Accelerating lithium-ion battery R&D

19th century - planetary mixer
20th century - extruder
2021 - YSTRAL Batt-TDS[™]

Welcome

to

Batt-TD



YSTRAL Batt-TDS[™] Powder Dispersion Systems

for lithium-ion battery slurry mixing processes

Lithium-ion energy demand is expected to grow 30 fold over the next 12 years, requiring unprecedented amounts of slurries to be mixed with increasingly large factories & higher quality demands. Linear scaling of traditional batch mixing is costly & unsustainable.



Powder handling, wetting and dispersion made easy

Batt-TDS[™] is a next-generation process technology. At its heart is Conti-TDS[™] Technology, which enables powders to be inducted dust-free, wetted & dispersed under vacuum in a single process step, but with its process capability extended to :

- a) viscosities that are not accessible with traditional rotor-stator technology,
- b) give independent control of both flow & shear rates,
- c) induct large particles with reduced metal contamination.

Systems built on this platform allow massive process simplifications and improvements in efficiency over conventional systems due in part to high process flexibility and the ability to mix diverse materials.



- Induct, wet and disperse powders dust- & loss-free in a semi-continuous process loop.
- Dissolve binders in the same process without additional equipment.
- An entire process requires only minutes with milliseconds used for active mixing.
- Hygienic design, fully integrated processing systems with WIP (wash in place) capability.
- Rapid screening of formulations & processes.
- Reduced metal wear.
- Optional skid for further deaeration.
- YCS Process[™] next-gen HMI interface.

YSTRAL Technology has been used to mix some of the most challenging products across many industries, including food, cosmetics, pharma, chemicals, coatings and electronics from 2 to 100K liters at a time. We have a solution for you. Contact us for a discussion on how YSTRAL Technology can simplify your roadmap.

🔀 battery@ystral.com

Conti-TDS[™] Technology

- Dust- and loss-free powder induction using the vacuum created inside the mixing chamber.
- Powder induction via suction hose / lance, bag tipping table / station, big-bag emptying station, receiving hopper, silo or silo truck.
- Easy treatment of sticky, spontaneously swelling, strong foaming powders and powders, which are difficult to wet.
- Powder wetting and dispersing under vacuum.
- Complete deagglomeration of the raw materials
 higher quality products.



dispersion

Inside the mixing chamber

Unlike other mixers, the Conti-TDS[™] has been designed from the ground up for powder induction into liquids, keeping powder and liquid separate until they are brought together in the turbulent region of the dispersing zone. This maximizes the surface area for wetting and - with the ability to tailor the extent of shear, independent of viscosity - enables gentle, but efficient separation of agglomerates under the ideal amount of required shear, accomplishing real-time powder dispersion. Combined with the ability to handle a wide range of viscosities, the net effect is an energysaving dispersion process with extraordinary quality and speed.



ystral gmbh 1 maschinenbau + processtechnik Wettelbrunner Strasse 7 79282 Ballrechten-Dottingen 1 Germany Tel: +49 7634 5603-0 ystral.com



Cathode slurry

Each material is unique, having its own specific dispersion and mixing requirements. Tailored process sequence: solvent, soluble binders, then particles with requirements from high shear to low shear.



Performance

Pouch-cell data courtesy Dr. Werner Bauer, Karlsruhe Institute of Technology



The Batt-TDS[™] is capable of producing slurries whose electrodes exceed the long-term performance of those from planetary batch mixing. This is accomplished at high solids content and in a fraction of the time, with only minutes of mixing and cumulatively just milliseconds of active mixing in the high-shear zone. Shear thinning can make further de-aeration unnecessary.

Straightforward and reliable scaling

Batt-TDS [™]	navi	pilot	PRO	
			mid	supra
reference batch size (L)	12	2000	5000	10,000
footprint (m x m)	2.9 x 1	5.5 x 4.5	5.8 x 4.8	6.4 x 5.4
slurry productivity (L/h) (NMC 622 92/3/3/2, 72% solids)	R&D	800-1300	2000-2800	4000-5100

Excludes powder conveyance system.

YSTRAL Batt-TDS[™] machines are available in navigator, pilot and PRO classes to meet R&D, formulation, process screening, scale-up and Production needs at any volume.