OBJECTIVE SHEET

FINISHING FLOORS

5

INTRODUCTION

There is much more to finishing concrete floors than just leaving the finish as specified. How the concrete is poured, consolidated, and allowed to begin hardening before troweling has a direct effect on strength and durability. In this unit you will learn the proper techniques for finishing large slabs with both floats, hand trowels, and troweling machines.

FOCUS ASSIGNMENTS

FOCUS ASSIGNMENTS

1. Look at tool catalogs and pick out various types of concrete finishing equipment.
2. Participate in a class discussion on situations where each type of tool would be used.

UNIT OBJECTIVE

After completing this unit, you will show the following competencies by mastering the activities on the Job Sheets and by scoring at least 85% on the Written Test.

SPECIFIC OBJECTIVES

1. Define rodding and jitterbugging.
2. State reasons for consolidating concrete.
3. Arrange in order the steps for placing and trowel finishing a concrete floor.
4. Select from a list types of finishes for concrete slabs.
5. Select from a list variables that may determine when to start finishing procedures.
6. Select from a list factors to look for before starting finishing operations.
7. State reasons for floating concrete.
8. State reasons for troweling concrete.

9. Explain what is meant by premature troweling.

10. Select from a list defects that may be caused by premature or excessive troweling.

11. Match special concrete toppings to their uses.

12. Float finish a large slab with a troweling machine. (Job Sheet 1)

13. Finish a slab with hand trowels. (Job Sheet 2)

OBJECTIVE 1

Optional Activities/ Resources in Instructor's Guide

Define rodding and jitterbugging.

WORDS YOU SHOULD KNOW	
consistency	slump (firmness or wetness) of fresh concrete
rollerbug	tool used to consolidate or compact low slump concrete

- **rodding** — process of leveling concrete to a specified grade (Figure 1)

  ✔ **NOTE:** Rodding is also referred to as *straightedging, screeding, striking off,* or *dragging off.*

FIGURE 1

- **jitterbugging** — process of consolidating concrete (Figure 2)

  ✔ **NOTE:** Jitterbugging or tamping of any type should be done sparingly to avoid segregation.

FIGURE 2

OBJECTIVE 2

Optional Activities/ Resources in Instructor's Guide

State reasons for consolidating concrete.

- Provides a workable material that does not have segregation or air pockets.

  ✔ **NOTE:** Every 1% of entrapped air decreases concrete strength by 5-6%.

OBJECTIVE 3

Required Activities/ Resources
— Handouts 1 and 2

Optional Activities/ Resources in Instructor's Guide

Arrange in order the steps for placing and trowel finishing a concrete floor.

WORDS YOU SHOULD KNOW	
floating	process of leveling the surface of concrete and leaving the surface with an open texture
troweling	process of smoothing the surface of concrete
edging	process of rounding and smoothing the edges of concrete

1. Pour/place (Figure 3)

FIGURE 3

2. Consolidate/vibrate (Figure 4)

FIGURE 4

3. Rod/strike off (Figure 5)

FIGURE 5

4. Bullfloat/darby (Figure 6)

FIGURE 6

5. Re-rod and hand float the edge (Figure 7)

FIGURE 7

6. Edge (Figure 8)

FIGURE 8

7. Float the edge mark (Figure 9)

FIGURE 9

8. Re-edge

9. Float

10. Trowel

11. Re-edge

12. Finish trowel (Figure 10)

✔ **NOTE:** Finish troweling may consist of two, three, or more trowelings.

FIGURE 10

OBJECTIVE 4

Optional Activities/ Resources in Instructor's Guide

Select from a list types of finishes for concrete slabs.

WORDS YOU SHOULD KNOW	
broom finishing	process of drawing a broom across the surface of fresh concrete leaving a textured pattern
burnish finishing	process of hard troweling concrete
swirl finishing (sweat troweling)	process of troweling concrete and leaving surface with a fuzzy fan-like pattern

- Textured
  - ❑ Hand-float finish (Figure 11)

FIGURE 11

- Rough-broom finish (Figure 12)

FIGURE 12

- Fine-broom finish (Figure 13)

FIGURE 13

❑ Swirl or sweat-trowel finish (Figure 14)

✔ **NOTE:** Nonskid material is sometimes used with a swirl finish.

FIGURE 14

❑ Exposed aggregate (Figure 15)

FIGURE 15

- Stamping pad design (Figure 16)

FIGURE 16

- Sand blast finish (Figure 17)

FIGURE 17

- Trowel finishes
  - ❑ Hand trowel finish
  - ❑ Machine/burnish finish (Figure 18)

FIGURE 18

✔ **NOTE:** Burnishing is a process of troweling concrete to a very hard smooth finish. This is accomplished by troweling the slab after it is hard enough that the surface actually turns dark from the troweling and the trowel makes a ringing sound.

