#### LEADER GUIDE

#### **4-H Machine Series Discovering Oxyacetylene** Welding & Cutting

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#### Welcome 4-H Leaders!

Welcome to the 4-H Discovering Oxyacetylene Welding & Cutting Leader's Guide. This guide provides you with project meeting plans (Skill Builders) that include a skills list, background information, activity suggestions and ways to know if your members have learned the skills. In short, all the information and tools Introduction necessary to make this project rewarding for you and your members. **Project Summary** 

In this project, members will examine, through a hands on approach, how to set up and safely use oxyacetylene welding and cutting torches. The project meetings are designed to engage the members in the discovery process. It is important to stress to members that we can learn just as much from our mistakes as from our successes in the design process.

This guide is written with the expectation that the project leaders will have a working knowledge of oxyacetylene torches. Do not attempt to teach this project if you do not have experience welding. This project manual serves as a guide to assist an experienced welder to transfer his/her skills to young people. For any activities that require a demonstration or hands on work by members, we recommend that leaders do them ahead of time. This ensures leaders will have a greater understanding of each activity and therefore will be able to more effectively teach members. This also allows for any adjustments should an activity not work well or if any equipment or supplies are unavailable.

The 3D's of Learning - Each builder has three sections called "Dream it!", "Do it!" and "Dig it!".

Dream it! Plan for Success - this gives members a chance to help plan their activities. A skills checklist, background information, important words, and activating questions are

included in the Member Manual so they will be able to think about the topic and activity and decide how they will approach it. The Leader Guide contains in depth background information on the topics, material lists, suggestions and time requirements for activities. Activating, acquiring, and applying questions are included to engage members' thinking through each step of the learning process.

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**Do it!** *Hands on learning* - this is where members are engaged in the activity planned / discussed in the Dream it! Section. Here members are doing the activities and leaders are observing, recording, and providing feedback on how well they are doing. Allow as much individual practice as required; you are assessing the progress and understanding of individual members.

Dig It(

Dig it! What did you learn? - this simply means that members and leaders need to 'dig into their learning'. For the learning cycle to be completed, both need to reflect on how things went and how well they did. For members, this involves self-assessment, giving feedback, creating meaning from their experiences, and thinking about what they would do differently next time. Once this is done they will be in a good position to apply what they have learned to the next experience.



The sequence of project meetings and skill building outcomes for members in this project are on the chart on the following page.



#### What Skills Will You Learn? Each section or Skill Builder (or Builder) in this project has activities that will help your project group learn to do by doing while learning new skills and having fun! To complete this project, you must: DISCOVER Complete the activities in each Builder **OR** a similar activity that focuses on the same skills, as you and your leader may plan other activities. • Plan and complete the Showcase Challenge. • Complete the Portfolio Page. • Participate in your club's Achievement (See the inside back cover for more information about 4-H Achievements). Members will be able to... Activities Page 11 Basic Equipment and Safety: Equipment Basics WHMIS Identify basic equipment 12 • Understand functions of basic equipment • Skill Understand the safety rules for working in the • Builder shop 1 Understand what safety equipment is required • • Identify WHMIS symbols and know what they mean Set Up, Lighting, and Shutting Down: Oxyacetylene Unit 21 • Set up an oxyacetylene unit properly and safely Assembly Lighting & Shutting Skill Test an oxyacetylene unit for leaks 22 • Builder Set up a welding torch for use Down the Flame • 2 Adjust the flame of a welding torch Adjusting the Flame 22 • • Shut down an oxyacetylene unit properly and safely Basic Weld Positions: Welding Word Search 27 Skill Perform forehand and backhand horizontal welds Getting the Feel for the 27 Builder Understand the difference between horizontal and Torch 3 vertical welds Weld Positions 28 **Basic Welding Joints:** Corner and Edge Joints 34 Identify and be able to weld the five basic joints -Butt, Lap, and Tee 35 Skill Lap, Tee, Butt, Edge, and Corner Joints 35 Builder Identify basic factors for creating a quality weld Creating a Quality • • 4 • Clean tips Weld 36 Understand basic trouble shooting **Cleaning Tips** Using the Cutting Torch: 43 Skill Setting up and using Builder Set up a cutting torch the Cutting Torch • • Make straight and shaped cuts 5 Basic Toolbox Or Skill Select a Project: 48 • Plan and complete a project Builder Select a Project 49 6 When you successfully complete your builders, you will showcase what you have learned. Showcase • Explain success in using the skills listed above Showcase Challenge 52 • My Portfolio Page & 53 Portfolio

#### Showcase Challenge and My Portfolio Page

At the end of the members' section are the **"Showcase Challenge"** and **"My Portfolio Page"**. The Showcase Challenge page gets members to think about their accomplishments and explain or demonstrate how they were successful. There are a number of suggestions along with planning information to help them decide how they will best "showcase" their learning to friends, family, community members and/or fellow 4-H members.

Record keeping is an important part of every 4-H project. **"My Portfolio Page"** is a graphic organizer used to keep track of members' 4-H experiences. As each member learns skills, the evidence of learning (through participation and completion of the various activities) is recorded on the page. When the Portfolio Page has been completed and confirmed by the leader, then it becomes a record of the member's completion of the project and participation in other 4-H activities beyond the project.

DISCOVER

**4-H leader assessment** of members will happen throughout the project as you assess the progress and understanding of individual members. You need to observe the members doing the skill and record what you see and hear. Your feedback should be positive and descriptive (not just "well done"). Share that feedback with members frequently so they can put your suggestions into action. How you choose to observe and record is up to you. Some methods are to create checklists, videos and notes while encouraging discussions, peer observations and questions. Recognize that members may improve over the course of a builder and that records should be updated to reflect when they demonstrated their best learning. You are discussing how well members are meeting the skills checklists that are at the beginning of each of the project books, in each Builder and on the Portfolio Page.

Projects promote technical, communication, meeting management, and leadership skills, as well as community involvement and real-world experiences. In addition to the specific skills members are to learn in each builder, the following general learning goals for members are important: Following instructions - Working with others - Using supplies safely - Using the key words -Improving with practice - Respecting timelines.

#### 4-H Project Series Skill Development Levels

Each project topic series contains three levels of skill development: explore, discover, and master.

**Explore** - each project series has one project outlining the fundamentals. All members will be expected to complete the Explore level project before moving into the Discover level of projects. It introduces the basic skills and terms needed by members for subsequent projects in that series.

**Discover** - each project series has several project options and members are encouraged to take as many as they would like. At this level, members practice topic specific techniques and gain theme related skills through specialized builders.

**Master** - multiple project options encourage members to specialize in a topic. They may branch out and take advantage of community options such as cooking for a canteen or participating in a food drive. The leader's role is to look for opportunities for their members to have more authentic experiences by: working with other mentors, partnering with outside agencies, participating in exchanges, entering competitions, etc. Projects at this level may include the "Partner-a-Project" whereby pre-approved courses will allow members to advance their skills, while applying their learning to the 4-H program.

#### **4-H LEADER TIPS FOR SUCCESS!**



- To complete, members must complete all the activities referred to on the "Project Completion Requirements" page OR alternate idea for an activity that would teach the same skill or an age appropriate variation. If activity substitutions are used, be sure to have the member make note in their manuals.
- Dependent on time available at each meeting, group size and abilities of group members, you may wish to break the Builders into more than one project meeting.
- The internet has lots of interesting websites and educational activities. You may choose to use a search engine to explore the options available. We do not endorse any website or the safety or functionality of any products they may sell. Information/products will be used at your own discretion.
- Safety is a number one priority. Care has been taken to create safe, age appropriate activities throughout this manual. As leaders, it is important for you to emphasize safety rules and manage or adapt activities in a manner that will safely match your members abilities. Ensure members have a good understanding of safe working and handling practices when using tools, that they use the appropriate safety equipment when necessary, and that appropriate supervision is provided. A quality experience needs to be a safe experience.
- The multiple intelligences theory teaches us that people learn in at least 8 different ways. All individuals will be stronger in some ways of "intelligences" and weaker in others. It follows that the more ways we teach, the more members we will reach. Throughout this project, you will find a mix of writing, reading, hands-on work, artwork, self-evaluation, group discussion and performance. Teaching projects using a broad blend will help increase the learning potential of all members.
- Projects are designed to teach many skills. However, the 4-H member is always more important than the subject matter. Stress cooperation in the activities where possible to develop teamwork and cooperation skills – valuable skills that will assist them in a number of settings. Ensure the work is completed in a manner that members feel good about themselves and their efforts. This can be done by assigning appropriate tasks or roles based on member's individual abilities. Modelling and expecting supportive behaviour - that is, no "put-downs" – amongst members, or by other adults, also contributes to a positive experience.
- There will be opportunity for experimentation and applying skills that members have learnt throughout this project. Experimenting can be frustrating, but learning through trial and error is an important life skill. Explain to members that it is alright to either go onto the next builder or do the builder again if they need the practice. Help the members work through their challenges until they are satisfied with the quality of their work. Creating inventive 4-H members will be very rewarding.
- Celebrating success is an important but sometimes overlooked part of our lives. We encourage you to use the final section to empower the members by celebrating all they have learned in a fun manner. Anything that you do to add to the spirit of fun and the sense of accomplishment of each member will likely be remembered as the high-light of their 4-H year.



Have fun and thanks for your belief in young people!



