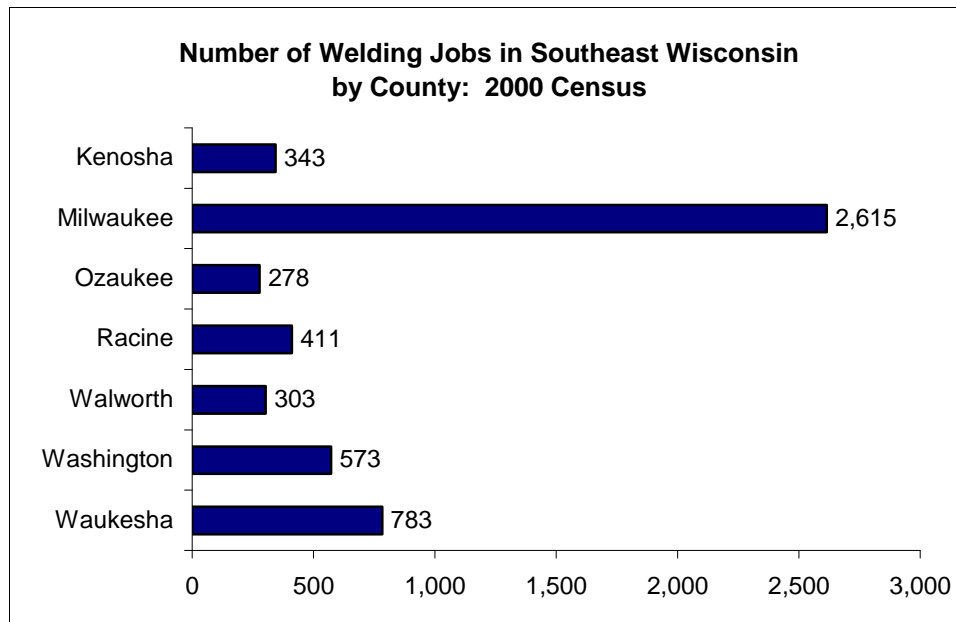
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### ▼ *Local Job Outlook*

To help you plan for jobs of today and the future, we regularly contact employers in Southeast Wisconsin to find out what kinds of jobs and what levels of education, training and experience are required. This report gives you a “snapshot” of welding jobs available now and in the future in the seven counties of Southeast Wisconsin – Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha counties.

This is an exciting time to think about careers. Many area companies are looking for new workers to replace those who are retiring and to meet expansion needs. While it is possible to find a welding job right out of high school, you will have a greater choice of careers and higher pay if you complete technical college training. In the welding field you have the opportunity to start as an entry level worker and with more experience advance to very difficult types of welds with average salaries of \$50,000 or more.

Welders are working throughout the region. At the time of the 2000 U.S. Census, about half of all welding jobs were located in Milwaukee County, 31 percent were in the WOW (Waukesha, Ozaukee and Washington) counties, and 20 percent were in Racine, Kenosha and Walworth counties.



Jobs for welders, cutters and welding machine operators are expected to increase five percent in the next 10 years. Openings for welders in the seven-county Southeast Wisconsin region will occur mainly due to the retirement of current workers. While some welding jobs will be eliminated by automated systems, manual welders with a wide variety of skills will still be needed for metal fabrication, maintenance, repair and other work in manufacturing.



*MATC instructor Larry Gross demonstrates robot welding system to a student at the West Allis campus.  
Photo: MATC/Sue Ruggles*

In December 2007 the University of Wisconsin-Milwaukee Employment and Training Institute conducted a targeted survey of fabricated metal product manufacturing firms and larger manufacturing companies. For this survey fifty employers reported a need to hire 228 welders within the next six months and another 142 welders in the year following. The types of welders needed by these companies are listed below.

