

engineering angles

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Small-scale revolution

Compact tablet presses can offer large-scale layout improvements



For too long, pharma manufacturers have had to make a trade off: If they want a tablet press with the latest design innovations, they've been limited to large-scale production units. Rare were the smaller-scale or product development presses combining the latest and greatest in flexible manufacturing, operator friendliness, and production insight.

Fortunately, the era of small presses playing second fiddle to their bigger brothers is ending — and for manufacturers, this presents a cascading benefits ripple effect that can permeate the entire production process.

Why go small

All things being equal, the argument for small presses is a straightforward matter of scale. Assuming a small-scale press is equipped with the same next-generation features as its medium- and large-scale counterparts, a smaller press with solid output and extremely fast change times to ensure maximum uptime would allow small-batch products to be produced more efficiently, with a reduced number of machines, in fewer compression suites.

Small-scale presses also can reduce required material quantities needed for scale-up to full production, and improve and streamline tech transfer, if they can operate with comparable feeder and compression dwell times, which is increasingly the case in the mid-range press segment.

Must-haves

To foment plant-wide production improvements, smaller-scale tablet presses must have the capability to support product development, scale-up, tech transfer, clinical batch manufacturing, small and medium batch production, as well as continuous manufacturing applications.

Crucially, a small-scale press must have the capability to work with a wide range of material quantities, from 1 to 50 or even 100 kg. This requires the press control system to work effectively with a reduced tools configuration, where press tools are installed in every second or third station in the turret. This permits operation with reduced material quantities and minimizes tooling investment.

Next, small-scale presses must offer a comprehensive instrumentation package to permit the real-time measurement and display of precompression force, main compression force, and ejection force. For bi-layer operation, the first layer tamping force is critical to instrumentation. For product development, the press needs on-board data acquisition and analysis capability for automated analysis to characterize force peaks, rate of force application, rate of force decay, area under the compression curve and contact time. These parameters permit formulations to be assessed, optimized, and compared to established baselines.

Flexibility is paramount. Many applications require single and bi-layer capability, and a fast-change conversion process managed directly by the user.

Finally, a small-scale press should offer portability to accommodate facilities where a dedicated room cannot be made available.

Boosting efficiencies

Here's where the bells and whistles yield broader manufacturing efficiencies: A capable small-scale press affords detailed evaluation of product portfolios which, in turn, leads to informed decision-making regarding the optimal mix of tablet compression technology to maximize production efficiencies.

Smaller tablet presses need not come with downsized features. Increasingly, premium offerings such as production-scale control systems — complete with secure operator login, electronic audit trails to track machine adjustments, alarms, tablet rejects, and secure batch data handling — will become the norm rather than an exception. As the metrics-driven push for optimized manufacturing facilities continues to evolve, smaller presses will showcase the same sophisticated designs as larger models; this will yield, among other benefits, seamless interface with peripheral devices such as overhead feed systems, dedusters, metal checks, and in-line tablet sampling systems.

Just as importantly, this small-scale revolution will yield information. It will yield a clearer picture of production parameters that allow manufacturers to anticipate needs and optimize batches like never before, dictating what products get made on what equipment and in what configuration. ●