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# **Welding Technology**

**Academic Program Review**

**2005-2006**

**The Office of Instruction**  
The Office of Institutional Planning,  
Research, and Assessment

# **Welding Technology Academic Program Review**

## **2005-2006**

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## **A. Mission, goals, and Planning**

### **Mission Statement**

The mission statement of the Welding Technology Program is to provide high quality learning opportunities for those seeking employment in the welding industry, lifelong learning, and general interest in a certificated format. The certificate prepares students for entry level positions in all aspects of the welding industry and provides state level welding certification testing.

### **Vision**

The vision for the Welding Technology Program is to provide state-of-the-art welding opportunities to students and the business industry in the following areas:

- Arc
- MIG
- TIG
- Oxy/Acetylene
- Plasma
- Blueprint Reading
- Fabrication

### **Program Outcomes**

Students awarded a certificate in the Welding Technology Program at Yavapai College will be able to:

1. Using appropriate welding (AWA) industry procedures, plan and fabricate a variety of objects.
2. Apply safety measures to the workplace at all times.
3. Interpret plans and blueprints in both shop and field settings for safe fabrication according to federal and state guidelines.
4. Model appropriate welding behaviors for subordinates.
5. Readily adjust to changes and new equipment in the industry.

### **Welding Technology Certificate**

The Welding Technology Certificate currently consists of thirty-seven (37) credit hours, 9 of which are in classes that introduce students to soft skills, and the remaining 28 in welding core classes. Certificate completers who also pass state welding certifications are prepared for entry level industry jobs in a variety of settings.

## Historical Sketch

The Welding Technology Program at Yavapai College is one of the oldest occupational/technical programs in the college dating back to the early 1970's. The program has always been run with one full-time instructor and one to two adjuncts. Past classes have been offered in Prescott, Mayer, Cottonwood, Bagdad, Chino Valley, and in smaller communities throughout Yavapai County via a mobile welding trailer which was declared unsafe and dismantled in 2002.

The program has typically had a great majority of students enrolled as lifelong learners (75 percent), and continues to maintain a fairly steady FTSE trend at 20 to 30 annually. Student numbers vary from 70-120 and again, have remained relatively constant over the years. The program is run through an open lab format where students can work at their own paces and complete required welds prior to semesters end.

Although the open lab format has been favorable, modifications were made under current instructor Tom Herman as the open exit policy left many students with incompletes that rolled over from semester to semester. The enrollment policy was modified in 2004 to an open entry/closed exit format and that has proven to be favorable in the short run. Lab hours run from 7:00 a.m. until 1:00 p.m., and from 5:30 p.m. until 9:00 p.m., Monday through Thursday. Friday is reserved for fabrication classes in the morning.

Finding quality adjunct instructors has been a frustrating part of the program over the years, as many welders have cycled through as adjunct instructors who did not cut it in the classroom. In addition, hiring full-time instructors has proven to be difficult with many potential top level instructors turning down the position due to salaries well below what they are capable of making in private industry or private technical schools. A conscientious effort has been made recently to overcome the salary issue; however, it is obvious that Yavapai College is woefully behind in instructor compensation.

Another trend that is disturbing is the lack of potential welding instructor candidates with formal education beyond high school, as most universities have done away with industrial arts degrees at the Baccalaureate level. These trends are troublesome when attempting to maintain program integrity and a high level of instruction.

## Need for Program

According to the American Welding Society (AWS), the shortage of qualified operators, technicians, and engineers in the field of welding is a potential threat to some U.S. industries. Over 40% of the Heavy Industrial Manufacturing firms indicated that a shortage of qualified welders impacts productivity either “moderately” or “extensively.” Approximately 30% of the firms in the Automotive and Construction industrial sectors indicated similar levels of impact. Industry experts reported that the need for qualified welders extends to all welding related professions, including technicians and engineers.

In Yavapai County, it is very difficult to get a handle on the number of firms that are doing all or a portion of their manufacturing in the welding realm, as less than 11% ever report labor needs or number of employees to DES for data capture. Although advisory board members confirm that there is considerable welding going on in the county, Ruger appears to be the largest employer of welders with more than 30, while the average company in the county employs 1-3.

