

Green Elephant®

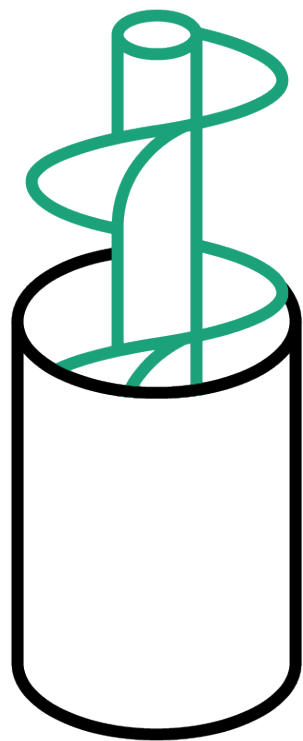
CellScrew®

Adherent cell production. Simplified.
High surface area. Compact footprint.

- Miniaturize and simplify your operational footprint
- High cell growth with simple handling and harvest
- Scalable in size and from research to clinical manufacturing environments



The genius in the bottle



Inspired by a playground. Engineered for adherent cells.

The internal structure of the CellScrew® is inspired by the Archimedes' screw, a mechanical solution once used to move water upward with minimal force.

While watching a screw in a playground water feature with his niece, the inventor recognized its potential for cell cultivation and reimagined it for modern bioprocessing. Today, this ancient principle enables gentle, continuous circulation inside the CellScrew® resulting in low shear conditions.

What happens inside

- Bottle rolls at 10-15° angle and 0.2–2 rpm
- Screw lifts and redistributes media
- Even delivery of gases and nutrients
- No chaotic movement — only controlled flow

Homogeneous cultivation — by design

- Constant low-shear environment
- Uniform cell exposure
- More reproducible outcomes
- Healthier growth conditions

CellScrew® vs. conventional roller bottle



- Active media transport
- Gently mixed by geometry



- Passive liquid movement
- Shear from liquid roll-over

More surface. Same footprint.

Rather than increasing the bottle size, the CellScrew® expands what matters inside. The concentric cylinder design places multiple cultivation layers inside one bottle — substantially increasing available growth surface without changing the outer dimensions.

What happens inside

- Multiple internal surfaces
- One continuous spiral system
- Same rolling movement, same handling concept
- More adherence area

Maximized cultivation area

- Optimized surface-to-volume ratio
- Same operation, higher output
- No workflow redesign needed
- Scales from R&D to clinical production

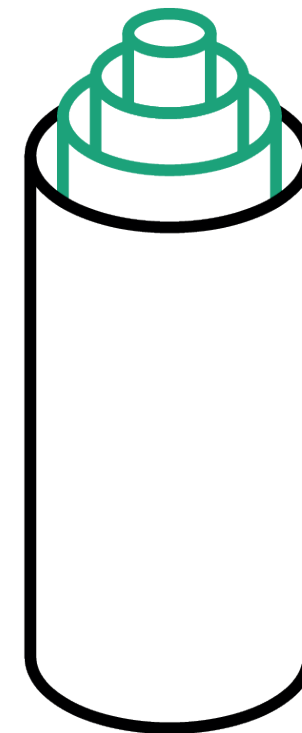
CellScrew® vs. conventional roller bottle



- Multiplied surface
- Surface-dense design
- Scaling = same system, larger size



- One surface layer
- Space inefficient
- Scaling = more bottles



One design. Three sizes.

Scale your culture,
not the complexity.



