



# Dry Powder Nano-Coating Breakthrough

*How Catalent Adopted ResonantAcoustic® Mixing to Unlock a New Generation of Oral Drug Delivery*

P: +1 (406) 497-5333

E: [info@resodynmixers.com](mailto:info@resodynmixers.com)

W: [resodynmixers.com](http://resodynmixers.com)

## OVERVIEW

Catalent Pharma Solutions is one of the world's leading pharmaceutical contract development and manufacturing organizations, producing billions of doses annually for patients in more than 60 countries. [1]

Dry powder coating of API particles at the sub-100  $\mu\text{m}$  scale is one of pharmaceutical manufacturing's most technically demanding challenges — and one that conventional

mixing technology cannot meet. When Catalent's scientists developed a next-generation orally disintegrating tablet (ODT) requiring precisely this capability, they turned to ResonantAcoustic® Mixing. The result was a pharmaceutical innovation voted the most groundbreaking of 2018 by over 2,000 industry professionals and a production platform now serving patients around the world. [2][3]



### Solution

- ResonantAcoustic® Technology
- Bladeless, Solvent-Free Dry Coating of API Particles
- Acoustic Energy Enabling Sub-100  $\mu\text{m}$  Particle Coating
- Production-Scale Acoustic Mixing Platform



### Achievement

- Up to 4X Higher Drug Load vs. Conventional ODT [1]
- Solvent-Free Dry Coating [5]
- Named The Medicine Maker 2018 Innovation of the Year [3]
- Adopted at Production Scale at a Global CDMO [1]

# CHALLENGES

Coating API particles is a well-established approach to taste masking and controlled drug release in pharmaceutical manufacturing — but achieving a continuous, uniform polymer film at the microscale is an entirely different challenge from coating larger particles. As particle size decreases, surface area increases dramatically, and the energy required to drive complete polymer deposition across every particle surface becomes inaccessible to conventional bladed or impeller-based mixers.

Traditional coating methods such as fluidized bed coating set a hard lower limit on particle size — typically no smaller than around 200 µm. Below that threshold, conventional methods cannot achieve the uniform, continuous polymer film required for effective taste masking. [4] The result is a ceiling on the drug candidates that can be formulated as

ODTs — and a ceiling on the drug load that any given formulation can deliver. For Catalent’s next-generation ODT formulation, coating at particles as small as 100 µm was not optional — it was the technical prerequisite for the entire platform.

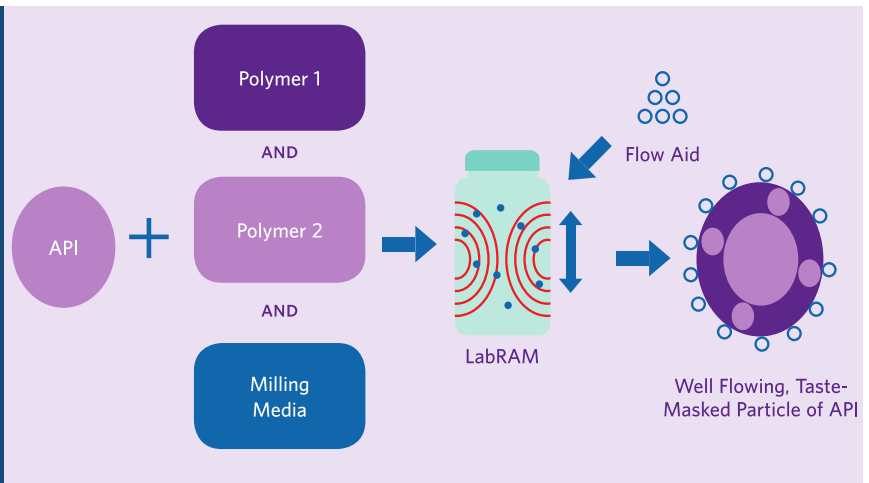
Conventional coating methods, limited to particle sizes of around 200 µm and above, could not bridge that gap. Higher drug loads require smaller, more densely packed particles, and effective taste masking of highly bitter APIs requires complete, continuous polymer coverage at exactly this scale. [4] Without the ability to coat below the threshold that conventional methods cannot cross, an entirely new generation of drug candidates — analgesics, anti-allergy treatments, anti-infectives — would remain beyond the reach of the ODT platform. [1]

## The Dry Coating Challenge in Pharma Manufacturing

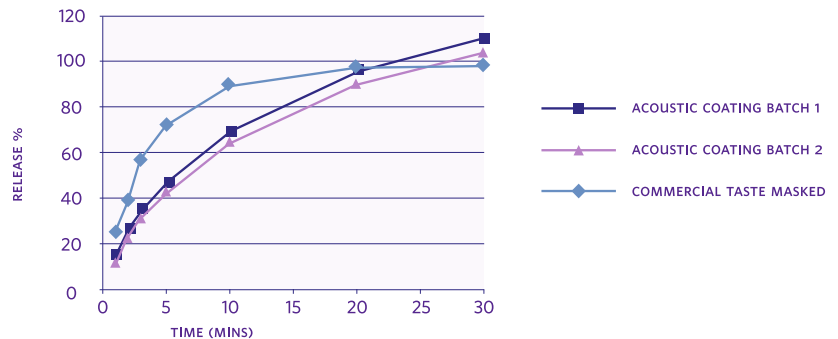
*Conventional coating dissolves polymer materials in solvents and sprays them onto drug particles — which is time-consuming, energy-intensive, and introduces solvent toxicity and regulatory complexity. Dry powder coating eliminates the solvent entirely, but cannot be done uniformly with conventional methods.*

