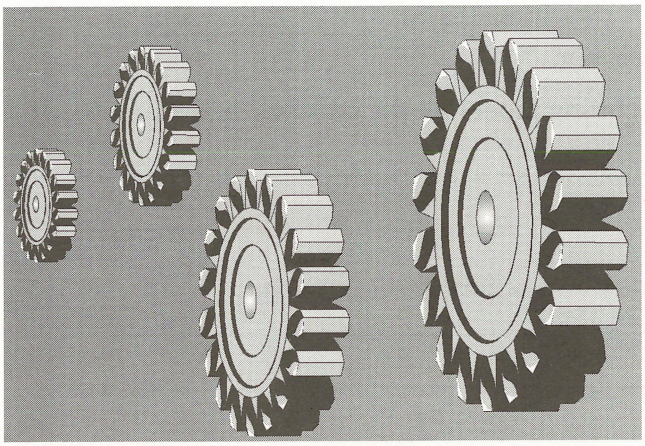

Chapter 14

Cutting Tapers and Screw Threads on the Lathe

Name:_____ Date:_____

Score: 130 Text pages 241–260

LEARNING OBJECTIVES

After studying this chapter, you will be able to:

- Describe how a taper is turned on a lathe.
- Calculate tailstock setover for turning a taper.
- Safely set up and operate a lather for taper turning.
- Describe the various forms of screw threads.
- Cut screw threads on a lathe.

■ Carefully study the chapter, then answer the following questions in the space provided.

1. Taper can be stated _____. 1. _____
   a. in taper per inch or foot
   b. as degrees or as a ratio
   c. mm per 25 mm
   d. None of the above.
   e. All of the above.

2. Only external tapers can be machined with the _____ _____ method. 2. _____

3. When an ample tolerance is allowed (± 0.015″ or 0.05 mm), the tailstock setover can be made by using a rule and measuring the distance between _____. 3. _____
   a. center points.
   b. witness lines at base of tailstock.
   c. Both a and b.
   d. Neither a nor b.

4. An accurate setover can be made by using the _____ _____ on the compound rest or cross slide or a dial indicator. 4. _____

5. Why should ball-tipped centers be used when cutting tapers by the tailstock setover method?

_____

_____

6. There are two types of taper attachments. Identify and briefly describe each.

_____

_____

_____

_____

_____

_____

7. What is the disadvantage of turning a taper with a square-nose tool? _____

_____

8. List the two basic methods of testing the accuracy of machined tapers.

_____

_____

_____

_____

9. When cutting threads on the lathe, a _____ may be used since the tool must be removed from the work after each cut and repositioned before the next cut can be started. 9. _____
   a. thread end groove
   b. center gage
   c. thread cutting stop
   d. All of the above.
   e. None of the above.

10. After replacing a broken cutting tool, how do you realign it with the portion of the thread already cut? _____

_____

_____

_____

_____

11. Cutting left-hand threads requires _____. 11. _____
    a. that the carriage travels towards the tailstock
    b. changing the lead screw rotation
    c. pivoting the compound to the left
    d. All of the above.
    e. None of the above.

12. Pitch of inch threads is equal to _____
    _____.

13. When cutting internal threads, tool infeed and removal from the cut are _____ when cutting external threads. 13. _____
    a. the same as those used
    b. the reverse of those used
    c. not necessary
    d. All of the above.
    e. None of the above.

14. When cutting V threads, the center gage is used for _____
    _____
    _____.

15. After adjustment, a thread cutting stop will let you _____
    _____.

16. What is a thread dial? _____
    _____

17. The face of the thread dial rotates when _____
    _____.

18. Always check the thread pitch after the first light cut with a _____. 18. _____
    a. half-nut
    b. rule
    c. screw pitch gage
    d. Both b and c.
    e. None of the above.

19. When cutting tapered threads to obtain a fluid- or gas-tight joint, the threading tool must be positioned _____. 19. _____
    a. in relation to the taper itself
    b. in relation to the centerline of the taper
    c. Either a or b.
    d. Neither a nor b.

■ Machine adjustments must be calculated for each tapering unit. The information that follows will enable you to calculate the necessary adjustment (tailstock setover) for problems 20–22. Use the space provided to perform your calculations.

