

## Chapter 6

# Threads & Threading

*You can never plan the future by the past.*

—Edmund Burke

### Introduction

Screw threads were used in the time of Plato, about 500 BC, in grape and olive presses. About one hundred years later, Archimedes was credited with inventing a water pump based on the screw to irrigate crops and remove water from ship bilges. Later the Romans used this pump to dewater mines. Until the English instrument maker, Jesse Ramsden, developed the first satisfactory screw-cutting lathe in 1770, all screw threads were cut by hand. This limited most threads to large wooden ones for presses and clamps until 1800 when Henry Maudslay, a talented machinist, produced a large screw-cutting lathe.

The development of steam engines, trains, and machine tools created a demand for threads in the form of nuts, bolts, and leadscrews. But lack of standardization was a great obstacle to the widespread use of threaded fasteners since each workshop had its own fastener designs and they were not interchangeable.

To overcome these problems, Joseph Whitworth collected sample screws from a large number of British workshops, and in 1841 proposed that the thread angle be standardized at  $55^\circ$  and that the number of threads per-inch should be standardized for various diameters. His proposals became standard practice in Britain in the 1860s.

In 1864 William Sellers of Pennsylvania, an engineer and machine tool builder, independently proposed another standard based on a  $60^\circ$  thread, and set thread pitches for different diameters. This was adopted as the U.S. Standard, and subsequently developed into the American Standard Coarse Series (NC) and the Fine Series (NF). In Continental Europe, several different thread standards emerged, but German and French standards based on the metric system and a  $60^\circ$  thread prevailed, and metric threads were established.