



DESIGNING NOVEL FLUID SAMPLING SYSTEMS FOR GMP OPERATIONS

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Overview

Bioprocess sampling

New product development lifecycle

Conceptualization

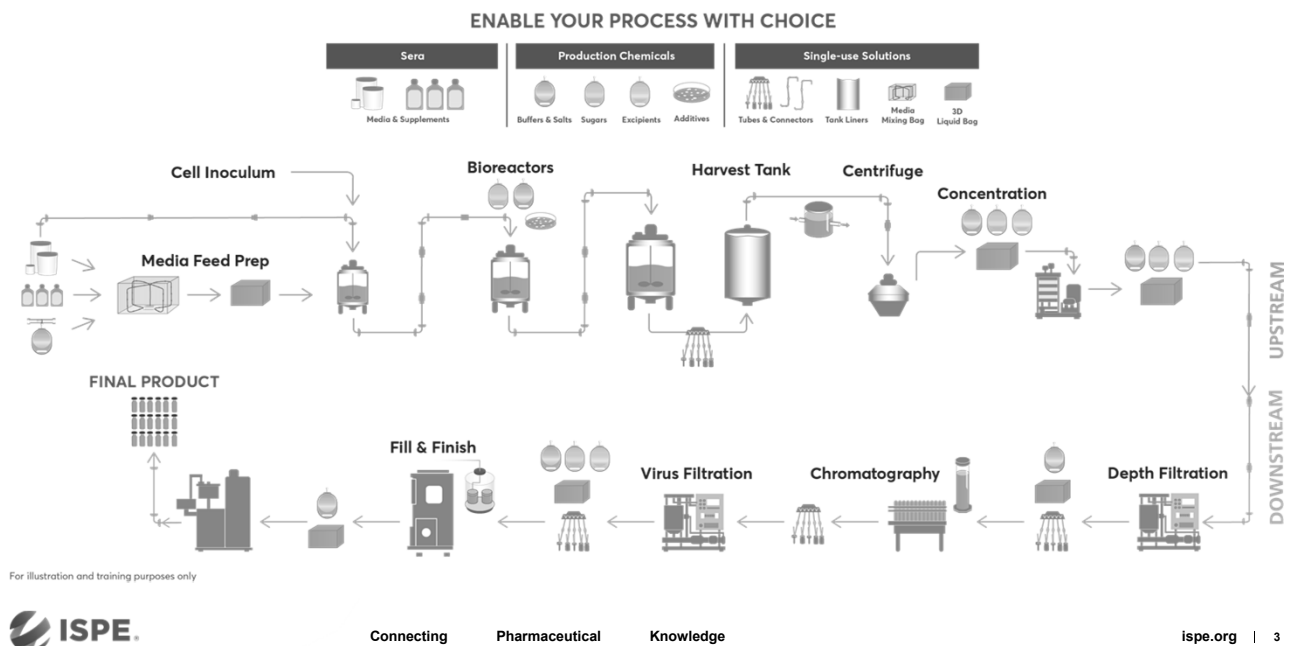
Engineering design

Quality by design

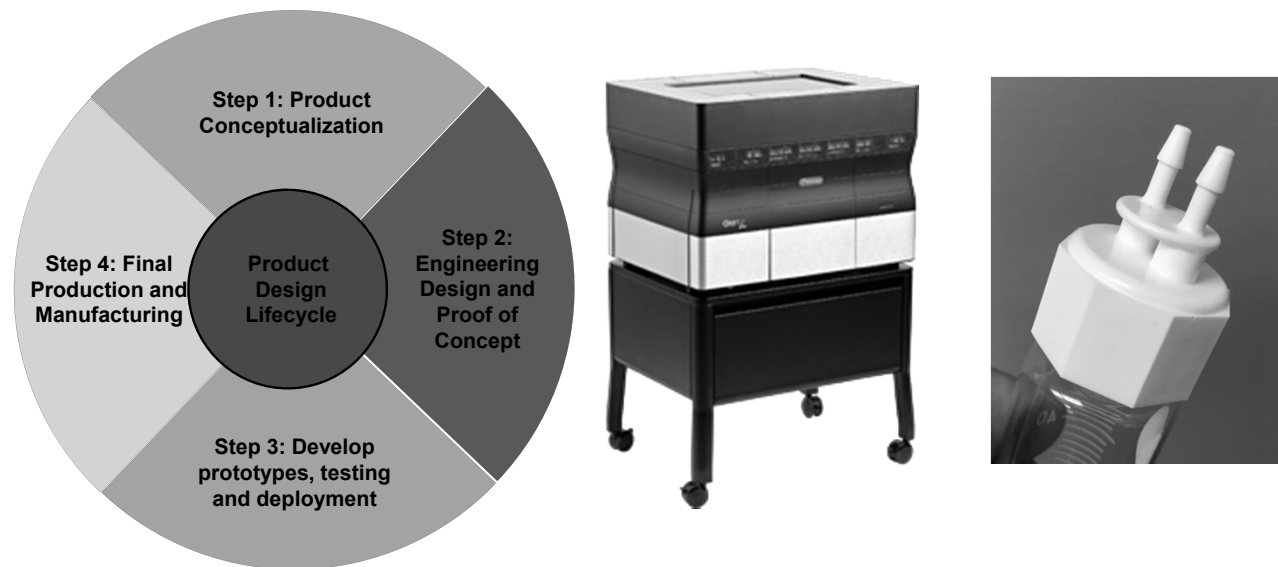
Production and manufacturing



Typical Process Schematic – Biopharma Manufacturing



Product Development Design Lifecycle



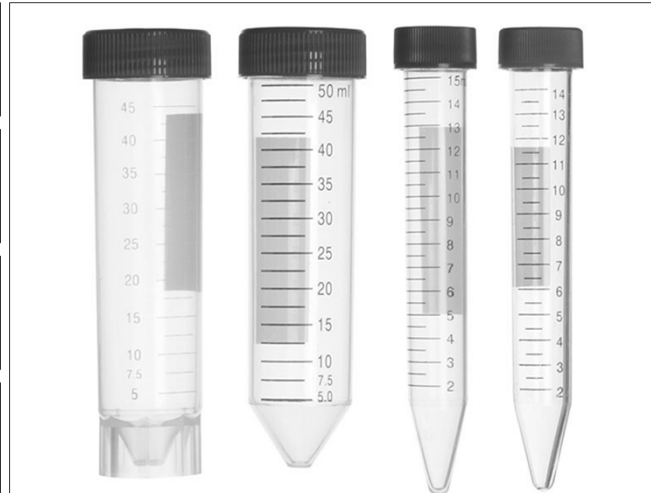
Primary Container Selection – Conical Tube

Universally accepted

No secondary transfers once in the lab

Variety of sizes available

Material selection



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Octocap Design – Small Volume, Closed System Sampling



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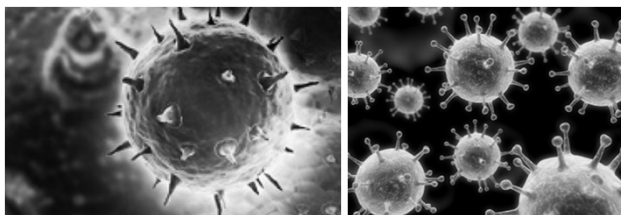
ENGINEERING DESIGN CONSIDERATIONS

CREATING PROPER SEALS

Material Selection Considerations

Tube Material Polypropylene vs. Polystyrene

- Endotoxin has an affinity to bind to polypropylene and give a false negative result.
- Solution: OmniTop w/ Polystyrene tubes designed specifically for Endotoxin testing yield more accurate results.
- Animal Origin Free or EMA 410



Why Octocaps?

Most caps are round with knurling



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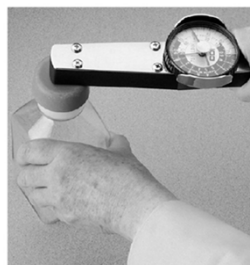
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Why Octocaps?

Applying Controlled Torque to Round Caps



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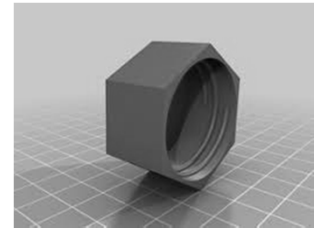
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Why Octocaps?

