

Chapter 4

Grinding, Reaming, Broaching, & Lapping

In the republic of mediocrity, genius is dangerous.

—Robert G. Ingersoll

Introduction

Although grinding, reaming, broaching, and lapping remove a relatively small metal volume compared with turning and milling, they are important processes because they are often the last machining operation and determine final size and finish.

The basic versions of these processes are easy to learn and master. Steps to perform them are detailed here. Only the specialized grinding operations, center-less, cylindrical, internal, and surface grinding, that use dedicated machines, are beyond the range of most machine shops. Although this type grinding may be sent out to a grinding shop, it is often possible to purchase components that already have the ground surfaces needed and incorporate them into the project. This avoids the delay and inconvenience of sending out work. Examples of already-ground components are ground flat stock ready to machine, bearings, drill rod, and reamer stock.

Section I – Grinding

Grinding Mechanics

How does the *grinding process* remove material?

When work is brought into contact with a rotating grinding wheel, each abrasive grain on the wheel's surface acts as a cutting tool and removes a tiny metal chip. When a grain becomes dull, frictional heat between the wheel and the workpiece causes the grain to break away and expose sharp, new grains. Grinding wheels are the only self-sharpening cutting tools.