EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING
Revised for
ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
EVALUATION OF INFORMATION

AN ACADEMIC SKILLS MANUAL
for
The Industrial Maintenance Mechanic Trades

This trade group includes the following trades:
Boiler Maker,
Facilities Maintenance Mechanic & Technician, and
Industrial Maintenance Mechanic (Millwright)

Workplace Support Services Branch
Ontario Ministry of Education and Training

Revised 2011

In preparing these Academic Skills Manuals, we have used passages, diagrams and questions similar to those an apprentice might find in a text, guide or trade manual.

This trade related material is not intended to instruct you in your trade. It is used only to demonstrate how understanding an academic skill will help you find and use the information you need.

COMMUNICATIONS SKILLS:
EVALUATION OF INFORMATION

An academic skill required for the study of the The Industrial Maintenance Mechanic Trades

INTRODUCTION

Evaluation of information *means careful consideration of information in order to make a judgment about its purpose, meaning, or accuracy.* We evaluate information to understand and solve a problem, to plan a job, or to choose a material, a tool or a method to do a job. As you learn your trade, and as you work, you will use this skill to make the best possible decisions about how to use information.

In order to make the best choices you need the best information. During training, and on the job, you will have many sources of information including textbooks, manuals, tables, diagrams as well as your teachers, supervisors and co-workers. You will decide if the information you have been given is accurate, or if it is just someone's opinion. And, you will decide how to use that information.

You evaluate information to help you make decisions as you proceed. You apply troubleshooting charts to identify problems associated with oil analysis, air conditioning systems and hydraulic systems. You gather and evaluate information to perform various diagnoses such as pump testing and specific gravity tests, or to identify the most efficient use of materials to minimize waste. Evaluation of information is also an important skill when you are required to download trade information from the Internet/

In this unit, we will examine evaluation of information under the following headings:

- Getting the right information
- Selecting relevant information
- Cause and effect
- Fact and opinion

PART I
GETTING THE RIGHT INFORMATION

In order to work through a project in an organized and effective way, you need to assess or ***evaluate*** the steps required to successfully reach your goal. Start by thinking about and planning the whole project before you begin any work**.**

> **Example:** You have a job to complete. You need to plan how you will proceed from the beginning of the job through to the end. Identifying safety or problem areas is probably a good first step. Next, you have to organize information, tools, materials,

and equipment. Once you have all of the information, make a list in your head or on paper of how to proceed with the job. Now you are ready to actually start working.

Approach your work systematically. The first step in a systematic approach is to *evaluate* your situation. Size up the job to identify safety or problem areas. Next, organize the information, tools, materials, and equipment. The goal is to think about and plan the project *before you begin*.

The Right Information

Once your purpose is clear, you can gather the right information from the right texts and manuals, manufacturers' guides and suppliers. Choose the table or text that applies to the job.

Examples:

Even if you work in Ontario, exhaust emissions of diesel and gasoline engine must comply with US EPA standards for the year the vehicle was produced.

If you are working with metric tools, you need metric guides – not U.S. or Imperial systems.

Making evaluated choices

When you have found information that seems relevant, you have to evaluate whether it is exactly what you need.

Example: Workplaces are supplied with safety equipment such as fire extinguishers. The choice of safety equipment is based on evaluating your working conditions and matching the equipment to the situation. To determine the class or type of fire extinguisher needed on the work site, you need to know information such as:

- the square footage of the work area,
- the presence of heat, combustibles, flammable products, chemicals, liquids, gases, etc. and
- legal requirements such as up to date regulations and fire and safety codes for your jurisdiction (your city, county or province).

Next, you need information about types or classes of fire extinguishers such as the following:

- size,
- discharge times,
- approximate range of extinguisher, and
- the types of extinguisher used for different types of fire.

Now you can evaluate the situation and make a decision as to which types of fire extinguishers are required.

The right choice is based on an evaluation of all the information gathered.

General steps used in making sound decisions include:

1. evaluate the situation,
2. get up-to-date information,
3. make sure you understand the information, and
4. use it to make your decision.

