Comparison of the handling time of the CellScrew® 6K and competitors

Industry Segment: Biotechnology R&D
Application Field: Handling time of cell culture systems
GEB Product(s): CellScrew®

The need of efficient cell culture systems

There is a growing demand for cell culture systems with large surface areas in biopharmaceutical applications, such as adherent cell cultures for cell therapy. For instance, stacking cell culture T-flasks within one system not only provides a large surface area but also streamlines processes and saves time compared to handling several T-flasks individually instead. Handling time is intricately connected to the system's performance through the space-time yield. With the introduction of the CellScrew®, Green Elephant Biotech brings a new, high surface-to-volume ratio cell culture system to the market. The patented structure, comprising of concentric cylinders and Archimedes' screws, offers a large surface area in a compact design. The subsequent evaluation demonstrates the handling time of the CellScrew® 6K (CS6K) in comparison to two existing high-surface cell culture systems (competitor A and B).

Key findings & advantages of the CellScrew®

- Comparable handling times were observed across operators for each system
- The CellScrew® 6K demonstrated reduced handling time compared to its competitors
- Enhanced processes within the CellScrew® 6K resulted in reduced working time

Authors: Paul Medebach, Björn Boshof, Lukas Käßer
All data was collected and analyzed in-house.

Comparison of the handling time

The R&D department of Green Elephant Biotech GmbH designed and performed the experiments in-house. To quantitatively compare the handling time, the duration of general operations in cell culture was timed for each system. All steps were performed in triplicate and by two different operators. The different steps examined are listed in Table 1.

Table 1: Cell culture working steps for investigating handling time of various large surface cell culture systems.

#	Working Step	Description
1	Inoculation	Addition of a cell suspension to the system for cell seeding.
2	Sampling	Extracting a small volume of medium from the system for analysis.
3	Medium exchange	Replacing used medium with fresh medium.
4	Harvest	Removal of medium, washing step, detachment of cells, removal of cell suspension.

All action steps were carried out in accordance with the handling protocols provided by the respective system manufacturer. To remove the liquid from the CellScrew® 6K, a screwable 3D-printed cap (referred to as the "liquid handling cap"), which functions like a funnel, was used to pour the liquid out of the system in a controlled manner.

Results

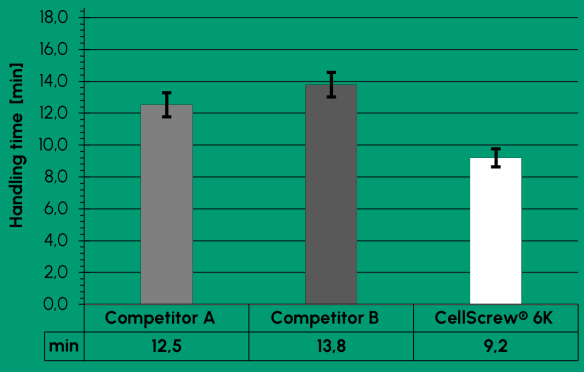

Figure 1: Total handling time per system with different operators (n=6).

Differences in the handling times of medium exchange were attributed to the varying recommended working volumes of the systems (Vol. CS6K < Vol. Competitor A < Vol. Competitor B). Figure 1 presents the total handling time for all three systems. In general the handling time of the CellScrew® 6K, competitor A and competitor B was comparable. When normalized against the handling time of the compared system, operating the CellScrew® 6K resulted in a reduction of approximately 26% and 33%, respectively.

Moreover, individual steps were examined separately, with the measured handling time presented in Figure 2. The total handling time for harvesting was nearly identical across all systems. However, variatons were noted when comparing specific process steps. Figure 2 indicates that the inoculation and medium exchange steps yielded the greatest time savings when employing the CellScrew® 6K. Overall, the data demonstrates that the CellScrew® 6K is either comparable to or even more efficient than its competitors in terms of handling time. This efficiency can be attributed to the compact and user-friendly design of the CellScrew® 6K. Furthermore, it was possible to demonstrate that enhancing established processes results in time reduction and, consequently, improved space-time yield using the liquid handling cap.

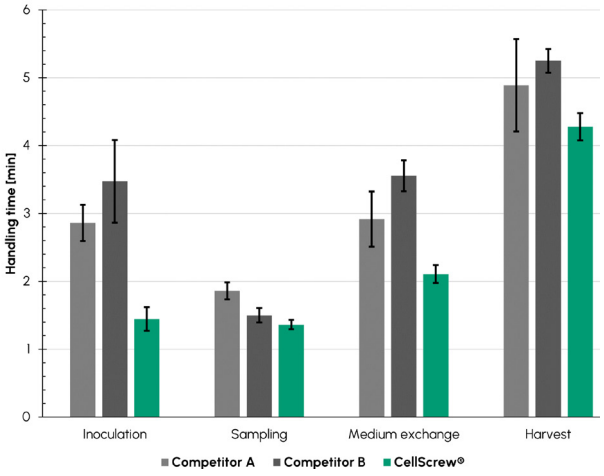

Figure 2: Handling time for the different working steps (n=6).

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