Accelerate cell culture development using



Pharma & Biotech

the MAST[®] Aseptic Sampling System

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Purpose

- On-line process analytical technology (PAT) tools like dielectric and Raman spectroscopy provide insight into cell processes that impact titer and antibody quality.
- The integration of these data with off-line measurements such as cell density, viability, titer and glycosylation remains an elusive goal.
- The MAST[®] Modular Automated Sampling Technology integrates automatic sampling with automated

Case study #1 – whole broth analysis: MAST[®] System vs. Manual

- Samples were collected from both SP100 and SP200 units.
- Vessel size ranged from 1 liter to 500 liter.
- Cell culture batch runs were performed at end user facilities and at Lonza.
- Cell culture purposes ranged from regulatory toxicology lots to small scale development experiments.
- Samples were drawn from two different facilities using two different Nova® BioProfile® FLEX units.

- analysis.
- Case Study #1 studies look at how the MAST[®] System helps eliminate non-value activities such as sample collection, processing, and analysis.
- Case Study #2 shows how implementation of automated aseptic sampling, analysis and data management lead to novel experimental approaches and dramatically reduce development time.
- Case Study #3 describes how automated aseptic sampling and analysis can lead to the implementation of a Product Quality Attribute Control (PQAC) scheme.

MAST[®] System

Master Controller, Analytical Navigator, Sample Navigator

- Coordinate aseptic sampling from 1-10 bioreactors.
- Deliver samples to up to 4 destinations.
- Control samples, purge gas and sanitant flows.
 Manage through MAST[®] Connect software.

Cell Removal System

- Effectively remove cells from 30 to 40 samples before cassette change out is required.
- Eliminate sample carryover with automated flushing between samples.

Sample Pilots SP100 and SP200
Improve sterility assurance with patented value



SP200



Metabolites (gluose, glutamine, glutamate and lactate) normalised parity plot comparing MAST[®] system to manual samples ples





The MAST[®] System was set up to collect cell free permeate samples and deliver to a Nova[®] BioProfile[®]
 Flex and a Gilson[®] Liquid Handler.



- system.
- Decrease risk of clogging.
- Reliably deliver 1 55 mL volume increments.
- Push sample by liquid or air to improve accuracy of sample delivery.
- Allow sample to travel long distances.
- Easily sanitize system after each sample collection.



Conclusions

- Over 100 Sample Pilot modules have been delivered and used in development bioreactors, pilot scale single use bioreactors, pilot scale fixed stainless steel bioreactors and downstream sample sources.
- Aseptic samples have been collected from upstream and downstream sources, and used in cell culture and microbial applications. In the last few years, the SP100 and SP200 units have collected over one hundred thousand samples without causing a sterility failure.
- Case Study #1 demonstrates that the MAST® System samples are consistent with manual samples and are representative of the conditions inside the bioreactor. Collecting samples automatically frees up resources to work on higher priority development projects.
 Case Study #2 shows how autosampling reduces process development time and allows for new approaches to experimental design.
 Automating cell removal and sample processing followed by automated analysis as described in Case Study #3 paves the way for integrated product quality attribute control.

- Experiment was designed to show how automated sampling will significantly reduce development time, from 12 to 4 days.
- We predicted that increased galactose feed would lead directly to increased galactosylation and that automation would decrease development process time.



Case study #3 – implementation of product quality attribute control

- Product Quality Attribute Control (PQAC), measurement of the product quality attribute (PQA), has significant technical hurdles.
- PQAs may include glycosylation profiles, degree of aggregation, degree of amidation etc. Devices such as HPLC, UPLC or LCMS are often used to measure these types of PQAs.
 Using the MAST(R) Aseptic Sampling System, the ability to automatically collect samples, remove the cells, perform activities on those samples (e.g. Protein A) and then automatically analyze their glycan profiles has been demonstrated.



MAST™ Interface

Sample Control Sanitant, Cleaner and Air Purge





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