OBJECTIVE 5

Select from a list variables that may determine when to start finishing procedures.

Optional Activities/ Resources in Instructor's Guide

✔ **NOTE:** There is no definitive time to start because of the variables listed below. Experience is the only true measure for determining when to start finishing procedures.

- Concrete temperature
- Air temperature
- Relative humidity
- Wind
- Admixtures

OBJECTIVE 6

Optional Activities/ Resources in Instructor's Guide

Select from a list factors to look for before starting finishing operations.

WORDS YOU SHOULD KNOW	
water sheen	lustrous surface imparted on the evaporation of bleed water
bleed water	water within the fresh concrete that has emerged to the surface of placed concrete

- Concrete is properly hardened

  ✔ **NOTE:** The concrete should be hard enough to support the weight of an average-size person, leaving only a slight impression.

- Bleed water is gone
- Water sheen has disappeared
- Glossy appearance is not noticeable

OBJECTIVE 7

Optional Activities/ Resources in Instructor's Guide

State reasons for floating concrete.

WORDS YOU SHOULD KNOW	
fines	paste that works to the surface of fresh concrete during the finishing process

- Removes slight imperfections
- Cuts off high places
- Fills in low places
- Helps compact the concrete
- Embeds large aggregate
- Brings fines to the surface
- Prepares surface for other finishing operations

OBJECTIVE 8

Optional Activities/ Resources in Instructor's Guide

State reasons for troweling concrete.

- Brings surface to a smooth, dense finish
- Provides desired texture and appearance

✔ **NOTE:** Excessive tilting of the trowel during the troweling process can cause chattering or rippling of the surface.

OBJECTIVE 9

Optional Activities/ Resources in Instructor's Guide

Explain what is meant by premature troweling.

Premature troweling is starting to finish the concrete before the water sheen has disappeared from the surface and before the concrete has hardened sufficiently.

OBJECTIVE 10

Optional Activities/ Resources in Instructor's Guide

Select from a list defects that may be caused by premature or excessive troweling.

- Reduced strength
- Reduced durability
- Reduced resistance to wear
- Dusting — fine dust on the surface of concrete (Figure 19)

FIGURE 19

Used with permission of the Portland Cement Association.

- Crazing — random hairline cracks on the surface (Figure 20)

FIGURE 20

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- Scaling — flaking away of the surface (Figure 21)

FIGURE 21

Used with permission of the Portland Cement Association.

- Surface imperfections, such as low spots

- Blistering — shallow, dome-shaped defects on a flatwork surface (Figure 22)

FIGURE 22

Used with permission of the Portland Cement Association.

OBJECTIVE 11

Match special concrete toppings to their uses.

Optional Activities/ Resources in Instructor's Guide

- **abrasion resistant** — used where floors are subjected to high abrasion, usually in industrial plants
- **impact resistant** — used primarily in heavy industry where the damage from impact is likely
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- **vermin proof** — used mainly in institutions and hospitals
- **colored** — used nearly anywhere to enhance the appearance of concrete; also used to mark off special areas, such as aisles and hazardous areas in industrial plants

OBJECTIVE 12

Complete Job Sheet 1.

OBJECTIVE 13

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OBJECTIVE 12

Complete Job Sheet 1.

OBJECTIVE 13

Complete Job Sheet 2.

JOB SHEET 1

FINISHING FLOORS

5

Name _____Score_____

OBJECTIVE 12

Float finish a large slab with a troweling machine.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- Straightedge
- Bullfloat
- Two hand floats and/or one trowel
- Knee boards
- Margin trowel
- Power float or trowel machine with float blades
- Sprayer for curing compound
- Fresh concrete
- Edger

✔ **NOTE:** Various sizes of edgers are used.

- Personal protective equipment

✔ **NOTE:** Refer to C.F.R 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

❑ ❑ 1. Place the concrete at the starting point. (Figure 1)

JOB SHEET 1

FINISHING FLOORS

5

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- Personal protective equipment

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PROCEDURE

Yes No

❑ ❑ 1. Place the concrete at the starting point. (Figure 1)

FIGURE 1

Yes No

❑ ❑ 2. Use a straightedge to rod the concrete, making sure there is enough concrete behind the straightedge to fill holes. (Figure 2)

