

# Kinsect Automated breeding systems tech specs

## System for flight chamber

Extremely high fly density: 37,000 to 46,000 flies/m<sup>3</sup> (adjustable)

No human-insect interaction

24/7 operation

Closed and isolated system to prevent fly escape into the surrounding environment

## Management Software

Management and control software of climatic parameters of the flight chamber

Recording and storing KPIs and trends

Unique identification code system to accurate tracking of each cage's production status

LED illuminators with optimized wavelengths that create the perfect conditions for successful mating

## Optimized process

Batch production optimization

Ability to collect eggs up to twice a day (adjustable)

Automatic sanitization of cages after each production cycle (adjustable)



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**Kinsect products**

Improve accuracy,  
efficiency and productivity  
in black soldier fly farms  
nursery.

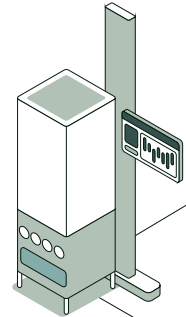


## We design automated breeding systems to oversee the entire Black Soldier Fly mating and egg-laying process.

Kinsect technology adopts a modular concept that allows for personalized customization according to the client's requirements. Our patented methodology is rooted in a scientific approach, backed by over 5 years of dedicated research and development.

Kinsect is a technology provider, founded in 2022, composed of a team of researcher and entrepreneurs already involved in various research projects dedicated to Black soldier fly (BSF) rearing since 2016. Kinsect's activity was focused on adult breeding since the beginning. Kinsect technology allows to make informed decisions, reducing operative costs, increasing the productivity and the safety of the insect farms.

