

## Chapter 7

# Turning Operations

*When a true genius appears in the world, you may know him by this sign,  
that all the dunces are against him.*

—Jonathan Swift

### Introduction

The lathe is the oldest and most basic machine tool. Egyptians used primitive lathes at least 3000 years ago. Lathes work by holding and rotating a workpiece while a tool, whose position is controlled by the lathe, is held against the work. Lathes can cut cylinders and cones, both solid and hollow. Metal lathes can make truly round parts to tolerances of less than one-thousandth of an inch that permits the production of matched components such as axles and bearings, pistons and cylinders, and gun barrels and projectiles. Lathes are also important because of their ability to thread shafts, nuts, and bolts. In addition, the lathe can turn a steel forging or cylinder into a one-piece crankshaft.

Not only does the lathe make parts required to build all other types of machine tools, it also makes components for engines, pumps, valves, vehicles, and electric motors and performs over a dozen different operations, more than any other machine tool. Because the versatile lathe makes essential parts for many of the devices that make modern life possible, you can see why 20% of all machine tools in the U.S. are lathes.

During their early development, lathes were used by furniture makers, wheelwrights, joiners, bell founders, and pulley makers. The lathe has no single inventor, but evolved as dozens of incremental improvements were added over time. Before 1700, long periods passed when the lathe saw few improvements and was limited to turning work between centers. Over the next 200 years, the lathe evolved into its present form. The basic design of lathes built after 1900 differs little from those made today. The majority of improvements were made first in England and then in the United States. Six major developments brought us to the modern lathe: