



**UNIVERCELLS**  
**Technologies™**  
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## User Guide

# Seed train or seed culture expansion process

The **seed train or seed culture expansion process** is a series of steps used to generate the sufficient amount of viable cells for large-scale production of vaccines, viral vectors, monoclonal antibodies and other biologics. The purpose of the seed train is to progressively grow and expand the initial small-scale cell culture to inoculate the large-scale bioreactor for higher capacity production.

Conventional equipment, ideal for lower expansion volumes, includes glass-spinner flasks and T-flasks for adherent cell lines, as well as shake flasks and small-volume stirred tanks for suspension cell lines. As the need for larger cell expansions (N-3) and intensified processes grows, more advanced equipment has emerged. This includes layered vessels, perfusion mode bioreactor rocker bags, and wave/rocking motion bioreactors, offering enhanced efficiency and scalability.

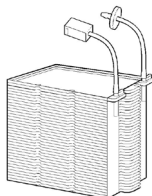
**Univercells Technologies** has recently developed a way to harvest the cells from its intensified fixed-bed bioreactors to dislodge cells and re-seed them with high viability.

The **scale-X™ cell collect** module is a benchtop cell harvest system for fixed-bed to fixed-bed inoculation.

The module retrieves cells through a combination of enzymatic and mechanical action, providing high cell harvest yields (**up to  $2.1 \times 10^9$  cells/m<sup>2</sup>**) with excellent viability (**>90%**). This enables cost-effective cell expansion in GMP-compliant conditions, while de-risking the seed train process in a low footprint.

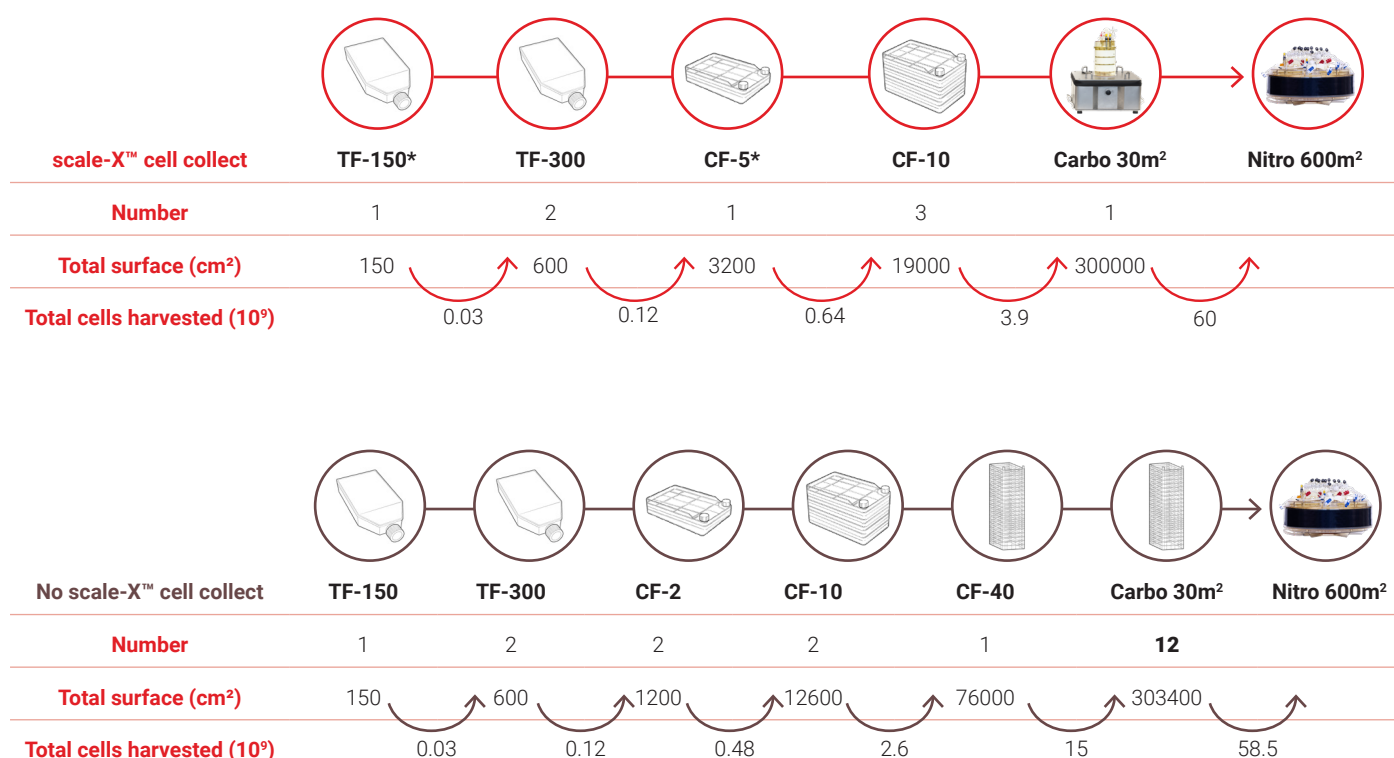
The use of the scale-X carbo bioreactor and cell collect module in a seed train can replace the last steps of the seed train process, which typically involve a significant amount of flatware when using traditional technologies. Figure 1 presents a comparison between the seed train using cell factories and hyperstack. The assumptions used in this comparison are detailed in Table 1.

As shown in the assumption table, the scale-X bioreactor can be seeded at a lower cell density and harvested at a higher density. Consequently, the total split ratio in the scale-X system is ultimately larger than that in the flatware system. This significant difference in split ratios highlights the advantages of adopting the scale-X bioreactor for seed train generation when comparing these two alternatives.

|                                   | 40-layers cell factory                                                              | Hyperstacks - 40                                                                     | scale-X™ carbo bioreactor with scale-X™ cell collect module                           |
|-----------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                   |  |  |  |
| <b>Surface area</b>               | 25,280 cm <sup>2</sup>                                                              | 18,000 cm <sup>2</sup>                                                               | 10-30m <sup>2</sup>                                                                   |
| <b>Expected harvest density</b>   | 150,000-200,000 cells/cm <sup>2</sup>                                               | 150,000 cells/cm <sup>2</sup>                                                        | Validated up to 400,000 cells/cm <sup>2</sup>                                         |
| <b>Final seeding cell density</b> | 20,000-40,000 cells/cm <sup>2</sup>                                                 | 20,000-40,000 cells/cm <sup>2</sup>                                                  | 2,000-20,000 cells/cm <sup>2</sup>                                                    |

**Table1. Assumption table of common large-scale adherent cell culture solutions**

The scenario with the scale-X cell collect module not only reduces an entire passage step in 40 layers cell factories, it also requires less equipment at the last passage at a fraction of the cost to achieve the inoculation density for the scale-X nitro bioreactor.



\*TF= T-Flask, CF= Cell Factory

**Figure 1. Example scenario using Cell Factories to seed scale-X nitro 600m² bioreactor**

See **Univercells Technologies** newly introduced cell expansion solution based on the scale-X bioreactor to simplify the workflow for your seed train needs - the scale-X cell collect module.

[Discover more](#)

Wondering what it would mean to intensify your seed expansion process using the scale-X cell collect module?

Our **Univercells Technologies** team is ready to support you at [customer\\_service@univercellstech.com](mailto:customer_service@univercellstech.com).