Adult Mating climatica chamber



Monitoring station

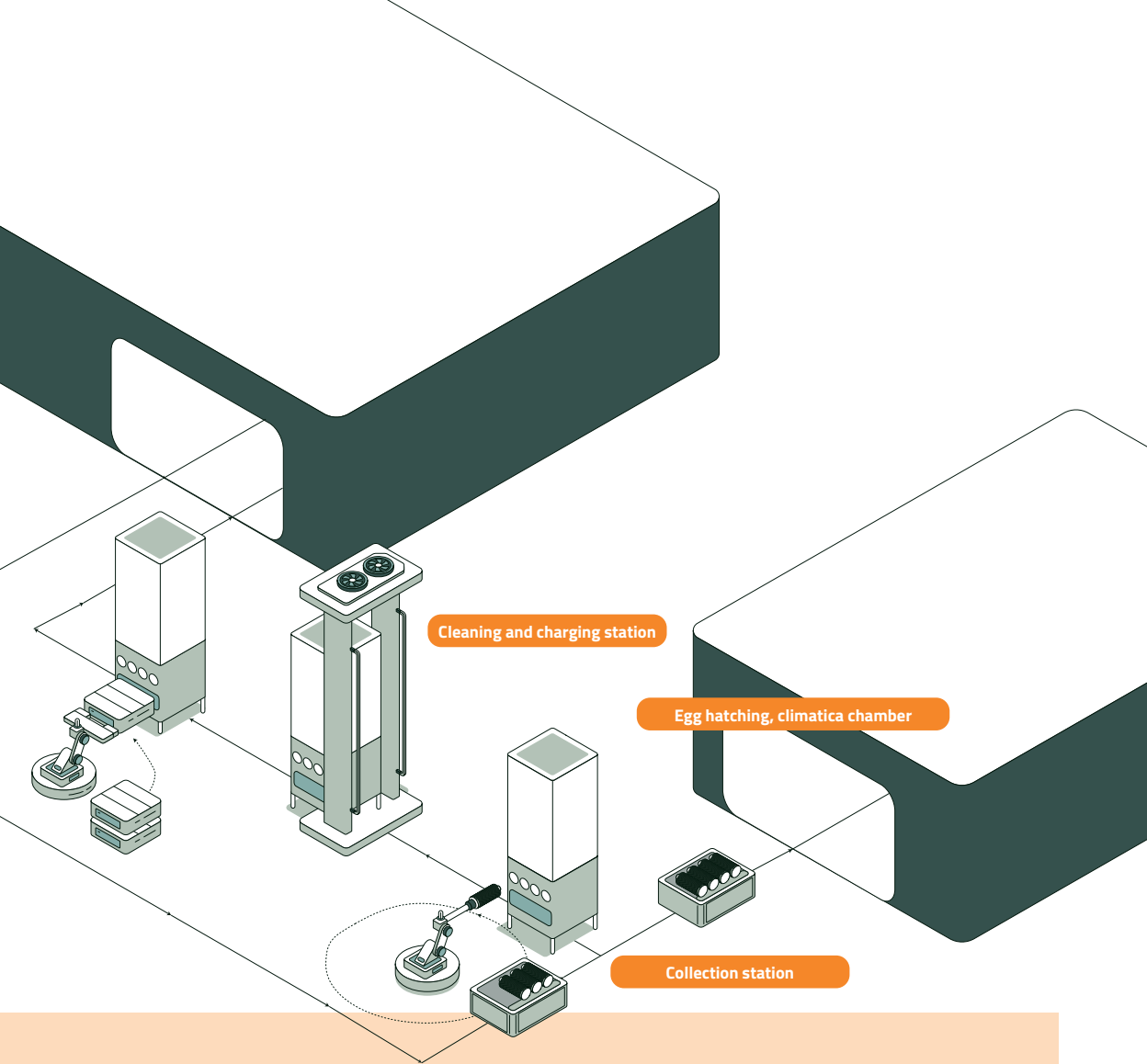
### Components of the Kinsect Solution

Our solution comprises two climate-controlled chambers: one for BSF adult mating and another dedicated to egg hatching. Additionally, there is a designated area for fly emergence, cage cleaning, and substrate preparation.

The comprehensive production control software not only monitors environmental conditions but also evaluates various parameters for BSF adult welfare and egg yields. Moreover, it predicts the egg production trend for each cage and for the entire production.

### Automation Process

The cages from the area dedicated to BSF adult mating are periodically transferred through an automatic station equipped with either a robotic arm or a worker station.