However, a great many of the students enrolled in the Yavapai program are taking the program for general interest, to upgrade skills, or simply to meet elective requirements in other degree areas. These students make up a large percentage of the program and many of them have interests in creating small businesses, especially as it pertains to fabrication of custom art and vehicle frame work.

For those companies who are heavily involved in welding on a national scale, there is a strong conviction that a large part of the United States’ economy is dependent on welding. Continued advances in the field of welding are necessary to increase productivity and strengthen the U.S. economy. Findings presented in a recent AWS and Edison Commission study indicate are for industries in the Manufacturing, Construction, and Mining industries in which welding is considered a critical enabling technology. Combined revenue of these industries totaled \$3.1 trillion in 2000, or approximately one-third of the total U.S. Gross Domestic Product. Industrial groups, or sectors, included in the welding industry are:

- Automotive
- Aircraft & Aerospace
- Electronics & Medical
- Light Industrial Manufacturing
- Heavy Industrial Manufacturing
- Construction
- Capitalized Repair & Maintenance

Welding expenditures represent a substantial contribution to the U.S. economy. Those industries included in the AWS study provide the backbone for our

nation's defense, infrastructure, and economic well-being, and represent one-third of the total U.S. Gross Domestic Product. Welding-related expenditures by these industries were no less than \$34.1 billion in the year 2000 alone. These expenditures totaled an amount equivalent to more than \$325 for every household in the U.S.

Nearly one-half of the establishments studied reported that their welding-related training needs are not being adequately met. Many companies report difficulties locating qualified individuals with welding expertise – from apprentice welders to engineers. The nature of the work and lack of advanced welding education programs are most commonly cited as the reasons for this problem.

Establishments relying on the use of welding processes are generally not actively pursuing additional automation of these processes. Nearly 60% of all firms reported no effort to actively pursue the automation of welding processes. Because of the capital risks associated with automation, it appears that most firms allow industry leaders to take such risks and then monitor the outcome. Once industry leaders have proven a return on automation process investments, other firms will gradually follow in adopting the automated process.



## Employment Outlook

### U.S. INDUSTRIES EMPLOYING WELDERS AND CUTTERS WITH PROJECTED EMPLOYMENT TO 2006

INDUSTRY	1996 Employment		PROJECTED 2006 EMPLOYMENT		CHANGE, 1996 - 2006	
	Number	Percent Distribution	Number	Percent Distribution	Number	Percent
Total, all industries	352,042	100.00	393,701	100/00	41,650	11.8
Fabricated structural metal products	36,414	10.34	39,045	10.18	2630	7.2
Self-employed workers	26,606	7.56	27,670	7.21	1064	4.0
Motor vehicles and equipment	22,451	6.38	24,916	6.49	2465	11.0
Construction and related machinery	20,397	5.79	22,683	5.91	2286	11.2
All other transportation equipment	11,238	3.19	13,910	3.63	2673	23.8
Heavy construction except highway and street	12,086	3.43	13,410	3.49	1324	11.0
Ship and boat building and repair	12,536	3.56	12,548	3.27	12	0.1
Miscellaneous fabricated metal products	7290	2.07	7470	1.95	180	2.5
Aircraft and parts	2662	0.76	3277	0.85	616	23.1

## **Academic Program Planning and Current Goals**

Current goals for the program are relatively straightforward and include altering and/or deleting some of the certificate courses to afford students a better opportunity of completing the degree in one year or less. These changes will be addressed later in this document. In addition, program personnel are considering ramping up new courses that focus on fabrication of custom motorcycles as well as race car frames. These potential changes are looming based on public inquiries and the need to serve an ever changing demographic.

Costs of steel for the program have risen nearly 400% from 2002-2005, and it is quickly becoming apparent that a request to place some of the lab fees collected into the budget will become necessary. No increased budget requests for the welding program have been asked for in nearly seven years. The welding program is actually a relatively low cost program as staffing outside of faculty and adjunct faculty has not been needed.

All dollars from the program are easily covered by FTSE, as the college has the ability to spend nearly \$200,000 from welding FTSE generated in a program that costs \$120,000 to operate. It is one of the lowest costs per FTSE occupational programs in the college. Most equipment is antiquated in the program, but still functional. Should the program get a new building at some point in the near future, it would be appropriate to replace welders some of which are 25 years old.

