EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING
Revised for
ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
DETAIL EXTRACTION

AN ACADEMIC SKILLS MANUAL
for
The Precision Machining And Tooling Trades

This trade group includes the following trades:
General Machinist, Tool & Die Maker,
Mould Maker, Pattern Maker, and
Machine-Tool Builder Integrator

Workplace Support Services Branch
Ontario Ministry of Training, Colleges and Universities

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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:
DETAIL EXTRACTION

An academic skill required for the study of the Precision Machining and Tooling Trades

INTRODUCTION

Reading for details is similar to shopping through aisles of items and then finding and taking something you need. ***Detail extraction*** *refers to finding information you need and then carefully reading it to pull out and use the specific points you need.*

In your work, you extract details from descriptions of policies, procedures, codes, manuals, data sheets, graphical displays, and blueprints. You also extract details when you make notes from texts and class material, and when you study, and review information for tests. When you select the right details from your trade materials and textbooks, you can use the information to get the results you want.

In this unit, we will look at the following methods to successfully extract details from technical reading material:

- Know your purpose.
- Use a method to find details.
- Understand the nature of details.
- Build on your experience.

PART I
KNOW YOUR PURPOSE

Details
Details *are the small parts of something.* They are the individual points, parts, components, or the bits. When you find a detail by itself, you may not recognize what it's used for or whether it's important. When you see a detail in its correct place – as part of a whole – you are more likely to recognize its use and its importance. When details are combined, each contributes to the whole idea, process or principle.

Extraction
Extraction *means pulling something out*. A geologist extracts gold from rock, a dentist extracts a tooth from your jaw. Extraction may be difficult and it may take some effort. You have a good reason for making this effort.

Your purpose
When you understand *why* you are reading, you can focus on the parts of the text that provide the information you need. When you know what you are looking for, you recognize the information when you find it. Then you can select the parts that answer "what should I do" and "what should I know." This is detail extraction. If you know what you *don't* need, you can skim through unnecessary details and get to the purpose for reading.

Think about your reasons for reading before you begin:

- What am I looking for?
- What have I been asked to do?
- What am I expected to know ?

Getting all the facts
The skill of extracting details requires you to identify your purpose and, then, *carefully read to extract the details.*

Often you need all the details provided, especially when you are told to follow a procedure. If you skim through them, you will miss something essential. When you are *directed* what to do, you will need to extract all the details.

> **Examples:**
> Follow steps 1 through 4 for correct hammering technique.
>
> Read these directions before you start preparation.

Statements like these tell you where to find the details and what you need the details for. They give you a purpose for finding and using details. You will need to find and use the details they point you to, especially if you need to learn correct hammering procedures or to understand how to do a job.

Statements that send you for information provide you with a purpose for reading. Among other things, they might tell you:

- to get help with a procedure,
- to compare details, or
- to make the correct adjustments (in products, measurements, etc.).

You may have two or three purposes for reading selected material, such as to memorize a new procedure or to learn more about fabricating or to take an exam. An added, but common, purpose for reading technical material is *to answer questions* to show that you have grasped the information, or details, in the material you have read**.**

Passage 1 below describes the formation of steel. Think about your purpose in reading this. It may be to do any or all of the following:

- understand a material or product,
- accurately follow directions,
- identify parts on a diagram,
- understand the sequence of events, or
- answer questions.

Read Passage 1 and answer the questions that follow. Answers are at the end of this manual.

Passage 1
Steel

Steel is a material that is made up of iron. Most steels contain over 90% iron, and many carbon steels contain more than 99%. In addition to iron, steel is made up of a second element: carbon. Other alloys are contained in steel, but iron and carbon are the only two elements that exist in all steel (see figure 5). Steels that contain the least carbon are more ductile than others but are not as strong. When carbon is added, strength, hardness and brittleness increase.