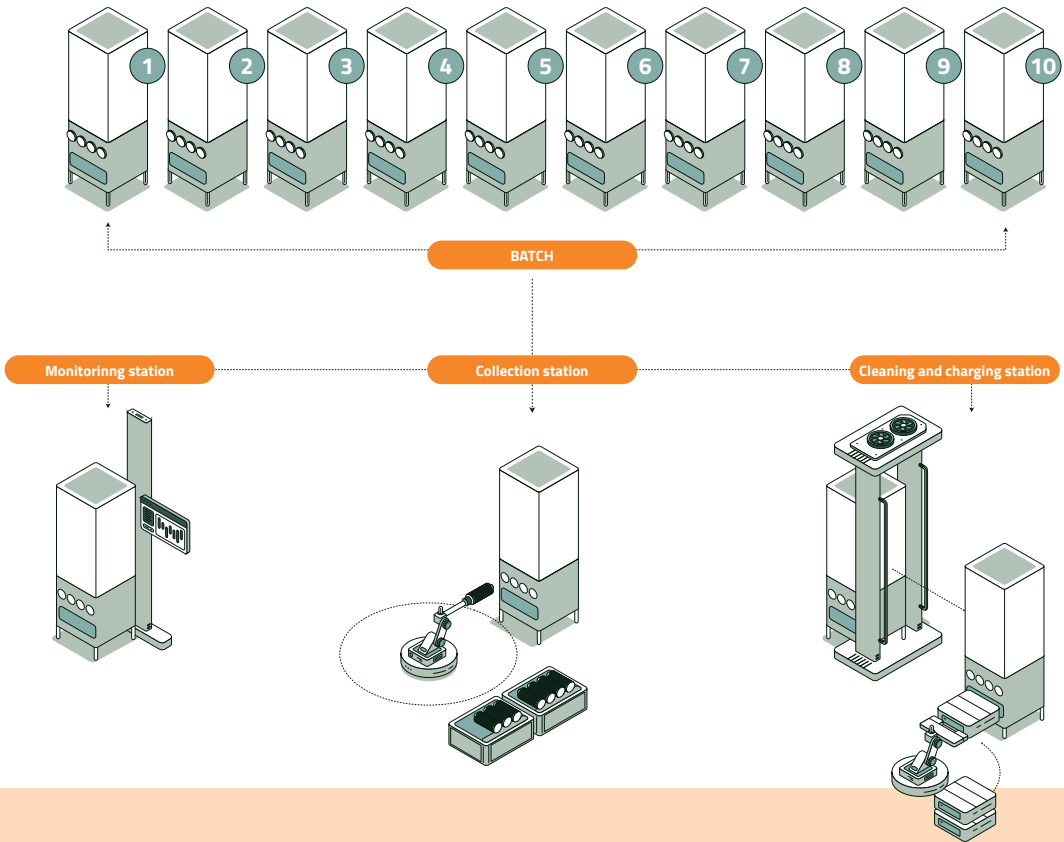


These stations perform various tasks, including; extracting egg collectors containing eggs, placing them into pre-prepared hatching trays, and inserting empty egg collectors.

When a cage reaches the end of its production period (which can be programmed by the customer), it undergoes automatic or manual cleaning, and the ready emergence tray is inserted. The control software can accurately identify the production status of each individual cage.

The tasks are executed by the robotic arm in the automated solution, but they can alternatively be carried out by a farm operator in the semi-automatic setup.

This approach leads to a notable enhancement in production efficiency by minimizing employee movements. Manual activities are concentrated within a designated area, allowing the operator to select specific cages for inspection.



## Batch Production

Our automated system operates on batch production, maximizing fly density per cubic meter to optimize production for increased yields and efficiency.

The integrated design of our cages, LED illuminators, and patented collection devices are in synergy with our software to maintain optimal conditions for mating, spawning, and hatching. We have developed and rigorously tested our collection devices to replicate the ideal conditions for egg-laying in nature. This results in higher hatching rates and healthier larvae.

## Streamlined Processes

Recognizing the natural fluctuations in fly egg production, we optimize our system to align with natural laying patterns in order to reduce them. Through batch production and the Kinsect identification code system, we reduce the laying period by eliminating non-productive cages. Additionally, this process facilitates the recovery of dead flies and exuviae (chitin).

## Cage Monitoring

Our unique cage identification code system syncs with the management software, enabling precise tracking of environmental variables and the production status of each individual cage. This empowers our clients to make informed decisions, predict production cycles, and optimize resource allocation.



## Kinsect plant features



### **Optimised productive cycle**

Our automated system, utilizing batch production, maximizes fly density per cubic meter, thereby optimizing the production process for increased yields and enhanced efficiency.



### **Effectiveness and automation**

Within a meticulously controlled environment, our specially designed cages operate automatically, maximizing egg production and facilitating efficient daily collection, eliminating the need for manual intervention.



### **Data driven control and Monitoring**

Our innovative cage identification code system seamlessly integrates with management software, enabling precise tracking of environmental variables and the production status of each individual cage.



### **Efficient Process without fluctuations**

Our system mirrors natural laying patterns, optimizing batch production. It identifies cages reaching the end of their production cycle, seamlessly redirecting them to a separate line for removal of non-productive flies and sanitation.