In addition, a primary goal of the program is to attract more high school students from the county into the program and assist them with placement into industry. At present, Bradshaw Mountain High School sends students to the welding program but does not plan on continuing that beyond 2006. Chino Valley and Mayer High Schools have agreed to dual enrollment options while Mingus High School is being talked to. Dual enrollment may also be obtained through future partnerships with the Navajo School District, although the devil will be in the details in terms of how to pull that off since the schools are located in another county.

Another goal is to incorporate a considerable amount of subject matter as it pertains to informational lessons into a Blackboard format for students. At present, students are receiving the informational portion of the class via video instruction and written exam. Adding some lessons in the Blackboard environment will allow students to familiarize themselves with computer based video delivery in addition to placing quizzes/exams online instead of the traditional format that is currently being used. This continues to play favorably into the programs open lab philosophy by allowing students to complete written assignments and instruction out of class, and focus on the hands on components when attending the open labs. The final goal of the program pertaining to academics is to increase the graduation rate at least threefold, while maintaining and or improving FTSE growth.

## B. Student, Class and FTSE Trends

### Student Profiles

The welding program is not unlike most welding programs on a global scale in that it is predominantly made up of males as evidenced by the chart below. Interestingly, to be running double digit female populations in all but one year of the review process is higher than the national average which equates to less than 10 percent. However, a more vigorous effort should be made to recruit from the female population.

SEX	2000 FALL		2001 FALL		2002 FALL		2003 FALL		2004 FALL	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Female	15	15.3%	11	13.6%	16	15.7%	6	7.5%	14	11.8%
Male	83	84.7%	69	85.2%	86	84.3%	74	92.5%	105	88.2%
Not Reported			1	1.2%						
<b>Total</b>	<b>98</b>	<b>100.0%</b>	<b>81</b>	<b>100.0%</b>	<b>102</b>	<b>100.0%</b>	<b>80</b>	<b>100.0%</b>	<b>119</b>	<b>100.0%</b>

The following table looks at student ethnicity within the welding program.

ETHNIC	2000 FALL		2001 FALL		2002 FALL		2003 FALL		2004 FALL	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Non-Resident Alien										
Black, non-Hispanic			1	1.2%	1	1.0%				
Native American	6	6.1%	5	6.2%	5	4.9%	7	8.8%	8	6.7%
Asian										
Hispanic	4	4.1%	1	1.2%	3	2.9%	8	10.0%	8	6.7%
White	78	79.6%	68	84.0%	82	80.4%	58	72.5%	94	79.0%
Other	10	10.2%	5	6.2%	11	10.8%	7	8.8%	9	7.6%
Not Reported			1	1.2%						
<b>Total</b>	<b>98</b>	<b>100.0%</b>	<b>81</b>	<b>100.0%</b>	<b>102</b>	<b>100.0%</b>	<b>80</b>	<b>100.0%</b>	<b>119</b>	<b>100.0%</b>

- Ethnicities equate very much too county demographics with white being the predominant population.
- Hispanic numbers have doubled in 5 years.
- Native American numbers have remained stable.
- Very few African Americans are enrolled

The following table looks at age distribution within the welding program.

AGE	2000 FALL		2001 FALL		2002 FALL		2003 FALL		2004 FALL	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Under 20	13	13.3%	22	27.2%	33	32.4%	31	38.8%	32	26.9%
20 to 24	18	18.4%	10	12.3%	10	9.8%	8	10.0%	18	15.1%
25 to 29	8	8.2%	4	4.9%	7	6.9%	6	7.5%	13	10.9%
30 to 39	16	16.3%	9	11.1%	7	6.9%	8	10.0%	12	10.1%
40 to 49	17	17.3%	12	14.8%	12	11.8%	12	15.0%	17	14.3%
50 to 59	13	13.3%	14	17.3%	17	16.7%	5	6.3%	14	11.8%
60 and over	13	13.3%	10	12.3%	16	15.7%	10	12.5%	13	10.9%
Not Reported										
<b>Total</b>	<b>98</b>	<b>100.0%</b>	<b>81</b>	<b>100.0%</b>	<b>102</b>	<b>100.0%</b>	<b>80</b>	<b>100.0%</b>	<b>119</b>	<b>100.0%</b>

- This may be the most interesting piece of data in that the age is one of the most balanced in any of the occupational areas, leading the committee to agree that both lifelong learning and career and technical preparation play a significant role in the program.
- The under twenty population was primarily made up of Bradshaw Mountain High School students who were bused to the program in the morning.
- The steadiest categories include the 40-49 range and the 60 and over range.