FIGURE 2

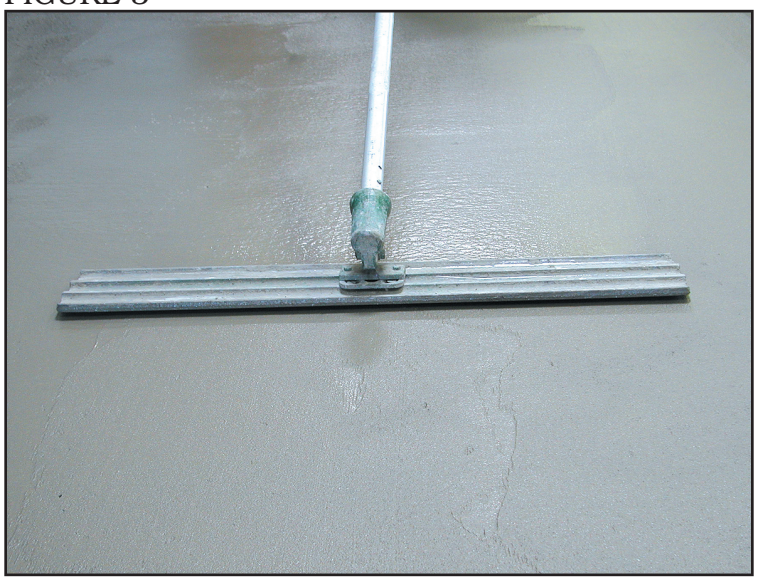
❑ ❑ 3. Bullfloat surface with a forward and backward movement.

A. Attach an extension to the handle of the bullfloat and use the float perpendicular to screeding.

Yes No

B. As you push the bullfloat across the slab, position the handle so that the far edge of the blade is slightly tilted up. This will prevent the float from digging into the wet concrete. (Figure 3)

FIGURE 3



C. Pull the float back toward you this time keeping the near edge raised slightly. (Figure 4)

✔ **NOTE:** Edges usually set faster; therefore, they should be floated and edged before the rest of the slab.

FIGURE 4

Yes No

❑ ❑ 4. Hand float the edge after bullfloating. (Figure 5)

FIGURE 5

❑ ❑ 5. The existing slab or form should be cleaned prior to edging. A margin trowel or edger may be used. (Figure 6)

FIGURE 6

Yes No

A. To edge, tilt the front of the edger up slightly, move it forward in an arm's length pattern, and, while still in motion, lift the edger at the end of the pass.

✔ **NOTE:** To avoid pulling up the surface, do not lift the edger from the concrete unless the edger is in motion.

B. Continue this procedure until all edges are rounded and smooth.

✔ **NOTE:** To avoid low places, do not place too much pressure on the edger. This will "roll" the edge. The slab should be flat to the edge.

❑ ❑ 6. Use a hand float to work around pipes, drains, and other areas the machine cannot reach. (Figure 7).

FIGURE 7

❑ ❑ 7. Position the machine at the hardest part of the slab. (Figure 8)

✔ **NOTE:** If necessary allow the concrete to harden so the machine operator's footsteps will leave only slight impressions. Check the oil and gas levels on trowel machine.

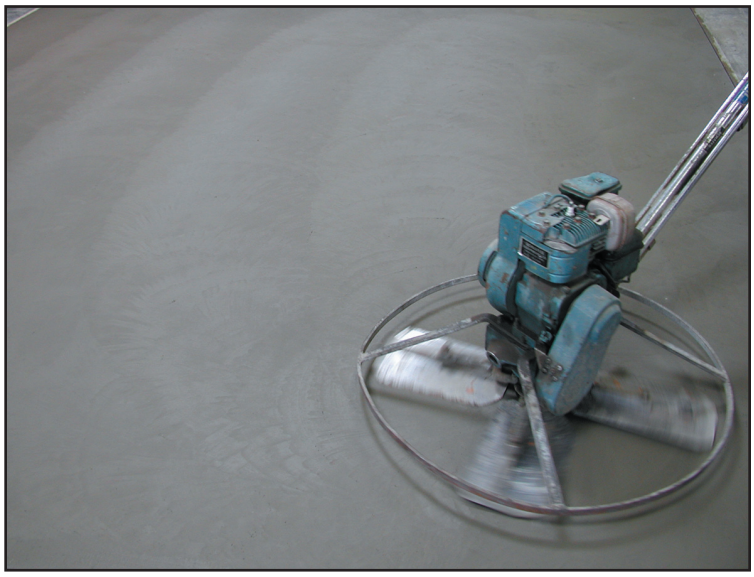
FIGURE 8

Yes No

❑ ❑ 8. Start the machine and move it from right to left and back again. (Figure 9)

✔ **NOTE:** To move the machine to the left, raise handle slightly; to move the machine to the right, lower handle slightly.

FIGURE 9



Yes No

❑ ❑ 9. Make the second pass of the machine by moving it backward and slightly overlapping first pass. (Figure 10)

✔ **NOTE:** Allow enough time after machine floating for desired finish to be obtained. Each machining should be done by working at a right angle to the previous machining.

