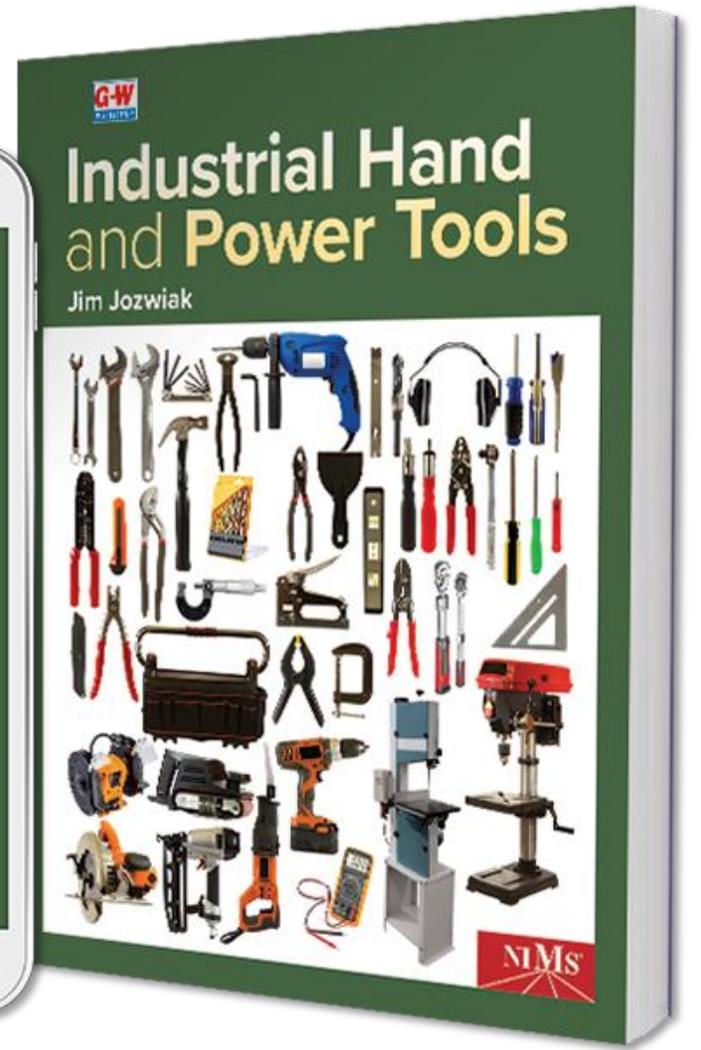
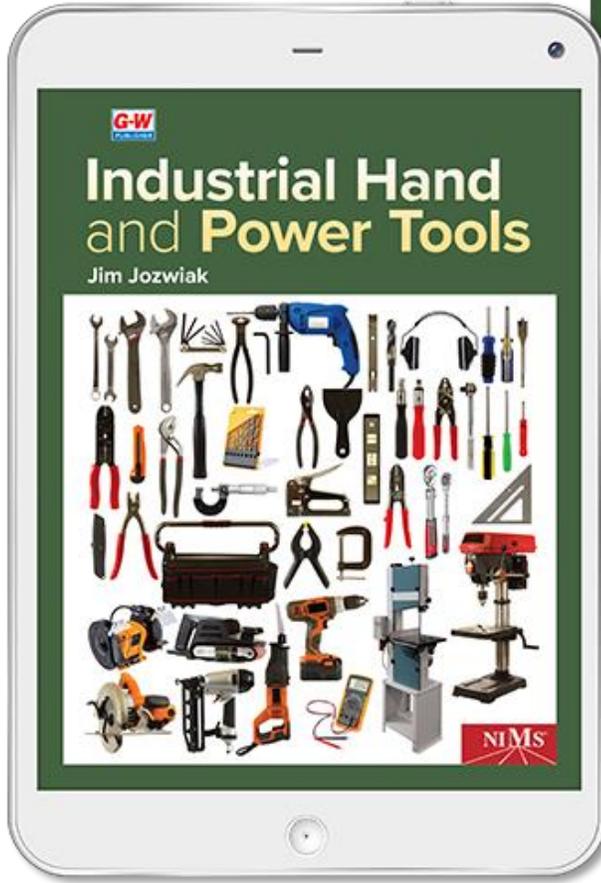