## FTSE Trends

The following table provides a five year review of FTSE in the welding program.

### Annual Program Summary

Academic Year	2000-01	2001-02	2002-03	2003-04	2004-05
Number of Sections	3	4	3	4	8
Average Enrollment	20.3	13.0	17.0	12.3	10.1
Percent Capacity	55%	43%	50%	57%	53%
Total Registrations	61	52	51	49	81

Courses Include: WLD  
Independent Study courses  
excluded.

- Total registrations have increased 33% since 2000/2001
- The number of sections have increased from 3 in 2000/2001 to 8 in 2004/2005

- Average class size has decreased (from 20.1 in 2001/02 to 10.1 in 2004/2005)
- Annual FTSE has remained constant (30.0 in 2004/2005)

## Grades

**WLD Grade Distribution Summary**

Grades	A	B	C	D	F	G	I	P	S	U	V	X	W	We	TOTAL
Year 2000-2001	91	48	11	4	14			24			60	33	40	6	331
Year 2001-2002	86	52	20	3	36			16			56	35	41	5	350
Year 2002-2003	89	42	2	1	14			10	2		66	41	74	21	362
Year 2003-2004	55	67	28	4	16						17	57	74	20	338
Year 2004-2005	41	74	51	8	34						44	63	57	11	383

A, B, C, D, F = Traditional letter grades

G, P = Course in progress, I = Incomplete

S = Satisfactory, U = Unsatisfactory, V = Enrichment

X = Drop, W = Withdrawal (regular)

We = Withdrawal (enrichment)

Over the past five years more than six out of ten of the students received a passing letter grade of C or better. The most frequently earned grade was A. Withdrawals from WLD courses over the past five years ranged from a 17% in 2001/2002 to 33% in 2002/2003. Students receiving failing grades range from 6% in 2002/2003 to 15% in 2001/2002.

## Graduates

Graduates in the welding program may earn an advanced certificate (10 graduates in the past four years). While the total number of graduates remains low relative to enrollment, a number of WLD students may attend YC to upgrade skills for career advancement or opt to work before securing a degree. All of the graduates were male with the largest share under age 40 years. Additionally, many take the classes for lifelong learning.

## **D. Curriculum Analysis**

### **Curriculum and Course Content**

Curriculum has been subjected to extensive review over the last three years with many changes added to the program. Those changes have centered mainly on competencies and in particular how and when those competencies attained were measured. Sophisticated student outcomes assessment forms were developed which allow the instructor and students to record when an outcome has been attained and at what level.

Because the program is hands-on intensive, course syllabi indicate the largest portion of grading criteria is based on quality of welds in a given area. Syllabi have all been revised to reflect changes in expectations and to clearly indicate outcomes and appropriate assessments. Since the classes are conducted in an open lab format, students may finish early and opt out of a definitive completion date. Changes were also made to the classes to allow for open entry/closed exit. This prevented rollover students that, when reviewing data, strung the courses along for years in some cases.

### **Instructional Delivery**

The welding program uses videos as the primary method for informational instruction, while the instructors focus more on booth time with students to ensure that appropriate skills are being mastered. The video method of instruction is somewhat antiquated and the expectation is that changes will be made to move more of the informational instruction into the Blackboard format.

The department is also looking at whether the instructor should make some of the video content and incorporate that content into Blackboard. Because the program is run in an open lab format from 7:00 a.m. to 1:00 p.m., and from 5:30 to 9:00 p.m., Monday through Thursday, no classes are ever cancelled and instructor load is calculated hourly. This is a very good option for program sustainability and has allowed the program to thrive without having to cancel low enrolled classes.

