



The new DPM Double Planetary Mixer – an economical alternative to double-arm kneaders

A recent innovation has stirred up a lot of excitement in many industries that rely on high viscosity mixers – the new Ross DPM Double Planetary mixer. Equipped with Ross's new HV Blades*, the new mixer can replace a double-arm kneader in many applications, cut operating costs substantially, and increase production.

Double planetary mixers have generally been considered appropriate for mixing materials to 1.5 million centipoise. Double-arm kneaders have traditionally handled the heavier stuff, such as highly filled adhesives, heavy silicone and butyl sealants, and bulk molding compounds. But a double-arm mixer commands about three times the price of a double planetary mixer, requires more space on the plant floor, and introduces many potential problems with shaft seals, stuffing boxes and packing glands submerged in the product zone.

The double-arm unit generally operates with more horsepower and consumes more energy than a double planetary mixer. Because of its horizontal orientation, it also cannot be supported with a set of interchangeable mix vessels – an option that often elevates double planetary mixing to a semi-continuous process.

A more efficient alternative

The new, streamlined DPM Double Planetary Mixer offers a variety of standard features and options that make it the most powerful, efficient and convenient double planetary mixer ever built. The standard model includes self-contained, pre-wired controls, variable speed inverter drives, and completely enclosed construction.

- Control options include turnkey automation, powerful data logging, and a simple

interface with your PLC and production management system.

- Ross can also provide all the equipment and fabrication necessary for vacuum/pressure, heat transfer, orbiting heat sensors, change can design and discharge systems.
- Three blade designs – Traditional, Finger and the new HV Blades – now allow you to select the right flow pattern for the material you are mixing.

New HV Blades – The HV Blade is fundamentally different than any planetary blade you’ve seen before. With the down-thrust action generated by its helical geometry, along with the absence of a lower crossbar, the HV Blade is capable of handling materials at viscosities far beyond the capabilities of conventional double planetary blades. Ross’s new HV Blade technology can increase the working viscosity of the double planetary mixer to beyond 8 million centipoise – offering manufacturers a new option for producing high-viscosity products while reducing costs.

Rectangular blades – In many applications, ideal for thorough wet or dry blending regardless of the material’s flow characteristics.

Finger blades – Preferred for mixing delicate solids and fibers. Custom designs fine-tune axial flow.

A closer look at the HV Blade design concept

To solve the ‘climbing’ problem of highly filled materials, blades were needed that would force heavy materials back down into the mix vessel. To succeed in mixing extremely heavy materials, the blades also required a streamlined design – with no horizontal crossbar to provide support at the lower end of the blades. These were the design goals that eventually lead to the HV Blade concept.

Helical down thrust configuration – Unlike traditional, rectangular planetary blades, the HV Blade is sloped in a precisely angled, helical contour. This sweeping curve firmly pushes the batch material forward *and downward*, yet it presents far less resistance than the vertical bars of the traditional planetary blade.

Flattening torque and power spikes – The vertical configuration of the traditional double planetary blade can create a problem. Each time the vertical bars of the two blades pass in the vessel, a significant shearing event takes place – requiring a surge in power and a spike in amperage is generated.

Thanks to their helical design, the HV Blades pass one another in a nearly continuous slicing motion. The result is a balanced load, and the amperage spike is eliminated. This is a key factor in the mixer's ability to handle extremely high viscosities.

More efficient leading and trailing edges – The leading edge of the HV Blade is flat, while the trailing edge is curved. This enhances the downward thrust imparted to the batch, while it prevents the formation of “dead zones” in the wake of the blade.

Lower crossbar eliminated – The lower crossbar on a traditional planetary blade serves two functions during mixing. It supports the vertical bars and provides rigidity. Continuously sweeping the bottom of the vessel, it also promotes flow upward into the center of the batch – improving heat transfer.

Laboratory testing has shown that as viscosity reaches extremely high levels, the value of this scraping action diminishes, while the resistance posed by the crossbar becomes a serious liability. By eliminating the lower crossbar, the HV blades are able to travel through the batch much more easily – which helps to increase their working viscosity range substantially. The HV Blades are engineered to operate without any need for the additional rigidity that a lower crossbar would provide.

After the mix cycle is completed, the crossbar presents another problem. Highly filled materials often stick tenaciously to the lower crossbar of a traditional planetary blade when the blade is removed from the batch. The HV Blades eliminate this problem.

HV Blade applications

1. Thick and sticky – The HV Blades should be considered for materials that are extremely viscous, especially if they are extremely sticky. Heavy hot melts and silicone sealants, bulk molding compounds, and liquid-butyl sealants that are highly filled with such solids as calcium carbonate, fumed silica and TiO₂ would all be excellent candidates.

The HV Blades are not well suited for solid-butyl mixtures, because they are not designed to masticate solids chunks of rubber as a double-arm mixer can.

2. *Fibrous fillers* – Many applications that include carbon or Kevlar™ fillers, which are inclined to climb the blades and likely to cling to the lower crossbar of a double planetary with traditional blades, make ideal applications for HV Blades.

Test drive the new DPM Double Planetary Mixer

The new mixer is available for testing in the Ross Test & Development Center. This allows you to experience firsthand what the mixer can do with your ingredients, simulating conditions on your process line. It will also provide an opportunity to work with the Ross Test & Development engineering staff to make your process more productive.

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