It's wise to customise

Zico Zeeman, EMT, the Netherlands, discusses the advantages and disadvantages of the machinery used in the fertilizer blending process, and considers how it can help to create tailor-made solutions for customers.

In the world of agriculture, fertilizer suppliers who can offer tailor-made solutions to meet the specific requirements of their target market are considered irreplaceable. By doing so, they can help their customers achieve their desired yields while using less fertilizer, resulting in significant cost savings without compromising revenue. To create customised blends and package them for blending, certain machines are required. This article delves into the specifics of these machines, their advantages and disadvantages, and their use in the blending process.

Blenders

Creating customised fertilizer blends requires the use of specialised blending units. These units can be categorised into two distinct groups: batch blenders and continuous blenders.

Batch blenders are designed to work in cycles, with each batch typically ranging from 2 – 16 t. The blending process begins with a filling stage, where each raw material is weighed, followed by the blending stage, and finally discharging. The capacity of batch blenders typically ranges from 20 – 70 tph, making them ideal for smaller-scale operations.

On the other hand, continuous blenders are designed to operate continuously and can blend up to 300 tph. These blenders are ideal for larger-scale operations, and are capable of creating blends with a high degree of consistency. Continuous blenders can also be used to incorporate micronutrients, inhibitors, or other additives into the blend as needed.

Regardless of the type of blender used, the blending process is a critical step in creating customised fertilizer solutions that meet the unique needs of each customer. By understanding the different types of blending units available and their capacities, suppliers can ensure that they are using the right equipment to meet their production goals while also maximising efficiency and minimising costs.

Paddle blenders

Paddle blenders are a versatile option for batch blending and can be used to blend granules or powdery materials, including water-soluble fertilizers. Twin-shaft high-speed paddle mixers are especially well-suited for powdery materials, with both shafts running at high speeds in opposite directions to ensure a thorough mix. With a typical capacity of 1 – 4 t per batch, paddle blenders are a popular choice for a range of industries.

Vertical blenders

The vertical blender is a blending system that utilises a conical screw to mix raw materials in a wave-like motion.

This system is designed to prevent product build up inside the container thanks to a 60° angle at the bottom cone of the blender. Additionally, a Salem valve located at
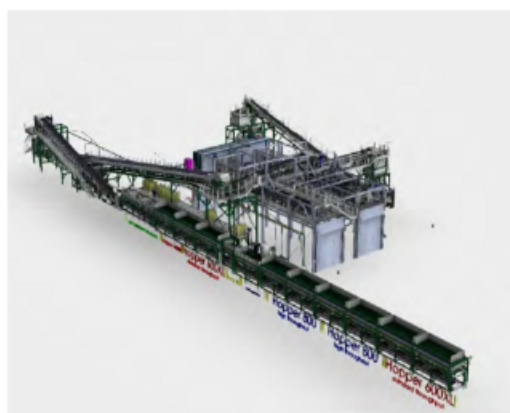
the bottom of the blender, combined with a sweep at the bottom of the auger, ensures that the blender is completely emptied during cleanout.

This blending system has a capacity of up to 60 tph, making it a high capacity machine suitable for large scale operations. The entire system is mounted on a digital weighing system, allowing for the precise measurement of raw materials during the blending process.

The use of the vertical blender ensures an accurate and efficient blending process with minimal product waste. Its unique design helps ensure uniformity in the blend and complete cleanout, enhancing the quality of the final product.

Horizontal rotating blenders

Horizontal rotating blenders are widely used in various industries to blend different raw materials. The process of blending is simple and efficient. The turning drum, which has internal flighting, folds the materials together to create a homogeneous blend with minimal degradation or segregation.

These blenders come in different capacities, ranging from 2 – 14 t, with a corresponding capacity of 2 – 14 m³. A weigh hopper with the same capacity as the blender is mounted on a digital weighing system, ensuring the accurate measurement of the raw materials.

In this type of blender, the weighing and blending processes are separated. This allows for a more controlled and precise blending process. The end result is a well mixed blend that meets the desired specifications.