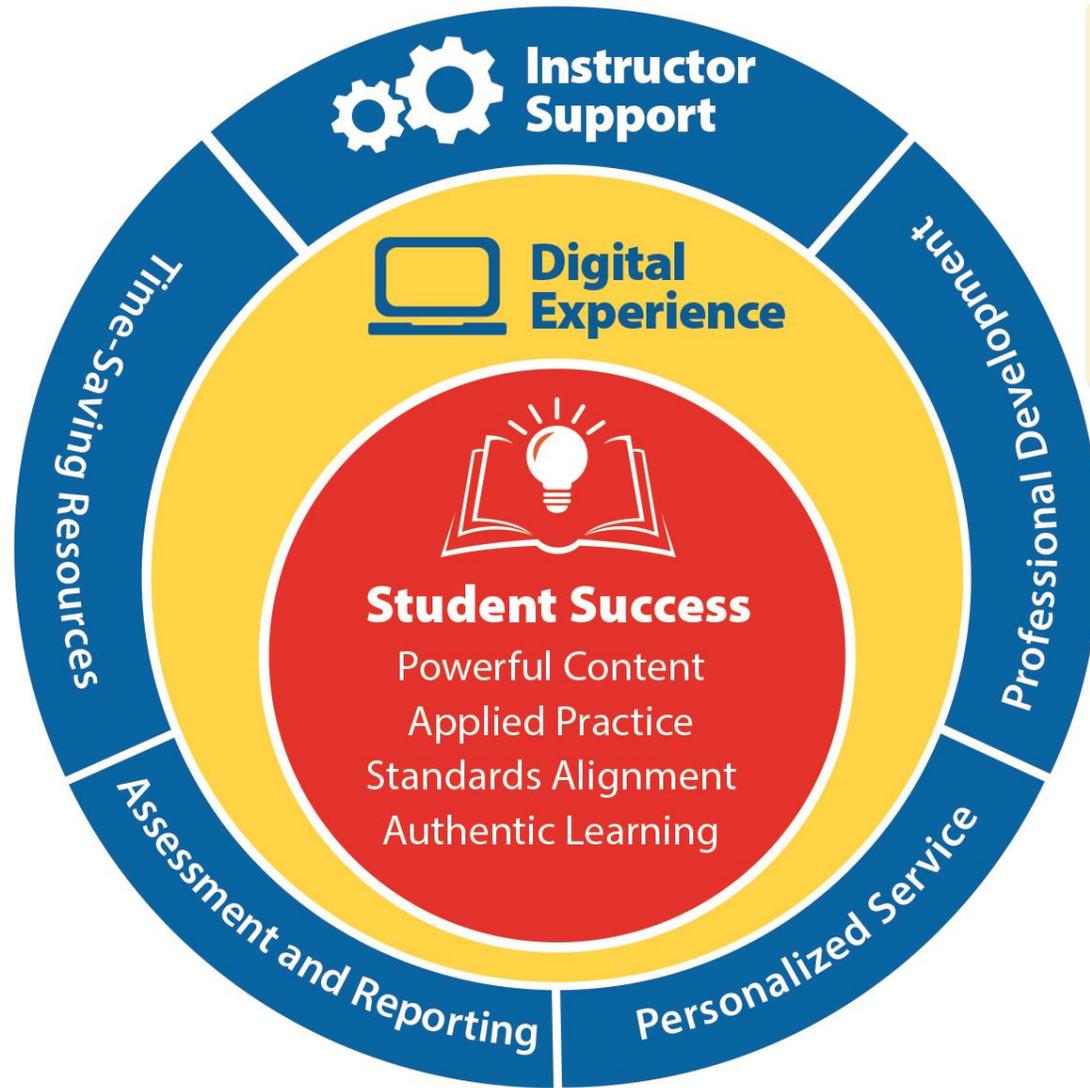
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*Shown are examples across various titles

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- ✓ Reinforce new concepts
- ✓ Assess learning

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Industrial Hand and Power Tools: Lesson Plan

Instructor:
Course:

Date:
Unit:

Chapter 4: Tool and Fastener Materials

Learning Outcomes

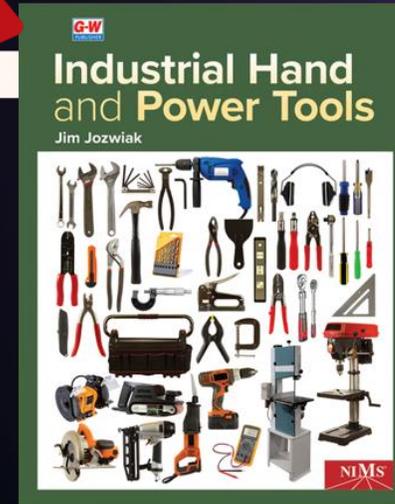
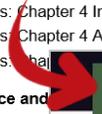
- 4.1 Describe the composition of steel and other materials used to make tools and fasteners.
- 4.2 Identify other materials (besides steel) used for tools and fasteners, and explain the advantages of each.
- 4.3 Explain properties of materials (such as yield strength, hardness, and elasticity) as they apply to tools and fasteners.
- 4.4 Identify different types of failure modes in materials and demonstrate how they can be avoided.