#### Skill Builder 1: Basic Equipment & Safety

DISCOVER

#### **Skills Checklist**

- Identify basic equipment
- Understand functions of basic equipment
- Understand the safety rules for working in the shop
- Understand what safety equipment is required
- Identify WHMIS symbols and know what they mean

#### Dream it!

#### **Background for Leaders**

Almost every farming business has an "Oxyacetylene Setup" and "Arc Welder" as part of the standard repair and fabrication equipment. The greatest use for the oxyacetylene equipment is as a heating and metal cutting device. With instruction and practice it can also be used to weld and braze steel and cast iron, which can sometimes be too difficult with the arc welding process. The equipment can be kept in the shop, or if properly secured, can be taken out to the field. It does not require any electrical power, and can be used on a variety of thickness of materials.

As a welding torch, the basic operation of an oxyacetylene unit is blending two gases, oxygen and acetylene, together in the right proportion to create a proper size flame. The flame is used to melt two pieces of metal to the point that they reach a liquid type state and flow together. This is called fusion and in most cases a filler metal rod is also heated and added to the liquid puddle. If done properly, the cooled weld can be very strong and have the same characteristics as the original part. As a cutting torch, the operation also introduces a stream of pure "higher pressured" oxygen to the heated metal. This stream cuts (burns) a path through the metal and allows us to separate sections of base material. As a heating tool, the torch can be helpful for bending metal, getting bent parts back to where they belong, or for freeing rusted bolts.

With proper instruction, a caring attitude, and practice the set up and use of oxyacetylene welding, heating, or cutting equipment can be a safe and versatile tool for farm repair and fabrication. If abused and used foolishly it can be a real danger. Be smart and be safe!

#### Age Considerations

• Ages 15 and up

#### **Thinking Ahead**

• What will you discuss with members? Gather observations and think of examples that will help support your discussion.

#### **Preparing for Success**

• Linking back to the Skills Checklist, help members identify how they will know they have been successful in learning from this builder. Discuss what success in these activities might look like, sound like, or feel like.

#### Important Words

Help members define the following words and listen for them using these words in their discussions. To increase the members' understanding try providing a synonym members know or provide examples. The more personalized the examples the better.

DISCOVER	Oxygen	A nonmetallic element constituting 21 percent of the atmosphere by volume that occurs as a diatomic gas, $O_2$ . Required for most combustion.		
Acetylene	A colorless gas, $C_2H_2$ , having an etherlike odour, produced usually by the action of water on calcium carbide			
Cylinder	A tank used to safely store gas			
Torch	A portable apparatus that produces a hot flame by the combustion of gases			
Goggles	Large spectacles equipped with special lenses to protect the eyes			
WHMIS	Workplace Hazardous Materials Information System that labels substances through a series of symbols			

#### Activating Strategies

Activate member's prior knowledge about welding by asking and discussing the following questions:

- What do you know about welding?
- Do you know anyone who welds? If so, what kinds of things do they weld?
- Why is it important to practice safety precautions when welding? What can we do to be safe? Have the members fill out the web with steps they can take to be safe in the shop. They may branch out and create more answers on their web.

An answer might include

- Keep the shop as clean as possible.
- Ensure that anything flammable is removed prior to beginning welding.
- Never put oil on any part of an oxyacetylene system as this is highly dangerous/ explosive.
- Check for gas leaks using soapy water
- Never weld or cut without appropriate eye protection.
- Do not pick up metal without welding gloves it is HOT!
- Know location of emergency supplies (fire extinguisher, water, closest phone, etc.).

#### **Basic Equipment**

*Oxygen Cylinders* – These tanks are made of steel and come in many sizes. Cylinders are under a lot of pressure so be careful when handling them. They have a high-pressure valve on them with a safety nut that will burst and let the oxygen out safely if the pressure in the cylinder becomes too great. Never move cylinders around with out the safety cap on, unless attached to an approved oxyacetylene mobile cart. Oxygen from these cylinders is not a substitute for compressed air. This oxygen can be 99% pure and makes things burn really fast

Acetylene Cylinders – These cylinders have lower amounts of pressure in them, but can be quite dangerous because acetylene is a fuel and can easily ignite. As a safety measure, acetylene should never be released or used at a rate above 15 pounds per square inch (p.s.i.). If the acetylene in the cylinder gets too hot, there are plugs on them which will melt and release the acetylene. Raw acetylene gas has a very strong odour (worse than propane) when released. It is a bad smell, but if it is leaking you know it right away.

*Regulators* – A regulator is a device used to control pressure from the tanks by reducing pressure and regulating flow rate. Regulators for oxygen and acetylene are different. Acetylene regulators have a male fitting with a left hand thread and oxygen regulators have a female fitting with a right hand thread. Normally, both types will have two gauges on them. One will indicate the amount of pressure left in the cylinder and the other will indicate the amount of pressure that has been set by the operator to go to the torch. There is an adjusting screw in the centre of the regulator that is used to adjust the flow of gas.

Hoses – As with regulators, the fittings on oxyacetylene hoses are different than the oxygen ones. The acetylene (fuel) hose has left hand threads and the oxygen hoses have standard threads. The acetylene hoses are usually red and the oxygen hoses are green. You must be careful to keep the hoses protected from damage as they are made of a flexible rubber.

DISCOVER

*Flashback Arrestors* – Not all oxyacetylene setups will have flashback arrestors or one-way check valves on them, but they are highly recommended and in some places, safety laws require them. This is to stop the travel of a spark up a hose and into a cylinder; which may result in an explosion.

*Torches* – The torch is the part that the welder holds and manipulates to make the weld. The most common torch for general versatility is a "combination torch". This allows the operator to install welding tips (various sizes), heating tips (also called a rose bud), and cutting attachments to the body (handle) of the torch.

*Goggles* – Welding/cutting goggles should be worn at all times when welding, brazing, cutting, or when a lot of heating is required. They should have a number 4, 5, or 6 shade filter lens in them and be C.S.A. approved. They are made to protect your eyes from sparks, dust, and damaging light rays that can be produced. At all times in a shop where there are potential sparks or fragments, safety glasses with a side shield should be worn.



#### Safety



Personal safety needs to be a priority when working at any job. Accidents often occur because someone was in too much of a hurry to get a job done and didn't take the proper steps or precautions to make the work safer. Welding and cutting with an oxyacetylene outfit can be safe if we respect the equipment and understand the potential danger. The following are some general considerations and rules when using the welding and cutting processes:

- Dress for the job. You will be working with sparks and a flame that is 3500 degrees C. Proper eye protection is extremely important. A good set of coveralls, gloves, and proper foot wear can be the first line of defence against burns. Choose heavy cotton or denim clothing, not nylon or fleece. Leather covered shoes or boots are better choices than running shoes.
- Never use oil. Oil, along with other petroleum base lubricants should never come in contact with oxyacetylene equipment. These products in combination with high-pressure gases can cause spontaneous combustion (explosions/fire). If cylinder valves won't open by hand or are not functioning properly, return them to the supplier. Oxyacetylene equipment is to be serviced by professionals.
- Is the area safe? The area that you are welding or cutting in needs to be free of combustible or explosive materials. Sparks from a cutting torch can travel quite a distance and sometimes when cutting things apart, those sparks can pop back at you. Welding or cutting near concrete is not a good idea as the heat can cause damage when hot materials come popping back at you.
- Is there good ventilation? Welding and cutting with oxyacetylene can create harmful fumes. Welding done on galvanized metal and the brazing process are examples where zinc oxides become present. Heating, welding, or cutting on painted surfaces can cause extra smoke and fumes that are very irritating to our bodies.
- Don't weld on or cut apart containers unless you know for sure what was contained in them was safe. The risk of explosion or toxic fume creation is too high. Do not work on anything that has had fuel or solvents in it.
- Use a proper striker to light the torch. Using matches or lighters becomes a safety issue. Combustion can occur without a spark. Do not have both the acetylene and oxygen gases flowing when you go to light the torch.
- Protect your equipment. Make sure the cylinders are secured properly. The oxyacetylene hoses are made from a durable rubber, but they can have holes melted in them or be cut open by a heavy piece of material dropping on them. Dirty or partly plugged torch tips can become inefficient and cause backfiring and an increased risk of flashback. Don't ever use the end of a cutting torch attachment to tap a piece of material that you have cut which didn't release from the base material. Be aware of where the sparks from cutting and grinding are heading. Regulators or other pieces of equipment can be damaged from them.
- Shut the equipment down if you're going to be away from it for a while. At times, small gas leaks have occurred without notice. This is a waste of valuable gas supplies and can become dangerous. For example, if a grinder spark makes contact with a gas leak the result will be explosion and/or fire.
- Ask permission before using other shop equipment.

#### WHMIS and MSDS Basics

First things first... what does WHMIS mean and why was it created? It means Workplace Hazardous Materials Information System and was developed nationally by divisions of labour, industry, and government over a number of years to try to ensure that all hazardous materials that are produced and supplied to industry come with proper safety information. With the regulations of WHMIS legislation and the federal *Hazardous Products Act*, this information must be categorized and printed on a MSDS, which stands for Material Safety Data Sheet. The products must also be properly labelled with the more important information and warning symbols.



#### SECTION

- 1 Material Identification
- 3 Physical Data
- 5 Reactivity Data
- 7 First Aid Measures9 Storage and Handling
- 4 Fire and Explosion Data6 Health Hazard Data

2 - Hazardous Ingredients

- 8 Preventative Measures
- 10 Spill Clean up and Waste Disposal

Each of the above sections must be filled out, even if it only states: "not determined" or "not applicable".

The WHMIS system groups hazardous materials into six classes or categories based on the type of hazard which they represent. These materials are also called controlled products. Each category has its own hazard symbol and it is important that the worker be able to recognize these.

The following are standard symbols and an explanation of them that can be found on product labels.