Steel is made by dissolving the carbon in the iron. Sometimes, there is too much carbon for the iron to "digest." In this case, the alloy can no longer be called steel. The carbon will precipitate out and remain as carbon flakes. This occurs at 2.0 percent carbon. There are many different types of steel and each has a name consisting of four numbers. The first two digits tell us the alloy content and the last two (or three) digits refer to the percent of carbon in the steel (see chart below).

Most steel contains ingredients or alloys in addition to iron and carbon. Although they are found in small amounts, they have a huge impact on the character of the steel. For example, if you want greater strength, you could add carbon, manganese or nickel. For better corrosion resistance, add chromium or copper. For better machinability, sulfur or lead could be added. It is unusual to have more than 2.0 percent of any alloy in steel.

Questions:

1. Which of the following would be the name of a steel with 40% carbon content, combined with the alloy nickel (number 23).

a) 4023
b) 2340
c) 2043
d) 4320

2. Some steels contain only small amounts of carbon. These steels are strong, hard and brittle

T F

3. Steel is made when carbon is dissolved into iron and a precipitate of carbon flakes forms.

T F

4. Manganese would provide the same qualities in steel as carbon.

T F

What I want . . .
As you read, you will often find that your purpose changes or expands in some way. Think about the passage above.

As you read the passage, you may have stuck to your original purpose, to learn more about steel and how it is made. And, you may have wanted to see the (omitted) chart the passage referred to, or wondered what different steels look like, or how you can tell one from another, and so on. These new purposes will send you to another text, manual or an expert to find the details you want.

Your expanded purpose leads you to find more details. *Searching to find those details and reading them carefully is important to the understanding of your trade.*

Your purpose tells you *why* you are looking for details. You will use the details in an appropriate way based on your purpose, whether you memorize them, record them or act on them.

Purposes for reading
For *detail extraction*, you read to locate facts, data or information for *any of the purposes* below. You will find other reasons of your own to add to this list.

- to compare products or equipment,
- to prepare for a test on a chapter,
- to learn a math formula,
- to understand a procedure,
- to explain a procedure to a supervisor.

PART II
USE A METHOD

Purpose directs your search for details as you ask: *What do I need or want? What am I going to do? What is expected of me?* Your search for details should be guided by a method. The method below will help you search for the right details. In this method, we use four steps to locate and extract the right information.

Four steps

1. *Define your purpose.* Your purpose might be to understand a process and/or to answer questions.
2. *Preview the reading.* Look over the whole piece. Pause to read or notice items: bold or *italic* print, diagrams, headings.
3. *Read carefully* to understand the whole piece.
4. *Locate details that answer the questions*. Reread with attention to select (and understand) the right details.

Passage 2 below describes a process – handling power tools. Your purposes are to understand this process because it relates to working safely, *and* to answer the questions.

Use the four steps as you read Passage 2. Then answer the questions that follow. Answers are at the end of this skill manual.

Passage 2
Electrical Tool Safety

Electrical tools must meet CSA standards and comply with WSIB regulations. When using electrically powered tools, make sure the terminal in the electrical outlet and the ground pin or terminal on the power cord are in place and in good repair (see WSIB regulation 22.32).

Some hand-held electric tools are referred to as "double insulated." In these tools, the power cords have no ground pin in the plug, but the plug may be polarized to fit into the socket one way only. You must correctly identify these tools before using them.

When using electrical tools, prevent electric shock by making sure the insulation on the power or extension cord is not cut or frayed. Do not operate them in wet locations. Do not lift or move them by their power cords. Always remove a plug by grasping the plug and pulling it straight out of the receptacle, not by jerking on the cord. Always disconnect, unplug or lock out any electrical equipment before making any kind of adjustment or performing maintenance.

Questions

1. Electrically powered tools should not be used in wet sites.

   T F

2. Which of a) or b) correctly lists details for making sure electrical tools are being used properly?

   a) Make sure the ground pin or terminal is in good repair, do not use a frayed cord in a wet area, and disconnect the cord before performing maintenance.

   b) Check to make sure the cord is not cut or frayed, lift the tool by its handle, and remove the plug by taking hold of the plug, not the cord

3. If a power or extension cord was cut or frayed, what could you expect?

4. Explain what is meant by "*polarized*."

5. If you needed to change a saw blade in a power saw, you should disconnect the power source before proceeding.

   T F

Types of details

Notice that the questions ask for different types of detail or information.