CellScrew® mini
Bench-scale



CellScrew® 6K
Scale-up



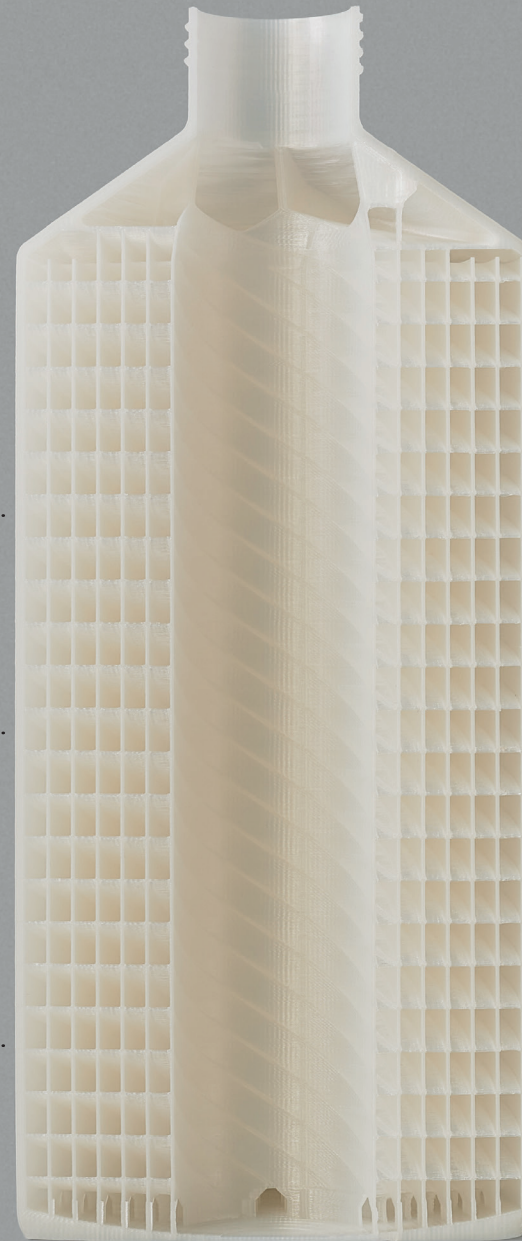
CellScrew® 10K
Clinical stage

Designed for simplified adherent cell production

Large cell culture area formed by concentric cylinders

Excellent mixing, oxygen transfer and gas exchange facilitated by Archimedes' screws and slow rotation on a roller

3D printed using PLA, a sustainable bioplastic derived from corn



Easy to handle design, optimized surface-to-volume ratio saving incubator space and handling time



Reducing costs and risks
Happy cells = happy scientists!

Seamless scalability options in ONE system from R&D to GMP



Skipping intense process development and reducing time-to-market

Material saving design with ~90% lower CO₂ emissions



Reducing environmental impact



Miniaturizing and intensifying adherent cell culture processes

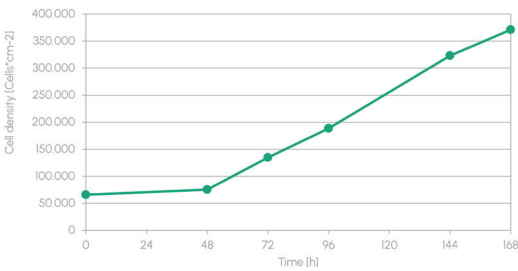
From lab-scale to large-scale, the CellScrew® reimagines adherent cell culture processes. With a single, robust and high-performance cell culture vessel, the CellScrew® simplifies and miniaturizes processes. Its innovative design frees up incubator space, scientist time and operational footprint while reducing risks, costs and errors. The CellScrew® enables simple scaling from small to XL, from research to clinical manufacturing environments.

Operational transformation

The CellScrew® realizes massive reduction in operational footprint enabling it to cut 92% of incubator footprint vs. roller bottles and 30% reduction in handling time vs. multi-layer stacks.



Growth kinetic of HEK-293 in CellScrew® 6K



Growth kinetic of HEK-293 in CS6K in RPMI (with 25 mM HEPES) + 10% FCS with a seeding density of 66,000 cells/cm².

Biological excellence

Cells like growing on PLA. With the CellScrew®s Archimedes screw design, there are no gradient build ups, rather cells grow in a dynamic, homogenous environment.

Scalable simplicity

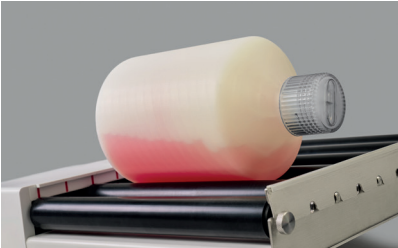
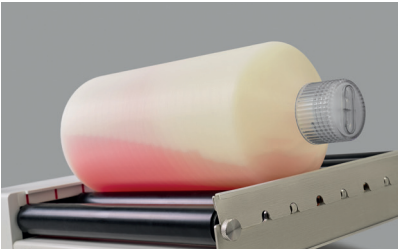
How does one win with GMP? Simplicity, traceability, and scalability. Manufactured in Germany, changing gear in size and quality is straight forward with the CellScrew®.



Scale-up or scale out, matching your operation

The CellScrew® is supplier in three sizes, mini, 6K and 10K to best match your application and to allow to you scale.

