

## **MIXING OPERATIONS FOR 50 L TO 2000 L SINGLE-USE MIXER: LIQUID-LIQUID MIXING CHARACTERIZATION AND SLURRY SUSPENSION**

Jordan Cobia, Thermo Fisher Scientific  
jordan.cobia@thermofisher.com  
Kevin Mullen, Thermo Fisher Scientific  
Becky Staerk, Patheon

Key Words: single-use mixer, mixing, viral inactivation, Touchscreen Control Panel, upstream, downstream, T95, hyperforma

Mixers are employed throughout all parts of bioprocessing. Single-use mixers (S.U.M.) are commonly used for upstream operations including media formulation and hydration, media holding, sterile filtration and downstream operations including media and product storage, viral inactivation, buffer preparation, and resin/slurry preparation for column packing. This study presents the automation of both simple and complex mixing procedures using the Thermo Fisher Touchscreen Control Panel. Also investigated are the selection method for scalable mixing parameters allowing normalized mixing performance across all single use mixer sizes. The following applications are demonstrated in this study:

- Characterization of scalable mixing parameters by comparing power input per volume and T95 blend time criteria
- Automation of a basic mixing process control variables including temperature, agitation, pump rate, flow valves, line pressure, and filtration efficiency using the Touchscreen Electrical Panel
- Automation of a complex viral inactivation process including multiple pH and temperature shifts

This work demonstrates best practices for mixing in bioprocessing unit operations including use of the Touchscreen Control Panel for automation thus minimizing operator intervention and process variance while maximizing the quality and traceability of data gathered during the mixing process thus improving overall lab efficiency.