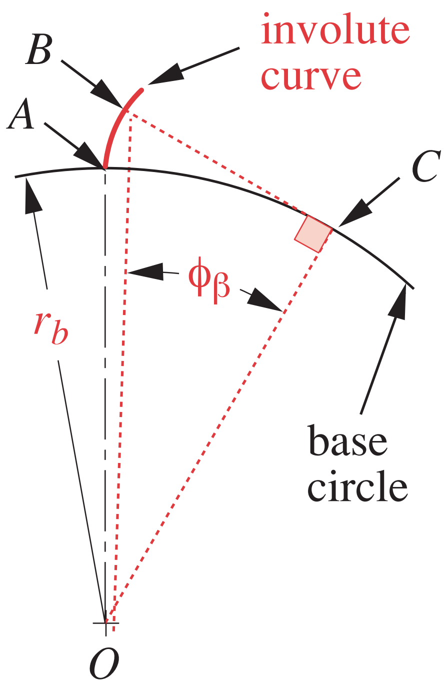

FIGURE P9-11

Problem 9-46

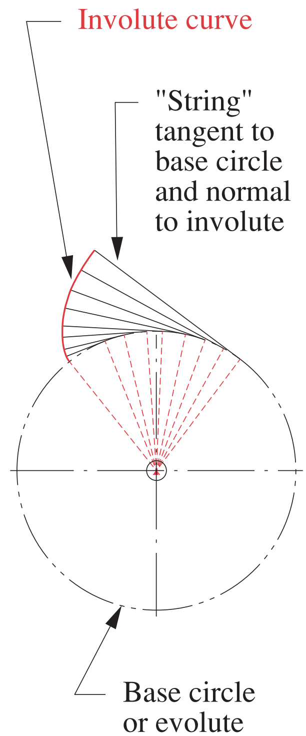

FIGURE 9-5

Development of the involute of a circle

9-46 Figure P9-11 shows an involute that has been generated from a base circle of radius r_b. Point *A* is simultaneously on the base circle and the involute. Point *B* is any point on the involute curve and point *C* is on the base circle where a line drawn from point *B* is tangent to the base circle. Point *O* is the center of the base circle. The angle ϕ_β (angle *BOC*) is known as the *involute pressure angle* corresponding to point *B* (not to be confused with the *pressure angle of two gears in mesh*, which is defined on page 467). The angle *AOB* is known as the *involute of* ϕ_β and is often designated as *inv* ϕ_β. Using the definition of the involute tooth form and Figure 9-5, derive an equation for *inv* ϕ_β as a function of ϕ_β alone.

9-47 Using the data and definitions from Problem 9-46, show that when the point B is at the pitch circle the *involute pressure angle* is equal to the *pressure angle of two gears in mesh*.

9-48 Using the data and definitions from Problem 9-46 and with the point B at the pitch circle where the involute pressure angle ϕ_β is equal to the pressure angle ϕ of two gears in mesh, derive equation 9.4b.

$$p_b = p_c \cos\phi \tag{9.4b}$$