**Anticipated Openings for Welders in Southeast Wisconsin**  
(50 Companies Reporting Welder Openings)

<b>Anticipated Openings</b>	<b>Nov-Dec 2007</b>	<b>Jan-June 2008</b>	<b>July-Dec 2008</b>	<b>Jan-June 2009</b>	<b>TOTAL</b>
MIG welder	19	63	16	12	110
Flux cored arc welder	4	25	20	19	68
TIG welder	6	20	13	4	43
Set up welder	7	16	6	4	33
Welder fabricator	5	11	7	7	30
MIG/TIG/flux cored arc	5	10	6	6	27
Welder fitter	0	8	2	0	10
Spot welder	3	3	3	1	10
MIG/TIG	2	3	2	3	10
Production welder	3	4	2	0	9
MIG/flux cored arc	0	2	0	2	4
Welder burner	0	1	1	1	3
Plate and weld inspector	0	2	1	0	3
Pipe welder	0	2	0	0	2
Finish welder	1	0	0	0	1
Other:	1	2	4	0	7
<b>TOTAL WELDERS</b>	<b>56</b>	<b>172</b>	<b>83</b>	<b>59</b>	<b>370</b>

*Categories of welders are identified based on the official American Welding Society (AWS) definitions of the processes: Gas Metal Arc Welding – GMAW (previously known as Metallic Inert Gas-MIG), Gas Tungsten Arc Welding – GTAW (previously known as Tungsten Inert Gas-TIG), and Flux Cored Arc Welding-FCAW. For more background on welding careers, go to the American Welding Society website at [www.aws.org/w/a/education/career.html](http://www.aws.org/w/a/education/career.html).*

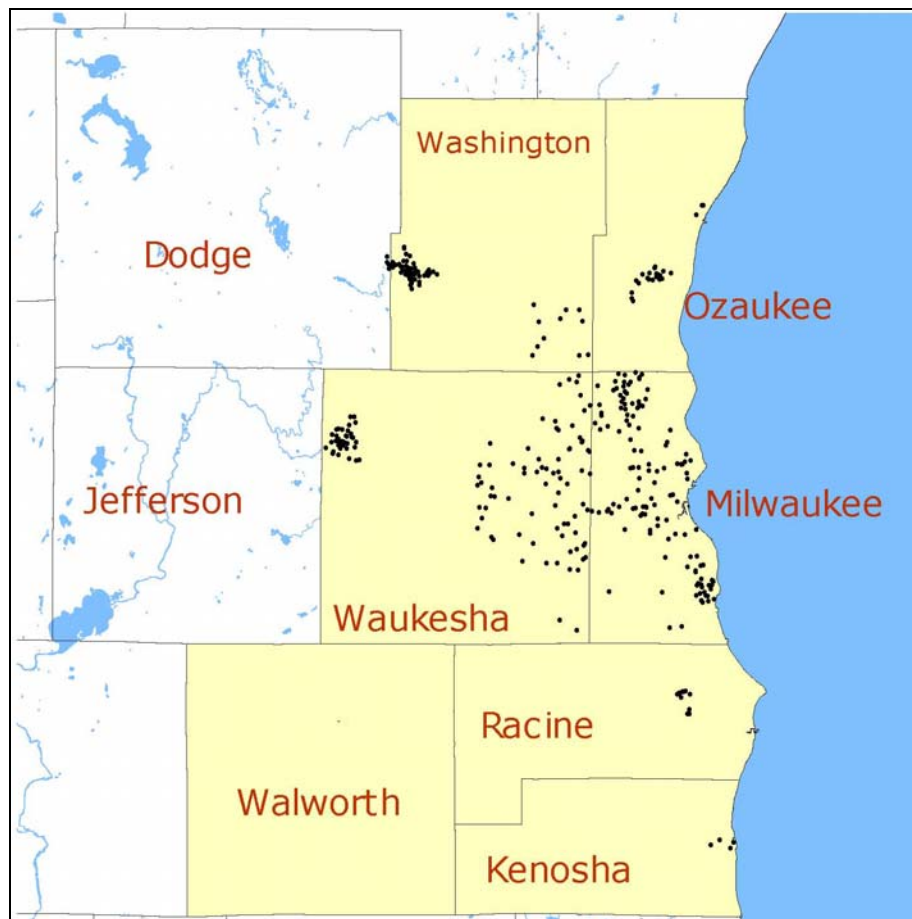


MATC instructor Richard Tupta explains welding techniques to a student at the West Allis campus.

