

### Reactor Analysis

M-Star's GPU-native CFD analysis sets a new standard in reactor performance optimization by harnessing the power of parallel computing for faster, more accurate simulations. Unlike traditional CPU-based methods, M-Star's GPU acceleration enables real-time analysis of complex fluid dynamics, making it ideal for applications such as blending, heat transfer, and mass transfer. This advanced capability allows for rapid iteration and optimization, providing deeper insights into critical processes like mixing efficiency, agitation stress, and reaction kinetics.



We combine finite element analysis with CFD to analyze both the fluid dynamics and structural integrity of reactors under operational conditions. While CFD models fluid behavior such as heat and mass transfer, FEA assesses thermal stresses and deformations on the reactor's structure. This integrated approach ensures optimized reactor performance and durability under real-world conditions.

**NOZZLE & BAFFLE FORCE CALCULATIONS:** Evaluates forces on nozzles and baffles to optimize equipment design, ensuring durability and preventing mechanical failures.

**NON-NEWTONIAN RHEOLOGY FOR SLURRIES AND POLYMERS:** Models complex flow behaviors in non-Newtonian fluids, improving processing accuracy and consistency for high-viscosity systems.

**DISPERSION AND DISSOLUTION PROCESSES:** Optimizes particle and solute dispersion, improving dissolution rates and product quality in chemical and pharmaceutical processes.

**BLEND TIME CALCULATIONS AND OPTIMIZATION::** Accurately predicts mixing times for homogeneity, optimizing process efficiency and ensuring uniformity, reducing waste and production time.

**AGITATOR AND MOTOR SELECTION:** Simulates the best agitator and motor configurations, improving energy efficiency and ensuring consistent mixing performance across various viscosities.

**GAS SPARGING ANALYSIS:** Improves gas distribution and mass transfer in aeration or fermentation processes, maximizing efficiency.

**JACKET HEAT TRANSFER ANALYSIS:** Enhances heat exchange efficiency in jacketed reactors, ensuring precise thermal control during reactions.

**REACTION RATE:** Provides insights into reaction kinetics, allowing fine-tuning of process variables for faster, more efficient reactions.

**MASS TRANSFER (OXYGEN UPTAKE RATE/OXYGEN TRANSFER RATE):** Maximizes gas exchange in bioprocesses, improving efficiency in fermentation or cell culture.

### Let's chat about our Services:

CFD and Process Optimization

Reactor, Heat Exchanger, & Boiler Design

Piping Analysis

Welding Engineering & Fracture Mechanics

Safety and Hazard Analysis & Simulation

Visit our website at [LATTICEPT.COM](https://www.latticept.com) to learn more about LATTICEPT and all we have to offer! Contact Ben Turner at [Ben.Turner@Latticept.com](mailto:Ben.Turner@Latticept.com).