Question 1 asks you whether a statement is correct (true or false). To answer the question, find the place where you read the information, reread it, examine the details and decide if the statement is accurate.

Question 2 asks about the accuracy of details in a list. Find where the items in two lists are described. Compare the details carefully, noting the correctness of each item. When you do this, you are using details to make comparisons and draw conclusions. You do this to understand when and why you would use different products, steps or techniques to complete a job.

Question 3 asks you to find a result. This involves the relationship of one or more details to what might happen. You look for cause and effect to avoid mistakes, to find the cause of a problem (diagnosis) or to come to a conclusion.

Question 4 asks you to explain what something means. This is a vocabulary detail about a word commonly used in your trade. Assume you don't know what *polarized* means. Look up the word in a dictionary or glossary. Use your own words or a simple sketch to make sure you understand it. A good test of your understanding is to explain it to someone else.

Question 5 asks you to evaluate information. You need to see how a detail fits into a larger category to come to a safe decision about what to do when changing a saw blade. You have to consider what might happen if you don't first disconnect the power source.

Preview your reading material
We have suggested you use the four steps to guide your ability to extract details. In technical reading, it is a good practice to browse the entire reading before you start (Step 2). When you preview a textbook or manual, ***you get an overview of the whole***.

This *preview* gives you a sense of the whole before you focus on the details. It can help you find the passages, chapters or sections that answer your questions. Previewing also gives you a sense of the range of information available.

A reminder about questions
We suggested earlier that you ask questions to help you extract the right details. Asking questions helps you understand each detail as you go.

Example: You might ask, "Do I understand:"

polarized	Yes or No?
insulated	Yes or No?
ground pin	Yes or No?"

If the answer to your question is no, you need to continue your search for answers that give you an understanding of the words and details of your trade.

PART III
THE NATURE OF DETAILS

Details cover a great range of information – anything from the history of steel manufacturing in Canada to the procedures for troubleshooting a hydraulic press. Some details are general in nature; some are very specific.

Details: General To Specific

The passage below is organized in a way that is common to technical material. It starts with general information and description then examines specific details. The general information often introduces the "*how to*" details that you would find in a procedure.

Read **Passage 3**. Pay attention to the way information is organized in the passage.

Note: *Etc. followed by . . . indicates that we have omitted the rest of the passage. Figure 1 is also omitted.*

Passage 3
Seals

Seals are used to prevent or control leakage of a fluid and to prevent contaminants from entering systems. **Static seals** are used between two stationary parts and **dynamic seals** are used between a moving and a stationary part. **Positive seals** are seals that prevent fluid from leaking from one side of a system to the other. **Non-positive seals** control the amount of such leakage

Gaskets are an example of a static seal and they serve several functions. They seal against a pressure load in hydraulic or pneumatic systems, they also seal against leakage in reduction units where no pressure is involved, and they control position by means of shim pack gaskets (see chapter 12- Gear Drives).

In pressure sealing, gaskets are subject to the force of compression exerted by the bolts. This force must be greater than the internal pressure (which tends to move the gasket sideways) and the hydrostatic end force due to internal pressure (which tends to push the joint apart as in figure 1). Etc. . .

General details

Look again at paragraph one. It gives you general information about what seals are and defines the different types:

- static seals,
- dynamic seals,
- positive seals, and
- non-positive seals.

Specific details

Look at how the second paragraph provides more precise detail. It tells you about one type of static seals, called gaskets. The paragraph explains the functions of gaskets:

- to seal against a pressure load,
- to seal against leakage,
- to control position through shim pack gaskets.

Paragraph three continues with details about the forces that affect gaskets during pressure sealing. You can see that these details are more specific than those in the first paragraph. These details build your understanding step-by-step so you have exact knowledge about an aspect of gaskets.