Photo: MATC/Sue Ruggles

Along with the ability to complete welding tasks, all employers are looking for applicants with good work habits and ability to follow instructions. Many of the openings require technical college training and certification, and often 1 to 3 years of welding experience is specified. The locations reported by surveyed companies for recent and current job openings are shown on the map below.

**Snapshot of Job Openings for Welders in Southeast Wisconsin**  
 (50 companies reporting openings for Nov. 2007 – June 2008)



Source: University of Wisconsin-Milwaukee Employment and Training Institute Targeted Survey of Welder Job Openings and Anticipated Needs in Southeast Wisconsin, conducted for the Waukesha-Ozaukee-Washington Workforce Investment Board, December 2007.

Some companies will hire and train their own welders on the job while others will only hire experienced welders or those with certification. The education levels of welders currently employed in the region show that the opportunities for those with less education are limited. Most welders are high school graduates (76%) and 28% have some college or a college associate degree. Only 24% of current welders did not complete high school.

Welding jobs titles and skill levels are determined based on your ability to demonstrate specific proficiencies when tested. Certification of advanced skills is a commonly accepted way of documenting your ability to perform welds as specified by welder classification. Gateway Technical College, Milwaukee Area Technical College, Moraine Park Technical College, and Waukesha County Technical College offer welder training and certification programs for entry level to advance training, and some with a special emphasis. Most of the technical college programs are running at full capacity and some are planning for expansion.

**Location of Technical College Campuses with Welding Programs**



## ▼ *Welding Job Mobility*

In a two-semester college diploma program, you will learn to set up and operate welding equipment, read blueprints, and help maintain welding equipment for manufacturing and construction industries. Short term certificate programs provide an introduction to types of welds. In some cases the employer will conduct the necessary training on the job. Technical training in welding offers job mobility into a number of occupations.

### Welding Job Mobility (from Gateway Technical College)

---

**Concurrent Occupations for welding program students:**

1. Chipper
2. Tacker
3. Welder's Helper
4. Production Welder

**Occupations for Technical Diploma Graduates:**

1. Arc Welder
2. Production Welder
3. Tig Welder
4. Mig Welder
5. Oxy-Acet Welder

**Advanced Occupations for Technical Diploma graduates with extra training or experience:**

1. Apprentice Welder
2. Certified Welder
3. Shop Welder
4. Combination Welder
5. Weld Supervisor
6. Set-Up Welder
7. Welding Inspector
8. Welding Technician

**Occupation for those with higher level degrees (such as bachelor's degree):**

1. Welding Engineer
2. Welding Instructor
3. Welding Technician

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Source: Gateway Technical College curriculum at [www.gtc.edu/docs/curriculumSheets/31-442-1C.pdf](http://www.gtc.edu/docs/curriculumSheets/31-442-1C.pdf).