Read Passage 1 below. It is about tensioning wedge belts. Several areas need to be evaluated We will look at these at the end of the passage.

Passage 1
Checking Belt Tension

Mechanics may be reluctant to tighten the wedge belt if they are basing this on their experience tensioning fractional-horsepower or standard multiple belts. The two types of belt (above) may be tightened to the right tension by "feel." This method, however, is not recommended for wedge belts, as much higher tensions are required. Because fewer and /or smaller belts are used per horsepower, each belt operates at higher tension and, thus, must be tighter. Operation at these higher tensions offers an advantage over standard multiple belts.

A belt-tensioning measuring tool allows the mechanic to correctly tension wedge-style V belts. Use the instructions and measurements appropriate to this tool to achieve accurate settings and to develop the "feel" for tightening this higher tension belt.

Passage 1 opens with an explanation:

- Mechanics may be reluctant to tighten the wedge belt if they are basing this on their experience tensioning fractional-horsepower or standard multiple belts . . . by "feel". . .

It then delivers advice and a reason for the advice:

- This method . . . is not recommended for wedge belts as much higher tensions are required.

Passage 1 tells us that an evaluation of the method of tensioning wedge belts by feel has found that it is unsuitable. The passage explains briefly, why this procedure is not recommended.

This passage also reminds us that *both knowledge and practice* are required to acquire a particular skill. While the passage can explain what to do and why (knowledge), it cannot give you the practice.

- You will have to acquire this by trying the correct hand techniques and then practicing them *in a variety of situations.*
- You will know you have acquired the skill when you have developed the *feel* for tightening a wedge belt.

Generally, if you are aware of what to watch for, you can be prepared to react to correct any problems when they start to happen. You will evaluate your work as proceed.

When you are learning your trade, you will look for instructions from texts and advice from instructors or experienced workers. You practice a skill, evaluate the results, and practice again, until you are satisfied with the result.

Learning one step at a time
Passage 1 reminds us that it is important to assess or evaluate our skill, experience and knowledge in any area. The quality of the end product, depends on the technician's skill, experience and knowledge about how a material behaves or how a tool is used.

Evaluation of your understanding as you learn and then practice new skills is important. You assess how well you know the theory of a skill and then assess your practice of the skill to ensure that you understand and can carry out a task using the skill.

This is a gradual learning process, of – study – evaluate – , practice – evaluate. It takes time but the results will be worthwhile. It is the step by step learning that all skilled trades people go through.

In Brief
You evaluate any task as you make decisions about how to handle it. The evaluation includes, but is not limited to, the following:

- the purpose of the task,
- the understanding of each factor affecting the task,
- the manufacturers' recommendations,
- where to find complete information, and
- your own skill and knowledge.

Following up
When information leaves you with one or two unanswered questions, you need to search for answers.

> **Example:** You read this:
> The experience of the welder often has a bearing on the size of the electrode. In particular, for out-of-position welding, the welder's skill determines the size of the molten pool that he/she can control.
>
> Now you need to know, how is the size of the molten pool controlled? Finding the answer should lead you to the right sources to find out what controls molten pool size.

When you look for answers to questions, you accomplish two things:

1) You do the job you've been hired to do with the right tools, equipment and metals.
2) You develop your research skills which increases your knowledge of the trade.

You may get information that tells you that you need to evaluate your experience and /or be prepared to try, or to try again.

> **Example:**
> Use the instructions and measurements appropriate to this tool to achieve accurate settings. Practice will help you to develop the "feel" for tightening this higher tension belt.

You may need to evaluate how information applies to you, you have to evaluate what you know.

Example:
In many cases, the weld timing can be left to the discretion of the operator.

Consider: What are these cases? You need the exact meaning of "In many cases" before you act.

Observing What's Important
Evaluating information means being observant. Trade materials use a variety of methods to emphasize important information. You may see words such as **NOTE:** or **Caution**. You may see boxed information, different sizes or types of print, or symbols such as ▸, !, or ▪. *These are signals* used to catch your attention so you read the information that comes next carefully.