#### A - COMPRESSED GAS



A compressed gas is a material which is a gas at normal room temperature (20 C) and pressure but is packaged as a pressured gas, dissolved gas or gas liquefied by compression or refrigeration. The hazard from these materials, aside from their chemical nature, arises from sudden loss of integrity of the container. A compressed gas cylinder is usually quite heavy and when ruptured can become a projectile with the potential to cause significant damage. Acetylene and oxygen are examples of compressed gases.

#### **B - FLAMMABLE AND COMBUSTIBLE MATERIAL**



Flammable or combustible materials will ignite and continue to burn if exposed to a flame or source of ignition. Materials are classified as a flammable gas, flammable aerosol, flammable liquid, combustible liquid, flammable solid, or reactive flammable material. Methane, acetone, aniline, and lithium hydride are examples of flammable materials.

#### **C - OXIDIZING MATERIAL**



An oxidizing material may or may not burn itself, but will release oxygen or another oxidizing substance, and thereby causes or contributes to the combustion of another material. Ozone, chlorine, and nitrogen dioxide are oxidizing materials. These chemicals will support a fire and are highly reactive.

#### D - POISONOUS AND INFECTIOUS MATERIAL

#### D1- Materials Causing Immediate and Serious Toxic Effects



These materials may be classified as toxic or very toxic based on information such as LD50 or LC50. *Examples: Styrene, hydrogen cyanide are very toxic substances.* 

#### D2 - Materials Causing Other Toxic Effects



A pure substance or mixture that may be any one of the following: a carcinogen, teratogen, reproductive toxin, respiratory tract sensitizer, irritant or chronic toxic hazard. *Examples: Asbestos causes cancer, ammonia is an irritant.* 

#### D3 - Biohazardous Infectious Material



This classification includes any organisms and the toxins produced by these organisms that have been shown to cause disease or are believed to cause disease in either humans or animals. For example, a blood sample containing the Hepatitis B virus is a biohazardous infectious material. It may cause hepatitis in persons exposed to it.

#### **E - CORROSIVE MATERIAL**



Corrosive materials can attack (*corrode*) metals or cause permanent damage to human tissues such as the skin and eyes on contact. Burning, scarring, and blindness may result from skin or eye contact. Corrosive materials may also cause metal containers or structural materials to become weak and eventually to leak or collapse.

Ammonia, fluorine, and hydrochloric acid are examples of corrosive substances.

#### F - DANGEROUSLY REACTIVE MATERIAL



Dangerously reactive materials may undergo vigorous polymerization, decomposition or condensation. They may react violently under conditions of shock or an increase in pressure or temperature. They may also react vigorously with water to release a toxic gas. Ozone, hydrazine, and benzoyl peroxide are examples of dangerously reactive materials.

#### **Product Labeling**

The following picture is an example of what a supplier product label looks like, and what basic information can be found on it.

DISCOVER



#### Do it!

#### **Equipment Basics**

Time required: 1 hour

#### Equipment/Supplies

- Cylinders Oxygen and Acetylene
- Regulators Oxygen and Acetylene
- Hoses Oxygen and Acetylene
- Flashback Arrestors

- Welding Torch
- Goggles/ Helmet
- Project manuals
- Pencils

#### Instructions

- 1. Before beginning, set the basic ground rules for being in the shop. Some suggestions might include:
  - Do not touch anything without permission.
  - Ask questions first, take action second.
  - Pay attention and no rough housing.
  - If at all uncertain, don't do it. Ask questions.
- 2. Take the members to the shop and explain the names and uses of the different pieces of oxyacetylene welding equipment.
- 3. Have members complete the labels on the diagram in their Member's Manual
- 4. As they go through the different parts ask them questions to reinforce what you have taught them
  - Why do you have to handle oxygen cylinders so carefully? Answer: Because they are under very high pressure and could explode.
  - What color is the oxygen tank? Answer: red or blue
  - What gives the oxyacetylene torch a very hot flame?

#### <u>WHMIS</u>

Time required: 30 minutes

#### Equipment/Supplies

- Common sample products having WHMIS symbols
- Project manuals

#### Instructions

DISCOVER

- 1. Use your manual to outline the WHMIS system including the symbols used and what those symbols represent.
- 2. Bring it to life with real examples such as the "Compressed Gas" symbol on the cylinders.
- 3. Have the members fill in the blanks in their Member's Workbook as a review of some of the symbols.

#### Dig it!

To help members reflect on their learning an apply what they know, ask them the following questions:

- What were some of the things that were hard to understand when you started this project?
- What did you learn from observation?
- How can you apply what you have learned about WHMIS to other things in your life?

#### What's next?

In the next project meeting members will learn about the proper set up, lighting, and shutting down of the oxyacetylene unit. To get members thinking about the next meeting, ask them what safety issues have to be addressed before they can operate the welding torch.

Leader's Notes	
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	<b>CANADA</b> 4-H Manitoba

# In the Member Manual

# Skill Builder 1: Basic Equipment & Safety



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### **Basic Equipment**

Oxygen Cylinders – are tanks made of steel and come in many sizes. Cylinders are under a lot of pressure. Be careful when handling them. They have a highpressure valve on them with a safety nut that will burst and let the oxygen out safely if the pressure in the cylinder becomes too great. Never move cylinders around without the safety cap on unless attached to an approved oxyacetylene mobile care. Oxygen from these cylinders is not a substitute for compressed air. This oxygen can be 99% pure and makes things burn really fast.

DISCOVER

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that can be produced. At all times in a shop where there are potential sparks or fragments, safety glasses with a side shield should be worn.

# In the Member Manual

#### Safety

The following are some general considerations and rules when using the welding and outfit can be safe if we respect the equipment and understand the potential danger. or precautions to make the work safer. Welding and cutting with an oxyacetylene Accidents don't just happen. They often occur because someone was in too much of a hurry to get a job done and didn't take the proper steps Personal safety needs to be a priority when working at any job. cutting processes.



can be the first line of defence against burns. Choose heavy cotton Dress for the job. You're going to be working with sparks and a or denim clothing over nylon or fleece. Leather covered shoes or flame that is 3500 degrees C. Proper eye protection is extremely important. A good set of coveralls, gloves, and proper foot wear boots are better choices than running shoes.

- pressure gases can cause spontaneous combustion (explosions/fire). If cylinder valves won't open by hand or are not functioning properly, return them to the supplier. Oxyacetylene come in contact with oxyacetylene equipment. These products in combination with high-Never use oil. Oil, along with other petroleum base lubricants should never equipment is to be serviced by professionals. .
- needs to be free of combustible or explosive materials. Sparks cutting near concrete is not a good idea as the heat can cause from a cutting torch can travel quite a distance. Welding or Is the area safe? The area where you are welding or cutting damage and hot materials can come popping back at you.



- smoke and Welding done on galvanized metal and the brazing process are examples where zinc oxides is there good ventilation? Welding and cutting with oxyacetylene can create harmful fumes. become present. Heating, welding, or cutting on painted surfaces can cause extra fumes that are very irritating to our bodies.
- contained in them was safe. The risk of explosion or toxic fume creation is too high. Do not work on anything that has had fuel or solvents in it. Don't weld on or cut apart containers unless you know that what was .
- becomes a safety issue. Combustion can occur without a spark. Do Use a proper striker to light the torch. Using matches or lighters not have both the acetylene and oxygen gases flowing when you go to light the torch.
- Protect your equipment. Make sure the cylinders are secured properly. The oxyacetylene hoses are made from a durable rubber, but they can have holes melted in them or be cut open by a .

Heat



flashback. Don't ever use the end of a cutting torch attachment to tap a heavy piece of material dropping on them. Dirty or partly plugged torch heading. Regulators or other pieces of equipment can be damaged from tips can become inefficient and cause backfiring and an increased risk of piece of material that you have cut which didn't release from the base material. Be aware of where the sparks from cutting and grinding are

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them.



spark makes contact with a gas leak the result will be explosion and/or fire. Shut the equipment down if you're going to be away from it for a while. At valuable gas supplies and can become dangerous. For example, if a grinder times, small gas leaks have occurred without notice. This is a waste of

everything is going to work just as you think. Get some guidance from your leader because their knowledge and past experience can help keep you safe. Ask permission before using other shop equipment. Don't assume that

### WHMIS and MSDS

First things first... what does WHMIS mean and why was it created? It means Workplace Hazardous Materials Information System and was developed nationally by divisions of labour, industry, and government over a and the federal Hazardous Products Act, this information must be Safety Data Sheet. The products must also be properly labelled categorized and printed on a MSDS, which stands for Material that are produced and supplied to industry come with proper safety information. With the regulations of WHMIS legislation number of years to try to ensure that all hazardous materials with the more important information and warning symbols.



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Take the time to read the following WHMIS categories and memorize their symbols.

# WHMIS Hazardous Material Categories

A - COMPRESSED GAS



under pressure. Handle with care; do not drop the cylinder and keep cylinders away This category poses an explosion danger because the gas is being held in a cylinder from fire and ignition sources. E.g. Helium, oxygen, propone, ocetylene and oxygen are examples of compressed gases



# **B - FLAMMABLE AND COMBUSTIBLE MATERIAL**

fire at lower temperatures than combustibles, so keep them away from heat sources These materials burn and are potential fire hazards. Flammable materials will catch and other combustible materials. E.g. Paint thinner, gasoline, methane, acetone, are examples of flammable materials.