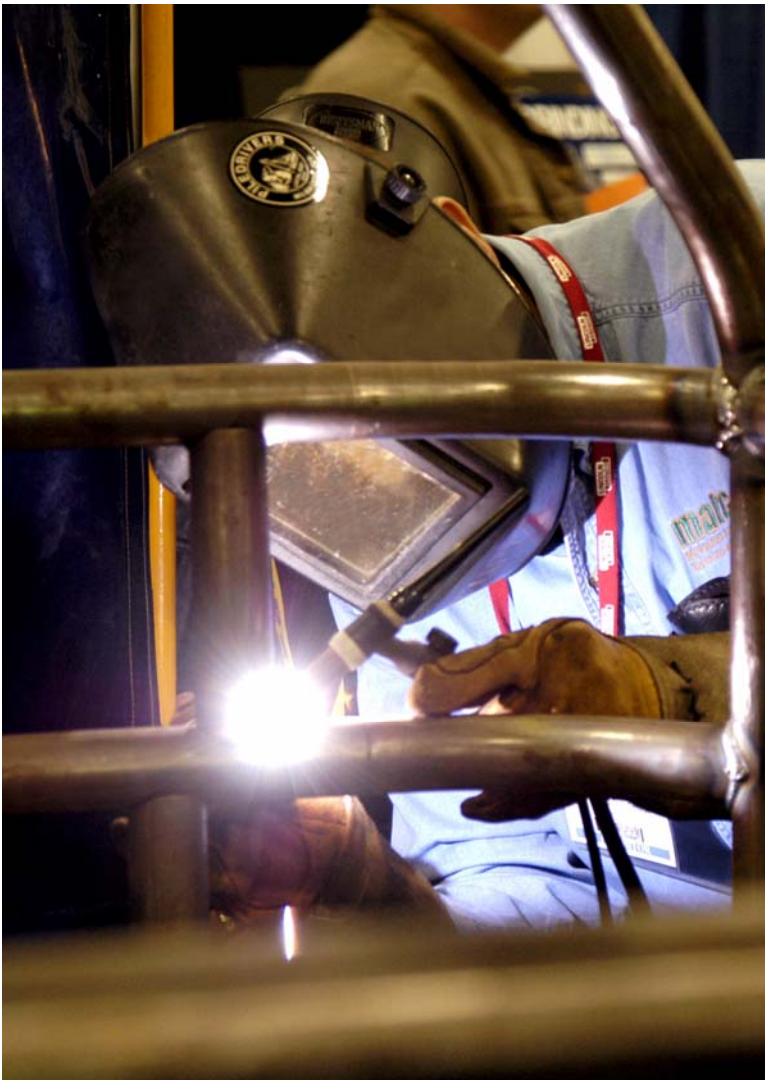


*Test candidate Roger Bratberg takes the performance component of the Certified Robotic Arc Welding (CRAW) exam at the MATC.  
Photo: MATC/Sue Ruggles.*

Acquiring welding skills can open doors to other careers as well as increased wages. Listed below are jobs and pay levels for occupations which require some welding experience.

Other Careers Requiring Welding Skills *(from the U.S. Department of Labor)*

<b><u>Occupational Title</u></b>	<b><u>Average Annual Salary</u></b>	<b><u>Relevance Score on Importance of Welding</u></b>
Structural metal fabricators and fitters	\$35,011	33
Sheet metal workers	\$52,041	32
Plumbers, pipefitters, and steamfitters	\$61,016	24
Structural iron and steel workers	\$52,649	24
Industrial machinery mechanics	\$46,863	22



*MATC welding instructor Peter Stojanovich demonstrates welding techniques on a race car chassis.*

Photo: MATC/Sue Ruggles

## Using the Internet to Learn About Careers in Welding

The Wisconsin technical colleges have information available at their campuses and on their websites about courses in welding, requirements for diploma and certificate programs, and resources about welding careers. (Sample websites are shown in the pages below.)

### ***Gateway Technical College (www.gtc.edu)***

#### Kenosha Campus

Contact: Mark Uttech [uttechm@gtc.edu](mailto:uttechm@gtc.edu)  
Location: 3520 30<sup>th</sup> Avenue, Kenosha, WI 53144  
Enrollment: 10 sessions are offered with a capacity of 16 per session; 4 sessions are held in both the a.m. and p.m.; 2 sessions are held on Friday night and Saturday.  
Capacity: 160

