

## Background

Resodyn Acoustic Mixers has developed and demonstrated a new and innovative technology that provides a significant contribution to the development and manufacture of advanced complex mix products. The technology applies a consistent shear field throughout an entire mixing vessel and has proven to mix materials with very consistent results. Trade marked ResonantAcoustics<sup>®</sup>, the technology efficiently substitutes low-frequency acoustic energy for traditional mechanical mixing impellers, leading to significant performance, environmental and economic improvements in the manufacture of many industrial products. The use of ResonantAcoustics<sup>®</sup> will greatly enhance development and production efforts of new and existing products by ensuring the most complete mix possible while incorporating real time monitoring of important physical characteristics.

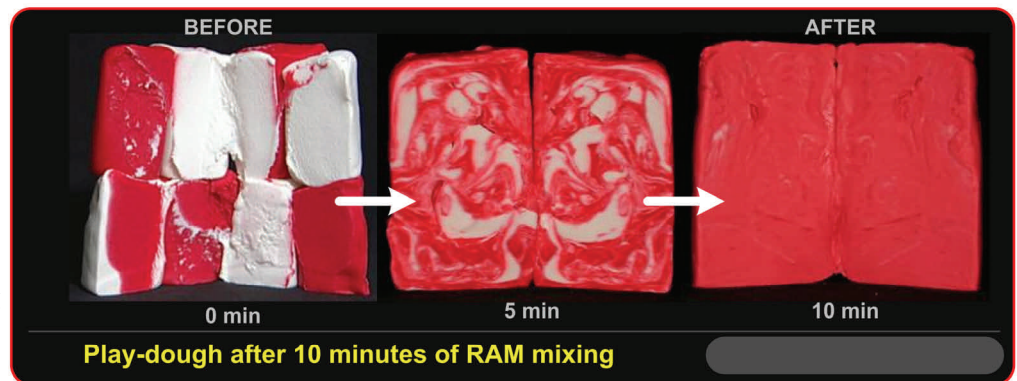


**LabRAM  
Bench top Mixer**

## Technology

Resodyn Corporation's ResonantAcoustics<sup>®</sup> mixing (RAM) technology is a new approach to solving mixing and dispersion problems that is distinct and superior to either conventional impeller agitation or ultrasonic mixing. Rather than mix by inducing bulk fluid flow, like impeller agitation, ResonantAcoustics<sup>®</sup> agitation mixes by inducing microscale turbulence through the propagation of acoustic waves throughout the medium. It differs from ultrasonic agitation in that the frequency of acoustic energy is lower and the scale of mixing is larger. Another distinct difference from ultrasonic technology is that the ResonantAcoustics<sup>®</sup> devices are simple, mechanically driven agitators that can be made large enough to perform industrial scale tasks at reasonable cost.

ResonantAcoustics<sup>®</sup> introduces acoustic vibrations into liquids and slurries via the resonant vibration of a mechanical system. The impedance of the vibrating system is matched to that of the load, i.e., the process fluid. The entire system vibrates in resonance, allowing efficient energy transport to the fluid creating small scale eddies. Although the eddies are at the microscale, the entire reactor is well mixed in an extremely short time because the acoustic streaming, generated by the acoustic field, causes the microscale vortices to be transmitted uniformly throughout the fluid. Multiple mixing regimes are made possible by using the Resonant Acoustics<sup>®</sup> mixing system and the controls developed exclusively for it.

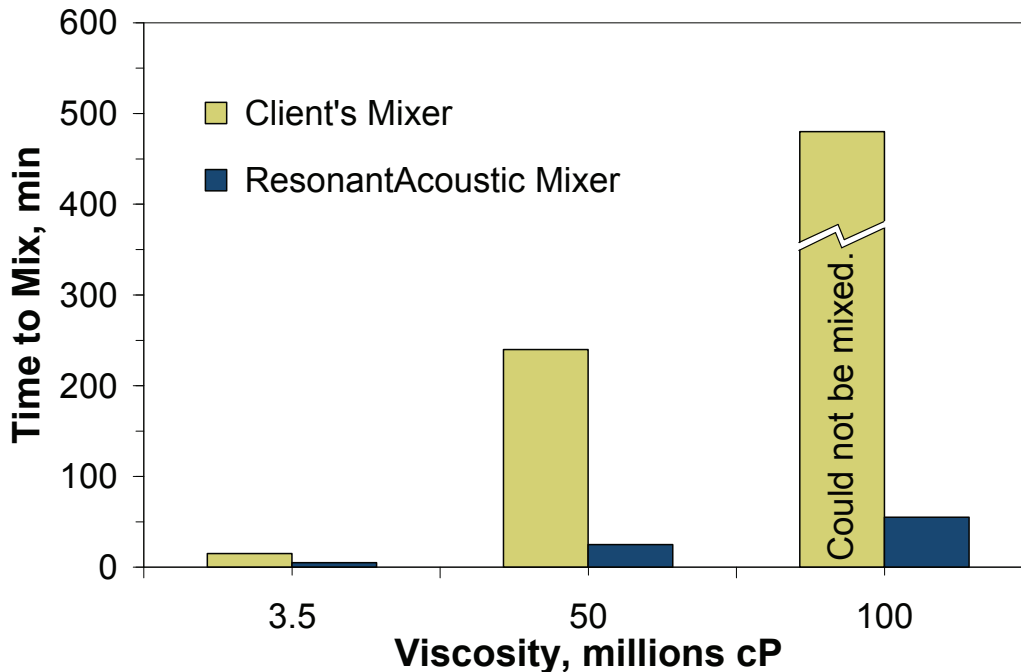


**Material showing characteristic mixing flow patterns**

In summary, the benefits of using ResonantAcoustics<sup>®</sup> are: (i) low hydrodynamic shear stress through the use of low-frequency acoustic energy (ii) enhanced mass transfer rate and (iii) the system is easily tunable to different frequencies suitable for multiple application requirements.

## Application Example

The blending of nano- and micron-sized powders mixed into a viscous polymer resin at solids loadings up to 80% by weight (approximately 100 million cP) has been demonstrated for a client. All materials were mixed until uniform. The figure below shows a comparison between the client's mixer and the ResonantAcoustic® mixer. For a material with a viscosity of 50 million cP the client's mixer took eight times longer than the ResonantAcoustic® mixer and the 100 million cP material that the client could not mix was mixed in about an hour by the ResonantAcoustic® mixer.



## ResonantAcoustic® Mixer Benefits

- Complete and thorough mixing
- Easy cleaning—no impellers
- Fast mixing times
- Enables new product innovations
- Mixes wide viscosity range (1cP to 100+million cP)
- Can mix hazardous materials (volatile and toxic)
- Offers flexibility in mixing vessel shape and design
- Easy to scale up from laboratory to production

## Applications

- Gases, liquids, solids, powders, pastes
- Caulks, adhesives, sealants
- Inks and pigments
- Electronic pastes and inks
- Cosmetics
- Pharmaceuticals
- Advanced materials
- Polymers

## Contact

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