Instructional Resources

- Textbook/eBook: Chapter 4
- Instructor Resources: Chapter 4 Instructor's Presentation for PowerPoint
- Instructor Resources: Chapter 4 Answer Key
- Instructor Resources: Chapter 4

Resources for Practice and Assessment

- Digital Companion: Interac
 - Digital Companion: E-Flas
 - Virtual Toolbox: Visual Fla
 - Textbook/eBook: Chapter 4
 - Know and Un
 - Apply and Ar
 - Critical Think
 - Chapter 4 Hands-On Activ
- Assessment**
- G-W Assessment Suite



Presentations for PowerPoint

Industrial Hand and Power Tools

**Lesson Plans, Assessments,
and Answer Keys**



G-W Assessment

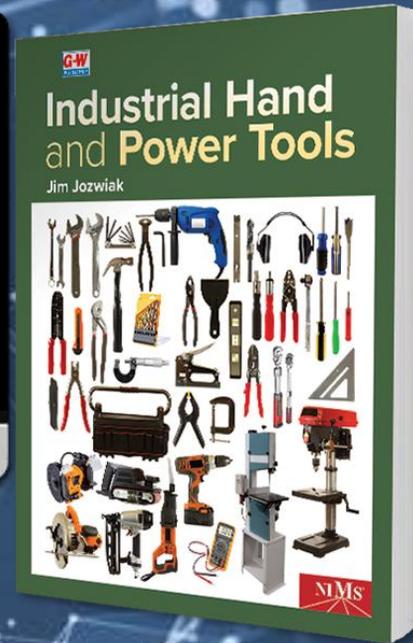
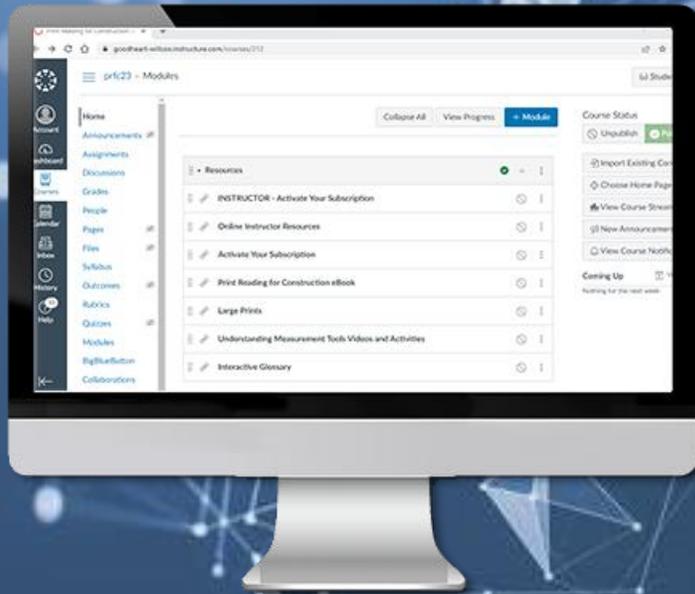
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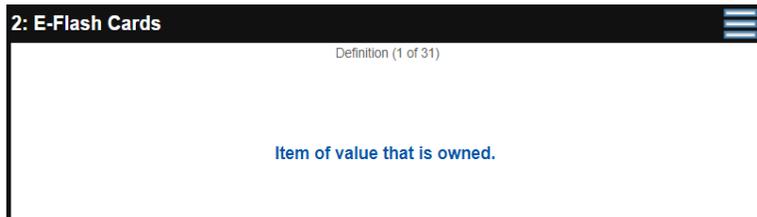
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E-Flash Cards & Vocabulary Practice

2: Vocabulary Game

Select a point value. Choose the term that matches the definition. Score: 800

<input checked="" type="radio"/> 100	100	100	100
200	200	200	200
300	<input checked="" type="radio"/> 300	300	300
400	400	400	<input checked="" type="radio"/> 400

Definition: Act of giving money, goods, or services to meet the needs of others and support causes that are important to an individual.

- pay yourself first
- variable expense
- recordkeeping
- philanthropy

[Check Answer](#)

Interactive Activities

Industrial Hand and Power Tools: Chapter 1 Review

Name:
Date:
Class:

Chapter 1: Building a Foundation for Tool Knowledge

Know and Understand

Answer the following questions using information in this chapter.