#### Elkhorn Campus

Contact: Kenneth Karwowski [karwowskik@gtc.edu](mailto:karwowskik@gtc.edu)  
Location: 400 County Road H, Elkhorn, WI 53121  
Enrollment: 56 in evening sessions; 20 in daytime sessions  
Capacity: 76

Useful starting website: [www.gtc.edu/pages/displayProgram.asp?pid=30-442-2](http://www.gtc.edu/pages/displayProgram.asp?pid=30-442-2)

### ***Milwaukee Area Technical College (www.matc.edu)***

Contact: Mark Koehler [KoehlerM@matc.edu](mailto:KoehlerM@matc.edu)  
Location: Downtown Milwaukee Campus (700 West State Street, Milwaukee, WI 53233)  
West Allis Campus (1200 South 71st Street, West Allis, WI 53214)  
Oak Creek Campus (6665 South Howell Avenue, Oak Creek, WI 53154)  
Capacity: 80 (20 per session, morning and afternoon at the Downtown Milwaukee Campus and West Allis Campus; 12 at Oak Creek Campus.  
Useful starting website: [www.matc.edu/documents/catalog/welding\\_technical\\_diploma.html](http://www.matc.edu/documents/catalog/welding_technical_diploma.html)

### ***Moraine Park Technical College (www.wptc.edu)***

Contact: Larry Clark [lclark@morainepark.edu](mailto:lclark@morainepark.edu)  
Location: Beaver Dam Campus (700 Gould Street, Beaver Dam, WI 53916)  
Some introductory apprentice courses are held at the Fond du Lac Campus (235 N. National Avenue, Fond du Lac, WI 54936)  
Enrollment: Two sections are offered: 1 in the evening, 1 during the day.  
Sessions start quarterly throughout the regular school year.  
Capacity: 28 (14 in each section)  
Useful starting website: [www.morainepark.edu/pages/441.asp](http://www.morainepark.edu/pages/441.asp)

### ***Waukesha County Technical College (www.wctc.edu)***

Contact: Michael Shiels, [mshiels@wctc.edu](mailto:mshiels@wctc.edu)  
Location: Main Campus, 800 Main Street, Pewaukee, WI 53072  
Capacity: 40  
Useful starting website: [www.wctc.edu/web/areas/trades/welding/welding.php](http://www.wctc.edu/web/areas/trades/welding/welding.php)



## Manufacturing, Engineering, and Maintenance

### Welding

A talented welder can always find well-paying work in a variety of industries. Gateway Technical College provides two technical diplomas that ensure you get the best of industry knowledge and can hit the workforce with the talent you need and the salary you want.

Gateway's Welding program provides flexible scheduling, multiple start dates, and is student-friendly. It includes extensive hands-on activity in lab provided by knowledgeable instructors with years of actual in-the-field experience.

[Visit the Welding web site.](#)

[Register for classes.](#)

Classes available this fall:

(Click the Course Number for an explanation. [For information regarding class days, times, and spaces available, click here.](#))

- [442-101](#) Welding Basics
- [442-102](#) Introduction to Welding
- [442-302](#) Metal Fabrication I
- [442-314](#) Welding/Fundamentals of
- [442-321](#) Welding/Gas Metal Arc Welding
- [442-322](#) Welding/Shielded Metal Arc Welding
- [442-323](#) Welding/Gas Tungsten Arc Welding
- [442-324](#) Weld Printreading and Fabrication Procedures
- [442-329](#) Welding/Advanced Oxyacetylene
- [442-330](#) Welding/Advanced Shielded Metal Arc Welding
- [442-332](#) Welding/Advanced Gas Metal Arc Welding
- [442-333](#) Welding/Advanced Gas Tungsten Arc Weld
- [442-334](#) Welding/Oxyacetylene
- [442-342](#) Welding/Pipe Oxyacetylene Fitting
- [442-343](#) Welding/Pipe Shielded Metal Arc Welding
- [442-344](#) Welding/Pipe Shielded Metal Arc Certification
- [442-345](#) Welding/Pipe Gas Tungsten Arc Welding
- [442-346](#) Welding/Pipe Gas Tungsten Arc Certification
- [442-347](#) Welding/Pipe Gas Metal Arc Welding
- [442-407](#) Welding
- [442-410](#) Welding for Sheet Metal
- [442-424](#) Art of Welding/Advanced