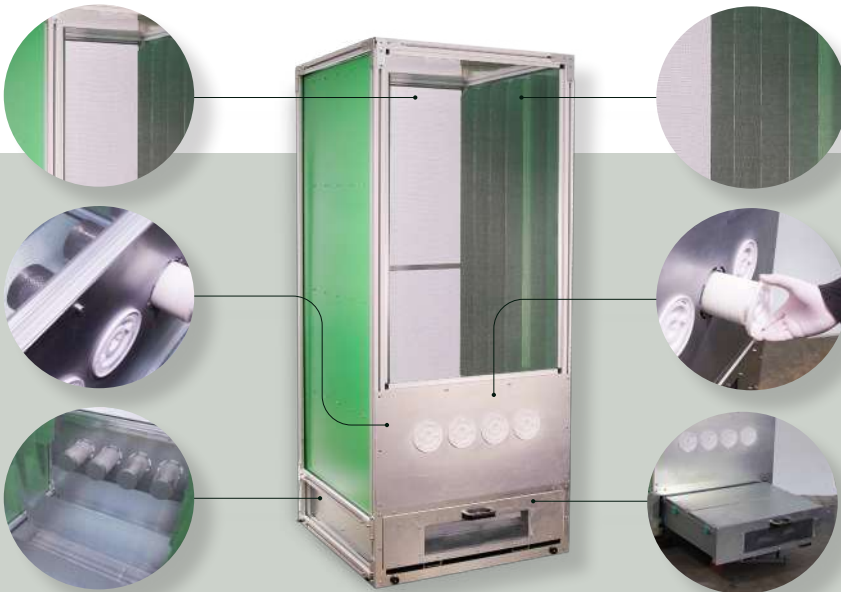
# K-cage

Our patented cages measure 0.9m x 0.9m x 1.6m, with a volume of 1.35 m<sup>3</sup>, and are automated to move along a belt conveyor inside the climatic chamber, arriving at the automatic station daily (programmable by the customer).

Each cage has the capacity to produce 165-200 grams of eggs per cycle. We consider an optimal egg production period to be 8-10 days, during which eggs are collected daily. The system also allows for the customization of the number and frequency of egg collections.

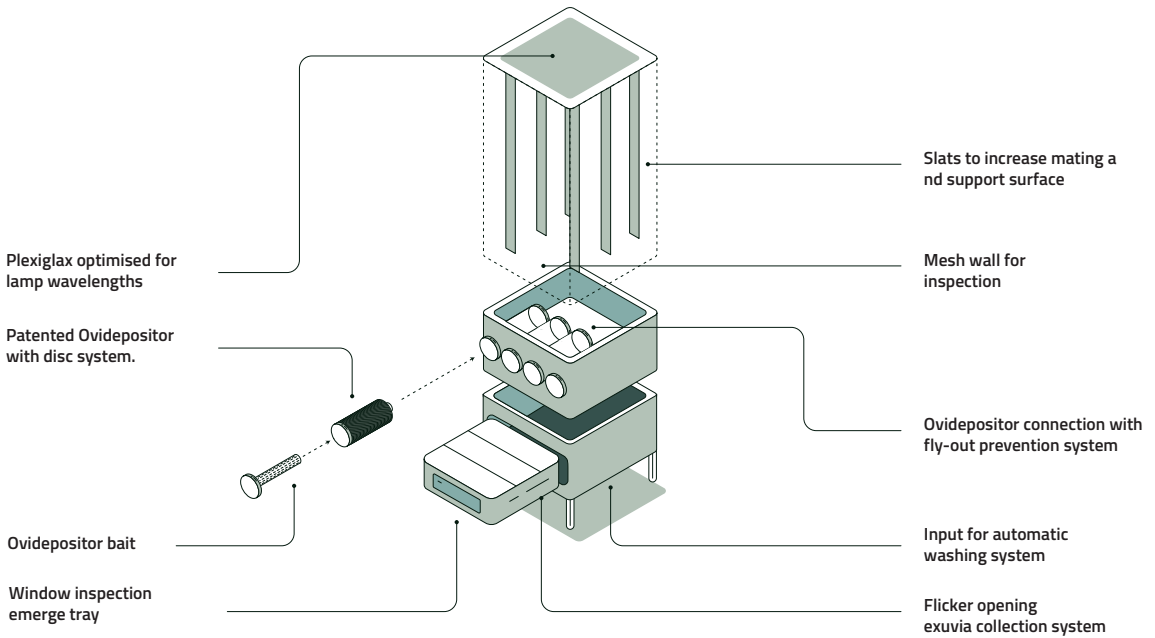
Our cages are highly optimized in terms of space/volume ratio and can accommodate between 37,000 and 46,000 flies per cubic meter. They are equipped with a KINSECT illumination system customized for the spectral response of BSF flies' eyes.

To ensure constant and consistent egg production, we recommend a batch rearing approach, where all the flies within one cage are of the same age. Thus, by utilizing 10 cages, each containing batches switched by one day, a total daily harvest of 165-200 grams of eggs can be achieved.