From General to Specific
Technical material is usually organized in this way:

- Passages start with general information that gives a basic understanding of what something is or what it does; often you find out ***why*** you need to learn about it.
- You then read details that describe some aspect of the topic such as differences between types of static seals.
- Further on you may find specific details that take you through a systematic procedure such as that for installing seals.

Each part of the material develops and builds from the general to the specific. These details continue to add to your knowledge of the trade.

Extracting details from graphics
Graphics *refer to any type of diagram or picture used to provide a visual representation of information.* Graphics extract specific details that focus on what you need to know. *When you use graphics, in conjunction with text, you learn the important information.*

It is generally easier to understand and remember steps in a procedure, differences in material or how one part relates to another, when it is illustrated in a diagram.

> **Example:** You are trying to find out about *helical snips.* When you go on-line, you find a long and complicated description. You would certainly understand better if there were a diagram showing *helical snips* was with this definition.

Passage 4 and Figure 1 below show you how details in a passage and in a diagram work together. Review the four-step method presented earlier in this unit and apply them to this task.

Passage 4
Electrochemical machining

Electrochemical machining (ECM) is a process by which electric and chemical energy are used as the cutting tool. Characterized by its “chipless” operation, it is very different from conventional metal-cutting techniques (see figure 1). The metal is easily removed, regardless of the work hardness. Because the *cutting tool* is a non-rotating tool in the same shape as the cavity; shapes that are square or difficult to machine can be easily cut in a workpiece (see figure 2).

ECM developed out of the electroplating process, and therefore, an explanation of the electroplating is beneficial (refer to figure 3). Two bars of unlike metal are immersed in an electrolyte solution. One bar is connected to a negative lead on a battery, while the other is connected to the positive lead. When the circuit is closed, direct current (DC) passes through the electrolyte solution between the two bars of metal. The chemical reaction causes metal from one bar to be transferred to the other.

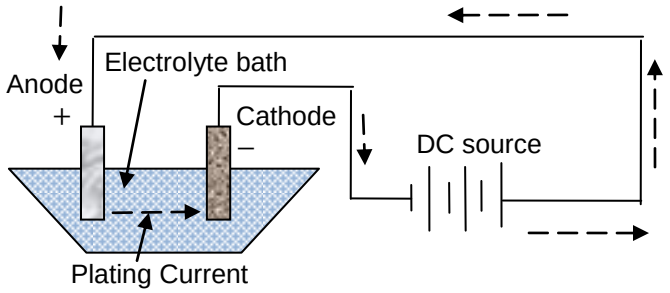

FIGURE 1: The Principal of the Electroplating Process

Extract details in the text *and* in the Figure to get the complete details and understanding. Make certain that when the text directs you to "see" something in the diagram, you look at that detail. If you don't understand each aspect of the diagram, find other information to help you.

When you look at Figure 1 above, use all the information available to:

- ♦ extract details
- ♦ improve your understanding
- ♦ remember a definition (or principle

Look at the detail available in Figure 3 and Passage 4. You can see:

- the electrolyte bath,
- the positive and negative leads (anode and cathode),
- the plating current moving from the positive to the negative, and
- the energy source.

The passage and diagram give you a sense of what the process looks like. You gain more information from the text and diagrams than from either on its own.

Text and graphics
The text gives definitions and details about a procedure, process or practice.

The graphic lets you see the details explained in the text. As you study a graphic, extract each detail and compare it to details in the text. Each piece of information in it relates to something in the text. Text or notes below a figure will add important details. Examine all of the information.

By combining information in the text with information in the diagram you get a more detailed understanding of the concept than you would from using either the text or diagram on its own

PART IV
BUILD ON EXPERIENCE

Experience will teach you to ask questions and to look for answers so that you fully understand what is expected of you. As you become familiar with your trade material, you will figure out what kind of details you are expected to memorize, and what kind you need to search for and extract from material only when you need them. .

