Eliminating Steps in the Bioprocess Pipeline with Aseptic **Optimum Growth® Sampling Flasks**

Author: Sam Ellis, Joe Machamer, Mike MyLymuk, Ana Sirianni
Thomson Instrument Company, Oceanside, CA

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The bioprocess community is under a lot of pressure to shorten the timeframe from shake flask, to culture bag. Innovative solutions for aseptic sampling and feeding cultures in shake flasks as well as transferring from shake flasks to culture bags will be investigated. These solutions include flasks with integrated one-way valves that allow for sterile sampling outside of the tissue culture hood and shake flasks with bi-directional ports. The ports allow for coupling of sterile tubing that can aseptically transfer cells/media into and out of the flasks. These ports allow scientists to process samples in an aseptic fashion while the flasks remain in the incubator while maintaining the ambient temperature and eliminating disruptions in cell growth. These Optimum Growth™ Flasks have the capability of speeding up and eliminating steps in bioprocess pipelines such as using, transferring material into and out of a cell bank, simplifying perfusion, and allowing for feeding of serum and other nutrients over time. Thomson Instrument Company strives to create tools that eliminate bottlenecks in biological process development.

Bidirectional Transfer Cap for 1.6L-5L **Optimum Growth® Flasks**

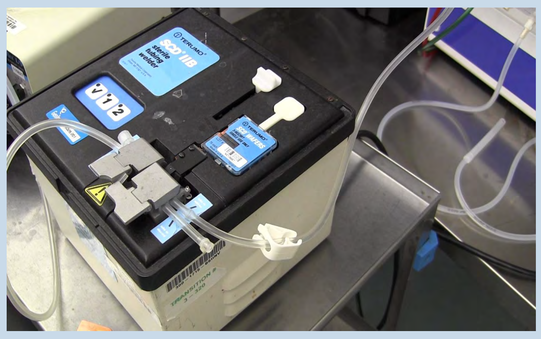
The Sterile Optimum Growth® Flasks and Bidirectional Transfer Caps (patented) with downstem, allow for easy aseptic transfer of media or cells into and/or out of cell bags, bioreactors, and flasks (from all manufacturers).

The Bidirectional Transfer Caps with downstem works with the Thomson Optimum Growth™ Flask product line. Simply, replace the culture cap with the Bidirectional Transfer Cap and connect to your vessel of choice and place peristaltic pump between.

- Sterile transfer of cells from an Optimum **Growth™ Flask to a larger Optimum Growth™** Flask, wave bag or bioreactor.
- Sterile reagent additions.
- Seeding of larger bioreactors or cell bags.
- Pumping of media into flasks from large drums or bags of media into and out of bioreactors.

How to Transfer or Feed

1. Replace Vent Cap with Bidirectional Transfer Cap.
2. Connect to your receiving vessel by Tube Fusing or using our Luer Lock option.
3. Place the silicone tubing in the peristaltic pump head or connect the Luer Lock fittings.
4. Liquid can then be pumped either into or out of the flask.



Tube fuses with C-16 C-**Flex or ¼"** OD Tubing

Connects to 5L bioreactor

Connects to cell culture bag

Connects to 14L bioreactor

Sampling Cap

The Sampling Cap is ventilated for cultivation and has a one way valve allowing for aseptic sampling of cells while the flasks remain in the shaker. This minimizes sampling time to a 1 minute operation. The Sampling Cap will also eliminate the need for flask removal from the shaker and into the hood; reducing the risk of contamination, mix up or other error from additional steps. Interruption of the culturing process is minimized.

The Sampling Cap option is available for the 125mL, 250mL and 500mL Optimum Growth™ Flasks.

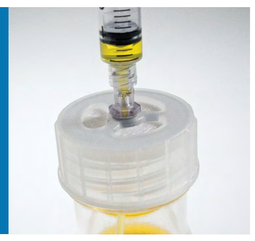
OLD Sampling Method:

1. Remove flask from shaker.
2. Spray down flask before putting in the hood.
3. Place flask in the hood.
4. Remove Cap.
5. Take sample.
6. Replace cap.
7. Put back in shaker.

Thomson Sampling Method:

1. Sample flask while in the shaker.

The Sampling Cap is ventilated and stays on during cultivation.



Sampling 16 Flasks = 16 Min./per day

Thomson Method 16 flasks in 16 minutes

Multiported Optimum Growth® Transfer & Feed Flask

The Multiported Flask is completely aseptic, making it the perfect start for initial seed cultures that seed bioreactors in multiple stages of clinical drug production. Other uses for the Multiported Optimum Growth™ Transfer & Feed Flask include keeping cell lines alive and other manufacturing functions.

The Multiported Optimum Growth™ Transfer & Feed Flask was born out of necessity from biopharmaceutical companies requiring a completely aseptic process. Benefits of these Multiported Flasks have replaced the process from starting point:

- Sterile tube fuse inoculation.
- Eliminates the need for cell bags 20L or less.
- Replaces current process requiring tube fusing for inoculation.
- Allows for multiple day additions.
- Aseptic 1-way sampling valve.
- Allows for simple use within a shaker.
- Great for aseptic manufacturing; never any opening needed preventing potential contamination.