Use the signals to make sure you observe all essential points or steps. Look over the material first to note the ***highlighted information***. Signals give advance warning about an important safety issue or an essential procedure. Reread these points and make sure you follow any instructions.

Examples:
Use utility knives with *retractable blades only*. Utility knives cause more cuts than any other sharp-edged cutting tool.

WARNING: Do NOT interchange thread types. Damage will result to the bolt or to the threads of the part.

Never use an air tool to blow off dust or dirt from clothes. Compressed air can enter the skin and bloodstream with disastrous results.

The **bold print**, CAPITAL LETTERS, coloured type, and box make information stand out. Pay attention! The information is designed to keep you safe and your materials in good shape.

PART II
USING TABLES, DIAGRAMS AND TEXT TO SELECT RELEVANT INFORMATION

As you read and become familiar with technical information, your ability to identify and select the right information improves. :

- You distinguish between general rules that apply to most situations and unique situations where you have to figure out the best way to proceed.
- You notice that patterns and principles you use today on the job also can apply to future situations.
- You see the *relevance* of information you come across.

Charts and tables
Charts and tables give you quick information. They are designed to be orderly, simplified, and usually in a list format. You can see all the information and select what fits your situation.

Tables can guide you in selecting a drill bit, or supply you with the pressure for power press brakes. Tables rate tools to help you decide which to use for a job, or which ones you might want to buy. Tables also compare materials, or can show you the advantages and disadvantages of a procedure or product.

NOTE: *Information in a table should be reliable, but it may not cover all the information you need. If it doesn't, make sure to use a number of sources to get a complete picture. Be sure you use current tables and up-to-date information suitable for the task.*

Table 1 below illustrates the clear and simple organization of tables. The row headings clearly tell you what the numbers mean. The table allows you to find what you want quickly.

Read Table 1. Glance over everything before reading so you know what is being compared.

Table 1 Heating Methods for Shrink *Fitting*: Some advantages and disadvantages

Heating Method	Advantages	Disadvantages
GAS gas ring; gas, oxyacetylene, gas and air torch; gas furnace	• Quick heat • Very portable • High temperatures possible • Even heat in furnaces • Relatively cheap to use	• Oxidation causing structural change or scaling of parts • Possibility of uneven heating when hand heating appliances used • Possibility of fire caused by careless handling
INDUCTION HEATING	• Speed • Cleanliness • Even heating • Excellent for small parts	• Expense of large parts • Difficulty of heating large or heavy sections
OIL AND ELECTRIC FURNACES	• Temperature control • Variety of furnaces available	• Large objects difficult to insert and remove from furnaces • Oxidation of machined surfaces

Note: Consult the working drawing or applicable table to determine the allowance for shrink fitting. Shrink fitting should be accomplished so that parts are assembled with a minimum (or with no) effort. Do not use force in an attempt to compensate for the wrong amount of expansion (or contraction).

In Table 1, you see the following information:
- three types of heating,
- advantages of each method, and
- disadvantages of each method

Did you also read the **Note:** at the bottom of the chart? If not, read it now. To evaluate *how*, *when* or *whether* to use any information, it is important to *read everything available to you.* The note at the bottom provides more details about welding forces.

Be sure to read all notes and decide how or if they apply to your job. The note tells you:
- to use appropriate working drawing or applicable table, and.
- why you need to use appropriate tables:

- to determine the allowance for shrink fitting.

It then directs you to identify and understand correct assembly and how to avoid improper assembly.

Notes with tables

Notes, or footnotes, that are with tables include essential information. You will have to read and follow the directions found in a table, at the bottom of the table and in the guides. Much more information is available to you when you combine footnotes with the table details. When you have more information to work from, you can decide how or if they apply to your assignment. You can *evaluate*. There is always a good reason for footnotes, so make sure you get all the details.

Notes explain terms or abbreviations.

Example:
Note: PSIG stands for pounds per square inch guage

Notes point out exceptions to a use.

Example:
Note: Some metals are excluded from this use because of corrosion.

Notes guide you to the information you need.