### Program Courses

[Printer Friendly Page](#)

List of degrees, diplomas or certificates available in this program area:

**WELDING/MAINTENANCE & FABRICATION** – Technical Diploma  
**WELDING** - Technical Diploma

Certificates Available:

OXY/FUEL WELDING  
 ADV. OXY/FUEL WELDING  
 PIPE/OXY/FUEL WELDING  
 GMAW WELDING  
 ADV. GMAW WELDING  
 PIPE GMAW WELDING  
 SMAW WELDING  
 ADV. SMAW WELDING  
 PIPE SMAW WELDING  
 PIPE SMAW CERT.  
 GTAW WELDING  
 ADV. GTAW WELDING  
 PIPE GTAW WELDING  
 PIPE GTAW CERT.  
 WELD PRINTREADING AND FABRICATION PROCEDURES  
 WELDING BASICS  
 WELDING FUNDAMENTALS

Note that there is a Robotics Option offered on the Elkhorn Campus within the Welding technical diploma.

### Job/Salary & Outlook

[Printer Friendly Page](#)

A talented welder can always find well-paying work in a variety of industries. Gateway Technical College provides two technical diplomas that ensure you get the best of industry knowledge and can hit the workforce with the talent you need and the salary you want.

Gateway's Welding program provides flexible scheduling, multiple start dates, and is student-friendly. It includes extensive hands-on activity in lab provided by knowledgeable instructors with years of actual in-the-field experience.

<u>Job</u>	<u>Salary</u>
Welder/Cutter/Fabricator	\$10.16- \$48.00

<u>Job</u>	<u>Outlook</u>
Welder/Cutter/Fabricator	Excellent - Huge shortage of welders/cutters/fabricators Starting wages already increasing due to shortage. Many job opportunities. Articles in local papers spotlighting shortages both locally and nationally.

<u>Job</u>	<u>Description</u>
Welder/Cutter/Fabricator	Cut/fabricate/weld/ assemble various components from a variety of metals

MILWAUKEE AREA **Technical College** CONTACT US JOBS SITE MAP SEARCH

Home Blackboard Library INFOnline Calendar Class Schedule College Store TechHELP

**Student**

2007-2008  
Welding  
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**Welding**  
**Technical Diploma — Downtown Milwaukee and West Allis Campuses**

**Program code: 31-442-1**

This curriculum goes into effect starting with the summer 2008 semester.

This page was last updated in July 2007.

**Overview** — Welding is a two-semester technical diploma program designed to prepare you to perform production, maintenance and repair welding in the manufacturing and construction industries.

**Career Outlook** — There is an increasing demand for welders having current industry skills. Advances in welding and related processes create opportunities in manufacturing and construction.

**Career Preparation and Expected Learning Outcomes** — Program graduates will have skills for employment. Employers will expect you to:

- ◆ Maintain good attendance
- ◆ Practice industry safety standards
- ◆ Set up and operate all welding and related equipment
- ◆ Troubleshoot and maintain equipment
- ◆ Utilize math and blueprint-reading skills
- ◆ Communicate effectively
- ◆ Abide by daily work routine and regulations, and work cooperatively with co-workers
- ◆ Follow instructions and work with minimal supervision
- ◆ Have pride in workmanship
- ◆ Have a good work ethic

**Preparation for Admission** — The following are required for admission to the program:

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**Student**

2007-2008  
Flux Core Welding  
[Back to certificates](#)

**Flux Core Welding Certificate**

**MATC Oak Creek Campus**  
**Center for Energy Conservation and Advanced Manufacturing (ECAM)**

Learn specialized skills involved in fabricating steel parts and structures through this hands-on certificate program. Classes are located at the new Center for Energy Conservation and Advanced Manufacturing, delivering innovative education and training that supports emerging energy and manufacturing methodologies. Credits in this certificate can count toward an MATC degree or diploma.