# C - OXIDIZING MATERIAL

Oxygen

ions

B

combustible materials. Keep oxidizers away from combustible materials such as wood and flammables such as fuels. E.g. fertilizers, oxygen, hydrogen peroxide These pose a fire &/or explosion hazard in the presence of flammable &



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#### Skill Builder 2: Set Up, Lighting & Shutting Down

DISCOVER

#### **Skills Checklist**

- Set up an oxyacetylene unit properly and safely
- Test an oxyacetylene unit for leaks
- Set up a welding torch for use
- Adjust the flame of a welding torch
- Shut down an oxyacetylene unit properly and safely

#### **Dream it!**

#### **Background for Leaders**

#### Oxyacetylene Torch Setup:

Although a torch system does not look complicated, it must be setup and tested for leaks before ever lighting and using for welding or cutting procedures. Because the combination of oxygen and acetylene can produce one of the hottest flames, acetylene has always been quite popular as a fuel gas. The down side to acetylene is the ease at which it can light up, so we must insure that there are no leaks in the system.

When setting up a torch system, **safety has to come first**. The cylinders must be properly secured to something stable such as a wall or if mobility is required, an approved cart.

Before installing the regulators on to the acetylene and oxygen cylinders, we must ensure that there is no dirt or oily matter on or in the cylinder valves. Visually check the valve. Then crack the valve open momentarily and quickly close it to allow a small amount of gas to come out of the cylinder. It is very important to **NOT** stand in front of the valve opening. The amount of pressure that may be released can cause harmful damage to you. This is called "sniffing out".

You can now install the regulators on to the cylinders by hand screwing the fittings together and then tightening with a proper fitting wrench. Remember that fuel fittings such as acetylene or propane have left hand threads, which means you have to turn them the opposite direction to tighten.

Now attach the hoses to the regulators and tighten firmly being careful not to over tighten and bust the fittings off the regulators. If the hoses are new or have not been hooked up to a system for some time, they should be blown out with compressed air to ensure that there is no unwanted matter in them.

Next, attach an approved set of flashback arrestors. There are two types of arrestors - one fits between the torch and hose and the other fits between the hose and the regulator.

The torch body can now be attached and either a welding or cutting tip attached to the body. Note: The nut that attaches the welding or cutting tip to the body should be hand tightened only.



Once the oxyacetylene outfit has been assembled, you need to set the system up for the work that is going to be performed. The following steps setup the system for torch welding and/or brazing.

- Check to see if the pressure adjustment screws on the two regulators has been backed off (counter-clockwise). They should feel loose. This is both a safety and a good maintenance procedure that should be practiced.
- 2. While standing to the side of the regulator, slowly open the acetylene cylinder valve allowing the pressure to build up on the regulator. It is recommended to open the valve from 1 to 1 1/2 turns. The oxygen valve can be opened slowly until it is fully opened.
- 3. Now with the torch body in one hand, open the acetylene valve of the torch a 1/2 turn and adjust the gas flow pressure by turning in (clockwise) the adjustment screw of the regulator till the line pressure gauge indicates 4 or 5 p.s.i. and then close the torch valve. Make sure you have good ventilation, as raw acetylene smells very bad and a build up of any fuel gas can be dangerous.
- 4. As with the acetylene cylinder, stand to the side of the oxygen regulator and slowly open the oxygen cylinder valve allowing the pressure to build up on the regulator and then continue to open the valve all the way.
- 5. Open the oxygen valve of the torch and adjust the oxygen regulator until there is 8 to 10 p.s.i. flow for welding and 25 to 35 p.s.i. flow for cutting. Close the torch valve.
- 6. The system should now be ready for use.

Before lighting the torch, test the system for leaks with soapy water. Using a spray bottle to apply the soapy water is a good idea. The operator must, also, consider personal protection first. You need to be wearing proper gloves and goggles and insure that the area you are using the torch in is safe.

#### Lighting the Torch and Flame Adjustment:

Having done this, guide your members through the following light up, flame adjustment, and shut off procedures.

- 1. Being careful that the torch tip is facing a safe direction, open the torch acetylene (fuel) valve a small amount. Using a proper friction striker, light the acetylene flame and adjust it so that it is feathering at the end and there is no great amount of black (carbon) smoke being given off. **IMPORTANT**: Make sure you hold the striker in a way that when the acetylene ignites, the flame is not near your hand. It is possible that the striker does not ignite the acetylene the first time and a gas build up may form near the end of the tip. If you have problems getting the torch ignited, shut off the torch acetylene valve and let the area clear of raw gas.
- 2. Once your acetylene flame is adjusted, slowly open the torch oxygen valve and adjust the flame to form a "neutral flame". This is where there is a small bright blue cone at the end of the tip and an envelope of flame around it. Provided that the tip is clean and in good shape this flame will not be noisy. If the flame is noisy (aggressive hiss, squeal, or screeching), you may be using too much gas flow or the torch may need to be shut down and the tip cleaned. Some regulators may "creep" a little, so the flame might have to be adjusted more than once when first starting out.

#### Shutting down the torch

To extinguish the flame you can simply shut off the torch acetylene (fuel) valve. This will usually result in a small pop or snap sound which is okay. **Always shut down the acetylene valve first.** Be sure to also shut the torch's oxygen valve. Oxygen does not smell, so it might not be obvious if the valve was left open a bit. The result is a waste of compressed oxygen which costs the equipment owner money to replace.



It is important to maintain your tips between uses.

The tip wears, becomes blackened, and pitted as you work with it. The tip-cleaning tool has a flat file that you can use to file the tip flat again. The cleaning tool has tip cleaners for each size of tip. Be sure to use the right size of cleaner for the tip you are cleaning as you may damage it. Be very careful when using these cleaners as they can break off inside the tip.

#### Shutting Down the O/A Outfit

To shut the complete system down, you can first close both cylinder valves. Next you should drain (purge) the regulators and hoses by opening the torch valves, watching the regulator gauges to insure they are being emptied, and then closing the torch valves. Remember that the acetylene smells bad and is a fuel gas, so you need good ventilation. Once the system has been drained, back the regulator adjustment screws off so they are ready for the next time. Hang up the hoses and place the torch where it will not get damaged.

#### Important Words

Help members define the following words and look for members using this vocabulary in their discussions. Have members describe the words in terms of their experiences to solidify.

Valve	Device for halting or controlling the flow of a gas, through a passage, pipe, inlet, outlet.
Regulator	A valve for regulating the pressure of flowing gas to maintain a predetermined pressure.
Flame	The zone of burning gases used to apply heat.

#### Age Considerations

• Ages 15 and up

#### Thinking Ahead

• What will you discuss with members? Gather observations that will help support your discussion.

#### **Preparing for Success**

• Linking back to the Skills Checklist, help members identify how they will know they have been successful in learning from this builder. Discuss what success in these activities might look like, sound like, or feel like.

#### **Activating Questions**

- How will you ensure the oxyacetylene unit is safe?
- What steps will you take before lighting the unit?



Have the members choose one of the three types of flames (oxidizing, neutral, or carburizing) and fill in the blanks. Then have them find two other members who chose the other types and compare notes. One answer might be:

Word: Carburizing Flame	Picture:	Synonym: Carbonizing Flame
<b>Sentence:</b> Carburization can make metal more malleable and flexible.		<b>Definition:</b> A flame with an excess of acetylene
Oxidizing Flame		
Neutral Flame		
Carburizing Flame		

#### Do it!

#### Oxyacetylene Unit Assembly

Time required: 15 minutes

#### Equipment/Supplies

- Disassembled oxyacetylene unit
- Soapy water

#### Instructions

- 1. Have your oxyacetylene unit disassembled ahead of your members coming. As a review, go through the different parts of an oxyacetylene unit one by one.
- 2. Demonstrate and guide each member through the assembly of the oxyacetylene unit.
- 3. Have them test the system for any possible gas leaks with soapy water (squirt bottle or dipped clean paint brush) and tighten any required fittings.
- Why do you use soapy water to test for gas leaks?

#### Lighting and Shutting Down the Flame

Time required: 15 minutes

#### Equipment/Supplies

- Oxyacetylene unit
- Gloves
- Goggles

#### Instructions

- Demonstrate how to hold the striker and safely light a welding torch. Carefully guide each of them as they light up and shut down a number of times. Be sure to ensure proper striker positioning. Emphasize the need to shut the acetylene valve down first and not to forget to shut off the oxygen valve.
- Where should you hold the striker when lighting the unit?

#### Adjusting the Flame

Time required: 15 minutes

#### Equipment/Supplies

- Oxyacetylene unit
- Gloves
- Goggles

#### Instructions

- 1. Demonstrate to the members what feathering in a flame means.
- 2. Demonstrate the three types of working flames (oxidizing, neutral and carbonizing) and demonstrate what they are used for.
- 3. Guide each member in adjusting the flame to reach the most used type of flame the neutral flame.
- What is the differences between the three types of flames?

#### Dig it!

To help members reflect on their learning and apply what they know, ask hem; the following questions:

- 1. How did you light the oxyacetylene torch?
- 2. What do you feel you need to work on to be good at operating the oxyacetylene torch?
- 3. In what other ways could you apply the skills you gained in this builder?

#### What's next?

With knowledge of how to operate the oxyacetylene unit members will practice the basic weld positions in the next project meeting.