Examples:
NOTE: See Chart 5 for Imperial. – Metric conversions

See the Welder's Guide for complete information.

Notes guide you to make correct adjustments.

Example:
The note with Table1 guides you to avoid incorrect adjustments and, thus, problems. You can check that you have determined welding force accurately, that equipment is operating to mechanical specifications (80 psi air line pressure), and that you apply the specified force to get the results you expect.

Notes may tell you where to find more details.

Examples:
See Figure 3-1 for a cross section of this diagram.

Consult the torque guideline when using lubricants X, Y or Z.

How And When To Use Information

To decide *how and when* to use information, it is important to evaluate whether it is relevant to a specific situation. The information must:

- be reliable,
- be complete, and
- answer all the questions about the situation.

You may need to read from more than one source to get the information you need. When you have enough information to work from, you can decide how it applies to your task.

Diagrams and Text

Passage 2 below describes the difficulties of getting a perfectly round hole when drilling through thin metal and what can be done about it. As you carefully read, think about tool selection and drilling techniques. In short, *evaluate what you read*.

Read Passage 2 and answer the questions that follow. Answers are at the end of this unit.

Passage 2
Drilling Thin Material

Drilling holes in sheet metal is difficult, and the results may be damaged work. This is especially true with standard twist drills over 12.7 mm (½ in) in diameter. The standard twist drill has a tendency to "hook" into the thin metal. This "hooking" action is caused by the rake angle created by the helix of the flutes and the drill point. A clean, round hole is not produced by the standard twist drill (See Figure 1).

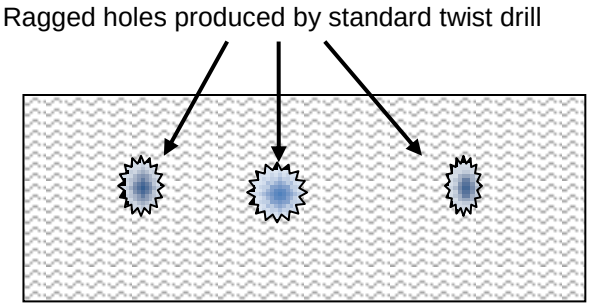

FIGURE 1: Standard Twist Drill Should Not Be Used To Drill Holes In Sheet Metal

Special drills and specially ground twist drills should be used when drilling thin material.

A low helix drill or a straight-fluted drill which has no rake angle improves the quality of drilled holes in thin materials. A standard twist drill can be modified by grinding a short flat on the lip of the drill to remove the rake angle if a straight-fluted or low helix drill is not available.

Another factor affecting the quality of the hole is the manner in which the drill point is ground. Grind so there is a small point in the centre to position the drill in the punch mark. Then grind the rest of the drill point to an angle of 5° from the flat with a lip clearance of about 12°. As the drill point penetrates the work, the outer edges act as a trepanning tool and result in a round, almost burr-free hole.

Questions:

1. A specially ground twist drill will produce approximately the same results as a standard twist drill.

   T F

2. By referring to Figure 1, you can understand how "the rake angle created by the helix of the flutes and the drill point" creates the "hooking" action.

   T F

3. Which topic below does Passage 2 give you the *least* information about?

   a) how to modify a standard twist drill
   b) how to produce a burr-free hole in thin material
   c) the causes of "damaged work"

4. Passage 2 gives enough information for you to understand helix of the flutes and trepanning tool.

   T F

Evaluation
You need to get the expected results from a project – drilled holes of the right size and quality. You need to avoid damage to tools, to the material and other classes of problem. To do all of this, you depend on a clear understanding of clamping, drilling, equipment and materials. *Your purpose is to select the right information to come to this understanding.*

Passage 2 is an evaluation of a drilling operation and a type of problem. It directs you to Figure 1 to show you the problem. The passage describes the problem, looks at the cause and offers a solution.

In a passage like this, someone has evaluated a task and a problem you might face. This kind of evaluation will direct you to correct procedures, directions, tools and materials. It may help you to do a job efficiently or to avoid a problem you might otherwise encounter.