- Which of the following STEM roles most emphasizes hands-on skills? (1.2)
 - A. Science
 - B. Technology
 - C. Engineering
 - D. Mathematics
 Answer:

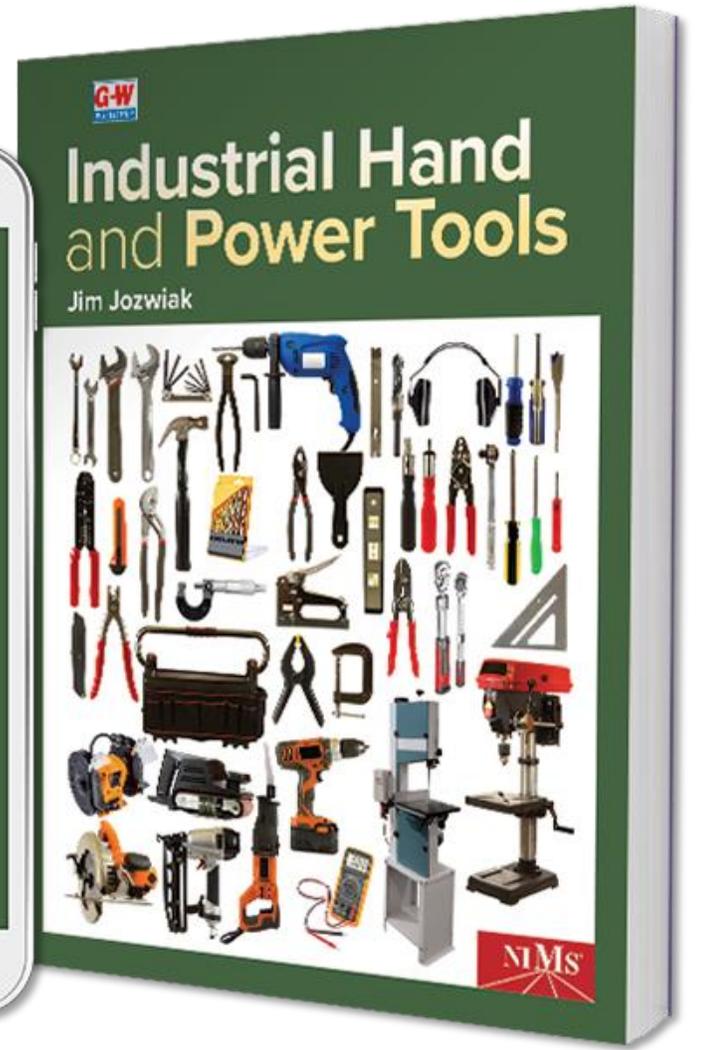
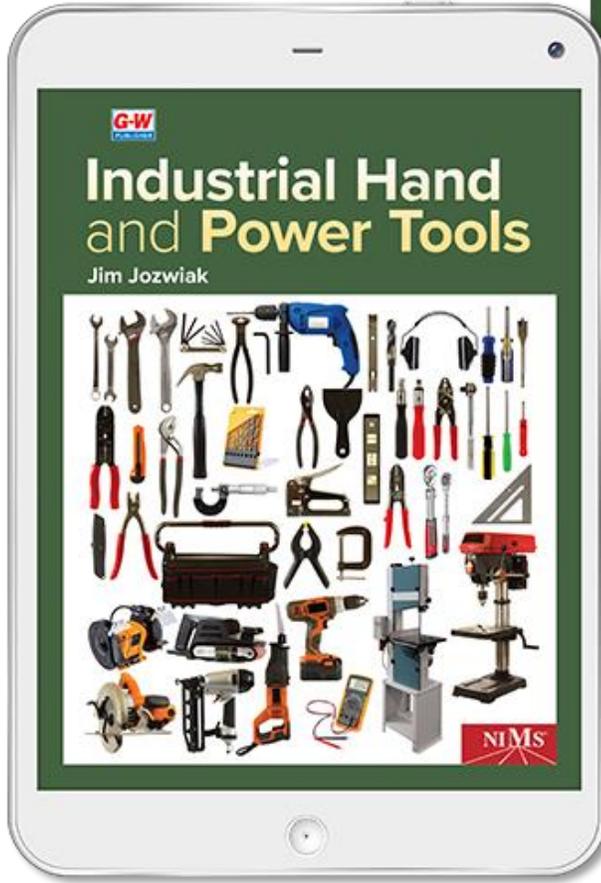
- Which of the following STEM roles is necessary in all four areas? (1.2)
 - A. Science
 - B. Technology
 - C. Engineering
 - D. Mathematics
 Answer:

- Which of the following technician tasks focuses on getting equipment up and running for the first time? (1.2)
 - A. Maintenance
 - B. Repair
 - C. Installation

Review Activities

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CHAPTER 1 TECHNICAL TERMS

- disruptive technology
- engineering
- installation
- maintenance
- mathematics
- mechanical advantage
- science
- STEM
- technology
- tool
- troubleshooting