Example: You will learn large amount of technical information, from hand symbols, the tools of your trade and general safety rules to technical terms. You likely won't memorize every detail about procedure, measurement, or material, but you can learn to look up information and find the details you need.

Organize your notes

When you take notes in class or on the job, you write down details that are related to the task. Developing the skill of extracting details will make note taking easier. As you organize your notes, you develop a note-taking system that is efficient and that makes the details quick and easy to find and to study. Creating your own lists and tables work well for this purpose.

Whether you use tables or lists to organize your notes and study materials, you can highlight, or mark (with checks or bullets) details that are important or related to each other. Developing a system to organize details will help you as you learn new information; a system will help you find details when it's time to review.

Tables

A simple table with clear headings lets you organize details and then find (extract) them again when needed. You will organize details better if you remind yourself about your purpose.

Example: Examine the table below to see how it organizes details and makes it easy to extract information.

Table 1: **Isometric Pitch and Diameter Combinations**.

Nominal Diameter (mm)	Thread Pitch (mm) [(1)]
1.6	0.35
2.0	0.40
2.5	0.45
3.0	0.50
3.5	0.60
4.0	0.70
5.0	0.80
etc...	

[(1)] **Note**: For manufacturer's standard gage for uncoated sheet and stainless steel, see Table 4 in chapter 2.

Details are easy to find in a table. The columns are labelled so you know what kind of detail each one has in it. This way you can look down a column to the information you want. And look across that row to the column where the information is.

Did you read the note below Table 1 above? The [(1)] which follows the heading in the second column directs you to a *footnote*. A footnote adds important detail. Make sure you read any footnotes.

Getting it wrong
As you search for information, you may find that you missed key details because you skimmed over them, or you picked the wrong details. If this happens, stop and check:

- Did you preview and read all the material before picking out details?
- Did you highlight the bits you extracted?

If you answered no to either question, you have to go back and, carefully, find what you missed.

If you still are picking the wrong details, check your purpose again. Be sure you know what you should be learning from the material. Be sure you understand after rereading. If not, who can help you?

Each time you approach new material, ask questions to make certain that you are extracting the right details from the start. Always be prepared to ask for help. It is part of the process.

Read the passage below and answer the questions. Use the four steps to guide you. Answers are at the end of this skills sheet.

Passage 5
Shaft Stresses

A shaft can undergo several stress conditions at the same time. These stresses may be torsional shear stress and bending stress. As well, axial loads may cause vertical shear stresses and direct normal stresses. Note that the stresses on a shaft are not distributed evenly - some sections will experience no stress; in other areas, the stress can be so concentrated that it will affect the integrity of the shaft.

All stress can be defined in the same way:
Stress is the internal resistance offered by a unit area of a material to an externally applied load.

Two normal stresses - tensile and compressive - are defined below.

- If the shaft tends to stretch (lengthen) as a result of the stress (load), it is called *tensile stress*.
- If the shaft tends to shorten (compress) as a result of the stress (load), it is called *compressive stress*.

Questions:

1. All types of stress can be defined in the same way.

   T F

2. Highlight the definition of *compressive stress.*

3. List the types of stress named in the first paragraph of the passage.

4. What causes vertical shear stresses?

5. How are stresses on a shaft distributed?

Building strong reading skills and strategies will keep you on top of your trade. Over your career, techniques and materials will change, but with a solid reading foundation, you will know how to continue finding and using relevant details. Mastery of extracting details and the associated note-taking and study skills are a useful preparation for your chosen trade.

CONCLUSION

Detail extraction means pulling out the details you need for a specific purpose. If you know your purpose before you start, then you will look for the right details, and you will know what to do with them. Taking notes, creating tables, interpreting diagrams and highlighting key information are useful strategies for detail extraction. Being able to find relevant details efficiently can help you become a focussed reader, a better student, and a master of the information you need to be successful in the precision machining trades.

Summary

1. **Know your purpose.** Think about what you need before and during the reading.

2. **Use a four step method to extract details**:
   a) Define your purpose.
   b) Preview the reading by examining the whole piece.
   c) Read everything carefully to understand the whole piece.
   d) Locate details that answer your questions. Read with attention to identify and understand the right details.