There's a bit missing
It is just as important in any evaluation to recognize when a piece of information is missing.

In some instances, you read information that causes you some difficulty or uncertainty.

> **Example:** You might read this about tension:
> Materials can withstand a certain amount of stress before they break or weaken.
>
> What exactly does *a certain amount* mean? The information doesn't explain it, so how do you know?
>
> **Example:** In a table on characteristics, uses and properties of copper, you find this:
> It has relatively high strength but is difficult to cold work.
>
> The note doesn't explain what *relatively high strength* means, or what metals copper is compared to. Is it difficult for an apprentice *to cold work* or for everyone?

Something is missing: you may know what these directions or notes mean, but if you don't, how can you evaluate the strength of a metal, or the difficulty you would have working with it, or your own safety?

Up-to-date information should be reliable. But, if information is not clear to you or details are missing, you cannot evaluate thoroughly. New developments and materials in your trade mean that products and techniques, standards and codes change. Make sure you keep up to the standards. Make sure you know who to ask for explanations or clarification to get the whole picture.

PART III
CAUSE AND EFFECT

*When we refer to **cause and effect,** we are evaluating a relationship between two events*. We want to see if one event is responsible for causing another event to happen. The connection between the two happenings can be established:

- by careful evaluation based on repeated observation,
- by referring to recognized standards and manuals, and
- by talking to respected supervisors and workers in the trade.

Safety on the job often means being aware of what action causes another and the consequences of that action. If a careless step can cause you harm, you should know the effects of that action. Safety warnings often highlight the cause and effect relationship in some way, especially if the effects are serious.

A warning might tell you to avoid doing something that can ***cause*** a problem, or a danger. The warning may also state the consequences ***effects*** and general ways to avoid the problem.

> **Example:**
> Avoid stringing wires for temporary circuits. Frequent relocation of circuits can loosen connections. This can break insulation, creating fire and other hazards.
>
> Remember that electricity is ***always*** a potential source of danger. Consider all electrical wires and equipment to be live until they are tested.

Recognizing cause and effect relationships can help you understand:

- ♦ what action causes a problem,
- ♦ what action solves a problem without creating a new one, and,
- ♦ what action can prevent a problem from happening in the first place.

> **Example:**
> *Never use a power buffer with a hand compound.* This will cause deep scratches and ...
>
> **Use machine compounds *only* when power buffing.**

A problem happens because something causes it. When you search for the cause of a problem, look at the relationships between actions that are closely related to the problem. As you search

for solutions, think about how to change the factors that have caused the problem. When planning a project, think ahead to the logical order of procedures so that you can avoid any action that has the potential to cause a problem.

Who (or what) caused it?

In the sentence below, it is clear what happened.
Fred threw a snowball and it went through the shed window.

Fred threw a snowball. The result, or effect was, it broke the shed window. You can reverse the order of the sentence and still make sense of the relationship: *The window was broken because Fred threw a snowball through it.*

Cause and effect relationships can be very clear. In the next example, you see a cause/ effect relationship between a drilling operation and a drill bit:

> **Example:**
> *Do not spin the drill bit too fast or press too hard*.
> *This will result in overheating which can quickly soften and ruin the bit.*

In this example, the first sentence gives you a cause – a drill bit that spins *too fast* or has too much pressure applied. The second sentence tells you the effect of the action – overheating and softening of the bit.

In this example:

- The first sentence gives you a cause – a drill bit that spins *too fast* or has too much pressure applied.
- The second sentence tells you the effect of the action – overheating and softening of the bit.

We can reverse the order of the sentences and still make sense of what happened:

> *A drill bit can soften and be ruined if it overheats from spinning too fast or being pressed too hard.*

But we ***cannot*** reverse the order of the relationship and still make sense. In other words, the result is not the cause. You cannot say:

> *A drill bit which softens and is ruined from overheating **will cause** the bit to spin too fast and with too hard a pressure*.