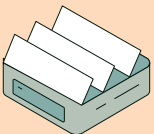
<b>VOLUME</b>	<b>1,4m<sup>3</sup></b>
<b>FLY NUMBER</b>	<b>48.000 -60.000</b>
<b>REARING METHOD</b>	<b>BATCH</b>

# Cage features



The cages developed by Kinsect have reached version 4. They have been engineered to increase the inner surface area for insects and to be loaded and sanitised by automatic stations.

Every cage includes a dedicated area for our patented emergence tray, effectively minimizing the cage's footprint compared to other solutions available on the market.



## Emerging trays

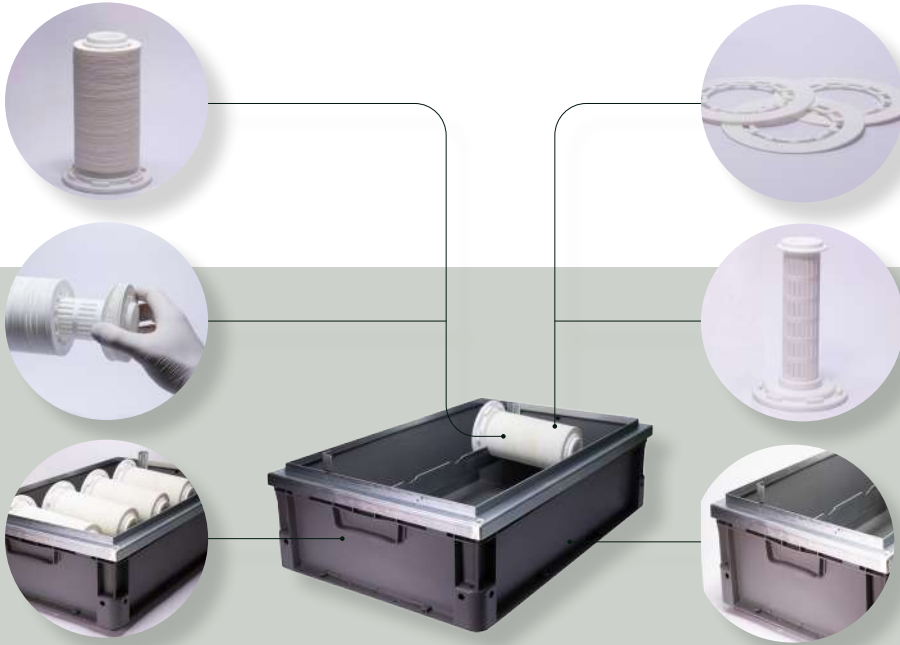
The Kinsect emerging tray, patent, technology, is designed to accommodate 48,000-60,000 pupae and can be easily attached to the cage. It features a unique system that enables the insertion of new flies into the cage without the risk of escape or loss of eggs.



# K-hatching

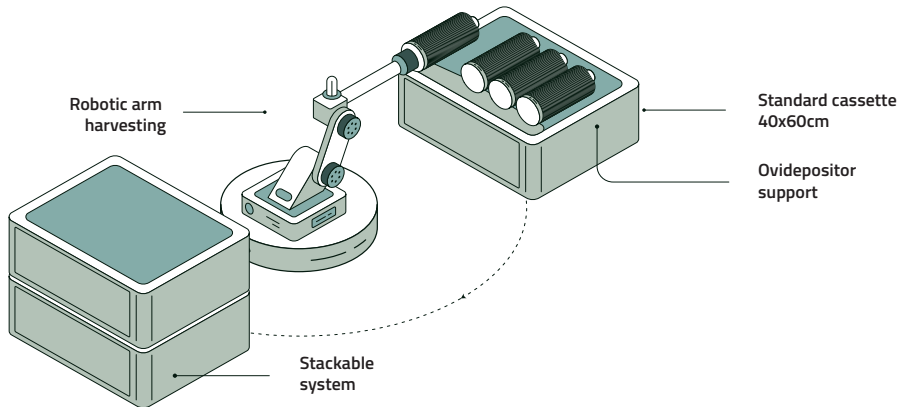
The system consists of a tray customized with support for accommodating up to 4 egg collectors, designed to be operated either manually or by a robotic arm. Based on clients' preferences, the tray can either come pre-filled with substrate for future neonate feeding, which can develop to 3-5 Dol in the same container, or it can be used solely for obtaining neonates, which can then be transferred to a neonate dosing machine.