Every CellScrew® comes with a vented cap, sterilized and TC-treated.	CellScrew® mini	CellScrew® 6K	CellScrew® 10K
Product code	GEB-CSmTCS-2	GEB-CS6KTCS-4	GEB-CS10KTCS-4
Growth area	850 cm²	6,000 cm²	10,000 cm²
Medium range	50–120 mL	250–800 mL	450–1,300 mL
Recommended medium volume	85 mL	600 mL	1,000 mL
Height	16.1 cm	20.22 cm	29.22 mm
Diameter	5.3 cm	12.1 cm	12.1 cm
Weight	162 g	615 g	930 g
Oxygen transfer coefficient k_La (@0.5 rpm)	> 4.11 h ⁻¹	> 3.50 h ⁻¹	> 3.03 h ⁻¹
Mixing times (@0.5 rpm)	< 8 min	< 9 min	< 28 min
Recommended speed	0.2–2 rpm	0.2–2 rpm	0.2–2 rpm



The CellScrew® mini is available for use in a 3x mini CellScrew® TriDock which matches the size of the 6K making it ideal to save space or test out three conditions at the same time.

CellScrew® is used by

CDMOs

Cell & Gene Therapy developers

Translational research

Biotechs and Pharma

Manufacturers of vaccines & proteins

Cell banking facilities

For quotations, ordering, and for details of our evaluation program, email sales@greenebt.com

Just imagine this

Process intensification achieved through the adoption of the CellScrew®

Many laboratory operations are limited by their logistics, waste management, and staffing. CellScrew® reduces operational footprint, handling time, storage and waste disposal driving efficiency and effectiveness in labs.

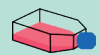
Swap out the CellScrew®

CellScrew® mini



850 cm²

=



12x T75 flask

or



1x roller bottle

CellScrew® 6K



6,000 cm²

=



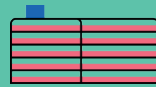
24x T250

or



7x roller bottle

or



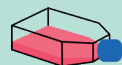
1x 10-layer stack

CellScrew® 10K



10,000 cm²

=



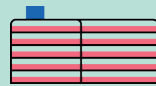
40x T250

or



12x roller bottle

or



1.6x 10-layer stack

More culture. Less clutter.

Super simple operation

The only question comes, what are you going to do with all that spare time and space?

The CellScrew® is a robust, easy to handle vessel. Easy to store and move around the lab. Less complexity and easier handling leads to great operating consistency and lower risk of contamination.

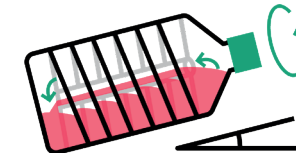
Operating the CellScrew® in your lab

STEP 1



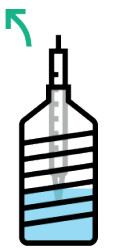
Inoculate the CellScrew® with cells and media, manually turn it a few rotations clockwise until the media is distributed in the bottle.

STEP 2



Incubate on a roller in a 10-15° angle; the Archimedes' screw inside the CellScrew® distribute cells, medium and gas homogeneously.

STEP 3



Harvest the cells from the CellScrew® after trypsinization or extract the supernatant.

How it works

Watch tutorial video



Applications

Where the CellScrew® is redefining adherent cell workflows

Cell banking

Efficient generation of high-density, uniform biomass for Master and Working Cell Banks in a single closed system.



Batch homogeneity: Using one vessel instead of dozens of T-flasks ensures the entire cell bank is uniform in quality, eliminating variation between individual culture vessels.



Contamination control: The closed system design significantly lowers the risk of contamination during this critical stage compared to the multiple open-handling steps required for T-flasks.

Seed train

Rapid intensification of adherent cell populations to generate the necessary cell numbers for inoculating larger production bioreactors.



Reduced footprint: The high surface-area-to-volume ratio allows you to generate massive cell numbers in a small incubator footprint, replacing large racks of cell stacks.



Media efficiency: The intensive culture environment reduces the volume of media required to reach inoculation densities, lowering the cost of goods (COGs) in the seed train phase.

Tissue engineering

Cell based assays

Cultivated meat

Cell and Gene Therapies

Human and animal vaccine production

A scalable, high-yield alternative to traditional roller bottles for the production of viral vectors and vaccines.



Labor reduction: One CellScrew® can replace hundreds of roller bottles, eliminating the labor-intensive and repetitive manual handling required to open, feed, and harvest individual bottles.



