



FIGURE 21.3 The total production process. From preparation of shell and fill material composition to counting and packaging finished product, the state-of-the-art equipment used for each step of the process. (Courtesy of Banner Pharmacaps)

ACCOGEL PROCESS

Although the rotary die process and reciprocating die process were capable of producing soft gelatin capsules containing oily liquids and pastes, the incorporation of powders into soft gelatin capsules was made possible by the *accogel process* (Augsburger, 1996). Developed in 1949 by Lederle Laboratories, this rotary process is a continuous one that produces softgel capsules containing granules and powders. Briefly, the process involves a *measuring roll* that holds the fill formulation in its cavities under the vacuum and rotates directly above the elasticized sheet of the gelatin ribbon. The ribbon is drawn into the capsule cavities of the *capsule die roll* by vacuum. The measuring rolls empty the fill material into the capsule-shaped gelatin cavities on the die roll. The die roll then converges with the rotating *sealing roll* covered with another sheet of elasticized gelatin. The convergence of two rotary rolls creates pressure to seal and cut the formed capsules.

SEAMLESS PROCESS

Truly seamless one-piece soft gelatin capsules were produced by the Globex Mark II Capsulator. [Figure 21.4](#) schematically shows this process, which does not require dies. In this process, a molten-gelatin stream flows through the outer nozzle of a concentric tube at a constant rate, and precision metering pump dispenses the medicated liquid formulation through the inner orifice. This method is often referred to as a *bubble method* that creates seamless, spherical softgel capsules called pearl. The process uses the pulsating mechanism at the orifice to force the emerging stream to break up into an intermittent but steady flow of uniformly sized, tubular-shaped composite droplets of immiscible cooling oil. The fundamental principle of interface physics—the tendency of liquids to