

## CHAPTER 13

### Fundamentals of Casting

#### Review Questions

1. Materials processing is the science and technology by which a material is converted into a useful shape with a structure and properties that are optimized for the intended service environment. More loosely, processing is "all that is done to convert stuff into things".

2. The four basic families of shape production processes are:

(1) Casting, (2) Material removal, (3) Deformation processes, and (4) Consolidation processes. Casting processes can produce extremely complex shapes, but may have defects related to shrinkage and porosity. Material removal processes can have outstanding precision, but generate scrap as the material is cut away. Deformation processes can offer high rates of production, but require powerful equipment and dedicated tools or dies. Consolidation processes can produce large or complex shapes, but the joints may possess properties that are different from the base material.

3. Cast parts can range in size from a fraction of an inch and a fraction of an ounce to over 30 feet and many tons. Moreover, casting can incorporate complex shapes, hollow sections or internal cavities, and irregular curved surfaces.

4. In the single-use molding processes, a new mold must be made for each casting. In contrast, multiple-use molds can be used for repeated castings and are generally made of

metal or graphite. They are quite costly and their use is generally restricted to large production runs where their cost can be distributed over a large number of castings. For small quantities, the single-use molds would be preferred.

5. When the molten metal is introduced into the mold, all of the air and gases in the mold prior to pouring and those generated by the action of the hot metal on the mold must be able to escape the mold cavity. This will enable the molten metal to completely fill the mold cavity and produce a fully dense casting that is free from defects.

6. If the mold provides too much restraint to the solidifying and cooling casting, the casting will crack as it tries to contract while its strength is low.

7. A casting pattern is an approximate duplicate of the final casting around which the mold material will be packed to form the mold cavity. A flask is the box that contains the molding aggregate. A core is a sand shape that is inserted into the mold to produce internal features in a casting, such as holes or passages. A mold cavity is the void into which the molten metal is poured and solidified to produce the desired casting. A riser is an extra void created in the mold that will be filled with the

8. The gating system of a mold is made up of a pouring cup, sprue, runners and gates. Its purpose is to deliver the molten metal from the outside of the mold to the mold cavity.

9. A parting line or parting surface is the interface which separates the cope and drag halves of the mold, flask, pattern, or core.

10. Draft is the taper on a pattern and so there will be taper on the casting. Draft permits the pattern to be withdrawn from the mold while minimizing damage to the mold (and the casting to be removed more easily from permanent molds).