Square and Hex Caps



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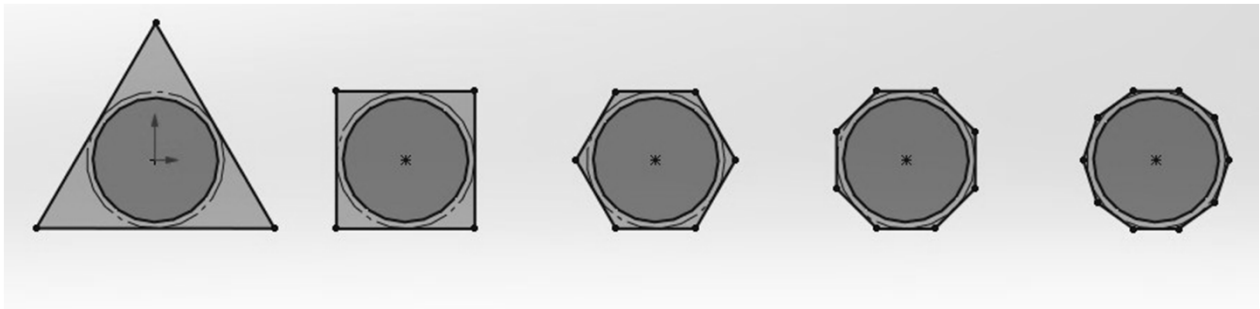
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Why Octocaps?

Wall Thickness



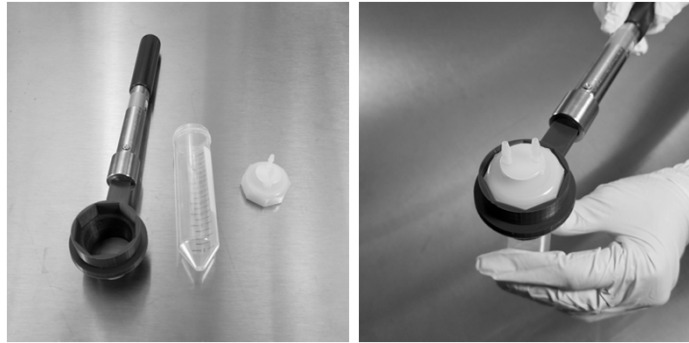
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Why Octocaps? Torque Wrench



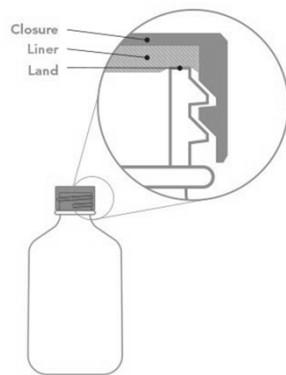
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Types of Seals



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QUALITY BY DESIGN

Single Use Supply Chain Risk Management Overview



Reliable and transparent supply chain solutions designed to decrease complexity

Designing for Regulatory and Quality Compliance



Sterility Validation

- Quarterly Dose Audits

Lot Release Testing

- Endotoxin and Particulate

System Integrity Testing



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Sterility Validation and Lot Release Testing

- **Sterility Validation (Gamma-Irradiation)**
 - Compliant to ANSI/AAMI/ISO 11137 (VDmax25)
 - Full Validation to a Simulated Product (48 Units)
 - Quarterly Re-Validation – Dose Audits (20 Units)
 - Bioburden, Endotoxin & Particulate Testing on Simulated Product
 - Sterility Testing
- **USP Lot Release Testing**
 - Endotoxin USP <85>
 - Particulate USP <788>



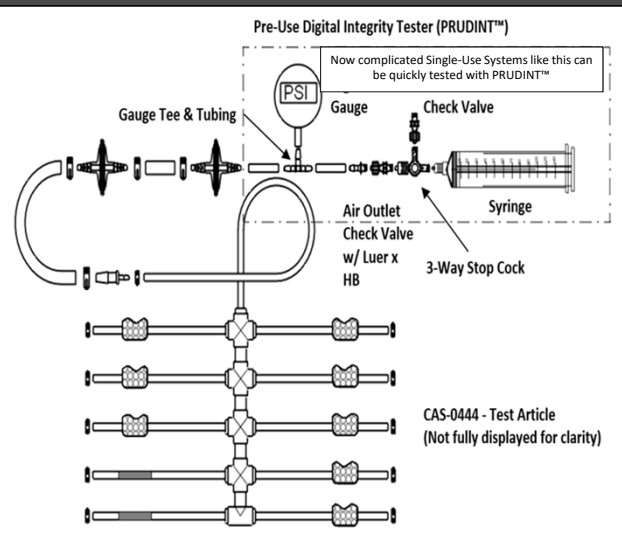
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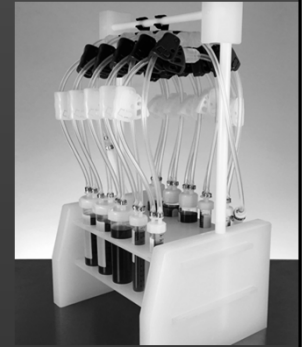
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Integrity Testing



Pre-Use Digital Integrity Testing for Single-Use Systems - PRUDINT

- Developed to permit pre-use integrity tests of single-use systems.
- Can be performed at point of use.
- Risk Mitigation for preventing loss of batch due to faulty or damaged single use systems.