**Leader's Notes** 



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# Skill Builder 2: Set Up, Lighting, & Shutting Down

## Gizmo says...

addition, the unit must be setup and tested for leaks before ever When setting up a torch system, safety has to come first. The cylinders must be properly secured to something stable such as a wall or if mobility is required, an approved cart. In lighting and using for welding or cutting procedures.



mportant words

Watch for these important words

- Set up an oxyacetylene unit properly and safely
  - Test an oxyacetylene unit for leaks
    - Set up a welding torch for use

throughout this builder: Valve, Regulator,

Flame

- Shut down an oxyacetylene unit properly and Adjust the flame of a welding torch
  - safely

### Dream it!

# Setting up the oxyacetylene unit

acetylene is the ease at which it can light up, so we must ensure Although a torch system does not look complicated, it must be welding or cutting procedures. The combination of oxygen and acetylene can produce one of the hottest flames, acetylene has setup and tested for leaks before ever lighting and using for always been quite popular as a fuel gas. The down side to that there are no leaks in the system.

\*\*\*\*\*\*\*\*\*\*\*\*\* own. Make sure your leader AAAAAAAAAAAAAAAAA oxyacetylene unit on your is there to guide and Never set up the supervise you. Safety First!

Before installing the regulators on to the acetylene and oxygen cylinders, we must ensure that there called "sniffing out." Open the valve for a second and quickly close it to allow a small amount of gas to come out of the cylinder. It is very important to NOT stand in front of the valve opening. The is no dirt or oily matter on or in the cylinder valves. Visually check the valve. Now use a process amount of pressure that may be released can cause harmful damage to you.



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# Lighting the Torch and Flame Adjustment:

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The <b>TVD INEE</b> Distribution of the next time. Harg up the hoses and amaged. The <b>TVD INEE</b> Distribution of the next time. Harg up the hoses and any water ing the oxyacetylene unit. The oxyacetylene unit. The oxyacetylene unit. The oryacetylene unit. The oxyacetylene unit. The oxyacetylene unit.	icture: Synonym: Synonym: Definition: Defi	you can have with oxyacetylene welding: <ul> <li>Prove you rately light a welding totch!</li> <li>Prove you rate a prove when a stately light a welding totch?</li> <li>Prove a diverse in the sectylene when so and rately light a welding tot rately and rately and rately light a welding tot rately and rately and rately and rately light a welding tot rately and rately and rately light a welding tot rately light a welding tot</li></ul>	Image: Second and the control of th	Ighting and Juntting Down the Flam:       Wate You Need:         rith oxyacetylene welding:       • Pow do you safely light a welding torch!       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#### **Skill Builder 3: Basic Weld Positions**

DISCOVER

#### Skills Checklist

- Perform forehand and backhand horizontal welds
- Understand the difference between horizontal and vertical welds

#### Dream it!

#### **Background for Leaders**

Note: Dependent on group size and member's ability, this unit may take two meetings.

Before welding, discuss with the members how to set up a proper welding workbench. You should have a steel welding table or bench - never weld on wood. Ideally, you would have a steel table with some firebricks on top to hold the heat away from the table.

To begin welding, have your goggles on and your flame adjusted appropriately. When all is ready, place your welding tip approximately one inch (2.5 cm) from the steel that you are working on - this brings the flame tip in to about 1/8 - 1/4 inches away (2-4 mm). Form a weld puddle of molten metal. The torch should be held at a 45 - 60 degree angle above the metal. Only practice will tell the welder what is the best angle for them to work at. Point the flame in the direction that you are forming the bead. Move the tip along with a slight side to side motion. This is called fusion welding and basically melts two pieces of steel together. Most situations require you to use filler rod to reinforce and strengthen the bond between the two pieces. When using filler rod, place the filler rod in front of your flame dipping it into the pool of molten steel that you have made. Gradually move your way along in the direction of the bead. You can weld in either direction. It is good to learn how to do it both ways - left to right (backhand) or right to left (forehand) as different situations may arise that will only allow you to move in one direction.





For basic welding, the horizontal position is the easiest and most often used. If members get skilled at horizontal welding in both directions, vertical welding could be demonstrated to them for practise. The difference between the two techniques is the puddling of the filler so the rod is held in a different position (more aligned with the torch tip) to compensate for the gravity at play.

#### Important Words

Help members define the following words and look for members using this vocabulary in their discussions. A few strategies you can use include;

- Teach synonyms by providing a synonym members know.
- Also, teach antonyms. Not all words have antonyms, but thinking about opposites requires the members to evaluate the critical attributes of the words in question.
- Provide non-examples. Similar to using antonyms, providing non-examples requires students to evaluate a word's attributes. Invite students to explain why it is not an example.

Backhand	Welding from left to right
Puddling	The small area of molten metal that forms during welding. The cooled weld pud- dle forms the permanent joint
Forehand	Welding from right to left
Horizontal	Welding that occurs either left to right or right to left, not up and down

#### Age Considerations

• Ages 15 and up

#### Thinking Ahead

What will you discuss with members? Gather observations that will help support your discussion.

#### **Activating Questions**

- What are the steps you will take to light the oxyacetylene torch?
- How will you adjust the flame?

#### Welding Word Search

Have the members complete the word search. Have them define each term in their own words as they find it. A completed word search is provide below:



BACKHAND CARBURIZING CYLINDER FILLER FLASHBACK FOREHAND GOGGLES HORIZONTAL NEUTRAL OXIDIZING OXYACETYLENE PUDDLING TORCH VERTICAL WHMIS

DISCOVER

#### Do it!

#### Getting the Feel of the Torch

Time required: 30 minutes

#### Equipment/Supplies

- Gauge material
- Oxyacetylene unit
- Steel filler
- Gloves
- Goggles

#### Instructions

You may wish to have the members just puddle lines on gauge material to get their eye/hand coordination and comfort levels up before setting up and welding joints. This is basic fusion welding.

• Is welding similar to other activities you have done with your hands?

#### Weld Positions

Time Required: 11/2 hours

#### **Required Equipment:**

- Gauge material
- Gloves

Oxyacetylene unit

1. If members are confident and skilled - you

and let them experiment.

may consider demonstrating vertical welds

Goggles

#### Instructions

DISCOVER

- 1. Demonstrate forehand and backhand methods of horizontal welding.
- 2. Bring in the filler rod and demonstrate how to run a bead using the rod.
- 3. Have each of the members practice the weld positions until some confidence is gained. Dependent on skill levels, it is likely most successful to have members practice forehand and backhand fusion lines and then move on to using the filler rod.
- 4. Outline the situations where each of the weld positions would be most likely used.
- Which welding position do you find easiest—forehand or backhand?

#### Vertical Positions (Optional)

Time Required: 1 hour

**Required Equipment:** 

#### Instructions

- Gauge material
- Oxyacetylene unit
- Steel filler
- Gloves
- Goggles

#### Dig it!

To help members reflect on their learning and apply what they know, ask them the following questions:

- 1. What is your favourite weld position?
- 2. How would you describe your skill at welding?
- 3. What would you do differently if you did this builder again?

#### What's next?

In the next builder members will use their welding position skills to make basic welding joints.

#### Leader's Notes

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Steel filler







#### **Skill Builder 4: Basic Welding Joints**

DISCOVER

Skills Checklist

- Identify and be able to weld the five basic joints Lap, Tee, Butt, Edge, and Corner
- Identify basic factors for creating a quality weld
- Clean tips
- Understand basic trouble shooting

#### **Dream it!**

#### **Background for Leaders**

#### **Basic Welding Joints**

There are numerous joints and variations that you will need to weld. However, most come from five basic joints. These joints are:

- Butt joint the most common joint with two edges butt up against each other
- Corner joint- when the two edges are at 90 degrees to each other
- Tee joint when the edges come together one horizontal and one vertical to make a "T"
- Edge joint- when two faces are welded together to form an edge
- Lap joint when two faces overlap and are joined at the seam



#### Basic Weld Types



The two most common types of weld used in oxyacetylene welding are:

Groove - The groove weld is used mainly for the butt joint and can be used in the edge joint. Basically, you leave a space between your two pieces of metal that you are welding in a butt joint and fill it with a bead of weld.





Fillet - The fillet weld is generally a layer of weld to fill in corners created in joints. The weld

looks like a triangular shape. It is most commonly used on lap, tee and corner joints.

#### Braze Welding

This is a weld done with a brass-brazing rod. The brazing rod is coated with a flux on the outside of the rod or a brass rod can be dipped into a can of flux coating it as you go. Brazing is used on broken castings such as engine manifolds, thin or delicate metals and it will join galvanized metals better than gas welding. When brazing the metal, the metal should not be melted. It should be heated more to a dull red color and the brazing rod should be dipped in to it. The torch should be held about two inches (5 cm) from the metal. You will know when the area is hot enough as the braze will flow evenly. If metal is too hot, the braze will spread out over a wide area and white smoke will be given off. Materials to be brazed should be cleaned with a wire brush removing all rust and paint. Brazing, when done right, will be as strong as welding.

#### Perfecting the Weld

There are several factors that impact on the quality of your weld. These factors include:

- Tip size
- Flame size
- Torch or rod angle
- Speed and method of torch movement
- Rod size
- Preparation of metal
- Distance between torch and work
- Maintenance of equipment

When you take all of the factors into consideration, the result is a high quality weld.

**Tip and rod size:** You need to select the proper tip size for the job to get the correct heat for the metal being welded. Experience and experimenting is the best teacher here. Some general guidelines include:

• Tips need to be selected to match the size of filler rod used and the thickness of the gauge metal being welded. The larger the filler rod, the

thicker the metal, the higher the number of tip to be used.

• As a basic rule of thumb, choose a rod size that is the same thickness as the metal that you are welding.

DISCOVER

• Tip sizes 3, 5 and 7 are common sizes to use for steel between 1/16"(1.6 mm) and 1/8" (3.2 mm) thick.

**Flame size:** If the puddle is not moving properly, it may be your tip size or it may mean you need to adjust your torch valve settings slightly. Remember that you also need to have the torch set for the correct flame type - usually neutral.