### **In Class Assessment**

Assessment has been an ongoing directive and has improved dramatically in the last three years. Data from assessment has been utilized to modify testing procedures and to bring the types of assessment utilized into a more current structure which allows instructors to analyze data and make changes based on the data.

A key area that still needs improvement is making sure that students are pulled aside from time to time and given a look at where they stand from an assessment standpoint as it pertains to outcomes and not necessarily where they stand from a grade standpoint. It has been easy to slip into the mode that the grade is actually an assessment of the outcome, and many discussions have taken place with instructors which have been helpful in their understanding that mastery of an outcome isn't always grade related.

A compilation of data from outcomes assessment has been made available to instructors at the end of each semester and also kept on file for NCA purposes. That data has helped in making changes accordingly mainly on the delivery side of things, although it is time consuming and requires considerable time from administrative assistants. Assessments have been important as it pertains to testing and student answers that appeared to show a weakness in some areas. Efforts have been made to modify instruction and testing based on findings.

## **D. Program Faculty and Personnel**

### **Full-Time Faculty**

Tom Herman was hired in the spring of 2003 to replace Harold McFarland. Tom came to the college with more than 30 years in the trades and brought an extensive background in fabrication methods with him. Although he was not degreed, getting him on board proved to be advantageous to the college as he repaired a considerable amount of equipment that had not been operational in years and saved the college nearly \$40,000 in repair costs.

Although Tom was called out of retirement to meet this commitment and plans on retiring at the end of school year 2005-06, he has been an asset to the program and the college has been fortunate to have him. A concern for the program is that it is getting more difficult to find welding instructors that possess additional education beyond high school, and even more difficult to convince them to come to Yavapai College with prevailing wages considerably less than what they can make in private industry.

### **Adjunct Faculty**

The program has been fortunate to not have high turnover with adjunct faculty. Because of the open lab format, adjuncts are paid an hourly wage that exceeds \$23.00 per hour. Adjuncts primarily man the evening sessions of classes and have also taught fabrication classes on Friday mornings. Adjuncts with the program are as follows:

Kenny McDaniel – 13 years welding experience and certified in multiple welding formats. Completed certification through ABC Technical Schools and is also a certified boat engine repair mechanic.

Robert Smith – Teaches on the Verde side and is also the instructor at Mingus Union High School. Holds Master's degree in administration, and is also a certified welder.

James Ivie – Primarily assists during the day classes but will be moving to the night classes in the fall of 2006. Finishing AAS through Yavapai College and owns his own company that custom fabricates motorcycles.

Adjunct faculties are not loaded with the exception of summer classes. It is estimated that 2.5 adjuncts are needed to sustain the program on an annual basis with projections going slightly higher with additional classes added to the program. Adjuncts are invaluable to the program and the night market of students is solely dependent upon the college's ability to keep adjuncts on board.



## **Administrative and Support Personnel**

Support for the welding program is located in Chino Valley and administrative assistants are in Prescott once a week to help out with paperwork. The welding instructors are under the supervision of John Morgan, who is the Chino Valley Campus Dean. All budgetary issues are handled by Mr. Morgan, however, the instructor is free to purchase supplies as needed.

Until the welding program is relocated, administrative support is somewhat challenging, and the division looks forward to being located together at some point in the near future. At this juncture the welding program does not need full-time administrative assistant support, and it is not envisioned that it will need more than part-time support in the future.

## **Professional Development/Achievements/Contributions to College and Community**

- Instructors are members of AWA/AWS
- Instructors volunteer for many community youth events
- Serve on College Safety Committee
- Participation in summer state vocational conference
- Participation in national SIMA conference

## **Support from Other Areas**

The program uses the following Yavapai College Support Staff:

- ITS for computer networking support.
- Facilities Management for basic repairs to building.
- Counseling for student management and degree completion.
- Shipping and receiving for coordination of purchases of large equipment and tagging and location of equipment.
- Purchasing department assists in bid process for large equipment.
- Mail center for mail delivery.
- Registration continues to do an excellent job for placing students in classes.
- Chino Valley Admin assistants split duties on assessment worksheets, billing, Y-Log maintenance, and building coordination for Verde Valley.