Chapter-Opening Materials

CHAPTER 1

Building a Foundation for Tool Knowledge



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CHAPTER 1 LEARNING OUTCOMES

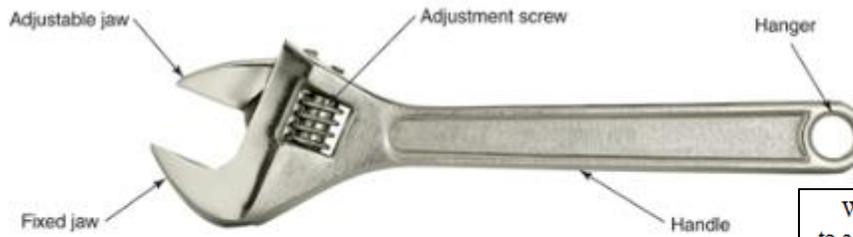
After studying this chapter, you will be able to:

- 1.1 Explain the significance of on-the-job training as it relates to tools.
- 1.2 Explain the four STEM disciplines and how they relate to tasks performed by technicians in industry.
- 1.3 Describe the two important functions of tools and give some examples of each.



Anatomy of an Adjustable Wrench

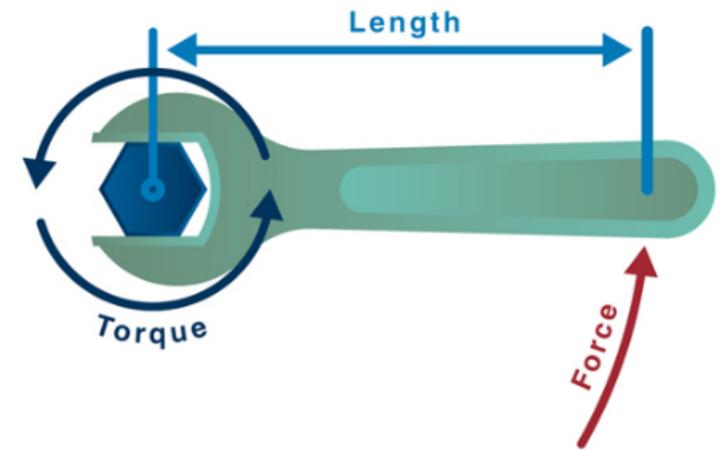
The head of an adjustable wrench consists of a fixed jaw that is the same solid piece as the handle, and a movable jaw. The wrench opening size is adjusted using a thumbwheel (worm screw) that moves the movable jaw towards or away from the fixed jaw. Refer to **Figure 8-3** for the anatomy of an adjustable wrench.



Goodheart-Willcox Publisher; conzorb/Shutterstock.com

Figure 8-3. Anatomy of an adjustable wrench.
Description

Wrenches and screwdrivers are the major hand tool categories that apply torque to a fastener. Torque is the product of the linear force applied to the end of a lever arm and the length of the lever arm itself. See **Figure 5-1**.



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Figure 5-1. Torque applied to a fastener with a wrench.



Hands-On Activity Proper Use of a Hacksaw

Name _____ Date _____ Class _____

Objectives

Following the successful completion of this lab, the student will be able to:

1. Select and mount the correct blade in a hacksaw for a given task.
2. Demonstrate safe and proper usage of a hacksaw.

Materials Needed

- Safety glasses
- Work gloves
- Adjustable frame hacksaw *without* any blade installed
- Three hacksaw blades, 12" long (14 TPI, 18 TPI, and 24 TPI)
- Stock material:
 - 1/8" × 1" steel bar (4" per student)
 - 1/2" aluminum rod (4" per student)
 - 1" PVC pipe (4" per student)

Procedure

Wear safety glasses and work gloves during this lab!

1. Select the blade type for the first stock material and record the blade TPI and your justification in the following table.
2. Mount the blade in the hacksaw.
3. Measure and cut a 4" length from the stock material.
4. Repeat steps 1–3 for the remaining two stock pieces.

Instructor Verification: _____

5. Clean up the work area.

Instructor Evaluation Criteria: Competency Test

Task	Yes	No	n/a
Main Project			
Safety glasses and work gloves worn at all times			
Work area is kept clean and organized throughout the project			
Correct blade chosen for each task			
Blade mounted correctly in the saw (proper tension, teeth pointed forward)			
Follows all saw safety practices (discussed in Chapter 11)			
Workpiece clamped before sawing			
Uses proper procedure			
Uses proper body position			
All work procedures are safe and acceptable			
Cuts are clean and to correct length (+/- 1/16")			
Table filled out correctly			

Cleanup

Stock pieces returned to storage			
Blade removed from saw and stored safely			
All tools gathered and arranged neatly for the next use			
Workstation and surrounding floor clean of dust and shavings			

Instructor Comments

I hereby certify that the student has satisfactorily demonstrated the ability to use hacksaws in a safe and effective manner by passing the assigned performance test.