**Features:**

- 448 hours of training and practice, 14 credits
- 12 weeks (40 hours/week)
- Capacity - 12 students on a first-come, first-served basis

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**MATC.NOW**  
*Latest News*

**THE INSTRUCTORS • BEYOND MATC • STUDENT STORIES • HOME PAGE**

*Rapid Response*  
**New Certificate Leads to Jobs in Heavy-Plate Welding**

A new welding certificate offered by Milwaukee Area Technical College creates a launching pad to customized welder training and jobs at heavy manufacturers such as Bucyrus International, Inc. of South Milwaukee. MATC developed the program on a fast track as a result of discussions with CEOs who reported having trouble finding enough welders with the right skills for their specialized needs.



The intensive, 12-week, 350-hour training program leads to a certificate in [flux core welding](#). To qualify, students need to achieve Accuplacer test scores of 55 in reading, 60 in writing and 36 in math. Also, students must have taken Welding 326 and 327; or have two years' industry experience in gas metal arc welding; or be state certified in structural welding.

Classes start March 21. Tuition cost for the 11-credit sequence is \$968. For more information, please contact: [Larry Gross](#), welding instructor, (414) 456 5454; or [Tom Wichert](#), program counselor, (414) 456-5451.

The screenshot shows the 'All Programs' page for Welding. The navigation bar includes 'GETTING STARTED', 'BUSINESS & INDUSTRY', 'ALUMNI/FOUNDATION', and 'ONLINE LEARNING'. The main heading is 'All Programs'. Below it, a breadcrumb trail reads 'Home > Academics > All Programs > Welding'. The 'Welding' section includes technical details: 'Technical Diploma: 31-442-1' and 'Campus: Beaver Dam'. A descriptive paragraph states that the two-semester diploma helps students develop welding and fabrication skills. A list of links on the right includes 'Curriculum', 'Outcomes', 'Career Opportunities', 'Admission Process', and 'Take a Program Tour'. An image of a student working in a welding lab is visible at the bottom right.

The screenshot shows the 'Curriculum' page for Welding. The navigation bar is the same as the previous page. The main heading is 'Curriculum'. Below it, a breadcrumb trail reads 'Home > Academics > All Programs > Welding > Welding Curriculum'. The 'Curriculum 2007-2008' section features a table of courses with columns for 'Course Number', 'Course Title', and 'Credits'. The table lists 'Core Courses' and 'Technical Support Courses'. A 'Total: 28' is shown at the end of the list. Below the table, a note states: 'A Welding Exit Assessment (997-153) is a graduation requirement for this program.'

Course Number	Course Title	Credits
<b>Core Courses</b>		
421-331	Welding Print Reading	2
442-309	Introduction to Welding Processes	4
442-310	Shielded and Gas Metal Arc Welding (SMAW/GMAW)	4
442-315	Gas Tungsten Arc Welding	4
442-316	Advanced Welding Techniques	4
442-345	Fabrication for Welders	4
<b>Technical Support Courses</b>		
801-310	Occupational Communication	2
804-106	Introduction to College Mathematics	3
890-125	Student Success	1
		<b>Total: 28</b>

The screenshot shows the 'Electronic Resources' page. The navigation bar is the same. The main heading is 'Electronic Resources'. A list of links includes 'E-Reserve', 'Directions for Accessing E-Reserves', 'Turnitin', 'Research Guides', 'Webographies', and 'Electronic Reference'. Below this, a breadcrumb trail reads 'Home > Library > Electronic Resources > Research Guides > Welding Research Guide'. The 'Welding Research Guide' section includes a paragraph explaining the guide's purpose and contact information for librarians. A section titled 'Books, e-books and Audiovisual Resources:' instructs users to use the MPTC Online Catalog. Another section titled 'Suggested keyword searches for topics related to welding:' lists terms like 'Welding and manufacturing processes', 'Welding and safety measures', 'Welding types (Arc, Tig, Mig, Plasma, Ultrasonic, Laser, Oxyacetylene)', and 'Solder and soldering'.

