

Process Design

Efficient product delivery through robust process design

Process Design involves the identification and regulation of critical process parameters to provide a greater degree of certainty that the critical quality attributes for an entire batch will meet the pre-defined limits.

The Process Design team supports the Technology Transfer team from conception to commercial scale, for both biotech and pharmaceutical molecules.

Purpose of Process Design

- Design robust processes by performing simulation studies
- Estimate process cycle times to ensure effectiveness and economic feasibility
- Estimate scale-up parameters accurately to minimise pitfalls upon scale-up

Key activities

- Basic engineering studies
- Evaluation of scale-up parameters using standardised templates
- Process modelling, simulation, and design
- Arriving at the best-suited criteria for complex chemistries and unit operations
- Multidisciplinary engineering solutions for complex processes like catalytic and gas induction reactions

Software enablers

- Dynochem and Aspen Plus for process simulation
- AutoCAD for process instrumentation diagram
- MixIT for estimating typical mixing scale-up parameters

Key deliverables

- Estimation of the plant scale reaction kinetics based on the lab data
- Application of simulation tools
- Rigorous distillation calculations to estimate solvent swaps and arriving the parameters for continuous operation.
- Mixing profiles for plant scale batches based on scale-up criteria
- Heat and mass transfer calculations
- Assessment of physical and chemical properties of all new molecules
- Simulation studies on fractional distillation, heat

exchanger rating, and separation efficiency of solvents, etc.

- Batch Cycle Time estimation
- Rigorous distillation calculations to estimate solvent swaps and arriving the parameters for continuous operation.
- All new molecules are assessed and the most appropriate isolation and drying techniques applied
- Performing sensitivity analysis using designed and standardised technical calculation templates for plug and play
- Techno-commercial evaluation of project proposals

Technical Calculations		
BCT estimation	Scale-up calculations	Simulations
<ul style="list-style-type: none"> • Heating-cooling time • Addition time • Distillation time • Filtration time • Drying time 	<ul style="list-style-type: none"> • Orifice size • P/V and tip speed • Heat of reaction (Cryo and Hydrogenation) • Overall heat transfer coefficient • Liquid nitrogen requirement • Vent size • Condenser area • Kinetics 	<ul style="list-style-type: none"> • Mixing simulation (Njs & Njd) • Distillation time • Solvent swapping • Mass transfer coefficient • Hydrogenation study • Overall heat transfer coefficient