Synthetic amorphous silicon dioxide, otherwise known as "fumed silica," is one of the lightest substances known. Bulk density is 3 lb per cu ft (38 kg/cu m) with average particle sizes from 0.2 to 0.3 micron. Handled incorrectly, the powder readily escapes as nuisance dust "so light that it actually hangs in the air," says Jim McGown, Nye Lubricants facilities manager.

Although feather-light, the bulk density of the loosely packed agglomerates can reach more than double when force is applied, causing packing. These properties make the fine, white, semi-free-flowing powder a challenge to handle.

Nye Lubricants adds fumed silica to oil as a thickener to produce synthetic damping greases. The company found a clean and safe way to introduce the powder into process vessels by replacing manual bag dumping with a fully enclosed caster-mounted mobile bag dump station from Flexicon comprised of a hopper, dust collector and flexible screw conveyor.

Operators now empty bags into the bag dumping station, while the flexible screw conveyor feeds the material into a process vessel. No powder escapes into the atmosphere.

Operators previously lifted bags onto an 8-ft (2.4 m) high operating platform, and emptied them into the process vessels. McGown says tramp fused silica inevitably escaped into the air.

Now, physical effort is reduced and potential safety issues are avoided as the operator cleans and opens bags on the waist-high bag tray support, and dumps contents into the deep 3-ft (0.9 m) hood to receive the contents of 44 in. x 23 in. x 9 in. (112 x 58 x 23 cm) bags that weigh only 10 lb (4.5 kg) due to the airy powder's high void volume.

Includes Internal Dust Collection
The bag dump station draws airborne dust at onto the exterior surfaces of two cartridge filters. A "pulse-jet" filter cleaning system releases short blasts of compressed air inside the filters at timed intervals, causing dust build-up on filter surfaces to fall into the hopper.

Flat Screw Moves Feather-Light Powder
The 15-ft (4.58 cm) long flexible screw conveyor transports the powder, at a 45° angle, into a process vessel through a transition adapter. A specialized flexible stainless steel screw imparts particles with force in a longitudinal direction, minimizing radial movement toward the tube wall.

The operator wheels the caster-mounted system to add fumed silica, in 300 lb (135 kg) batches, to several process vessels preparing various grades of light to heavy damping greases.

In addition to improving worker safety and plant cleanliness, the mobile bag dump and conveyor system "free[s] workers for other process-related functions," McGown says.

Operator empties bags of fumed silica into bag dumping station dust-free while flexible screw conveyor feeds the material into a process vessel.

Electron micrograph of fumed silica at magnification of 100,000 X shows loose packing of chain-like aggregates.