

## ***Fill Cam Selection for a New Product***

When compressing a formulation for the first time, fill cam selection is one of the most important steps in the setup process. The fill cam pull the lower punch down to allow powder to enter the die cavity, the weight cam then adjusts this fill to determine the final weight of the tablet. Overfilling can result in excess waste and, in extreme cases, compaction inside the feed frame. Insufficient fill depth can increase weight variability and prevent target weights from being achieved. Estimating the required fill depth will help you choose the right fill cam for your product.

There are 5 things you need to know to get started:

- The bulk density of your product - Can be determined with a graduated cylinder and a scale. Divide the net weight of powder in the cylinder by the volume it occupies to get the bulk density of the formulation.
- The tip area of your compression tooling – Can be calculated based on the geometry of the punch tip cross-section. The formulae for common shapes can be found in the ‘Calculating Tip Area’ entry in Tech Tips.
- The cup volume of your lower compression tooling (if applicable) – Can be found on the drawings provided by your tooling manufacturer.
- The target tablet weight
- Fill cam options – Fill cams come in discrete sizes and pull the lower punches to a specified depth below the die table surface. They are specific to the tablet press, tooling format (TSM or EU), and size (B, D, etc.).

Once this information is gathered, the calculation for estimating fill depth is as follows:

$$\text{Estimated Fill Depth} = \frac{\frac{\text{Target Weight}}{\text{Bulk Density}} - \text{Cup Volume}}{\text{Tip Area}}$$

*\*Ensure your units are correct (Standard or SI, cm or mm, etc.)*

The actual fill depth will differ slightly from this estimate, but it is adequate for choosing a fill cam. The fill cam should ideally be 1-2 mm larger than the actual fill depth in order to reduce weight variability and product loss. As an example, if you were to estimate a fill depth of 10.5 mm and your weight cam options were 7 mm, 11 mm, 15 mm, and 19 mm, you would select the 15 mm fill cam.