Continuous blenders

Continuous blenders, like the EMT Weightcont blender in the Ballance project, operate continuously and have the ability to fill and discharge simultaneously. They can use a blending screw to mix materials, with capacities that can reach up to 300 tph. These blenders employ modern technology, with a computer system controlling the entire weighing and blending process through a variable electro system to ensure optimal quality.

The system works as follows: operators use a wheel loader or forklift with a bucket to fill the hoppers with raw materials. Each hopper is equipped with a digital weighing system, and stainless steel dosing conveyors in combination with the digital weighing systems ensure proper dosing of the raw materials. There is an unlimited number of hoppers. The complete blender is made of stainless steel and has a hopper capacity of 4 – 15 t/m³.

Micronutrients, inhibitors, or additives can be added to the blend using both types of blenders. It is crucial to determine which type of product needs to be added to enhance the product's value for customers. Depending on the requirements, a powder-adding unit or a liquid-adding unit may be installed in the blender.

Blending software

To optimise the blending process, software can be used. Software packages to support the blending process, such as Optiblend by EMT, help to make cost effective calculations for fertilizer blending. This is an optimisation programme and can help to make the right formulations for the lowest possible costs. In addition, a complete product analysis can

be calculated, including the NPK value, as well as all required micronutrients. The programme helps to calculate the right raw material that can be used for the blending process. In the programme, it is possible to add the nutrient value of crops, organic fertilizer, soil quality, manure, and mineral fertilizer.

Then, a field hectare or acre calculation based on the farmer's information can be made, so that the farmer receives the correct amount of fertilizer. Through the use of programmes like this, in combination with a blender system, the correct quantity of fertilizer will be spread onto the field, therefore reducing costs and environmental pressures.

Bagging

When the blender line has a high capacity per hour, the bagging line also needs to have the same capacity. For big bags (jumbo bags), 70 tph per line can be necessary. For 50 kg bags, up to 50 tph per line can be necessary. When a 25 kg bag is necessary, a capacity of 25 tph per line can be required. By doubling this bagging line, the capacity is easy to increase. All bagging machines are suitable for powder and granulated material.

The 'small bag single unit' has a stainless-steel scale with a capacity of 60 kg. The complete system operates fully automatically by means of a weight indicator. It is also possible to manually operate the machine. The operator secures the bag around the filling mouth, where a clamp holds the bag so that it stays in position. The weighed product automatically falls into the bag. When the bag is filled, the clamp automatically releases, and the full bag is transported through the conveyor belt to the sewing or sealing machine. The capacity of the 'small bag single unit' is 400 bags for open

mouth bags and 300 valve bags per hour. This machine is also available as a double unit, which doubles the capacity.

The 'big bag economic' and 'low profile unit' are automatic bag filling systems made for FIBC bags (flexible, intermediary, bulk, containers). The big bag is attached and held by hand around the filler pipe. This prevents dust formation during the filling process. The filling height is determined based on the size of the big bag. When the bag is full, the weight of the product is determined and the bag is transported further by a conveyor belt. The weighing system is equipped with a weight indicator. The entire system can be operated fully automatically or manually. The machines are suitable to be set up in various ways. The 'big bag economic' is a fixed machine with a supply hopper on top. The big bag low profile is a movable machine that can be filled by a shovel. The capacity of both machines is 30 tph for big bags of 1 t and around 40 bags of 500 kg/h.

The 'big bag high speed' is also an automatic bag filling system that fills FIBC bags. The machine weighs and fills automatically and can fill 100 – 1250 kg bags. The height of the filler pipe is adjustable over a length of 500 mm. The scale hopper releases the material through a stainless steel pipe in the big bag, and this can be removed with a forklift.

Conclusion

This article has highlighted the importance of blending units for creating customised fertilizer blends. Batch and continuous blenders offer varying capacities for small and large scale operations, ensuring precise mixing and product quality. The addition of micronutrients and additives enhances product value, with the choice of powder or liquid units. **WF**