

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** WELD QUALITY AND INSPECTION  
**CODE NO. :** ASR114 **SEMESTER:** ONE  
**PROGRAM:** AIRCRAFT STRUCTURAL REPAIR  
**AUTHOR:** Dennis Clement-Socchia  
**DATE:** April 2001 **PREVIOUS OUTLINE DATED:** N/A  
**APPROVED:**

\_\_\_\_\_  
**DEAN** **DATE**

**TOTAL CREDITS:** 2  
**PREREQUISITE(S):** None  
**HOURS/WEEK:** 2

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*For additional information, please contact Kitty Derosario, Dean  
School of Technology, Engineering & Technical Trades  
(705) 759-2554, Ext.642*

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**I. COURSE DESCRIPTION:** This course will introduce the topics of 'weld quality' and 'visual inspection' using the requirements of AC 43.13-1A and MIL-STD 1595-A as a working model. Students will examine and discuss equipment and procedures used with the Oxy-Acetylene Welding and the Gas Tungsten Arc Welding processes as well as use it to produce groove and fillet welds made on thin gauge sheet metal and tubular products. These welds will in turn be subjected to various inspection and testing procedures in order to verify their compliance with the above standards. Shop demonstrations, lectures and lab reports will be used as the method of course delivery and will be further supported by means of written theory tests.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. ***Communicate clearly and correctly in the written form as well as demonstrate by means of their participation in shop activities a sound working knowledge of both personal and shop safety.***

Potential Elements of the Performance:

- Identify proper eye, hand and face protection equipment and procedures.
- Identify proper safety footwear and clothing
- Locate and identify shop lighting ventilation controls and devices.
- Understand correct emergency procedures for evacuation of shop areas.
- Identify basic physical properties and dangers associated with the use of welding grade oxygen.
- Identify basic physical properties and dangers associated with the use of acetylene gas.
- Pressurize and purge regulators, hoses, torch bodies and tips.
- Understand and explain the dangers associated to the hazards of backfire and flashback.
- Understand and explain the correct safe response to backfire and flashback.
- Identify correct versus unsafe flame ignition procedures.
- Adjust the torch valves to produce flames designated as carburizing, neutral and oxidizing.
- Shut down typical oxyacetylene equipment and assigned workstation.

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2. ***Communicate clearly and correctly in the written form as well as demonstrate by means of their participation in shop activities a clear recognition and understanding of the concepts related to mechanical properties.***

Potential Elements of the Performance:

- Identify proper eye, hand and face protection equipment and procedures.
- Identify proper safety footwear and clothing
- Define and describe tensile strength, yield strength, ductility, brittleness, toughness and hardness.
- Identify the presence or absence of a mechanical property in a base metal thru the use of standard shop tools.
- Estimate mechanical properties thru the use of standard shop tools and known standards.
- Estimate the width of a H.A.Z. in a completed weld via destructive testing.
- Examine how the H.A.Z. can affect the overall strength of a welded member.

3. ***Communicate clearly and correctly in the written form as well as demonstrate by means of their participation in shop activities a clear understanding of the uses for and limitations of the Oxy-Acetylene Fusion Welding process.***

Potential Elements of the Performance:

- Identify proper eye, hand and face protection equipment and procedures.
- Identify proper safety footwear and clothing
- Estimate the amount of time required to complete a given weld.
- Estimate the general temperature of a completed weld and its H.A.Z.
- Estimate the width of the resulting H.A.Z.
- Determine the amount of distortion that results from a completed weld.
- Determine what effect the process of normalizing a weld has upon its resulting mechanical properties.
- Determine what effect the process of quenching a weld has upon its resulting mechanical properties.
- Compare the appearance properties of welds made on mild steel, low alloy and stainless steel.

4. ***Communicate clearly and correctly in the written form as well as***

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***demonstrate by means of their participation in shop activities a clear understanding of the uses for and limitations of the Gas Tungsten Arc Welding process.***

Potential Elements of the Performance:

- Identify proper eye, hand and face protection equipment and procedures.
- Identify proper safety footwear and clothing
- Estimate the amount of time required to complete a given weld.
- Estimate the general temperature of a completed weld and its H.A.Z.
- Estimate the width of the resulting H.A.Z.
- Determine the amount of distortion that results from a completed weld.
- Determine what effect the process of normalizing a weld has upon its resulting mechanical properties.
- Determine what effect the process of quenching a weld has upon its resulting mechanical properties.
- Compare the appearance properties of welds made on mild steel, low alloy and stainless steel.

5. ***Communicate clearly and correctly in the written form as well as demonstrate by means of their participation in shop activities a clear recognition of acceptable vs. non-acceptable welds via destructive testing and visual examination.***

Potential Elements of the Performance:

- Identify and describe requirements for base metal cleaning, edge preparation and joint fit up prior to welding.
- Identify criteria for acceptable vs. non-acceptable weld profiles.
- Visually examine weld samples to identify acceptable vs. non-acceptable weld profiles.
- Examine the relationship between weld profile and weld strength.
- Identify and describe typical weld defects and discontinuities.
- Visually examine weld samples to identify weld defects and discontinuities.
- Examine the relationship between weld strength and the presence of random defects and discontinuities.

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6. ***Demonstrate by means of regular attendance, punctuality and safe work habits a willingness to assume the responsibilities of employment.***

Potential Elements of the Performance:

- Be present for all scheduled classes
- Provide a satisfactory reason to the professor for having to leave class early
- Provide a reasonable excuse to the professor for being absent from class
- Provide a written statement to the professor explaining the reason(s) for being absent on an assignment due date or the day of a scheduled test
- Demonstrate behaviour that does not interfere with or obstruct the over- all learning environment
- Actively participate in all course assignments and projects
- Operate any and all lab / shop equipment according to guidelines prescribed by the college and / or course professor
- Wear personal protective equipment at all times while in the shop
- Return all equipment and unused practice materials to their designated place upon completion of work
- Remove all scrap and thoroughly clean individual and / or assigned station

**III. TOPICS:**

1. Mechanical Properties and Heat Affected Zone ( H.A.Z.)
2. Destructive Testing of Welds
3. Visual Inspection of Welds
4. The Oxy-Acetylene Fusion Welding Process.
5. The Gas Tungsten Arc Welding Process.

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

CSA Approved (Impact Resistant) Safety Glasses  
CSA Approved (8 inch High Cut) Safety Work Boots  
CSA Approved (Gauntlet Type) Welding Gloves  
3 inch Diameter Magnifying Glass  
8 ½ by 11 inch Clip Board  
Text: "Principles of Industrial Welding"

**V. EVALUATION PROCESS/GRADING SYSTEM:**

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	94 – 100%	4.00
A	86 – 93%	3.75
B	78 – 85%	3.00
C	70 – 77%	2.00
R (Repeat)	69% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies &amp; Procedures Manual B Deferred Grades and Make-up</i> ).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has not been possible for the faculty member to report grades.	

**VI. SPECIAL NOTES:**

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of academic dishonesty@ in *Student Rights and Responsibilities*. Students who engage in academic dishonesty@ will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

*<include any other special notes appropriate to your course>*

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.

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