

FOURTH EDITION

Fundamentals of Heat and Mass Transfer

FRANK P. INCROPERA

DAVID P. DEWITT

*School of Mechanical Engineering
Purdue University*



JOHN WILEY & SONS

New York • Chichester • Brisbane • Toronto • Singapore

Different fin configurations are illustrated in Figure 3.14. A *straight fin* is any extended surface that is attached to a *plane wall*. It may be of uniform cross-sectional area, or its cross-sectional area may vary with the distance x from the wall. An *annular fin* is one that is circumferentially attached to a cylinder, and its cross section varies with radius from the centerline of the cylinder. The foregoing fin types have rectangular cross sections, whose area may be expressed as a product of the fin thickness t and the width w for straight fins or the circumference $2\pi r$ for annular fins. In contrast a *pin fin*, or *spine*, is an extended surface of circular cross section. Pin fins may also be of uniform or nonuniform cross section. In any application, selection of a particular fin con-

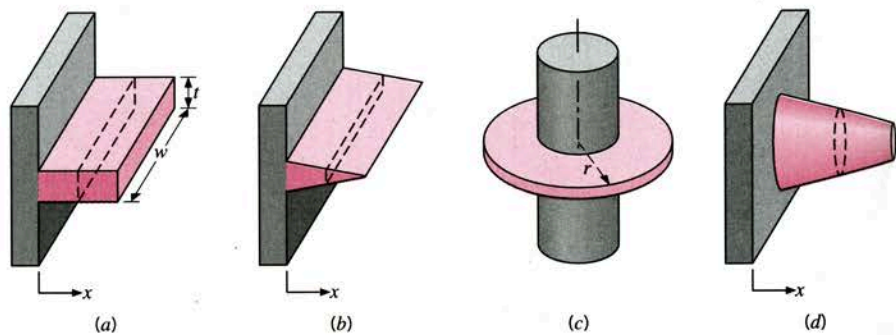


FIGURE 3.14 Fin configurations. (a) Straight fin of uniform cross section. (b) Straight fin of nonuniform cross section. (c) Annular fin. (d) Pin fin.

3.6 ■ Heat Transfer from Extended Surfaces

113

figuration may depend on space, weight, manufacturing, and cost considerations, as well as on the extent to which the fins reduce the surface convection coefficient and increase the pressure drop associated with flow over the fins.