Operation and Performance Criteria:

There are several important guidelines that must be considered to achieve maximum performance. The criteria that affect the Inline SLIM's performance can be broken down into three (3) distinct categories:

- **Product specific variables**
- **Machine specific variables**
- **Interconnection specific variables**

Product specific variables include characteristics of the raw ingredient streams, as well as the final product obtained through the mixing of the liquid and powder.

These variables are considered independent of machine and interconnection variables and are described as follows:

- **Starting and final viscosity.**

  The Inline SLIM will perform to its maximum potential at low viscosities. As the viscosity of the recirculated liquid increases, the powder suction performance will decrease. To illustrate this point, see the data in the following table, which indicates the powder induction rates for successive 10 lb. bags of fumed silica inducted into a light mineral oil, using a Ross Model ME-405SB-25:

Total Amount of Fumed Silica Added	Rate / 10 Lb. Bag
10 lbs.	20 sec. / bag
20 lbs.	22 sec. / bag
30 lbs.	33 sec. / bag
40 lbs.	45 sec. / bag

- **Density of the product.**

The Inline SLIM was designed to handle liquids with a wide range of densities (specific gravity).

Liquid raw ingredients and the resulting end products having a specific gravity greater than 1.00 will increase the power demand of the motor driving the Inline SLIM System. These higher densities are not a major concern, as they will not adversely affect the powder induction performance, however, the increased powder demand needs to be considered by your Ross engineer.

Liquid raw ingredients and the resulting end products having a specific gravity significantly less than 1.00 will negatively affect the powder induction performance. Other than the physical properties of the raw ingredients, the most significant source of low densities is the aeration of the recirculated product. It is therefore important to minimize sources of air incorporation when using an Inline SLIM System.

The main sources of product aeration are through the powder inlet connection, and during the return flow of product into the recirculation vessel.

To minimize air entrainment from the return flow of product into the recirculation vessel, consider a sub-surface return connection and minimize the chance of vortex formation in the recirculation vessel.

Machine specific variables include operating parameters of the Inline SLIM System.

These variables are considered independent of product and interconnection variables and are described as follows:

- **Rotor speed**

  Under most conditions, the Inline SLIM should be run at its maximum speed, even when it appears that the performance is adequate at lower speeds.

Often, Inline SLIM systems are provided with AC variable frequency inverter drives. Speed control can be a useful parameter to vary in order to control the shear rate of the rotor/stator, **before or after** the powder induction phase. It is highly recommended that the speed not be reduced during the powder induction phase.

- **Stator configuration**

  The Inline SLIM is available with several stator configurations. Due to its higher flow and lower restrictive characteristics, we usually recommended the use of the LSHD stator for most powder induction requirements.

Interconnection specific variables include all aspects of the Inline SLIM installation, exclusive of the product and machine variables.

Interconnection specific variables have the most significant effect on Inline SLIM performance and thus, require the most attention from the personnel responsible for installing and operating this equipment.

The interconnection specific variables are described below:

- **Inlet and outlet line diameter**

  When selecting the tubing or hose diameter, use the largest diameter tube or hose possible. If the inlet of the Inline SLIM is 2", than the diameter of the inlet-side tubing or hose should be 2" minimum. If possible, it would be even better to use 2-1/2" or 3" diameter tubing or hose up to the inlet, and then reduce the size to 2" right before the inlet.

  The same points above apply to the discharge tubing or hose.

- **Inlet and outlet restrictions to flow**

  Keep the restrictions and disturbances to flow to a minimum. Valves should be full-ported ball valves where possible (butterfly valves are more restrictive to flow). Minimize the amount of elbows and "Tee's" in the line.

  If hose is being used, make certain that there are no bends or kinks in the hose.

- **Distance from the source of the incoming liquid (vessel)**

  Locate the Inline SLIM as close as possible to the source of the incoming liquid. This usually means locating the Inline SLIM near the outlet of the feed vessel.

- **Distance to the point of ultimate discharge**

  Keep the length of the discharge tubing or hose to a minimum. Try to run this tubing or hose directly to the closest point of discharge into a return vessel. If the return hose is excessively long, obtain a hose that is the shortest appropriate length.

- **Return of discharged product to the recirculation vessel.**

  The return of the discharged product to the recirculation vessel should not create any aeration of the bulk. Product that becomes aerated will result in a performance decrease in the Inline SLIM.

  If possible, submerge the return flow under the surface of the liquid in the recirculation vessel to minimize aeration.

  The return flow should not create a strong vortex in the recirculation vessel. A strong vortex will entrain air in the product, resulting in a performance decrease in the Inline SLIM.