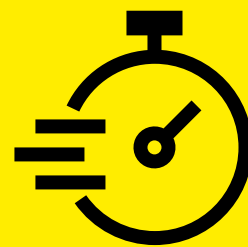


# Optimized Upstream Development – Actionable Insights Through In Silico Simulations



Time



Performance



Quality



Costs

## Perfusion Cell Line Selection

Instantly generate fed-batch, perfusion, and N-1 cell culture clone performance forecasts

Maximize understanding of clone performance through rich in silico predictions

Reduce run variability by standardizing clone-selection workflows

Choose the best clone without having to perform resource-intensive, *in vitro* experiments

## Condition Configuration

Quickly determine optimal bioreactor parameter settings

Determine how parameter adjustments impact cell growth, metabolism, and productivity

Maintain key attributes within specification

Find optimized bioreactor settings using *in silico* simulations

## Perfusion Protocol Configuration

Rapidly configure and optimize perfusion media exchange settings

Investigate how perfusion media composition and exchange rates impact cell growth

Develop understanding of core growth kinetics and sensitivity to waste by-products during media exchanges

Minimize the necessary number of experiments to define optimal media compositions and perfusion media exchange settings

## Seed Train Configuration

Quickly configure and optimize high-cell-density seed trains

Understand how seed duration, number of passages, and culture methods impact cell growth

Identify seed train configurations that deliver desirable performance at high cell densities

Experiment with different seed train configurations without having to perform physical experiments