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PRODUCTION AND MANUFACTURING

OmniTop – Closed System Sampling

- **OctoCap** – 2 x 1/8"HB Ports
 - Standard Inlet – 1/8"ID x 1/4"OD TPE Tubing
 - Octagonal Designed to achieve desired torqued closure
 - Vent – 0.2 Hydrophobic Filter with female luer connection
- **Connection Method:** Tube Welding
 - Custom Solutions Available
 - Aseptic Connection Devices, Luers, Needleless Free Devices
- **Simple Sampling:** Fluid Transfers via vacuum generated in the OmniTop through 0.2um filter with syringe



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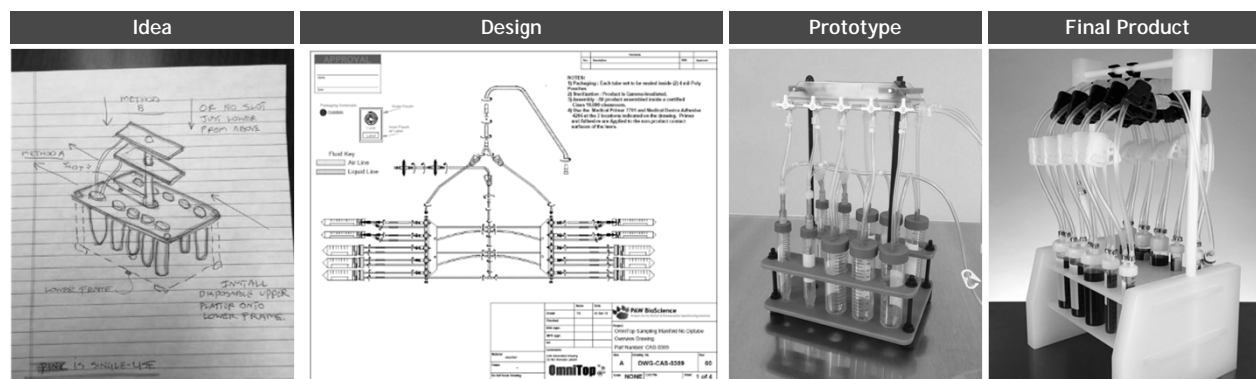
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Developing Sampling Plan Manifolds

Custom solutions based on an open architecture model combined with application knowledge, engineering & single-use expertise



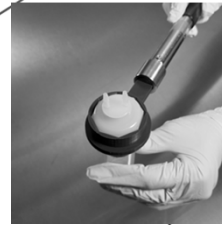
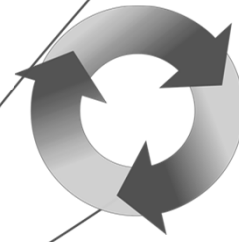
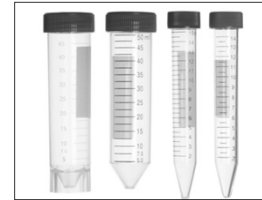
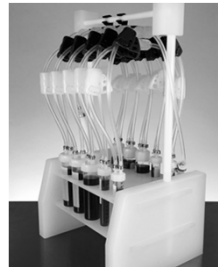
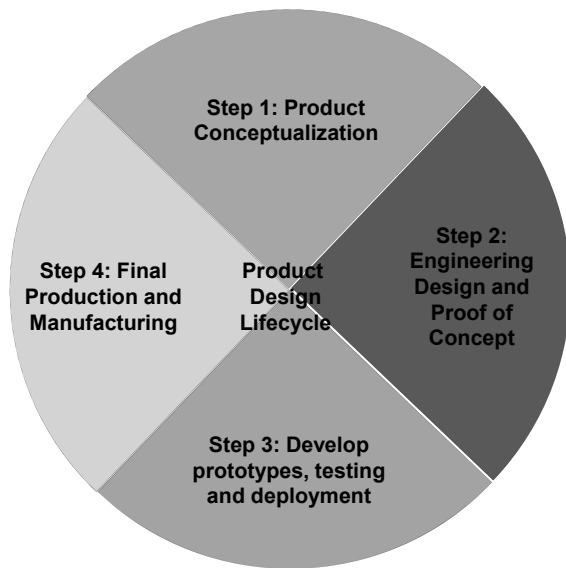
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Summary



THANK YOU

QUESTIONS?

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Avantor