

Case Study: Robotics in an Oral Solid Dose Facility

The Problem

An International Pharmaceutical Manufacturer had an Oral Solid Dosage (OSD) processing facility with a problem: They were manually loading and unloading tablets to and from dryer trays, as well as handling the unwieldy trays themselves in and out of an oven dryer. The existing operation was a labor-intensive, manual operation that required precision handling of the tablets. Each tray had to be loaded with the correct weight of tablets, placed in a dryer rack slot and subsequently loaded into an oven dryer. The reverse manual unloading operation also occurred

The Solution

The initial concept was a “robotic arm” that would “read” indexed trays and remove the appropriate empty trays from the rack onto a table. Although this concept had some desirable characteristics, such as a small footprint and no operator intervention, it still contained several challenges: maintenance, cleanability and cost.

The design process developed into maneuvering the dryer rack itself with retractable arms at a fixed elevation. The dryer rack containing individual trays was mounted on a moveable carriage. The carriage would be maneuvered vertically (up and down) on a lifting mechanism. The retractable arms would pull or push individual trays in or out of their slots, across a series of rollers. A vibratory feeder would evenly distribute the tablets onto the trays before they pushed back into position. After replacing the filled tray into the rack, the lift mechanism would elevate the rack to the next indexed tray position, and the previous step was repeated.

During the unloading of the dried tablets, the same steps as above, in reverse, would occur. A tray would be indexed so that it lined up with the retracting arms. The arms would then remove the filled tray across the rollers. Clamps would grab and secure the trays, as the series of rollers, with the trays on top, is slowly lowered into an unloading chamber, which is directly connected to a discharge IBC/tote. After the tablets have been totally discharged from the tray, the retracting arms would elevate the empty trays back to the initial elevation and push them back into the tray rack. This step is repeated for each filled tray. Finally, the empty tray rack with all the empty trays is lowered back to floor level by the carriage hoist

The Advantages

The advantages of this approach is that the fixed mechanical arms would not require nearly as much functionality, small parts or inelegance as the robotic arm approach and results in a much simpler design. No enclosed mechanical devices would be in contact with the product path. Any parts required for cleaning, such as the rollers, would be easily accessible and removable. In addition the number and complexity of mechanical items is greatly reduced. Finally, commercially available components such as the hoist mechanism and vibratory feeder are integral to the design, thereby helping to reduce costs and making available readily obtainable spare parts.