3. **Understand the nature of details**: they move from general and specific.

4. **Extract details from diagrams and illustrations** to understand procedures, various parts and their relationships. Combine this information with your text reading.

5. **Organize your own data** in a table or chart for study and retrieval purposes.

6. **Ask questions based on your experience**; use everything available to you.

7. **Be prepared to follow up if information is not clear**. Talk to an expert in the trade, a teacher or use a different text or manual. All are excellent resources.

Answers to Questions

Part I Passage 1, Steel

1. Which of the following would be the name of steel with 40% carbon content, combined with the alloy nickel (number 23)?

   b) 2340

   The passage states "*the first two digits tell us the alloy content.*" We know that the alloy number for nickel is 23, and that this number goes first. We know that the percentage of carbon is 40% and that "*the last two (or three) digits refer to the percent of carbon in the steel*."

2. Some steels contain only small amounts of carbon. These steels are strong, hard and brittle

   F This detail can be found near the end of the first paragraph. It says: *Steels that contain the **least** carbon are more ductile but are not as strong.* It goes on to say that when you add carbon, strength, hardness and brittleness increase.

3. Steel is formed when carbon is dissolved into iron and a precipitate of carbon flakes forms.

   F The second paragraph tells us that when there is too much carbon for the iron to absorb, this precipitate forms and *the alloy can no longer be called steel.*

4. Manganese would provide the same qualities in steel as carbon.

   T The last paragraph will provide you with this answer. It states: I*f you want greater strength, you could add carbon, manganese or nickel.* Both manganese and carbon will increase the strength of steel.

PART II Passage 2, Electrical Tool Safety

1. Electrically powered tools should not be used on wet sites

   T This question asks you to search through a passage to find details. Although this is the first question, the answer is in the third paragraph. Answers may not always be where you expect them.

2. Which of a) or b) correctly lists details for making sure electrical tools are being used properly?

   b) check to make sure the cord is not cut or frayed, lift the tool by its handle, and remove the plug by taking hold of the plug, not the cord.

You are not looking for a sequence of events, but for steps to take and exact details. In answer a), one of the steps is not correct in all details. It says, "…do not use a frayed cord in a wet area." A frayed cord should not be used, whether the site is wet or not. Also note that electrical tools should not be used on wet sites, even if the cord is in good condition. Pay attention to *exact* wording.

3. If a power or extension cord was cut or frayed, what could you expect?

   This question asks for a cause and effect detail. Using a frayed or cut cord could result in an electric shock.

4. Explain what is meant by *polarized*.

   This is a vocabulary detail that is not explained in the passage. However, the passage does say "the plug may be polarized to fit into the socket one way only." You could guess that polarized means to be oriented in one direction. The dictionary definition of polarize is: *to give magnetic or electric polarity to (a substance or body).* Thinking of the poles of a magnet or battery can also give you a general idea but you will need to follow up to understand what this means in relation to handling electric tools, in other words, the application to your trade.

5. If you needed to change a saw blade in a power saw, you should disconnect the power source before proceeding.

   T Changing a blade is the kind of adjustment you would do when performing maintenance. Although the passage doesn't specifically say, "change a saw blade" this procedure fits into the general category of maintenance.

Part IV Passage 5, Shaft Stresses

1. All types of stress can be defined in the same way.

   T *Stress can be defined as the internal resistance offered . . . etc.*

2. Highlight the definition of *compressive stress.*

   Highlight the last sentence in the passage beginning, "If the shaft tends to shorten (compress) as a result of the stress . . . etc."

3. List the types of stress named in the first paragraph of the passage.

   In order, the types of stress: torsional shear, bending, vertical shear, direct normal.

4. What causes vertical shear stresses?

   Axial loads may cause vertical shear stress.

5. How are stresses on a shaft distributed?

   Stresses on a shaft are not distributed evenly. Some sections experience no stress; others experience concentrated stress that affects shaft integrity.