Signed (Student) _____ Date _____

Signed (Teacher) _____ Date _____

Special Features

APPENDIX A Recommended Tool Sets

Appendix A Overview

This appendix lists tools that all technicians should always have with them. Tool set recommendations are categorized as minimal, optimal, and comprehensive. Even though other tools are useful, they are not included here because they are less frequently needed. The choice of which tools to buy and carry with you depends on many factors, including how much money you have to spend and how much weight you can comfortably carry.

Minimal Tool Set

Figure AA-1 shows the *minimal tool set* every technician should have. It includes tools that will allow the technician to perform the most common tasks.



Weight: <20 lbs
Approximate cost: \$100-\$150
Fits in a normal-sized toolbox

Goodheart-Willcox Publisher

Figure AA-1. Minimal tool set.

Optimal Tool Set

Figure AA-2 shows the technician's *optimal tool set*, which provides increased capability over the minimal tool set. The optimal tool set enables completion of more tasks and allows common tasks to be performed more efficiently.

Category	Tool	Minimal	Optimal	Comprehensive
Cutting Tools	Combination knife	X	X	X
	Utility knife	X	X	X
	Craft knife	X	X	X
	Hose cutter			X
	Pipe cutter			X
	Scissors	X	X	X
	Sheet metal cutter			X
Files	Flat	X	X	X
	Round	X	X	X
	Half-round	X	X	X
	Triangular	X	X	X
	File handle	X	X	X
Hammers	Ball peen or claw	X	X	X
	Dead blow hammer			X
	Mallet		X	X

Chapter 14 Review and Assessment

Summary

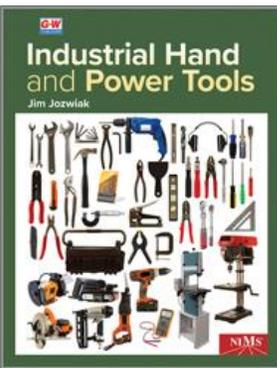
- Hammers utilize the principle of a lever arm to increase the striking force. (14.1)
- Hammers are useful tools for striking objects. In some cases, the objects are other tools, such as chisels. In other cases, the objects are workpieces that need to be broken, reshaped, or driven (as in nails). (14.2)
- The most useful hammer for technicians is the ball peen hammer, with the claw hammer being an acceptable alternative. (14.2)
- Other useful hammers include dead blow hammers (with little or no rebound), mallets (to prevent damage to the workpieces), and sledgehammers (for brute force). (14.2)
- Hammers come in different sizes and weights. A 1-pound or 2-pound hammer is a good size for most jobs without being excessively heavy. (14.3)
- Hammers can be dangerous tools. They require careful attention to procedures, PPE, and awareness of surroundings to avoid hurting others. In particular, hammer heads can fly off their handles and become a serious hazard. (14.4)
- Hammering is most effective when the body is positioned over the work, a firm but relaxed grip is used, and enough backswing is used to get sufficient striking force while maintaining good aim at the target. (14.5)
- Hammers should be cleaned before they are put away. In some cases, mushroomed hammer heads may need to be redressed using a bench grinder. (14.6)
- Every technician should have a ball peen hammer, or a claw hammer, between 1 and 2 pounds in their toolbox. (14.7)

Know and Understand

Answer the following questions using information in this chapter.

1. Hammering is most effective when the hammering direction is oriented _____. (14.1)
 - A. downward
 - B. upward
 - C. sideways
 - D. All are correct.
2. Which of the following hammers is held at an angle nearly horizontal to the work surface? (14.2)
 - A. Claw
 - B. Scaling
 - C. Sledge
 - D. Ball peen
3. *True or False?* Increasing the length of the hammer handle increases the downward force. (14.3)
4. *True or False?* The most common injury from hammering is smashed fingers. (14.4)
5. Which hammer type is safe to use on hardened metal for shaping, riveting, and punching? (14.2)
 - A. Claw
 - B. Sledgehammer
 - C. Ball peen
 - D. Finishing
6. Which hammer type is least likely to damage the workpiece? (14.2)
 - A. Claw
 - B. Dead blow
 - C. Ball peen
 - D. Mallet
7. Which of the following does *not* increase the force applied by the hammer to the workpiece? (14.5)
 - A. Higher backswing
 - B. Longer handle
 - C. Heavier hammer head
 - D. Tighter grip on the handle
8. *True or False?* A hammer blow should always be struck with the hammer face at a 15° angle with the surface being struck. (14.5)