You cannot say: "*A broken window caused a snowball to be thrown."*

It doesn't make sense if you mix up the cause and result. The events occur because of a cause and effect relationship. You have to keep this relationship in mind as you troubleshoot. As you search for problems and their solutions, remember to note the order of the actions even if the *sentence order* is changed.

Take two directions to study cause and effect
In practice, we often work in two directions - backwards and forwards - when we talk about cause and effect. Sometimes we know what happened (the *effect* or *result*), but we don't know why (the *cause*). Sometimes we know what action we are taking (the *cause*), but we don't know the effects or results of it.

> **Example:** As you are driving on a winter's night along an unfamiliar concession road, think ahead. Predict the likely results of your actions. You may do any of the following:
>
> a) skid into a ditch,
> b) miss a turn and get lost,
> c) hit an icy patch and spin, or,
> d) be lucky and arrive safely.

You have worked from your present actions forward to predict the probable or possible effects. The purpose in doing this is to evaluate the likelihood of an event taking place - of *a, b, c,* or *d.* When you evaluate the effects of what you are doing now, you can change your behaviour to avoid or prevent a problem.

> **Example:** Knowing that improper care and/or use of steel rulers will reduce their value as accurate measuring tools, you can adopt practices that will avoid this result. You can evaluate your own practices compared to recommended (proper) handling and use. So when caring for steel tools:
> - handle with the same care as for precision instruments,
> - check ends and corners for wear,
> - use only for measuring – never as a screwdriver of lever, and,
> - observe how experts handle and store this and other tools.

Passage 3 outlines a relationship between cause and effect. The purpose is to understand and, therefore, avoid poor or ruined work. **Read Passage2 and study Table 2. Answer the questions that follow. Answers are at the end of this skills manual.**

Passage 3
Pneumatic Tool Maintenance

Tools and equipment cannot operate correctly unless you take proper care of them. Although air tools do not require much upkeep, basic maintenance will prevent problems. For example, storing a tool with water in it will cause moisture to gather in the lines and to be blown into the tool when next used. Also, rust will form resulting in a shortened life for this tool.

Maintain tools and equipment. *More jobs are ruined because of poor care than by any other single cause!* If a tool is not functioning properly, fix it.
These are the most common causes of pneumatic or air tool malfunction:
- poor or lack of proper lubrication,
- excessive air pressure or lack of it,
- excessive moisture or dirt in air lines.

See Table 2 for a troubleshooting guide to air tools.

Follow the recommended air pressure for all air tools. An overworked tool will wear out faster. It may cause a series of problems as well: if a tool with worn parts is used, it will use more air pressure; the air compressor may become overworked and put out air that is not clean or dry which may shoot back into the tool. And so on....

.

Table 2 Troubleshooting Guide For Air Drills

Problem	Probable Cause	Recommended Action
Tool does not run, air flows freely from exhaust, spindle turns freely.	Rotor vanes stuck with dirt or varnish.	1. Check for dirt in inlet. 2. Pour liberal amount of air tool oil in air inlet. 3. Operate trigger in short bursts. 4. Disconnect air supply; then turn empty and closed drill chuck by hand. Reconnect air supply. 5. If still not operating, have tool checked by authorized service centre.

Questions:

1. According to this passage, a technician or mechanic could avoid most of the causes of ruined tools and equipment.

   T F

2. Which is the most likely cause of shortened pneumatic or air tool life?

   a) the formation of rust
   b) storing the tool with water in it
   c) reduced or excessive air pressure
   d) all of the above

3. If you cannot fix an air drill yourself, you should replace it immediately.

   T F

4. Which is **not** a common source of a ruined pneumatic tool?

   a) frequent use
   b) lack of air pressure
   c) dirt or varnish in the rotor vanes
   d) worn out parts

Trouble Shooting Guides

Troubleshooting guides list common causes of problems and solutions so you can find and solve them quickly. Table 2 is an example of a cause and effect guide found in your trade.

Look for the places the problem could have occurred. As you eliminate possible causes, narrow in on the most likely ones. This process will help you find the cause of tool malfunction in a logical manner. The cause will lead you to the solution such as a changed method, a different technique, or a tool replacement.