**Preparation of metal:** Metal should be free of rust, grease, oil and paint. Use a grinder or wire brush to remove rust or paint. Anything that has had oil or grease on it should be avoided as it is potentially toxic and flammable when heated.

**Torch or rod angle:** The angle between the torch flame and the steel helps you to move the weld puddle where you want it. Change the angle that you are working from until you find the angle that works best.

**Distance between torch and work:** The closer you hold the torch to your work, the more heat is created. The greater heat increases the depth of penetration of the weld and makes the weld puddle narrower.

**Speed and method of torch movement:** Slower speed will make a wider weld with a deeper penetration. The object is to get a flat weld. To achieve that you may need some slight back and forth or oval motions with the torch. A steady, even speed and movement is important to achieving a quality weld.

**Maintenance of equipment:** If your tip becomes plugged, the flame will go sideways and splutter or go out. You need to be sure that your tips are kept clean with a tip cleaner.

Problem	Cause	Solution
Backfire: Produces a whistling noise and the torch handle gets hot	<ul> <li>Flame is being sucked into the torch. This may be caused by:</li> <li>a spark from the metal going up the tip</li> <li>the tip being clogged</li> <li>the pressures being too low.</li> </ul>	<ul> <li>clean the tip</li> <li>adjust the pressures</li> <li>cool down the torch</li> </ul>
Flashback: Popping noises during operation	<ul> <li>This is very serious and is actually a series of explosions in the gas line usually caused by:</li> <li>very unequal pressures between the two gases</li> <li>clogged tips</li> </ul>	<ul> <li>be sure your equipment has flashback arrestors</li> <li>clean your tips</li> <li>adjust your pressures</li> <li>cool down the torch</li> </ul>

Troubleshooting Guide

#### Important Words

Т



Help members define the following words and look for members using this vocabulary in their discussions

	100	Edge joint	I wo faces are welded together.		
DISCOVER		Corner joint	Two edges form a right angle and are welded together.		
		Tee joint	Two edges meet perpendicularly and the one is welded on both sides to the other.		
Butt joint	The sin	nplest and wea	kest joint where two ends meet each other and are welded.		
Groove	Used for a butt joint and edge joint, fills in the space in between the two pieces of metal.				
Fillet	A layered weld in a corner that resembles a triangle. Used for lap, tee and corner joints.				
Backfire	The momentary retrogression of the flame into the torch tip. The user hears a "pop," and the flame is extinguished.				
Flashback	Momentary or sustained retrogression of the flame upstream of the mixer, usually in the torch or hoses.				

#### Age Considerations

Ages 15 and up

#### Thinking Ahead

What will you discuss with members? Gather observations and think of examples that will help support your discussion.

#### **Preparing for Success**

Linking back to the Skills Checklist, help members identify how they will know they have been successful in their learning in this builder. Discuss what success in these activities might look like, sound like, or feel like.

#### **Activating Strategies**

Have the members take a look around the shop and find an example of each joint weld. They should write it down beside the picture. Picnic tables, gates and signs might be good things to have nearby.

#### Do it!

#### Corner and Edge joints

Time Required: 1 hour

#### Instructions

success.

#### Equipment/Supplies

- 1. Take some gauge material and show the members the basic design for the corner and edge joints. The corner and edge joints can be welded with or without filler. 2. Have the member work on these joints until they have some
- Gauge material
- Steel filler rod
- Oxyacetylene unit
- Gloves
- Goggles

3. Have the members label and save their best samples.

#### Butt, Lap and Tee joints

#### Time Required: 1 hour

#### Equipment/Supplies

• Gauge material

Steel filler rods

Gloves

- Oxyacetylene unit
- Goggles

#### Instructions

- 1. Take some gauge material and show the members the basic design for the butt and tee joints. The butt and tee joints are best welded with filler.
- 2. Have the members work on these joints until they have some success.
- 3. Have the members label and save their best samples.

#### Braze Welding (Optional)

Time Required: 1 hour

#### Equipment/Supplies

- Gauge material
- Oxyacetylene unit
- Gloves

• Goggles

#### Instructions:

1. Once you feel the members have reached their goals in welding with steel filler, you could demonstrate and explain braze welding.

Braze filler rods and/or flux

- 2. Have them run some braze filler stringers on gauge material.
- 3. When they have gained good heat control/timing etc. of using braze filler, you could demonstrate and have them setup and braze lap and tee joints with gauge material.
- 4. Have the members label and save their best samples.

#### Creating a Quality Weld

Time Required: 1 hour

#### Equipment/Supplies

- Gauge material
- Oxyacetylene unit
- Filler rodsGloves

Goggles

#### Instructions:

- 1. After reviewing all the factors, have the members practice considering the different factors that can impact on their weld quality.
- 2. Have the members evaluate their welds.



#### **Cleaning Tips**

Time Required: 15 minutes

## DISCOVER

- Equipment/Supplies
- Tips
- Tip cleaner

#### Instructions:

- 1. Demonstrate how to clean the tips.
- 2. Discuss why it is important to keep your tips clean.
- 3. Have members practice by cleaning a tip.

#### Dig it!

To help members reflect on their learning and apply what they know, ask them the following questions:

- How did it feel to do the activities in this builder?
- What did you learn?
- How would you teach someone how to make basic welding joints?

Have members attach a picture of them doing something from this builder. They should also begin to collect different samples of their work and place it into a box.

#### What's next?

In the next builder members will get a chance at using a different kind of torch — a cutting torch. Ask them if they think the setup, lighting, and operation of a cutting torch might be different than the welding torch and why?





The provided as it is potentially toxic and flammable when the react in the second as a to be avoided as it is potentially toxic and flammable when the task on it should be avoided as it is potentially toxic and flammable when the task on the solid be avoided as it is potentially toxic and flammable when the task on the solid be avoided as it is potentially toxic and flammable when the task on the task of the angle between the torch flame and the seel helps us to move the weld pudde where you want: i. Change the angle that works best. Orch and work: The closer you hold the torch to your work, the more heat the tast increases the depth of penetration of the weld and makes the weld the task is the tast increases the depth of penetration of the weld and makes the weld with a deeper of the tast increases the depth of penetration of the weld and makes the weld with the torch. A steady, even speed and movement is important to achieving with the torch. A steady, even speed and movement is important to achieving with the torch. A steady, even speed and movement is important to achieving with the torch. A steady, even speed and movement is important to achieving with the torch. A steady, even speed and movement is important to achieving with the torch. A steady, even speed and movement is important to achieving the teach and platted as you work with it. The the-cleaning tool has a flat to be sure that your tips are kept clean with a depert. Be very se cleaners as they can break of inside the tp.	<b>Bo it!</b> What You Need: Gauge material, Steel filler rod, Oxyacetyle unit, Gloves, Goggles, Tip, Tip Cleaner	<ul> <li>Corner and Edge joints</li> <li>1. Take some gauge material and weld the basic design for the co and edge joints can be welded with or without filler.</li> <li>2. Work on these joints until you are successful</li> <li>3. Label and save your best samples.</li> </ul>	<ul> <li>Butt. Lap and Jee joints</li> <li>I. Take some gauge material and weld the basic design for the butt joints. The butt, lap and tee joints are best welded with filler, joints. The butt, lap and tee joints are best welded with filler, 3. Label and save your best samples.</li> </ul>	Creating a Quality Weld	Lind the	Gizmo's Fast Fact Welding is useful in several areas of the workforce. Imagine using your welding skills:	<ul> <li>Underwater on offshore oil rigs</li> <li>In space on the International Space Station</li> <li>To create custom signs and arr</li> <li>The opportunities are endless! Which would you choose!</li> </ul>
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	the state	een the to ou want it. .hat works old the torr ation of thu	speed will mak te that you may peed and movi ugged, the flarr t clean with a t	u work with it. T aning tool has th are cleaning as yc off inside the tip.		le torch. This	ctually a series • a usually caused between the

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In the Member Manual

#### **Skill Builder 5: Using the Cutting Torch**

**Skills Checklist** 

- Set up a cutting torch
- Make straight and shaped cuts

#### Dream it!

DISCOVER

#### Background for Leaders



#### Using a Cutting Torch

The cutting torch attachment is a very important and widely used tool when it comes to oxyacetylene outfits. Most farmers will tell you that the cutting attachment is almost always set up on their torch. The attachment can be used for both straight heating and for cutting metals of various thicknesses. The attachment works by producing a fast pre-heat system and the induction of a stream of pure oxygen. Having a number of smaller neutral oxyacetylene flames (usually 6) around the center hole of the tip creates the pre-heat. Once these pre-heat flames have gotten the metal hot enough, the operator presses down on a lever that lets higher-pressure oxygen flow through the center hole and cut through the metal.

#### Setting up the torch

To set up the torch for cutting, simply remove the welding tip and replace it with the cutting attachment. When installing the attachment, the nut should be hand tightened only. You can damage the rubber "O" rings if you over tighten by using a wrench. The rings are there to keep the gasses separated and to prevent gas leaking at the joint.

The most common cutting attachment for combination oxyacetylene outfits will have an extra adjustable oxygen valve along with the oxygen release lever. This requires us to modify the way we set up and light the torch. Once the attachment is installed, the oxygen valve on the torch body can be opened all the way. This allows the full amount of line pressure to make its way to the oxygen release lever on the cutting attachment. We can light the torch the same way as before, but in order to add oxygen to the acetylene flame we have to use the adjustable oxygen valve on the cutting attachment. A neutral flame will have all of the inner flame cones at equal lengths and sizes.