## E. Facilities, Equipment, Materials, and Financial Resources

### Facilities

The facility housing the welding department is getting very old and it won't be long before serious issues will emerge as to student safety, asbestos, ability to adequately vent, and general lack of open workspace. There have been discussions about building a new facility in Chino Valley that will house welding, automotive, and gunsmithing together. However, that facility is dependent upon the sale of the Chino Valley Center located on Highway 89.

Should that center sell in a timely manner, it is possible for the college to float a revenue bond in order to support the new building construction. The existing facility is 5,700 square feet and has an office, small classroom and shop space. Upon review of the facilities by the advisory committee, most were concerned about the long term continued use of the building.

Curb appeal for the facility is an embarrassment. Because shipping and receiving are located between the welding and gunsmithing program, storage containers have been placed near the entrance. The bookstore now resides right out of the program doors as well. In addition, the roof leaks periodically, creating an unsafe environment and the potential for electric shock to occur.

### Equipment

A 10 person team was brought in to review the facilities and equipment with their comments and ratings listed in the following table.

	Needs Improvement	Adequate	Exceptional	Not Applicable	Comments
Classrooms	8	2			Run Down, old, small.
Laboratories	10				Not enough table space.
Faculty Offices Staff/Adminstrative Offices		10		XX	
Equipment	10				Some machines are 30 years old
Materials		10			
ADA Accessibility	10				Group not sure of ADA laws

The table clearly indicates the committee's consensus on the need to update equipment. It is the committee's recommendation that equipment upgrades occur pending a move into a new building, and that the design be more of a large

open bay concept with the ability to move portable equipment around i.e. MIG welders, cutting torches, etc. The committee did not feel comfortable making recommendations pertaining to ADA without understanding what the ADA statutes/laws indicate.

## **Materials**

Most curriculum materials are video based and the VCR systems are woefully outdated. The material needs to be converted to DVD format and new TV's purchased for the program if that format is to continue. An excellent filing system is in place for tests as well as all the blueprint reading assignments. To change to DVD format plus a change to TV's would cost upwards of \$5,000 unless the company that creates the videos is willing to discount some of the tapes.

As far as supply materials, costs for steel continue to escalate and the course fees collected need to be seriously looked at as being added to the supply budget. Federal Carl Perkins Dollars have also been utilized to offset rising costs as of late. Regardless, the costs have continued to rise.

## **Financial Resources**

The welding program is a relatively low cost per FTSE by occupational standards, and the average FTSE based on freeing up \$9,000 per FTSE more than covers program expenses for now. The program will have to increase the adjunct lines as costs have gone up to some extent and the line is falling about \$10,000 short annually. So far the budget has been managed using over/under procedures.

The total budget for the program is \$110,000, with \$14,000 of that budget being utilized on the Verde Campus and the remainder for the west campus (Prescott). With FTSE remaining constant the program is in good shape for the short foreseeable future.

## **F. Advisory Committee/Partnerships**

### **Advisory Committee**

A standing advisory committee meets at least annually and often semi-annually. Members of the committee include the following:

- Joe Almand from Yavapai Welding
- Bruce Moeller from Yavapai Welding
- Terry Braner from Phoenix Welding Supply
- Bud Salome from Yavapai Steel
- Linda Buchanan from Yavapai College
- James Ivie, student and adjunct instructor
- Doyle Douglas, student

The advisory committee assists and makes recommendations on everything from job market to materials purchases, as well as making recommendations on types of classes to offer and overall program direction. Minutes are kept from all meetings, and submitted annually as part of the federal Carl Perkins grant review process. The advisory board has also proven useful in finding discounted companies to sell consumable supplies in bulk to Yavapai College.

### **Partnerships**

There are no partnerships developed for the welding program at this time.

## **G. General Outcomes**

### **Student Evaluation of Instructors and Advising**

Students evaluate the lead and adjunct instructors in all classes on a semester basis. The aggregate of the evaluation scores over the last 5 years have been 4.5, indicating a very high quality of instruction. Students have written many letters citing the excellence of Tom Herman, and have asked him not to retire. Whoever replaces Tom will have big shoes to fill. Students also have made numerous comments on the evaluations all of which have been very positive towards the instructors.