Process safety: Moving from an open processing technique (pouring roller bottles) to a closed bioreactor system protects the operator from exposure to viral agents and protects the product from environmental contaminants.

iPSCs

MSCs

We are actively engaged in the development of methodologies for

Cell types grown in the CellScrew® include

HEK-293, MSC, iPSC, CHO, Vero, MDCK, and a growing list of cell lines.

iPSC-derived cells, MSCs, Cell & Gene Therapy, tissue engineering, cell manufacturing for cell-based assays.

Contact our lab, always happy to share what we know.



Supporting your shift to GMP manufacturing

The CellScrew® completely eliminates the traditional “scaling gap” that plagues adherent cell culture development. Unlike conventional workflows — which often require switching from T-flasks or stacks to completely different bioreactor geometries as volumes increase — the CellScrew® utilizes a unified vessel design across all stages of development. This means the hydrodynamic environment and surface area characteristics your cells experience during early R&D are identical to those in later stages, ensuring that your research-grade success translates directly into clinical-grade performance.

By maintaining the same vessel geometry from the lab bench to the manufacturing floor, you significantly reduce the variables typically introduced during tech transfer. Data generated during the research phase becomes immediately predictive of clinical runs because the fundamental process parameters — such as mixing efficiency, shear stress, and oxygen transfer — remain constant. This consistency minimizes the need for extensive re-optimization studies, allowing your team to focus on biology rather than engineering troubleshooting.

CellScrew® offers

- True linear scalability
- Accelerated tech transfer
- Simplified regulatory compliance
- Predictable cell behavior
- Cost-efficient development

Suitable for integration with

We support your clinical journey

- Manufacturing and operating within an ISO 9001:2015 environment
- Full traceability of CellScrew® materials and production on a single item level
- Providing Extractables & Leachables Testing
- 100 % integrity testing (pressure drop test)
- FDA and EU Title 21 compliant



Closed cap system



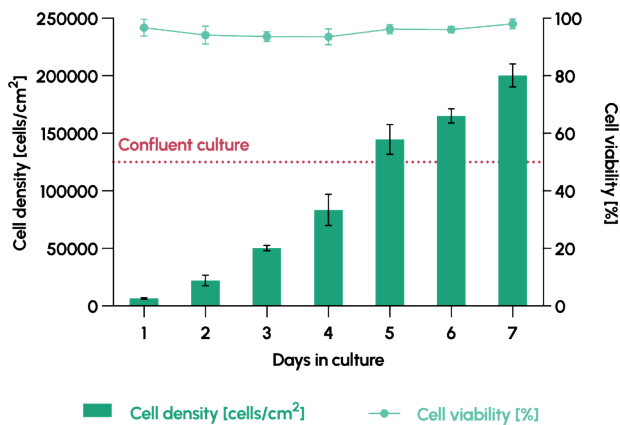
Archimedes® One bioreactor



3rd party equipment and biocontrollers

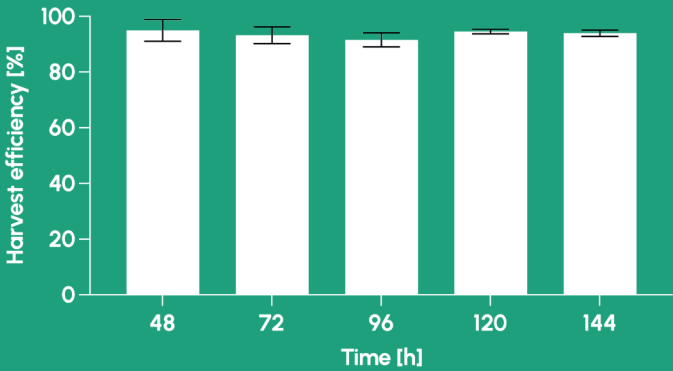
The scientific base

Enhanced cell growth and recovery using the CellScrew®

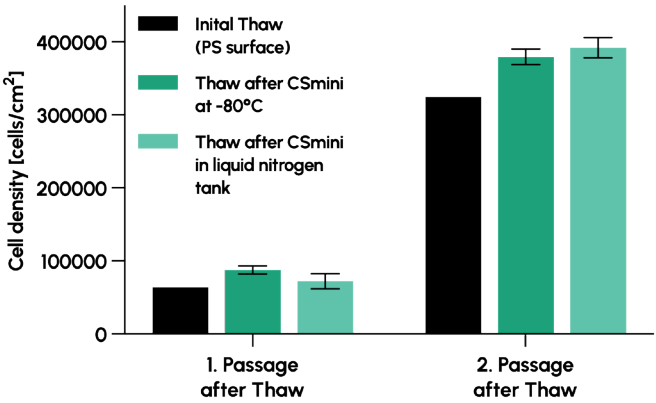


Growth kinetics of CHO-K1 in CellScrew® mini in Ham's F12 supplemented with 10% FCS. Cells were seeded at a density of 400 cells/cm², and three CellScrew® minis were harvested every 24 h.