The flow pressures that we set on the oxygen and acetylene regulators will have to be changed when using the cutting attachment. For general cutting operations, a common pressure of 3- 5 p.s.i. acetylene and 25 - 35 p.s.i. oxygen will work. If the cutting tip is clean and working properly, this will allow you to cut regular steel up to 3/8 inch (10mm) thick. If the material is thicker, you may need to increase the oxygen pressure or tip size.





Too much oxygen

Correct blend

DISCOVER

#### Producing a Clean Cut

Make sure you guide your members the first time they go through the process of changing the torch from a welding tip to a cutting attachment and the first few times of lighting and adjusting the cutting torch. The cutting process is not difficult but it does take a considerable amount of time and practice to become good at it.

The basic process requires you to use the pre-heat flames to heat a starting area of the material you want to cut till it reaches the right temperature. Hold the flames close to the metal and wait for the material to turn bright red. This indicates that the right temperature has been reached. Once this temperature has been reached, you can press down on the oxygen release lever and then slowly move in the direction that you wish to cut. If you move too fast in that direction the cutting process will stop. You will have to let go of the lever and put the pre-heat flames back to where the process stopped and wait till you see the material turn red once again before continuing.



A common error made by beginners is getting the pre-heat flames too close to the material when cutting. If the material is hot enough and your travel speed is correct the tips of the flames should be 1/8 inch (3mm) away from the material. You do not want to get too close as you will plug your cutting tip with slag or smother your flame.

The torch tip should be kept perpendicular to the material in most cutting situations. The angle on which you hold the cutting torch will vary according to how thick the material to be cut is and whether you are cutting in a straight line or in a shape. Selecting the correct tip size for the thickness of the material you are cutting is, also, important.

Another difficulty is following the line you want to cut. To help with keeping a straight line, it is a good idea to clamp a straight piece of iron down the line you want to cut (slightly offside to allow for the width of the cutting tip). This will help guide the operator as s/he cuts. When you are cutting shapes, mark the line with chalk. Then use a center punch to punch holes all along the line. This gives you a guide to follow when cutting.

As always, safety is a priority. Slag and hot pieces of metal fly when cutting. Be sure the members are wearing goggles, gloves and protective gear. Make sure hot metal and slag are being deposited on metal to avoid risk of fire or damaging shop floors.



#### Important Words

Here are some examples of how to use the "important words" to increase the members understanding:

- Ask members to form a mental image of the new word.
- Get members to use a dictionary and show them the range of information it provides.
- Have members describe (rather than define) the new word in terms of their experiences.

Cutting torch	Heats metal by the flame and once the correct temperature is attained, oxygen is supplied to the heated parts. This reacts with the metal, forming iron oxide and producing heat (which continues the cutting process).
O-ring	A flat ring made of rubber or plastic, used as a gasket.
Slag	The cruddy matter left over after a cutting torch passes through. Can be scraped off or filed down for a smooth finish.

#### Age Considerations

• Ages 15 and up

#### Thinking Ahead

• What will you discuss with members? Gather observations and think of examples that will help support your discussion.

#### **Preparing for Success**

• Linking back to the Skills Checklist, help members identify how they will know they have been successful in their learning in this builder. Discuss what success in these activities might look like, sound like, or feel like.

#### **Activating Strategies**

- How do you think the cutting torch works?
- What kinds of things do you think farmers would use the cutting torch on?

Have the members fill out what they can in the compare/contrast boxes. They can complete the rest during the Dig it! portion of this builder. A suggested final answer is included under Dig it!

#### Do it!

#### Setting up the Cutting Torch

Time Required: 1/2 hour

#### Equipment/Supplies

- Cutting torch
- Oxyacetylene unit
- Gauge material
   Gloves

Goggles

#### Instructions:

- 1. With close guidance to start with, have your members switch from a welding tip to a cutting torch attachment. If your attachment has a separate oxygen flow valve, explain the different process in lighting and neutral flame adjustment.
- 2. Have him/her adjust the oxygen regulator for a flow pressure of about 25 to 30 p.s.i. for cutting material up to 3/8 inch thick.

#### Using the Cutting Torch

#### Time Required: 1 hour

#### Equipment/Supplies

- Cutting torch
- Oxyacetylene unit
- Gauge material
- Gloves

• Goggles

#### Instructions:

- 1. Explain and demonstrate tip distance, travel speed, tip angle, etc,.
- 2. Start the members with cutting on 3/16 or 1/4 inch plate using a straight edge guide.
- 3. After some practice, have them move on to free hand cutting.





#### **Complex Cutting**

Time Required: 1/2 hour

#### Equipment/Supplies

- Cutting torch
- Oxyacetylene unit
- Goggles

Different gauges of material
 Gloves

#### Instructions:

1. Challenge the members to move on to more complex cutting such as circles. Have them experiment with cutting different gauges of material.

#### **Cleaning Tips**

Time Required: 10 minutes

#### Equipment/Supplies

- Tip cleaner
- Cold cutting torch

#### Instructions:

- 1. Demonstrate to the members how the cutting tips get clogged and pitted. Show them how this can affect cutting quality of the tip.
- 2. Use the cleaning tool file and tip cleaners to show them how you clean up the tips.

#### Dig it!

To help members reflect on their learning and apply what they know, ask them the following questions:

- What surprised you about the oxyacetylene torch?
- What did you learn?
- How could the things you learned in this builder be used to help you in other situations?

Have the members complete the compare/contrast chart. One answer might be:

Compare (are alike)	Contrast (are different)		
Both Welding and Cutting Torch	Welding Torch Only	Cutting Torch Only	
Alters metals Used in the shops Require oxygen Require acetylene	One or Two pipes to nozzle Joins metals Nozzle is at 75 degrees 8-10 p.s.i. oxygen flow	Three pipes to nozzle Cuts metals Nozzle is at a right angle 25-35 p.s.i. oxygen flow	

#### What's next?

Members should now have a good understanding of welding and be comfortable using the oxyacetylene unit. Next up is the final builder where members will have the choice of building a tool box or coming up with and creating their own welding project idea. Discuss with members what they might like to build and have them list the materials required.



# Skill Builder 5: Using the Cutting Torch



used tool when it comes to oxyacetylene outlits. Most farmers will tell you that the cutting attachment is almost always set up The cutting torch attachment is a very important and widely on their torch. \$

# SKILLS CHECKLIST

Make straight and shaped cuts Set up a cutting torch

Watch for these important words throughout this builder: Cutting torch, "O" rings, slag mportant words

社

### Dream it!

Begin filling this table in now and finish during Dig it! Consider things like set up, lighting, and function.

**Leader's Notes** 

Compare (are alike)	Contrast (a	re different)
Both Welding and Cutting Torch	Welding Torch Only	Cutting Torch On

### Using a Cutting Torch

number of smaller neutral flames (usually 6) around the center hole of the tip creates the pre-heat. The attachment can be used for both straight heating and for cutting metals of various thicknesses. The attachment works by producing a fast pre-heat system and a stream of pure oxygen. Having a Once these pre-heat flames have gotten the metal hot enough, the operator presses down on a lever that lets higher-pressure oxygen flow through the center hole and cut through the metal.

### Setting up torch

damage the rubber "O" rings if you over tighten by using a wrench. The rings are there to keep the attachment. When installing the attachment, the nut should be hand tightened only. You can To set up the torch for cutting, simply remove the welding tip and replace it with the cutting gases separated and to prevent gas leaking at the joint.

set up and light the torch. Once the attachment is installed, the oxygen valve on the torch body can adjustable oxygen valve along with the oxygen release lever. This requires us to modify the way we cutting attachment. A neutral flame will have all of the inner flame cones at equal lengths and sizes. be opened all the way. This allows the full amount of line pressure to make its way to the oxygen The most common cutting attachment for combination oxyacetylene outfits will have an extra release lever on the cutting attachment. We can light the torch the same way as before, but in order to add oxygen to the acetylene flame we have to use the adjustable oxygen valve on the



DISCOVER



angle on which you hold the cutting torch will vary according to how thick the material to be cut is and whether you are cutting in a straight line or in a shape. Selecting the correct tip size for the thickness of the material you are cutting is also important.

cutting shapes, mark the line with chalk. Then use a center punch to punch holes all along the line. good idea to clamp a straight piece of iron down the line you want to cut (slightly offside to allow Another difficulty is following the line you want to cut. To help with keeping a straight line, it is a for the width of the cutting tip). This will help guide the operator as she/he cuts. When you are This gives you a guide to follow when cutting.

# Welding on the Web

Most trade programs take 2-4 years to complete and they combine approximately 80% paid-on-the Apprenticeship is post-secondary training that leads to certification as a journeyperson in a skilled trade. A difference from other forms of education is as an apprentice YOU GET PAID to learn. job training with 20% technical/in-school learning. Do some research on: www.gov.mb.ca/tce/apprent/index.html

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wearing goggles, gloves and protective gear. Make sure hot metal and slag are being deposited on As always, safety is a priority. Slag and hot pieces of metal fly when cutting. Be sure you are

# How Did it Go?

Write down any thoughts, comments, questions, and what you have learned in this builder.

What's next?

unit. Next up is the final builder where you will have the choice of building a tool box or coming up You should now have a good understanding of welding and be comfortable using the oxyacetylene with and creating your own welding project idea. Think about what you would like to build and discuss it with your leader.

#### Skills Checklist

• Plan and complete a project

#### **Dream it!**



#### **Background for Leaders**

Members need to select and create a project using the skills that they have acquired in this project manual. Their project should use oxyacetylene welding and cutting torch techniques to build. You may wish to have the members do the same project or you can choose to accommodate each member by allowing them to select different projects.

