Sweetening The Deal - Overcoming Confectionary Issues

As of 2024 the worldwide confectionary industry is worth a huge $213.74 billion, which isn't too surprising when you think about the love and long history humanity has with sweet treats. In ancient times, before sugar was readily available, confectionery production was based on honey. Honey was used across the ancient world to coat fruits and flowers to preserve them and create sweets. Different types of sweets and confits were enjoyed after that, but the idea of confectionary in Europe truly took flight in the late 18th century when Turkish Delight became hugely popular European and British high society. In modern times, there is a huge variety of confectionaries, and some of those products require compression into a solid form. Some popular brands you might know that undergo tablet compression processes are Love Hearts, Parma Violets and Polo mints. Whilst all tablet formulations are diverse, compression of confectionery products present a challenge. With every confectionary product so different, it is hard to choose just one prevalent production issue among confectionary products, but in our experience, we often see complaints relating to punch wear, that contributes to tablet defects such as core erosion, edge chipping and issues when coating the tablet. Avoidable damage is also frequently seen on tooling, which can negatively affect the tablet, in fact, 85% of tooling issues can be tracked back to poor handling procedures such as misaligned tools, bumps and drops.

For example, a customer reached out to I Holland as they were having difficulty compressing a gum product. They were seeing premature punch tip wear and misalignment between the punches and dies. Their tools were only lasting them a maximum of 6 months. They were also facing several issues during coating because the damaged punch tip was resulting in core erosion, flashing and edge chipping. After a site visit, we confirmed the turret was in a generally good condition, and after performing a TSAR~Predict, I Holland recommended and supplied punch sets with a steel and coating combination designed for nutraceutical production. To help with alignment issues, we also supplied an alignment tool. After introducing the new coating and using the die alignment tool, the customer confirmed the new tool sets ran well with no issues. Furthermore, the coating process has improved and has saved the customer both time and money.

This case study emphasizes the importance of utilising tools that can minimize tabletting issues before they ever arise, such as appropriate steel and coating choices and TSAR~Predict. The TSAR~Predict model accurately forecasts the correct anti-stick coating solution for each formulation. It calculates single particle adhesion to the punch tip face without the need for time consuming and expensive field trials. With a database of thousands of formulations, the software analyses how sticky the product is likely to be during compression, and suggests remedies for this issue, advising on the best tools and coatings for the manufacturing process. The ideal tool material balances durability and performance properties including anti-stick, abrasion and

corrosion resistance. Compressive strength, hardness, and resistance to chipping and cracking are also important qualities to consider. There is a wide choice of tool steel, some specifically designed to compress abrasive or sticky granules and include high carbon, high chrome, cold work tool steels. Choosing a specialist steel such as HPG-P (premium) ensures the tool is suitable for formulations that are particularly abrasive or are prone to wearing tools prematurely. Premium steels from a reputable seller should extend tooling life, be resistant to issues such as fracturing, which leads to fewer tabletting problems. Finding the right steel and coating for your product can overwhelming, and that's why it is important to take advantage of your tool suppliers' expertise, being as open and communicative as possible to ensure you get the correct tools the job, the first-time round.

Before fixing their issue with I Holland, our customer had been experiencing core erosion, flashing and edge chipping. Whilst the root cause in the case study was the worn punches creating defective tablets, other preventative measures can be carried out. Core erosion takes place during the coating process due to abrasion from the coating pan and the tablet bed. Worn tooling can cause defects, but it is important to also consider other causes and solutions. Core erosion could be happening because the tablet core is too soft, the coating pan speed is excessive, or the tablet design is inappropriate e.g. the surface area of the tablet is too small. Overly soft tablet cores can be solved by increasing tablet hardness within the tolerance but ensure to not exceed the tooling maximum press force during manufacture. Fortunately, solving excessive coating span speed is simpler – slow down the pan speed. If you suspect the issue may be caused by inappropriate tablet profile, then it is time to rethink the design of the tablet itself. For this solution it's always a good idea to work with your tooling supplier to optimise the tablet, as they often know best, and can keep the redesign process realistic and efficient. Tablet edge chipping and flashing can also be caused worn tooling, and the same solutions as above can be utilised to minimise this problem. For tools with signs of wearing, using a thorough and correct polishing procedure can solve issues of flashing, however once a punch is too worn, it must be replaced.

Core erosion takes place during the coating process

Another one of the most common issues experienced is handling damage. There are several stages of the tablet manufacturing process where damage can take place, including unpacking the tooling, loading/unloading the tools in or out of the tablet press, during tool cleaning/ maintenance procedures and storage/transportation. If damage occurs it can lead to the production of poor-quality tablets, and even further damage to both the tooling and the tablet press. Although tooling produced by reputable suppliers is hardened and tempered to high hardness levels, the fine details on punch tips are the most susceptible to handling damage. During the loading or unloading of punches, extra care should be taken that the punch tip edges do not contact any part of the tablet press. The same consideration should be taken when loading the tooling into polishing machines, making sure tip faces aren't bumped into the holders. Punches should also always be transported in trays, boxes or trolleys designed so the punch tips do not come into contact with each other. Too often operators transport tools by holding multiple in each hand! Finally, tooling should always be stored in an organised way, keeping punches separate. Not only does this prevent contact damage, but by organising tooling in an orderly manner you make your workflow that much more efficient.