FIGURE 10

❑ ❑ 10. Continue floating out all footprints and imperfections until the entire slab has been floated.

❑ ❑ 11. Place knee boards at the hardest area of the concrete. (Figure 11)

FIGURE 11

Yes No

❑ ❑ 12. Position your body so that both knees are on the knee boards.

✔ **NOTE:** Balance by leaning on a trowel or float in one hand and working with the other hand.

❑ ❑ 13. Reach out at arm's length and float the surface with a semicircular fan-like motion, keeping the float flat to the surface of the concrete. (Figure 12)

FIGURE 12

❑ ❑ 14. Continue floating and moving backward over the slab until the slab is finished.

✔ **NOTE:** To avoid pulling up the surface of the concrete, lift the knee boards with a sliding motion. In final application, metal knee boards (sliders) may be used.

❑ ❑ 15. Apply a curing agent using a sprayer with the nozzle adjusted to a fine mist. (Figure 13)

FIGURE 13

Yes No

❑ ❑ 16. Have the instructor check your work.

❑ ❑ 17. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 2

FINISHING FLOORS

5

Name _____Score_____

OBJECTIVE 13

Finish a slab with hand trowels.

BASIC SKILLS

Employability

INTRODUCTION

EQUIPMENT AND SUPPLIES

- Straightedge
- Bullfloat
- Hand float
- Hand trowels

✔ **NOTE:** Various sizes of trowels are used. The size of the trowel used depends on the consistency of the concrete and personal preference.

- Darby, if needed
- Edger

✔ **NOTE:** Various sizes of edgers are used.

- Sprayer
- Fresh concrete
- Curing agent
- Personal protective equipment

✔ **NOTE:** Refer to C.F.R 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

❑ ❑ 1. Place the concrete at the starting point.

❑ ❑ 2. Use a straightedge to rod the concrete, making sure there is enough concrete behind the straightedge to fill holes.

Yes No

❑ ❑ 3. When concrete with low slump (one inch or less) is used, use a rollerbug, if necessary, by moving it slowly forward and backward across the slab, forcing large aggregate beneath the surface and bringing fines to the top.

✔ **NOTE:** Do not use rollerbug except on concrete with low slump, one inch or less.

❑ ❑ 4. Continue rollerbugging at a right angle to the direction of placement until the slab has been completed.

❑ ❑ 5. Re-rod the edges using a darby and a 4' straightedge to ensure flatness.

❑ ❑ 6. Bullfloat the surface with a forward and backward movement immediately after rollerbugging.

A. Attach an extension to the handle of the bullfloat and use the float perpendicular to screeding.

B. As you push the bullfloat across the slab, position the handle so that the far edge of the blade is slightly tilted up. This will prevent the float from digging into the wet concrete.

C. As the float approaches the far edge of the slab, shake the handle slightly to loosen the blade from the surface of the concrete to prevent damaging the surface.

D. Pull the float back toward you this time keeping the near edge raised slightly.

E. Hand float the edge after bullfloating.

✔ **NOTE:** Edges usually set faster; therefore, they should be floated and edged before the rest of the slab.

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A. To edge, tilt the front of the edger up slightly, move it forward in an arm's length pattern, and, while still in motion, lift the edger at the end of the pass.

✔ **NOTE:** To avoid pulling up the surface, do not lift the edger from the concrete unless the edger is in motion.

Yes No

B. Continue this procedure until all the edges are rounded and smooth.

✔ **NOTE:** To avoid low places, do not place too much pressure on the edger. This will "roll" the edge. The slab should be flat to the edge.

❑ ❑ 8. Use a hand float to work around pipes, drains, and forms.

❑ ❑ 9. After the concrete has hardened sufficiently, trowel the edges of the concrete with a finishing trowel immediately after floating each area.

✔ **NOTE:** Use the same method with a trowel as used with the float.

❑ ❑ 10. Tilt the trowel slightly and with trowel at arm's length, move in a semicircular motion until the surface is smooth.

❑ ❑ 11. Continue troweling until the slab has been completed.

✔ **NOTE:** Allow enough time after the first troweling for the surface of the concrete to harden sufficiently before second troweling.

❑ ❑ 12. Trowel the slab a second time and re-edge, taking care to tilt and pick up the edger properly.

❑ ❑ 13. Continue this procedure until the entire slab is completed.

✔ **NOTE:** Sometimes it is necessary to trowel the slab several times to obtain the desired finish. If this is necessary, trowel the slab in a semicircular motion with the edge of the trowel slightly tilted.

❑ ❑ 14. Apply a curing agent using a sprayer with the nozzle adjusted to a fine mist.

❑ ❑ 15. Have the instructor check your work.

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