Formulas: When taper per inch is known: $\text{Offset} = \frac{L \times TPI}{2}$

When taper per foot is known: $\text{Offset} = \frac{L \times TPF}{24}$

When dimensions of tapered section are known but TPI or TPF is *not* given: $\text{Offset} = \frac{L \times (D - d)}{2 \times l}$

Where:

TPI = Taper per inch

TPF = Taper per foot

D = Diameter at large end

d = Diameter at small end

l = Length of taper

L = Total length of piece

20. Compute the tailstock setover (offset) for the following job. Show your work.
Taper per inch = 0.125
Total length of piece =4.00″

20. _____

21. Compute the tailstock setover for the following job. Show your work.
Taper per foot = 0.125
Total length of piece = 8.500′

21. _____

22. Compute the tailstock setover for the following job. Show your work.
Large diameter = 2.500
Small diameter = 1.500
Length of taper = 3.000
Length of piece = 9.000

22. _____

- The common tapers used to hold cutting tools and tool holders will *not* change with the metric system. Usually, these tapers are given in inches per foot or inches per inch or as a relationship. If the taper is given in inches per inch, then it will be given in millimeters per 25 millimeters. If the taper is given as a ratio, this will *not* change. Using the information below, answer problems 23–25. Use the space provided for your calculations.

- Other-than-standard tapers can be shown in several different ways:

  Taper per millimeter (T/mm). For example, a taper of 0.002 mm per mm is expressed as TAPER 0.002:1.

- Dimensions shown in mm where the taper is cut on the total length of the work.

Formulas: When taper per mm is known: $\text{Offset} = \dfrac{\text{L/mm} \times \text{T/mm}}{2}$

When dimensions of tapered section are known but T/mm is not given:

$$\text{Offset} = \frac{\text{L/mm} \times (\text{D/mm} - \text{d/mm})}{2 \times l/\text{mm}}$$

Where:

T/mm = Taper per millimeter

D/mm = Diameter at large end in millimeters

d/mm = Diameter at small end in millimeters

l/mm = Length of taper in millimeters

L/mm = Total length of piece in millimeters

23. Compute the tailstock setover for the following job. Show your work. 23. _____

Taper per mm = TAPER 0.002:1

L/mm = 876 mm

24. Compute the tailstock setover for the following job. Show your work. 24. _____

D/mm = 150.0
d/mm = 100.0
L/mm = 875.0
l/mm = 125.0

25. Compute the tailstock setover for the following job. Show your work. 25. _____

D/mm = 225.0
d/mm = 125.0
L/mm = 1000.0
l/mm = 875.0

■ For problems 26–40, using the 3-wire method for measuring screw threads, calculate the correct measurement over the wire for the threads given. Use the wire size given. Use the space provided to perform your calculations.

Formulas: $M = D + 3G - \frac{1.5155}{N}$

Where:

M = Measurement over the N wires

D = Major diameter of thread

G = Diameter of wires

N = Number of threads per inch

26. 5/16-18UNC (Wire size 0.032″) 26. _____

27. 3/8-24UNF (Wire size 0.024″) 27. _____

28. 7/16-20UNF (Wire size 0.032″) 28. _____

29. 1/2-13 UNC (Wire size 0.044″) 29. _____

30. 3/4-16UNF (Wire size 0.036″) 30. _____

31. 7/8-9UNC (Wire size 0.064″) 31. _____

32. 1 1/8-7UNC (Wire size 0.082″) 32. _____

33. 1/4-32UNS (Wire size 0.018″) 33. _____

34. #12-24UNC (0.216″ diameter) (Wire size 0.0240″) 34. _____

35. 7/16-14UNC (Wire size 0.0412″) 35. _____

36. 9/16-12UNC (Wire size 0.0481″) 36. _____

37. 5/8-11UNC (Wire size 0.0525″) 37. _____

38. 3/4-10UNC (Wire size 0.0577″) 38. _____

39. 1 1/4-7UNC (Wire size 0.0825″) 39. _____

40. 1 3/8-6UNC (Wire size 00.0962″) 40. _____