

## Why you need to get your timing right to make better tablets

*Need to mass-produce tablets with quality solid dosage in a quick and cost-effective way? The time that a formulation is under compression is one area you should address through the use of innovative tablet tooling.*



Compaction plays an important role in the quality of the final tablet. In order to produce tablets from granule or powder, it is necessary to use the correct compression force. Too much, or too little of either, can result in tabletting problems like sticking, picking and capping. For this reason, dwell time is extremely important. Dwell time is the time that each individual punch head flat remains in contact with the compression roller of a rotary press. The compression force applied when forming the tablet must be above 90% of its peak value. Key influences affecting dwell time include the punch head flat diameter and shape, use of pre-compression and turret speed (RPM) used during production. This is commonly overlooked when initiating a good tooling set-up.

Some formulations are extremely difficult to compress effectively and particularly sensitive to how this crucial element of compression is performed. They require extended time under peak compression to obtain the required tablet hardness and prevent any problems. The importance of ensuring this process is performed correctly is becoming more and more significant as the requirement for fast, efficient and fault-free tablet production becomes a necessity in modern manufacturing practices.

Dwell time plays an important part in determining if one can produce a tablet

successfully, especially in those incorporating formulations that are challenging to compress. Not all formulations are dwell sensitive as some will compress effectively at any speed. However, the majority are very vulnerable to even the slightest change.

### The answer is in the tooling

Slowing the tablet press down to achieve an increase in dwell time is one way to help in increasing compression. This however leads to a reduction in tablet production and has a detrimental effect on production in terms of output and cost. Equally, over-pressuring of the punch can cause the failure of the tool and will damage the press, again affecting production.

Another method to increase dwell is through the installation of larger diameter compression rollers to increase the total compression time, but this can be expensive, or simply impossible on some presses. The most practical answer is through the use of extended dwell tooling that can be used without slowing the press. This tooling is designed specifically with an elliptical head form, which has an extended head flat.

The diameter of the flat area on the top of the punch head is extended allowing the time it is in contact with the compression roller to be longer. Importantly, it's possible to use the tooling on standard cams to help in achieving higher press speeds with challenging products

and formulations. Think easy fitting with no modification.

The benefits of using elliptical head form tooling when compared to other dwell time increasing options are enormous.

- **50% longer.** The elliptical head flat design can increase the dwell time by up to 50% over a standard punch head, increasing tablet output and significantly saving time in production.
- **Improved granule bonding .** Some granules are extremely challenging to compress effectively – for example, those with plastic or elastic properties where the behaviour of a particle under compression can either stay deformed or return to its original shape. This can lead to tabletting issues. In these instances, the dwell time of the machine can be critical particularly for formulations with predominantly plastic deformation behaviour.
- **Solve dwell time problems without upsizing punches.** A common technique used to increase dwell time is to up-size the punches with a larger head flat. This however requires investment, not just in tooling but also in a new turret and so can be an expensive outlay.
- **More than D-type dwell on B-type punch.** It enhances tablet compaction and cohesion by increasing dwell time without upsizing punches or investing in a new press.
- **Designed to run on standard cams.** Extended dwell flat can run on standard cams, giving users higher press speeds without the need for expensive modifications.
- **Allows faster press operation.** Because one doesn't need to slow the press down to increase compression time, faster and more efficient tablet production can take place.

Producing quality tablets quickly is a priority in modern tablet production, it is therefore important to implement proficient methods to achieve this.

Understanding dwell sensitivity is instrumental in the production of solid dose forms. Every formulation is different and requires its own carefully calculated compression time. If this is not factored into the production, the results can be detrimental to the bottom line, with product quality, time to market and cost implications all affected. The application of modern techniques like elliptical head form tooling can be the key to a quality tablet and the answer to successful tablet manufacture.