End-of-Chapter Content



Apply and Analyze

1. What materials are mallets made of? (14.2)
2. What inspection should you make before using a hammer? (14.6)
3. What is peening? (14.2)
4. Explain how you can increase the leverage of a claw hammer when using it to remove nails. (14.2)
5. Explain how the procedure to use a scaling hammer is different from the other hammers in this chapter. (14.2)
6. How does a dead blow hammer prevent rebound? (14.2)
7. What materials are most hammer handles made of? (14.3)
8. What must be considered before using a hammer to strike a material? (14.4)
9. Which hammer(s) should you stock in your toolbox? (14.7)

Critical Thinking

1. If you could fit one more hammer in your toolbox, besides a ball peen hammer, which type of hammer should it be? Please explain your choice. (14.2, 14.7)
2. Refer back to Chapter 4, *Tool and Fastener Materials*. Which type of steel is best suited for hammers? Please explain your choice. (14.2, 14.4)
3. Besides just practicing, what might also be done to improve hammering aim and reduce missed hammer strikes, beyond what is suggested in this chapter? (14.3, 14.4, 14.5)

Identification Test

Write the name of the hammers in the spaces provided.

A. _____



B. _____



C. _____



D. _____

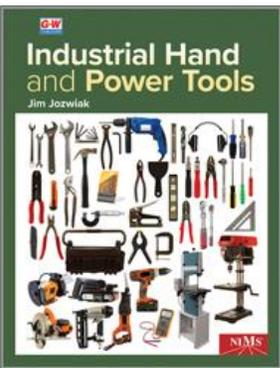


E. _____



F. _____

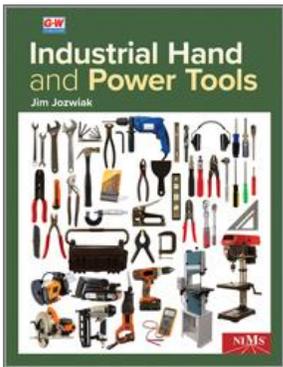
End-of-Chapter Content



How to Use a Bandsaw

is powered down and unplugged.

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2 Tool Care and Storage E-Flash Cards

Term (1 of 8)



Select to flip

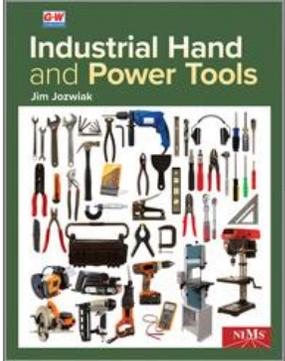
2 Tool Care and Storage E-Flash Cards

Definition (1 of 8)

tool backpack

Storage system for tools that can be carried on a worker's back.

Previous Remove Next



Virtual Toolbox



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Chapter 16 Clamps

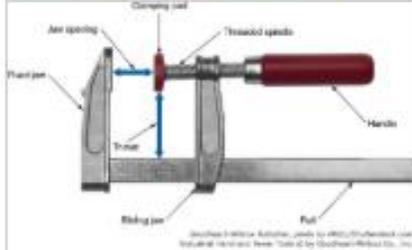


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Figure 16.3 - Andrey Zhar/Shutterstock.com



Figure 16.4 - Yarrrrrbright/Shutterstock.com

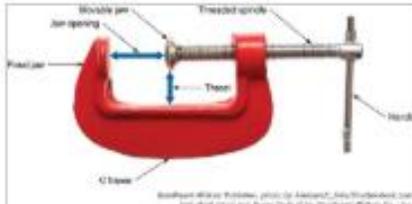


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2 Tool Care and Storage ▼

- [2 Web Gallery](#)
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3 Tool Safety ▼

- [3 Web Gallery](#)
- [3 ZIP Download](#)

4 Tool and Fastener Materials ▼

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5 Tool Physics ▼

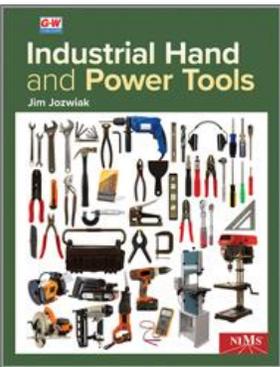
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6 Measurement Principles ▼

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7 Measurement Tools ▼

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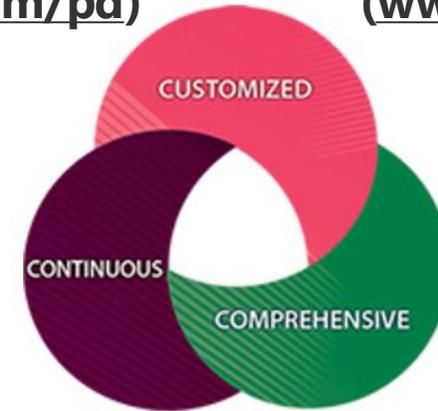
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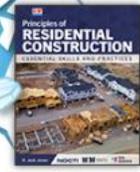
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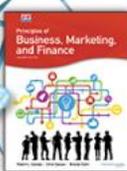
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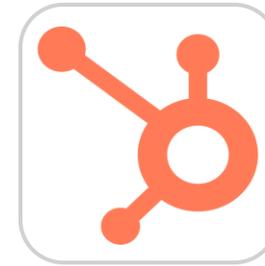


