

## Chapter 5

# Drills & Drilling Operations

*Procrastination is the thief of time.*

—Edward Young

### Introduction

Drilling holes is the most common of all machining processes, and the tool most commonly used to make them is the twist drill. Twist drills remove metal from holes and reduce it to chips in a fast, simple, and economical process. Nearly 75% of the metal removed by machining is drilled out. Drilling is often the starting point for other operations such as reaming, counterboring, countersinking, and tapping. Though usually used in a drill press, also called a *drilling machine*, twist drills can be used in lathes and milling machines. There are many twist drill designs. Some optimize drilling speed, diameter control, and wall smoothness, while others perform deep-hole drilling or drill very hard materials. This chapter covers the designs most useful to non-production, small- and medium sized shops.

The most popular drill press design is the *sensitive drill press*. We'll cover two sizes of this machine using current commercial models. Also, we'll examine how drill press size is measured, drill press components and controls, twist drill sizing systems, the mechanics of drilling, securing work, and drill speeds and feeds. Procedures for transferring hole position, correcting off-position drills, extending drills for a longer reach, the use of bushings, and the making of drilling jigs are included. In addition, this chapter looks at other, non-twist drill designs, such as flycutters and punches. Although drilling metal is our primary interest, the drilling of wood, plastic, glass, and rubber is also covered. Two other hole-related procedures, reaming and tapping, are covered in *Chapter 4 – Grinding, Reaming, Broaching & Lapping*, and in *Chapter 6 – Threads & Threading*, respectively.