Test Your Abilities
Evaluate the situation and yourself.

If the troubleshooting process leads you to the limits of your own expertise, you may have to find another source of information. Tables and manuals can help you make this assessment.

> **Example:** Under the heading, *Recommended Action* in **Table 2,** step # 5, you read this: *have tool checked by an authorized service centre*. Now, you know to go to a service centre for more help.

Directions in manuals may say something like:

- *if the tool is not functioning properly...*
- *Maintain tools...*
- *use proper lubrication*

These directions assume that you know what *functioning properly, maintaining tools,* and *proper lubrication* mean, and that if you don't know, you will find out. An important part of evaluating a situation is to figure out when you have to look something up, or when you have to find further information. It also means knowing where to go for help.

Looking for more causes
Be aware that there may be more than one cause of a problem. A problem such as a badly maintained air drill may be the cause of another problem such as an overworked air compressor. If you have not lubricated the air drill properly, or you used the wrong type or quantity of oil, this problem may lead to another in the compressor.

PART IV
THE DIFFERENCE BETWEEN FACT AND OPINION

In this last section, we examine the difference between **fact** and **opinion**.

*A **fact** is based on something that can be measured or proven.* When you can explain a statement based on solid information, you are presenting a fact.

> **Examples:**
> The Maple Leafs did not win the Stanley Cup last year.
>
> Reverse or back flushing is a salvage operation. Back flushing can cause loosened scale particles to clog the system. These particles can cause damage to internal seals, water pump and thermostat areas.

*An **opinion** is based on an unproven belief*. When we base a choice on an opinion, we need to look closely to find our reasons for thinking the way we do.

> **Examples:**
> Fords are better than Hondas.

The Maple Leafs will win the Stanley Cup.

Know the difference
When you evaluate information, you need to look closely at your reasons for thinking the way you do.

> **Example:** Are tools produced for professional use better than tools produced for ordinary use? In what ways? For which situations? Explain your answers.
>
> If you can explain the answers to these questions by drawing on facts that support what you say, your answer will be true.
>
> If you explain your answer by saying "I think " or "I heard that …", you are stating an opinion. It may or may not be true.

When someone tells you something is wrong with a finished product, they are probably providing you with valuable information. It's your job to evaluate this information. Can you get reliable details about where and when the product failed, with an accurate description? Or, is it an opinion? Something like, "This bin doesn't seem like the other ones". In evaluating any situation, keep an open mind, ask questions and include information from a variety of quality sources.

Know your sources
Table 2, *The Trouble Shooting Guide*, is an example from a repair manual that includes directions to use *recommended* air pressures and *authorized* service centres.

It is important when you evaluate information is to find out who wrote it. A maintenance manual provided by the manufacturer is a very reliable source. An article in a respected trade magazine is another. A chat room on the internet may not contain the high value information that you are seeking. *An important rule is to rely on high quality sources to provide your information.*

You will seek advice from experts and experienced professionals. But even the time-honoured practices of seasoned trades people come under occasional review that can lead to a new and better way of doing things. You need to learn and respect traditional methods but be open to new ideas. New and better ideas can only develop by someone carefully observing the actual relationship between cause and effect in the work site.

Language
Just as some words make a cause and effect relationship very clear, some words and phrases make rules and codes very clear. In some situations, the language tells you that there is no room for opinion.

Words and phrases such as *never, always, must (not), shall (not), are prohibited,* make it very clear that the information presented is not open to opinion, debate or evaluation. Your experience may not give you enough information to understand or evaluate the reasons for every direction. The language tells you what to do; it tells you there is no decision-making necessary.

Examples:
Do not perform any of the following repairs until you read and understand all OEM information.

Gasoline must never be used as a cleaning agent. It presents an extreme fire hazard.

Employees must wear approved safety equipment.

Always maintain and use tools properly. A defective tool is a dangerous tool.

Words and phrases like *should be, ought to, is recommended* and *make a reasonable effort,* offer suggestions or offer opinions. They offer advice that you will consider and evaluate. There may be some room for decision-making based on opinion:

Examples:
Tools should be good quality.