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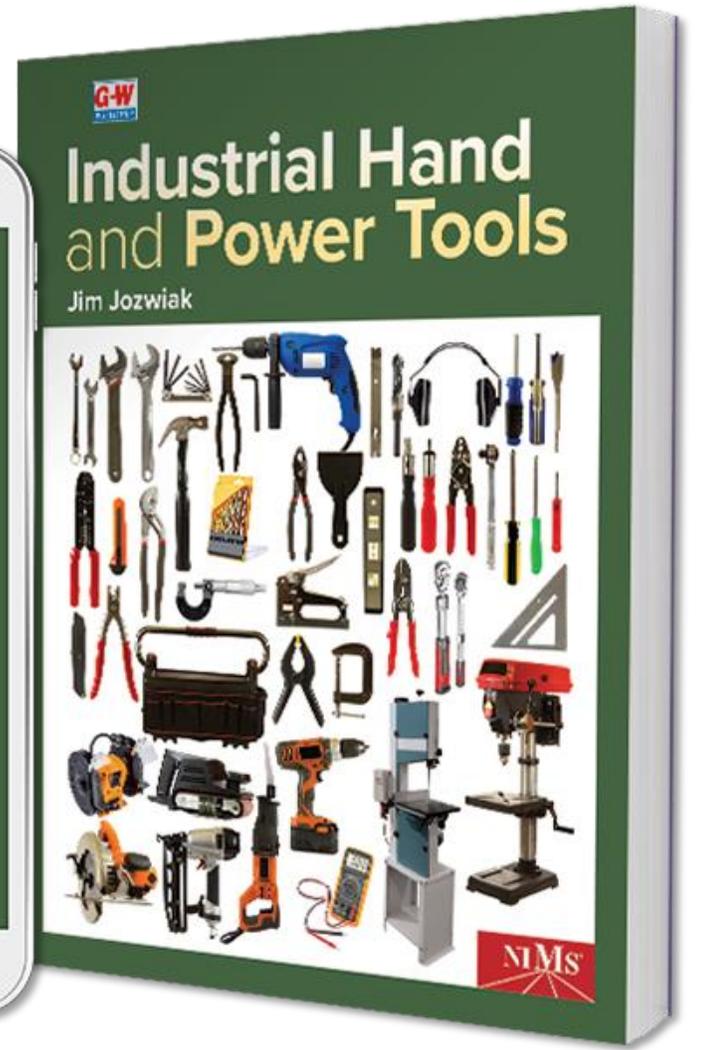
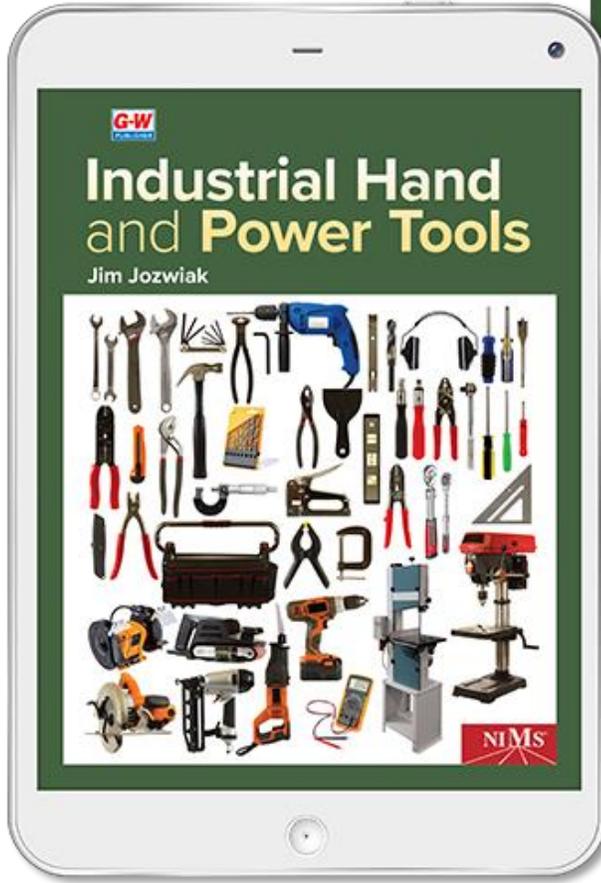
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