

TECHNOLOGY BRIEF:

Viscous products possessing shear-sensitive behavior, fragile components or abrasive properties require gentle but thorough mixing. In most cases, a double planetary mixer is the best choice for processing such applications.

Double planetary mixers are ideal for low shear processing of viscous materials.



Ross Double Planetary Mixer

Why low shear mixing?

Low shear mixing of viscous formulations is preferred when incorporating abrasive materials, fibers or delicate solids, such as hollow glass microspheres. Mixing under gentle, laminar flow conditions is also ideal for viscous products with shear-sensitive properties. A number of gel or paste formulations containing active pharmaceutical ingredients fall into this category.

Planetary stirring action

Various mixer configurations deliver low shear mixing, from simple propellers and paddle blades to more complex counter-rotating agitators. However, these devices face a common limitation which is viscosity. When a batch becomes too viscous or thick, agitators with a fixed axis of rotation will eventually fail to produce adequate flow. For example, an anchor will simply carve a path through a viscous batch instead of pushing product away from the walls and into the center. Agitation close to the axis of rotation becomes limited at elevated viscosities.

Double Planetary Mixer Blade Designs



"HV" Blades

US Patent No. 6,652,137



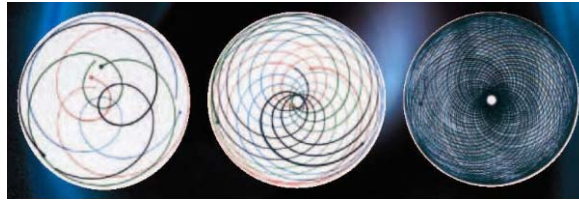
Rectangular Blades



Finger Blades

For more information on
Double Planetary Mixers,
[check out this video](#) or
visit www.planetarymixers.com.

The logical solution is to utilize agitators that move through the batch regardless of product flow. That is the forte of the double planetary mixer. It moves material by rotating two identical blades on their own axes as they orbit on a common axis. The blades continuously advance along the periphery of the mix vessel, removing material from the walls and transporting it towards the interior.



Orbital blade motion in a double planetary mixer is predictable and efficient. Shown here are blade movements after 1, 3 and 36 revolutions wherein the blades have contacted virtually the entire batch.

Gentle but powerful and thorough

Double planetary mixers are robust machines capable of handling materials as high as 8million cP*. The gentle and thorough folding action imparted by the orbiting blades carefully mixes minor or trace ingredients into a viscous batch that would otherwise break apart from excessive shear. Certain gels and pastes, for instance, undergo irreversible viscosity loss when over-sheared. Double planetary mixers are also widely used in applications where the solids being dispersed are sensitive to shear, as in the case of high viscosity composites filled with hollow microspheres, which require gentle and thorough mixing to reduce fractures. The relatively short cycle times achieved in double planetary mixers also help minimize wear on product-contact surfaces when processing abrasive materials.

**when equipped with High Viscosity "HV" blades.*

Sample Application: Microbicide Gels

Researchers at the Population Council are developing safe and effective microbicide gels that prevent the transmission of HIV and other sexually-transmitted infections.



Their laboratory is equipped with a Ross Double Planetary Mixer for making bench-top scale batches of these microbicide gels which contain active ingredient dosages of 1% or less by weight. Mixing is performed under vacuum to remove air in the final gel product.

Larger batches are produced in a 150-gallon Ross Double Planetary Mixer with High Viscosity "HV" blades (photo shown on page 1).