*“The novel dry coating process represents a step change in coating technology eliminating the need for solvents, reducing processing times, providing the ability to coat smaller particle size APIs and allowing for increased API potency by reducing the amount of coating polymer.”*

— Catalent Pharma Solutions [6]



USP Release Profile of Coated API



## SOLUTION

ResonantAcoustic® Mixing, pioneered by Resodyn Acoustic Mixers, uses low-frequency, high-intensity acoustic energy to process materials without blades or impellers. Rather than relying on mechanical shear from rotating blades, RAM distributes energy uniformly throughout the entire mixing vessel — generating the intense particle-to-particle collisions needed to drive continuous polymer deposition onto API surfaces at scales conventional methods cannot reach.

### The Mechanism — Why Acoustic Mixing Works at the Nano Scale

As documented by Catalent’s own scientists in Drug Development & Delivery:

“In place of a fluidized bed coating method, API particles are mixed with micronized polymer agglomerates in a vessel that has an acoustic vibrator. When the vibrator is activated, the contents begin to accelerate rapidly, and the polymer is deposited around the API. The vibration and collisions within the mixer result in a continuous polymer layer being formed. It is this layer that confers the desired taste-masking properties.” [4]

Ralph Gosden, Head of Product Development at Catalent, confirmed the practical outcome in Pharmaceutical Technology:

“Micronized polymer agglomerates, through the action of acoustic vibration and particle–particle interaction, are used to coat the host API... No solvent is involved in this process; it is a completely dry process. It has the ability to coat small particles of approximately 100 µm and the potential for much higher API potency in the coated material.” [5]

The combination of sub-100 µm coating



Resodyn integrated Catalent’s preferred robotic arm to automate loading/unloading.

capability and solvent-free processing directly unlocks higher API potency — enabling the up to 4X increase in drug load that the next-generation ODT platform delivers. [1]

### Validated by the Industry

The pharmaceutical industry recognized the significance of this capability. The Medicine Maker 2018 Innovation Awards — voted on by over 2,000 pharmaceutical professionals — named the acoustic mixing-enabled coating technology the most groundbreaking innovation of the year:

“The coating technology uses acoustic mixing to bombard particles of the API with a micronized polymer; the energy produced increases the temperature of the API and polymer, allowing the polymer to form the coating over the API.” [3]

# CONCLUSION

The adoption of ResonantAcoustic® Mixing at Catalent demonstrates that the path to next-generation oral drug delivery runs directly through better mixing science. Where conventional coating methods reach a hard physical limit at around 200 µm, acoustic mixing delivers uniform, continuous, solvent-free polymer coverage at 100 µm and below — unlocking drug loads, particle sizes, and

APIs that no legacy pharmaceutical mixing technology can access.

The outcome was a platform voted the pharmaceutical industry's most groundbreaking innovation of 2018, adopted at one of the world's leading CDMOs as the essential enabling technology for a new generation of oral drug delivery. [1][2][3]



**Contact Resodyn Acoustic Mixers, Inc. to discuss revolutionizing your mixing process for pharmaceutical discovery and manufacturing.**

P: +1 (406) 497-5333

E: [info@resodyn.com](mailto:info@resodyn.com)

W: [www.resodynmixers.com](http://www.resodynmixers.com)

## CITATIONS

1. Catalent Invests Over \$27 Million to Commercialize Zydis® Ultra. Catalent Pharma Solutions. March 7, 2019. <https://www.catalent.com/catalent-news/catalent-invests-over-27-million-to-commercialize-zydis-r-ultra-a-next-generation-oral-disintegrating-tablet/>
2. Allen, P. Switch on to Swindon. Vimeo. 2019. <https://vimeo.com/335176662>
3. Vine, S. "And the Winner is... Zydis Ultra Coating Technology." The Medicine Maker. April 29, 2019. <https://themedicinemaker.com/issues/2019/articles/apr/and-the-winner-is-zydis-ultra-coating-technology/>
4. Grother, L. and Bayru, M. "Orally Disintegrating Tablets — Patient-Centric Dose Design, Developments in Orally Disintegrating Tablets." Drug Development & Delivery. January/February 2017. <https://drug-dev.com/orally-disintegrating-tablets-patient-centric-dose-design-developments-in-orally-disintegrating-tablets/>
5. Siew, A. "ODTs Dissolve Drug Administration Challenges." Pharmaceutical Technology 41 (11) 18. November 2017. <https://www.pharmtech.com/view/odts-dissolve-drug-administration-challenges-1>
6. "Novel Coating Process Enables Taste Masking for Immediate Release Formulations." Catalent Pharma Solutions. <https://www.catalent.com/expert-content/development-bioavailability/novel-coating-process-enables-taste-masking-for-immediate-release-formulations/>