The screenshot shows the 'Certifications and Licensure' page. The navigation bar is the same. The main heading is 'Certifications and Licensure'. Below it, a breadcrumb trail reads 'Home > Academics > Certifications and Licensure > Welding Certification'. The 'Welding Certification' section includes a paragraph about the Certified Welding Inspectors at the Beaver Dam facility and a link to the 'Structural Welding Certification Exam Schedule'. A note says: 'For a more detailed overview or a price quote, please contact Marcia Arndt.' At the bottom, there is a grid of navigation links: 'About Moraine Park', 'Academics', 'myMPTC', 'Bookstore', 'Admissions', 'Financial Aid', 'Library', 'Registration', 'Home', 'Getting Started', 'Online Learning', 'Business & Industry', and 'Alumni / Foundation'. A footer contains 'Contact Us / Site Index / College Catalog / Financial Facts / Terms & Conditions / Staff / News Releases' and the slogan 'Let it work for you.'



**WCTC**  
waukesha county technical college

- Areas of Study
- Admissions
- Registration & Course Information
- Financial Aid & Scholarships
- Student Services
- Career Services & Academic Skill Building
- Business Services
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**Skilled Trades**  
Center of Excellence

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[Printable Fact Sheet](#)  
[Get Started at WCTC](#)



**Metal Fabrication/Welding**  
**About the Program**

30-credit technical diploma

Develop skills in interpreting blueprints; creating the exact shape of a part for cutting, fabrication and welding; and producing quality parts through the use of different techniques and materials. Learn to program and operate computercontrolled press brakes and shears, plasma arc cutting machines and microprocessor-based power sources. Welding techniques and joining methods are emphasized throughout the program.

Graduates may work in positions such as fabricator, laser operator, welder or welder/press operator.



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**Metal Fabrication/Welding**  
**Employment Outlook**

Average salary of recent graduates\*:

<b>Salary Range</b>	\$25,000-\$50,000
<b>Average Salary</b>	\$34,882
<b>Median Salary</b>	\$32,293
<b>Average Hourly Wage</b>	\$14.56
<b>Average Entry-Level Salary</b>	\$34,190



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**Metal Fabrication/Welding**  
**Required Courses**

**First Semester**

Course Num	Course Name	Credits
457-310	<a href="#">Blueprint Reading-Fab</a>	2
457-320	<a href="#">Thermal Cutting Processes</a>	2
457-350	<a href="#">Metal Fabrication Welding I</a>	4
457-360	<a href="#">Metal Fabrication I</a>	5 *
804-304	<a href="#">Industrial Math I</a>	2 +
809-345	<a href="#">Basic Workplace Psychology</a>	1
<b>Total Semester Credits</b>		<b>16</b>

**Second Semester**

Course Num	Course Name	Credits
422-303	<a href="#">Metals Tech-Fabrication</a>	1
457-321	<a href="#">Thermal Cutting Processes II</a>	2 *
457-355	<a href="#">Metal Fabrication Welding II</a>	4 *
457-365	<a href="#">Metal Fabrication II</a>	5 *
801-311	<a href="#">Communication in the Workplace</a>	2 +
<b>Total Semester Credits</b>		<b>14</b>

+ (Proficiency Exam Available)  
\* (Prerequisites or substitutes may apply to this class. Click on course title for specific information.)



*Jessica Cooper is trained in a welding program partnership involving Milwaukee Area Technical College, Genesis High School, and Tramont Corporation.*

Photo: MATC/Sue Ruggles

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