One project that suits the learning accomplished is a toolbox. A basic pattern and instructions follows. The members and yourself are free to select any other project you wish. Project selection will be dependent on skill level progression of members, available materials, costs and searching for patterns or projects.

#### Important Words

Help members define the following words and look for members using this vocabulary in their discussions. Ask for sentences that "show you know." When members construct novel sentences they confirm their understanding of a new word. Have members use as many terms per sentence to show that connections are useful. Members can also create impromptu speeches using these

Blueprints	A comprehensive plan of action(s).
Evaluation	Used to improve learning, checks if goals have been met. Assessment examines the whole process whereas evaluation just looks at the end product.

#### terms. Age Considerations

• Ages15 and up

#### **Thinking Ahead**

• What will you discuss with members? Gather observations and think of examples that will help support your discussion.

#### **Preparing for Success**

• Linking back to the Skills Checklist, help members identify how they will know they have been successful in learning from this builder. Discuss what success in these activities might look like, sound like, or feel like.

#### **Activating Strategies**

• What are two different things the members can think of that they would like to weld? Have them quickly draw and describe these. They can be anything from a pencil case to a silo.



Now the members need to choose to design and build one of their two choices or a toolbox. The member should choose something SMART (specific, measureable, achievable, realistic, and timely). If they are thinking of a 20 foot sculpture that will take them 500 hours to make, that is probably not a good choice for this project. Ensure the members clear their ideas and plans with you before construction begins. If the members choose the tool box, they will follow the instructions below. If not they need to make a list of supplies, instructions, and draw a detailed diagram.



#### Do it!

#### **Basic Toolbox**

Time Required: 2 hours

#### Equipment/Supplies

- 2 pieces of 18" x 6" x 1/16" (45 cm x 15 cm x 1.6 mm) flat plate (sides)
- 1 piece of 12" x 6" x 1/16" (30 cm x 15 cm x 1.6 mm) flat plate (bottom)
- 1 piece of 12 1/4" x 61/4" x 1/16" (30.5 cm x 15.5cm x 1.6 mm) flat plate (lid)
- 1 piece of 1" x 24 3/4"x 1/16" (2.5 cm x 61.5 cm x 1.6 mm) (lid surround)
- 1 metal gate handle (or make your own handle)
- 1 -12" heavy duty piano hinge or 2 door hinges
- 1 clasp

#### Instructions:

- 1. Bend the first 2 -18" (45 cm) pieces at 6" (15 cm) to right angle.
- 2. Weld the 2 corner seams of the sides together to form a rectangular box.
- 3. Weld the  $12" \times 6"$  piece (30 cm x 15 cm) on to the bottom.
- 4. Bend the lid surround the 1" x 24 3/4" (2.5 cm x 61.5 cm) piece to form three sides. Bends need to be at right angles at 6 1/4" (15.5 cm)
- 5. Weld the surround to the lid plate the  $12 \frac{1}{4} \times \frac{61}{4}$  (30.5 cm x 15.5 cm) piece.
- 6. Weld the hinge(s) on the back side for smooth movement of the lid.
- 7. Weld on the handle and clasp.

Encourage members to be proud of their workmanship. They can spray paint it if they like with a metal rust paint.

#### Select A Project

#### Materials/Supplies

- Possible project ideas
- Oxyacetylene unit
- Project supplies
- Goggles

#### Instructions:

#### A. The Plan

- Member Manual
   Cutting torch
- Gloves



- 1. Have members' search for project ideas. Their project should use oxyacetylene welding and cutting torch techniques to build. Possible places to search are the project outlined in this manual, the internet, welders, magazines, etc.
- 2. Have members develop a blue print of their project and a supplies list. Have members gather supplies before the meeting.

#### B. The Project

1. Support the members in building the project in a manner that builds skills and confidence while creating a quality product in a safe environment.

#### C. The Evaluation

1. Have the members evaluate their project by completing the Project Evaluation chart in their Member's Manual.

#### Dig it!

To help members reflect on their learning and apply what they know, ask them the following questions:

- What did you like best about this project?
- What do you feel you need to work on to be an excellent welder?
- Will you use the skills you have learned to do more welding in the future?

Have them include a picture in their members' manual that depicts some step of their project from this builder.

#### **Leader's Notes**









- Weld the  $12^{\circ} \times 6^{\circ}$  piece (30 cm x 15 cm) on to the bottom.
- Bend the lid surround the 1" x 24 3/4" (2.5 cm x 61.5 cm) piece to form three sides. Bends need to be at right angles at 6 1/4" (15.5 cm) 4
  - Weld the surround to the lid plate the 12 1/4" x 61/4" (30.5 cm x 15.5cm) piece. പ
    - Weld the hinge(s) on the back side for smooth movement of the lid.
    - Weld on the handle and clasp. 6.000
- Spray paint your toolbox with metal rust paint if you'd like.
- Fill in the project assessment chart on the following page.

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# In the Member Manual



#### Showcase Challenge

Have members use their member project books to help them in organizing what they have learned. The form of presentation can vary according to the wishes of the leaders and member's ability. Information could be presented in many forms, some of which are: posters, pamphlets, written reports, speeches, computer presentations, displays, etc. Suggestions are listed on the Showcase Challenge page at the back of the Member Manual. The best results are almost always obtained when members are allowed to present their information in the style of their choice.

SO ANADA nsert or attach your finished product or a photo of you sharing your skills in How will you use your new skills in the future? (in different situations?) 30 Now that you have showcased your project skills: What would you do differently next time our Showcase Challenge How did your Showcase Challenge go? Do It? Dig Ict Here are some Showcase Challenge Suggestions: Or come up with your own idea. It is up to you and your leader! Make a computer presentation (e.g. 88 your topic. The goal of the Showcase Challenge is to help nighlight your new skills and help **you** understand how you can use them. It can be an opportunity to receive feedback from others on your project. So go back skills to work by helping at a community event or at your club Achievement or Now that you have finished this project, it is time to think about how you will Make a poster or display chrough your manual and find some highlights of your learning (what you are share your experiences and knowledge with others. You may put your new **My Showcase Challenge Plan** Write a report Showcase Challenge PowerPoint) Bringing it all together! proud of) and think about how you will "showcase" it. • 29 Use your new skills to help with the Club Achievement plans Demonstrate something you made What materials and resources do I need? When do I need to have things done by? Who do I need to help me? or learned about Make a pamphlet Give a speech teaching others about **Dream It!** My showcase idea 88

In the Member Manual

#### Portfolio Page

In the Member Manual

Once members have completed all the builders they will have a lot of information recorded in their manuals. These are products of their learning. As a final project activity, members and leaders will pull together all this learning in completing the portfolio page in the Member Manual. There is a skills chart that lists the skills members are expected to complete by the end of the project. Leaders must indicate how they know the member was successful at a particular skill. Leaders will find evidence if they think about what they have observed members doing, what discussions they have had with members, and what members have produced. If leaders think that members need to go back and improve on any skill, this chart helps them clarify what needs to be done.

Slub:	Date: Hours Spent on 4-H:(Project	and Other 4-H Activities)
Disco To	be completed by the leader and the member based on obse conversations throughout the project.	Skills Chart rvations and
Skill Builder	Members will be able to Each Builder had a Skills Checklist which identified the skill you will learn.	We know this because Identify activities completed and record observations and information from discussions about activities.
ı	<ul> <li>Identify basic equipment</li> <li>Understand functions of basic equipment</li> <li>Understand the safety rules for working in the shop</li> <li>Understand what safety equipment is required</li> <li>Identify WHMIS symbols and know what they mean</li> </ul>	
2	<ul> <li>Set up an oxyacetylene unit properly and safely</li> <li>Test an oxyacetylene unit for leaks</li> <li>Set up a welding torch for use</li> <li>Adjust the flame of a welding torch</li> <li>Shut down an oxyacetylene unit properly and safely</li> </ul>	
3	<ul> <li>Perform forehand and backhand horizontal welds</li> <li>Understand the difference between horizontal and vertical welds</li> </ul>	1
4	<ul> <li>Identify and be able to weld the five basic joints</li> <li>Identify basic factors for creating a quality weld</li> <li>Clean tips</li> <li>Understand basic trouble shooting</li> </ul>	
5	<ul><li>Set up a cutting torch</li><li>Make straight and shaped cuts</li></ul>	
6	Plan and complete a project	

I acknowledge that the member has completed the 4-H project requirements.



\_eader's Signature:

#### In the Member Manual

Above and Beyond!	Company and Com-
In addition to project skills, 4-H also increases skills in meetir leadership, community involvement through participation in clu activities. List below any activities you participate (Some examples include Executive Positions Held, Workshops, Communica Conferences, Judging, Camps, Trips, Awards, Representation to A	g management, communications, o, area, or provincial 4-H events of d in this year in 4-H. ion, Community Service, Rally, Bonspiels rea or Provincial Councils, etc)
**Feel Free to add additional pages that include awards, certificates, that describe your 4-H involveme	new clippings, photos or other items nt.
Member Point of Pride	Ĩ
Member Point of Pride	1
Member Point of Pride What I learned What I need to improve on	
Member Point of Pride What I learned What I need to improve on What I want others to notice	1
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Member Point of Pride What I learned What I need to improve on What I want others to notice Member's Signature: Point of Praise! Another's perspective on you Community professionals, 4-H club head lead I am most impressed by I believe that you have learned In the future I encourage you to	I CANAD A-H Manitoba r achievements in A-H. ers, friends of 4-H Signature Canada A-H Manitoba