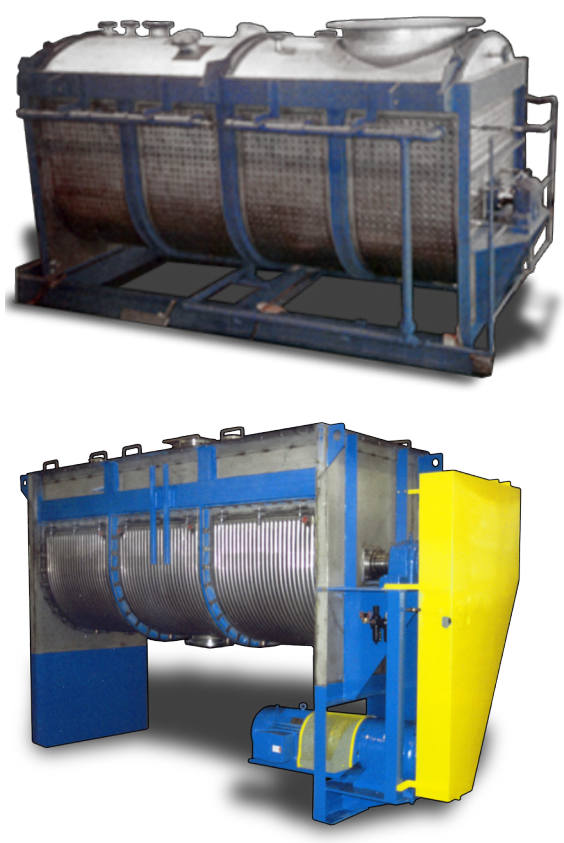
MIXER PROCESS OPTIONS

QUALIFICATIONS:

ASME “U” Stamp and “R” Stamp Cerificates of Authorization

APPLICATIONS:

Drying • Polymerization • Heat curing • Cooling/freezing • Microbial kill • Sintering/calcining

HEATING/COOLING MIXERS	ATMOSPHERIC MIXERS (DRYERS)	VACUUM MIXERS (DRYERS)
		
Thermal treatment is provided through a thermal fluid jacket on the mixing vessel. Material is heated or cooled by direct contact with the surface area on the tank walls as the paddles and/or ribbons continuously agitate the material. Based on standard models, our engineers can design a heating or cooling mixer to your specific processing needs.	Conductive heating of materials through a thermal fluid jacket on the mixing vessel will result in a flash evaporation of volatile components such as water or organic solvents as the material agitation or transfer exposes the material to the open space at the top of the S. Howes mixer. In order to continue to drive the evaporation, the vapor in this free space must be removed either by the assistance of a conventional fan or by convection.	Similar to atmospheric drying, the vacuum process also reduces the atmospheric pressure within the mixer to reduce the vapor pressure of the water. This allows the evaporation of the volatile component to occur at a lower temperature than at atmospheric conditions. Based on standard models, our engineers can design a vacuum mixer/dryer to your specific processing needs.
Advantages: • Cost savings as the thermal treatment is accomplished in the same time and vessel being used for mixing step • Accurate control of batch thermal treatment time • Good control of end material temperature	**Advantages:** • Low capital cost as the drying is accomplished in the same time and vessel being used for transferring and/or mixing • Control of batch drying time • Good control of end material temperature • Suitable for drying of either water or organic solvents • No or low dust generation, reduces chances for dust explosions that can occur in convective type dryers • Residence time can be adjusted to allow for the removal of “bound” moisture	**Advantages:** • Lower operating temperatures make it more suitable for heat sensitive materials such as pharmaceuticals or materials that melt at higher temperatures at atmospheric pressure • Head space in the mixer is filled with vapor that will reduce or eliminate presence of oxygen for oxygen sensitive materials or solvents • Batch drying time is infinitely variable depending on the residence time required
Limits: • Materials that soften on heating (thermoplastic) may smear and foul preventing satisfactory heat transfer • Material needs to flow well during thermal treatment period to ensure homogeneous treatment • Lower heat transfer coefficients than with convective temperature control • Temperature of heat transfer media must be controlled to a point that will not damage the material when the material is in direct contact with thermal surface	**Limits:** • Generally for heat insensitive materials • Thermoplastic (heat softening) may smear and foul preventing satisfactory heat transfer • Material needs to flow well during thermal treatment period to ensure homogeneous treatment • Lower heat transfer coefficients than with convective dryers • Temperature of heat transfer media must be controlled to a point that will not damage the material when the material is in direct contact with thermal surface	**Limits:** • More costly since vacuum system must be included • More costly as mixer vessel and other components need to be constructed to handle and maintain the vacuum pressure • Lower heat transfer coefficients than with convective dryers • Temperature of heat transfer media must be controlled to a point that will not damage the material when the material is in direct contact with thermal surface