One trend that has emerged repeatedly from evaluation is that there are not enough oxy-acetylene stations and students generally have to wait for use of equipment. This may result in looking at maximum class loads for that particular class, although that is not a recommendation at this time due to the open lab operations of the facility.

### **Advising**

Advising is handled either by Fred Kester for students who are seeking the certificate, or in a great many cases by the instructor for those who are just interested in taking a class. At this review, there does not appear to be any problems with advising.

### **Retention**

Retention is difficult as greater than 75% of students take a single class or two for personal enrichment. Those that are seeking a certificate tend to quit the program if they cannot complete it in a reasonable amount of time. It is with this in mind that the certificated portion of the program will undergo some changes as a result of this review. Those changes primarily include eliminating some courses that no longer apply to industry to a great extent, and also eliminating some general education classes that are poorly placed within the certificate.

## **H. Student Outcomes Assessment Plan**

The AGS department underwent a very aggressive outcomes assessment campaign beginning in the fall of 2003. All students are assessed for outcome attainment each semester, and instructors are given the data and asked to make changes based on methods for testing, evaluating and changing existing outcomes.

The process has proven to be very tedious for both instructors and administrative assistants, although the information has been invaluable. Plans are underway for the development of software which will make the process a little easier and constitute far less man hours. The information collected was provided to the NCA review committee and the comments indicated that there was too much data being obtained, indicating the need to assess on a more random basis and not necessarily every student.

With the addition of new faculty planned for 2006, the Campus Dean will work with that new faculty to have a plan in place for future assessment techniques. Samples of outcomes assessment worksheets are listed under appendix A.

## **I. Future Trends**

Development of a national standard for measuring welding productivity and the development of standard practices for measuring welding productivity from AWS will allow firms to readily adopt standards and thereby improve productivity through the monitoring of this critical process.

AWS is also looking at developing an on-going mechanism for monitoring changes in welding productivity within and across industries. Verifying gains in welding productivity, and quantifying of the economic value of those gains, will serve as a catalyst for continued welding productivity improvements. This, in turn will continue to strengthen the economic position of those employing more productive practices.

Other trends seem to indicate that MIG welding is the norm for virtually all fabrication using steel less than ¼" thick. That has placed a higher demand on institutions to produce welders with MIG experience. Additionally, oxy/acetylene has moved into a market where the primary use is for cutting. Artists continue to like oxy/acetylene for piece work, but the trend for industrial welding remains strongly focused on MIG, TIG, and ARC.

Expansion of collaborative research and development efforts focusing on welding

productivity improvements need to be addressed by the industry as a whole. Advances in welding applications would be greatly advanced by cooperative research and development programs – both government/industry and industry/industry – that emphasize “real world” applications of semi-automated and automated processes. These programs should include research on the economics associated with the adoption of these more productive processes. Because these issues are often overlooked, it is difficult to project potential significant changes other than to assume that automation will continue to become a large part of the industry.

## **J. Strengths and Concerns**

### **Strengths**

1. Faculty – Continue to have quality faculty and adjunct faculty.
2. Overall quantity of equipment.
3. Program Consistency – Enrollment is very stable with very few spikes or drops in FTSE.
4. Tuition – Is a steal for what students get in terms of instruction, materials, and booth time.
5. Student balance – welding is very well balanced in all age categories from 18-65.

### **Concerns**

1. Antiquated equipment – equipment is getting old and should be replaced as part of the five year capital improvement plan.
2. Age of Building – these buildings weren't really built to last 30 years and are quickly becoming an eyesore and health hazard.
3. Wages - have been market based, but recent potential hires have turned the position down after finding the cost of housing in the county to be quite high.
4. Potential relocation – will enrollment drop in the short run if program is relocated?
5. Right to work state – Arizona's status as a right-to-work state with very few unions has forced wages down for welders to the point where graduates leave the area.
6. Costs – rising costs of steel will force delivery costs up.
7. Night /Day split – students are split between night and day which almost requires two full time instructors.



## **K. Recommendations**

### **1. Create new courses in custom fabrication**

Market is hot for course in motorcycle frame fabrication and any type of auto welding work. Current television shows are driving people towards fabrication in large numbers.

