



OVERLOAD SETTING

TRICKS AND TECHNIQUES

MECHANICAL OVERLOAD

PRE 3.3 kN

MAIN 20.8 kN

DEC 9.76 kN

TF 9.30 kN

Release Motor

INC

WHITEPAPER

OVERLOAD SETTING - TRICKS AND TECHNIQUES



By Todd Martin
8/20/2024

Nearly every tablet press has a safety release mechanism to relieve pressure and may initiate immediate press shutdown when compression forces exceed the set overload force value. This safety device protects the tools, the machine, and the operator. Excess pressure may occur from many potential mishaps including:

- Double-weight tablet formed from a prior tablet not releasing from the upper punch face.
- Tablet(s) jumping into a feed frame, fragment into compressed chunks, and re-enter the fill.
- Tablet thickness setting moved to be too thin.
- Poor flow of formulation (starving and flooding).
- Excessive formulation re-circulation.
- Misaligned or damaged tooling.
- Loose press component (e.g., scraper blade) or foreign contaminant interfering with compression cycle.
- Contaminant buildup on pressure roll.

Overload systems vary in design and function. Simple overload systems can include springs that indirectly support pressure rolls. In case of over compression, this spring permits the pressure roll to move relieving pressure. Spring tension can be adjusted by means of the nut located at the end of the spring rod. To increase pressure, tighten the nuts to shorten the spring length. Tighten lock nuts after each adjustment to prevent your overload value from slipping. The overload tonnage can be determined by comparing the length of the spring to its free length (this is commonly indicated with hash marks).

Some overload systems use a hydraulic cylinder mounted below a compression spring. The press setup technician moves a hand lever to actuate a pump to force oil into a hydraulic cylinder mounted below a compression spring. The extent of this pressure is shown on a scale to





indicate the overload setting and can be released with a handwheel. During an overload event, a red overload light may illuminate, and again a compression spring increases the distance between the pressure rolls. As soon as the overloaded punch passes, the spring returns the roll to its original position. For these older style machines, running a press with this light on is “Running on Overload” which will create inconsistent soft, thick tablets and is not recommended.

More sophisticated hydraulic overload systems include pressure accumulators to differentiate between a minor over compression event which moves the pressure roll versus a major over compression event that initiates a full press shutdown. Over pressure protection may rely on limit switches or pre-tensioned gas cushions.

Single station eccentric machines also offer overload protection. In the case of the Manesty F3, for instance, there is an adjustable lower regulating collar which deflects under excessive force.

Instrumented tablet presses commonly allow setting the overload through the HMI (human machine interface) and may be recorded as part of the recipe.

Each of these systems requires periodic calibration (at least annually).

Tablet drawings from reputable tooling suppliers will include a maximum recommended compression force. The overload setting should be set to a value that does not exceed this number. In cases where more force is needed to reach target tablet hardness than the force rating allows, contact Natoli Engineering for assistance as there are a range of solutions we can offer:

- Evaluate the tooling material of construction for improvement.
- Tablet re-design to increase the force rating.
- Review press setup and operating parameters for optimization.
- Predictive fatigue failure analysis to determine tool life when over-compressing.
- Formulation evaluation and guidance to increase compactibility.

In other cases, the allowable tool rating may far exceed the actual force needed to make good tablets. This is fortunate, as it allows the operator to use the overload system not only as a safety mechanism, but also as a troubleshooting helper.

In cases with less sophisticated (or non-existent) weight control systems, best practice would be to set your overload at 15% to 25% above the average force needed to reach target tablet hardness, depending on the relative standard deviation of forces being applied. In cases where you have a good flowing product (low SREL), the overload can be set closer to the average force value without any nuisance trips. For poorer flowing products, a higher setting is needed.



YOU DEMAND. WE DELIVER.

For example, if your formulation normally flows well and your tool rating is robust enough, then set your overload to 20% above the average force needed to make good tablets. If a particular batch is poor (let's say it sat in storage too long after blending) causing a starving/flooding situation, the overload will trigger and warn you of a problem so that you don't make a lot of bad tablets.

Setting your overload is often overlooked or neglected. Following best practice with a calibrated overload setting to your product protects you, the tools, and the machine. **Contact Natoli Engineering for assistance with calibration, adjustments, and establishing set points.**