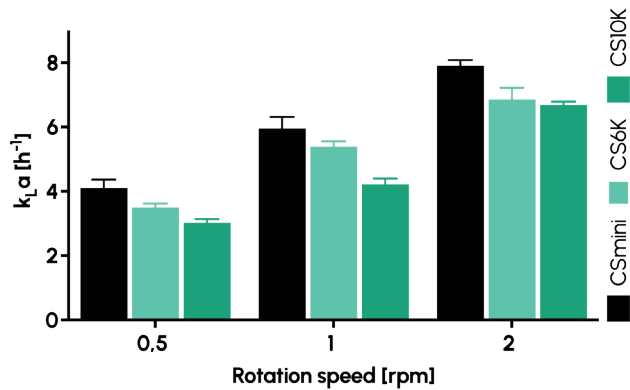
In-house data show that CHO-K1 and HEK-293 cells expand reliably on the PLA-based CellScrew® surface under dynamic conditions while maintaining >90% viability. Harvest efficiency consistently exceeded 90%, even with a 33% reduction in enzymatic reagent concentration, demonstrating a robust and efficient harvesting process. Cells retained expected morphology and behavior after detachment, confirming full downstream compatibility. Cryopreservation studies further showed complete functional recovery after thawing, with post-thaw growth matching conventional polystyrene-based workflows.



Harvest efficiency of CHO-K1 using TrypLE (1:3 in DPBS). After the initial harvest, an additional washing with DPBS was performed, and cells removed from this wash were also counted to calculate the overall harvesting efficiency.



Recovery of the CHO-K1 cells after cryostorage at -80 °C and in liquid nitrogen. Cell densities were determined after the first thaw and second passage.



Oxygen transfer coefficient ($k_L a$ -value) of the CellScrew® mini, 6K, and 10K at a range of recommended rotational speed from 0.5–2 rpm.

Quantified oxygen transfer and mixing performance

CellScrew® was characterized for mixing time and oxygen transfer ($k_L a$) to support controlled adherent processes. Mixing times were consistently short, remaining below 8 minutes for the CellScrew® mini, 9 minutes in the CellScrew® 6K, and below 28 minutes in the CellScrew® 10K across the recommended speed range. Oxygen transfer increased with rotation speed, levels comparable to benchtop stirred-tank systems. These results confirm efficient oxygen supply even for metabolically demanding cultures while maintaining gentle, low-shear conditions and a homogeneous cultivation environment.

Greener manufacturing for a more sustainable future

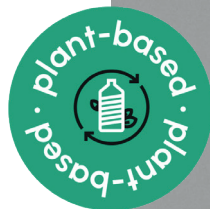
The CellScrew® is not only a breakthrough in bioprocess efficiency, but also a step toward more sustainable cell culture. Manufactured from high-quality, corn-derived polylactic acid (PLA), it is based on renewable resources rather than fossil fuels. Its high-density internal structure, produced via advanced additive manufacturing, achieves large surface areas while using less raw material.

This approach delivers up to a **90% reduction in carbon footprint** compared to traditional multi-layer stack systems — enabling high-performance processes that also support your sustainability goals.

Made from corn, saving **90%** carbon emissions



About



Green Elephant Biotech was founded with two driving forces: making advanced therapies more accessible by changing how cells are manufactured, and making the life sciences industry more sustainable.

Our flagship product, the **CellScrew®**, is a compact, 3D-printed system that expands adherent cells at scale — providing more than 100x the growth surface of a T-75 flask while reducing incubator footprint by over 90%. Built for Cell and Gene Therapies, vaccines, and biologics, it enables efficient scale-up of adherent cell production processes from research to clinical manufacturing.

At the same time, we apply plant-based bioplastics to traditional labware, such as the **Green Elephant® microPLAte** — a 96-well plate that delivers high performance with 50% less environmental impact.

Founded in 2021 as a University spin-off, Green Elephant Biotech operates from Berlin and Giessen with a growing international team.



GEB-CSmTC2S

GEB-CS6KTCS-2

GEB-CS10KTCS-4



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Join the herd

Become part of the Green Elephant® community for environmental and scientific fact-packs, and support the journey towards more sustainable workflows.

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