### **2. Alter Certificate Courses**

Counselors have indicated students are frustrated with amount of time it takes to get certificate completed.

### **3. Replace antiquated equipment**

Equipment is somewhat old although functioning. A phase in of equipment over a 5 year period is proposed.

### **4. Purchase more custom equipment**

Fabrication classes need custom equipment such as English Wheels and Notchers.

### **5. New Facility**

Build a new facility that makes more sense and houses a number of occupational programs together that share common outcomes.

## **L. Action Plans**

### **Objective #1**

Create course in motorcycle frame and auto body fabrication

### **Activities:**

1. Develop outcomes for courses and submit to curriculum committee as quick start
2. Market course to county.
3. Assess student numbers and compatibility issues.

**Cost:** \$1,500 for adjunct instructor per course, but increase to supply budget  
TBD

### **Assessment:**

1. Student enrollment and productivity

**Responsibility:** Lead Faculty

**Objective #2**

Remove specific and antiquated courses from certificate.

**Activities:**

1. Remove oxyacetylene from certificate and add the cutting portion to ARC
  1. Remove workplace dynamics, tech math, and first aide, and add fabrication class.

**Cost:** None

**Assessment:** Certificate completers in a timelier manner.

**Responsibility:** Lead faculty, Instructional Dean, Campus Dean.

**Objective #3**

Replace antiquated equipment.

**Activities:**

1. Submit 5 year capital improvement plan.
2. Replace over 5 year period until equipment is reasonable current.
3. Tie into potential new building.

**Cost:** \$47,000

**Assessment:**

1. Receipts of purchases and better retention.

**Responsibility:** Lead Faculty, V.P., Campus Dean

**Objective #4**

Purchase custom equipment for fabrication.

**Activities:**

1. Develop list of equipment needed for custom fabrication.
2. Submit as part of capital improvement plan.
3. Purchase and set up equipment.

**Cost:** TBD not to exceed \$20,000

**Assessment:**

1. Student enrollment and productivity

**Responsibility:** Lead Faculty

**Objective #5**

Design and build new facility.

**Activities:**

1. Complete sale or lease of existing Chino Center.
2. Work with facilities on plans for Center.
3. Budget accordingly based on needs.

**Cost:** TBD in millions if tied to Automotive, Gunsmithing

**Assessment:**

1. Increased student enrollment, safe, functional working facilities.

**Responsibility:** Lead Faculty, Campus Dean, V.P., Facilities, Board of Governors.

# Appendix A

Student Name: \_\_\_\_\_

Student ID #: \_\_\_\_\_

Degree: \_\_\_\_\_

Competency #	<p style="text-align: center;"><b>WLD 240:</b> <b>Welding Test and Inspection</b>  (competencies)</p>	<p style="text-align: center;"><b>LEVEL of ATTAINMENT</b> (0 - 4) <small>0 = 0%, 1 = 70%, 2 = 80%, 3 = 90%, 4 = 100%</small></p>	<p style="text-align: center;"><b>METHOD of ATTAINMENT</b> (1 - 5)</p>	<p style="text-align: center;"><b>DATE of ATTAINMENT</b> (Semester or M/YYYY)</p>	<p style="text-align: center;"><b>Aggregate Competency Attained</b> (1 or 0)</p>
1.0	1. Possess a better understanding of the basics of metallurgy and the welding phenomena occurring in such metals.				
2.0	2. Recognize the causes of weld faults and the responsibility for identifying and elimination.				
3.0	3. Explore concepts dealing with welding distortion residual stresses.				
4.0	4. Develop proper welding procedures to assure minimum distortion and stresses.				
5.0	5. Be familiar with various testing procedures, such as an ultrasonic inspection, radiographic inspection and surface inspection of welds.				
<b>Average Attainment</b>		0.0		<b>% Attained</b>	0%

**Instructor Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

*LEVEL of ATTAINMENT*

- 0 - Unattained = 0%
- 1 - Attained = 70%
- 2 - Surpassed = 80%
- 3 - Exceeded = 90%
- 4 - Mastered = 100%

*METHOD of ATTAINMENT*

- Written – 1
- Oral Presentation – 2
- Project – 3
- Portfolio – 4
- Classroom Observation – 5

