Lesson Plan

Course Title: Manufacturing Systems

Session Title: Safety with Metal

Performance Objective:
Students will research and formulate a safety plan for a specific machine.

Specific Objectives:

- Explain the importance of practicing safe work habits;
- Summarize the general safety practices observed in working with metal;
- List common safety equipment and protective clothing used in a metal lab;
- Apply safe work habits when operating machinery; and,
- Recognize and avoid unsafe work practices.

Preparation

TEKS Correlations:
Manufacturing Systems
123.43(7)(B)
… follow safety manuals, instructions, and requirements…

Interdisciplinary Correlations:

English:

110.xx(6)(A) – Vocabulary Development
…expand vocabulary through…listening and discussing…

110.xx(6)(B) – Vocabulary Development
…rely on context to determine meanings of words…

Teacher Preparation:

References:
Safety manuals of various machines.

Instructional Aids:

1. Grinder Safety Plan
2. Safety with Metal Rubric

Materials Needed:

1. Paper
2. Pencil
3. Tool Manuals

Equipment Needed:
Computer with PowerPoint software
Infocus Projector

Learner Preparation:

Vocabulary Terms
Guards -to equip a machine or device with a protective cover.
Equipment -the tools, clothing, or other items needed for a particular activity or purpose.
Techniques -the procedure, skill, or art used in a specific task.
Protection -something that prevents somebody or something from being harmed or damaged.
Safety- protection from the occurrence of injury, danger, or loss.

Lesson Plan

Introduction (LSI Quadrant I):

ASK: Why is safety important? Ask for a show of hands and take responses from students. List these responses on the board for discussion.

ASK: Why do we need rules and regulations in the shop and working environment? List responses on the board and discuss how they relate to keeping us working safely.

Outline

Outline (LSI Quadrant II):
Instructors can use the PowerPoint presentation, slides, handouts, and note pages in conjunction with the following outline.

MI	Outline	Notes to Instructor
	I. Identify Why Safety is Important A. Why safety matters to you. B. State and school safety requirements.	
	II. Identify Who is Responsible for Safety A. Explain employee's responsibility. B. Explain employer's responsibility. C. Avoid operating machinery while taking medication.	
	III. Personal Protective Equipment (PPE) A. Why PPE matters B. Eye and face protection C. Head protection D. Hearing protection E. Hand protection F. Foot protection	
	IV. Machine instruction and safety information must be understood before operation.	Permission from the instructor must be given before operation any tool or machine.

	V. All machines must have properly working guards and safety devices.	
	VI. Clean Up. A. Safely dispose of rags and metal shavings in the metal lab. **All accidents must be reported to the instructor.**	

Copy and paste Multiple Intelligences Graphic in appropriate place in left column.

								
Verbal Linguistic	**Logical Mathematical**	**Visual Spatial**	**Musical Rhythmic**	**Bodily Kinesthetic**	**Intra-personal**	**Inter-personal**	**Naturalist**	**Existentialist**

Application

Guided Practice (LSI Quadrant III):

Students will work in groups of two and prepare a safety plan for a machine.

Independent Practice (LSI Quadrant III):

Research will be conducted using the internet and any other source of information concerning the machine they are assigned. Example: Grinder

Summary

Review (LSI Quadrants I and IV):
A full review should be done at this time.
Demonstration by a student and/or the instructor informally in front of the class.

Evaluation

Informal Assessment (LSI Quadrant III):

The students will be evaluated on performance and involvement daily.
The students will be graded on overall participation/involvement.

Formal Assessment (LSI Quadrant III, IV):
Safety with Metal Rubric

Extension/Enrichment (LSI Quadrant IV):

Example: Grinder Safety Plan

Grinders:

- Never operate a grinder without protecting your eyes with safety glasses, goggles, or a face shield.
- If the material being worked on will produce a lot of dust or other particles, you should wear a filtering face piece (dust mask) respirator.
- Make sure the grinder has guard housing.
- Place the tool rest 1/8" from the wheel on bench-mounted units.
- Before starting a portable grinder, look to see where the sparks might fall.
- Clean the work area if necessary.
- When starting a grinder, stand to one side of the wheel and turn on the switch.
- Allow the wheel to reach full speed before stepping into the grinding position.
- Grind on the face of the wheel unless otherwise designed.
- Use a vise-grip pliers, or clamp, to hold small pieces.
- Move the work piece slowly across the wheel face.
- Allow the wheel to stop naturally when turning it off.
- Periodically check for soundness of grinding wheels.
- If wheels are badly worn, cracked, or out-of-round, lock the grinder out and contact facilities for maintenance.
- Abrasive wheels should be stored hanging from a hook or in a vertical position to lessen the change of cracking that can occur from stacking horizontally.

Note: Different abrasive wheels are manufactured for different metals/uses. Never grind soft metals on a wheel designed for hard metal grinding as the soft metal fines/dusts can become incorporated within the wheel resin. This can cause overheating and subsequent wheel disintegration. Be sure the abrasive wheel you are using is correct for the job. (Refer to the posted chart on how to read abrasive wheel markings.)

Note:
Evaluation of the safety plan will be done by the instructor. It would be a good idea to have safety plans on each tool or machine being covered, and use this as a standard for evaluation. Safety plans can usually be obtained from the vendors of the tools or the internet.

***Along with applying a safety plan, it is a very good idea to have each student take a written safety test on each tool or machine. This is good documentation that shows the student understands the safety rules and regulations.**

Safety with Metal Rubric

Test & Daily 0-50 pts	40-50 Test 100% Daily 90-100%	25-39 Test 100% Daily 85-89%	0-24 Test 100% Daily 0-84%
Participation 0-15 pts	10-15 90-100% Participation	5-9 85-89% Participation	0-4 0-84% Participation
Proper Use of Equipment 0-35 pts	25-35 Complete understanding and use	15-24 85% Understanding and use	0-14 84% Understanding and use