The AlteCap™ Swift Cell EYE

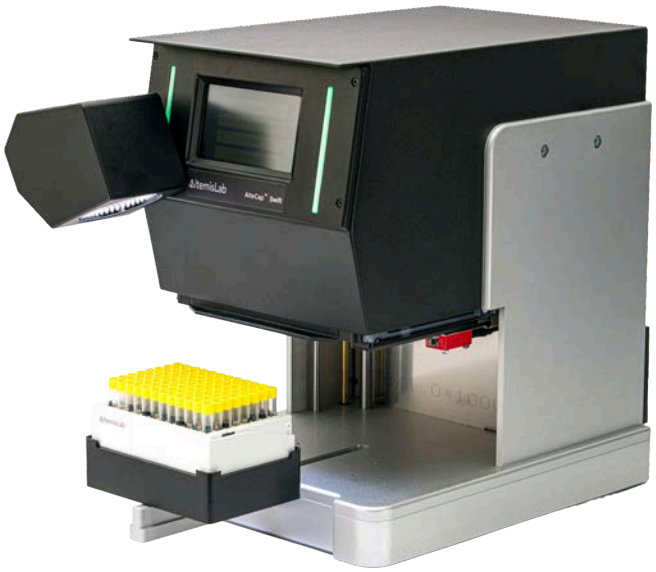
Our advanced vision-enabled decapping system delivers precise, automated verification at every step using powerful lighting and AI-driven detection. With adaptive tube height handling, built-in auto-calibration, and seamless integrated control, it ensures reliable performance and full traceability in every cycle.

Struggles

High throughput lab using automation face the risk of errors in both decap and recap cycles, as traditional systems often detect only missing or dropped caps. This can lead to workflow disruptions, unexpected downtime, and reduced sample integrity

Solution

Optimise error handling with Swift Cell EYE, which verifies exact cap positions to ensure every decap and recap cycle is performed correctly, providing a high level of reliability and sample integrity



The Swift Cell EYE upgrades workflows with AI-powered sequence verification that reliably detects and validates every decap & recap step under all lighting conditions. Featuring adaptive tube height handling and auto-calibration, it ensures consistent performance while reporting precise error positions for easy troubleshooting. Smart energy-saving controls and early anomaly detection significantly reduce manual checks and improve process confidence.

The AlteCap™ Swift Cell EYE

Automatic sequence verification
Detects and validates each decap/recap step with high reliability.

Fully-integrated vision control
Camera feeds directly into the decapper's main PCB using RS-232.

AI-powered* object detection
Runs locally on the camera and uses a pre-trained AI model to reliably detect the presence or absence of caps and tubes. Trained on multiple examples of caps, it ensures accurate detection even under challenging lighting conditions.

AI powered* anomaly detection
Runs locally on the camera and uses a pre-trained model to identify misaligned, tilted, upside-down, or cross-threaded caps, going beyond simple presence/absence checks. Ensures every decap and recap step is performed correctly.

Adaptive tube height handling
Automatically adjusts to different tube heights via built-in firmware, with no manual reconfiguration required.

Powerful LED light ring**
Ensures consistent detection performance regardless of the ambient lighting conditions.

Auto-calibration
Dynamically tunes camera exposure, focus, and shutter time to compensate for changing lighting.

Full-traceability
Optional image storage via FTP server. Operation is not dependant on image storage.

*: Type: Convolutional Neural Network (CNN) for image detection and classification. Mode: Inference only, predictions are based on pre-trained model.
**:LED lighting doesn't generate heat

AltemisLab

How does the AlteCap Swift Cell EYE carry out error handling?

Decap Scan 1: Confirms all caps are present (for full racks) and records their exact positions for end-cycle comparison

Decap Scan 2: Detects dropped caps, loose tubes, or foreign objects after decapping and sends precise error positions via serial communication

Recap Scan 1: Checks again for dropped caps or foreign objects before recapping to prevent damage to downstream liquid handlers

Recap Scan 2: Verifies final cap positions, compares them with the first scan, and flags any mismatch, tilt, or anomaly with exact positional data

Camera Specs	
Sensor	Monochrome, 1.2 MP (1280 x 960 px)
Sensor Resolution	1.2 MP (1280 x 960 px)
Scanning Rate	40 Hz
Optical Focus	Liquid Lens (Auto-focus)
Work Area	50 mm to 300 mm
Focal Length	6 mm
Ingress Protection	IP 65
Power	3.5 W
Interface	RS-232, TCP/IP

Feature	Swift CELL EYE	Others
AI-based object & anomaly detection	Pre-trained AI model for tubes/caps	Standard presence checks only
Adaptive tube height handling	Automatic, multi-height support	Only one tube height
Lighting system	Tolerant to a range of lighting conditions – Utilises web-based software with microsecond-level exposure adjustments to maintain consistent image quality in any environment	Easily affected by ambient light
Cycle by cycle traceability	In-built error handling with the option to store images	Image stored every cycle, takes a lot of storage
Energy management	Auto light off after 5 minutes	Always on
Error detection	Detects caps after each decap and recap cycle	Detects only missing or dropped caps
System	Unified with decapper firmware	Separate subsystems