In some cases, two people ought to work together.

A metatarsal type safety shoe is recommended.

Make a reasonable effort to contain the fire.

In Brief
As you learn about your trade, make observations with a clear, open mind. Constantly evaluate your ideas or materials. Assess your skill level in carrying out a project. What do you still need to learn? Based on your experiments and observations, you will learn to make evaluations based on useful facts, not unsupported opinions.

CONCLUSION

The steps in a procedure may be straightforward, but you still have to evaluate information as you make decisions about materials, equipment, costs and time or when you look for trouble spots. To solve most problems, you first need a clear understanding of how something is supposed to work. Through experience, you will discover causes of and solutions to problems. You will also learn to use experience to evaluate the effectiveness of each solution as you try it.

Materials, installation techniques, equipment and codes are constantly changing in the trades. You have to keep up with these changes. You have to differentiate between someone's opinion and reliable facts. Check with inspectors, suppliers and manufacturers to learn about the latest products and information. Learn to recognize the relevance of the information you read by evaluating how it relates to your trade and to the job you are doing.

Sound decisions depend on knowing your sources and taking advantage of all the available resources. Information can come from written material, from experts and from your own

experience. Learn to evaluate what you learn so you choose the information that best fits the situation.

Summary

1. **Evaluate the situation from every angle** and choose information, products and rules that fit the job.

2. **Understand the relationship of the information in a table, diagram and the text.** Use it all and relate it all to what you are doing or learning.

3. **Assess your skills, experience, information, and how you are applying the information.** Evaluation is one of the best learning tools we have.

4. **Understand what cause is, and what effect is**. Work backwards to find cause, and work forward to predict the effect, or the result. Your object is to prevent problems.

5. **Weigh the facts you have available and make appropriate choices at every step.**

6. **Learn the difference between fact and opinion**.

Answers to Questions

PART I Passage 2, Drilling Thin Material

1. A specially ground twist drill will produce approximately the same results as a standard twist drill.

F Paragraph one states Paragraph one states that "a clean round hole is not produced by a standard twist drill" and that "special drills and specially ground drills should be used".

2. By referring to Figure 1-2, you can understand how "the rake angle created by the helix of the flutes and the drill point creates the "hooking" action."

F By referring to Figure 1, you can see the effects of the hooking action (a ragged hole) but it does not show *how* this occurs.

3. Which topic below does Passage 2 give you the *least* information about?

c) the causes of "damaged work." We get one type of damage and one cause of this type. We do not know about any other types.

4. Passage 2 gives enough information for you to understand rake angle and low helix drill.

F There's really nothing in Passage 2 to explain, describe or illustrate either term above. This goes back to the answer to question 2.

PART III Passage 3, Pneumatic Tool Maintenance
Table 2: Troubleshooting Guide for Air Drills

1. According to this passage, a tradesperson can avoid the common problems which cause air tools to malfunction or function badly.

T Passage 3 lists the most common causes of pneumatic or air tool malfunction. A tradesperson can avoid these. Furthermore, the passage states what to do if the tool is not functioning properly so the tradesperson avoids ruining a job.

2. Rust will form in air tools for the following reason:
c) tool is stored with water in it

This is the only cause listed for rust problems although there may be others. The solution is to plan time for routine upkeep and to store tools correctly. Answers a), b) and d) will cause problems and should be corrected.

3. An air tool which requires more air pressure may cause damage to the air compressor.

   T This is a cause and effect question. The best bet is to avoid the problem in the first place. Usually, one problem causes another or a continuing problem. As each problem can affect a final result, troubleshoot to find and solve it.

4. The air flows freely from the exhaust in your air drill and the spindle turns, but your air drill does not run. According to Passage 2, which action below will **not** correct the problem?
   a) drying the water in it before storing,

   The answer is found in Table 2. Answer a) is the only action that does ***not*** correct this problem. Eliminate wrong choices or actions to focus on the correct or most likely solutions. The right solution – either b), c) or d) will eliminate or prevent this problem.