The patented egg collector device is designed to protect the eggs from environmental degradation and to shield them during manipulation. Additionally, it is specially engineered to be compatible with automation, allowing for seamless operation



<b>OVIDEPOSITOR COLLECTION SURFACE</b>	<b>600 cm<sup>3</sup></b>
<b>HARVESTING CAPACITY</b>	<b>80 - 100 gr.</b>
<b>DISC MATERIALS</b>	<b>PP food-grade plastic</b>

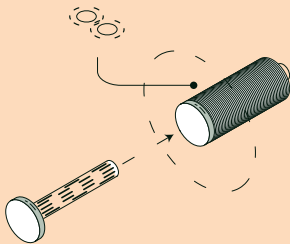
# Ovidepositor and tray features



**The system is developed to minimise direct contact with the eggs and allow hatching directly in the trays. Each component is engineered for automation and designed for space optimisation.**

**All components of the system are robust and easily washable to withstand large numbers of production cycles.**

## Ovidepositors



Kinsect's patented ovidepositors are a key part of the process. They minimise insect-egg contact and at the same time minimise egg loss by providing the ideal conditions for laying and hatching.

# K-light

The illumination system is based on latest LEDs technology, with the possibility to create custom program for regulating the intensity creating precise light/dark cycles. The kinsect light system is modular with optimised spetro for the eye of the flies. The lights are adjustable in intensity and programmable in cycles the automotive connectors are interchangeable. The kinsect lights have a safety system to switch off the UV rays if an operator intervenes on the cage.

Production cycle, climate and lighting are controlled by our software, which optimises production through constant monitoring of breeding kpi the entire production by automatically collecting and analysing the status of each batch once a day.

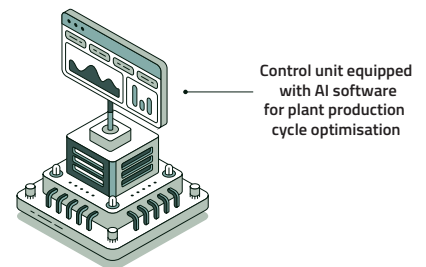
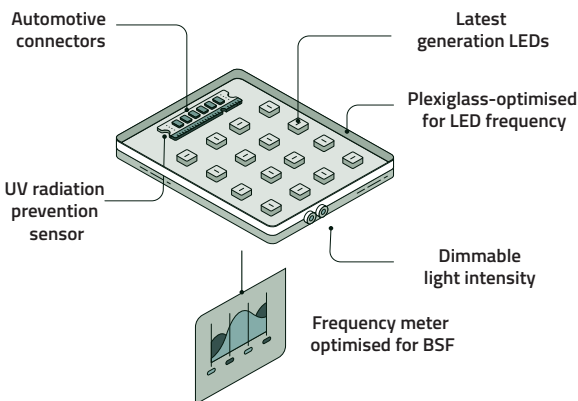


**SPECTRUM OTIMIZZATION**

**350-60 nm**

**POWER**

**P < 150W m<sup>2</sup>**





## Advantages of the Kinsect automated breeding plant



### **An integrated nursery platform**

The hardware and software components of the Kinsect solution work in unison according to a specific breeding methodology. Batch production ensures maximum programmability of production and minimum fluctuations.



### **Modular and scalable approach**

System is modular, scalable and programmable by the customer according to production requirements. The system can be optimised for different levels of automation.



### **Data drive accuracy**

A key factor in Kinsect's success is our software, which grants control over all environmental parameters within the BSF mating chamber. We can define temperature, humidity, and lighting, leveraging specific wavelengths to create optimal conditions for successful mating. This data is cross-referenced with cage productivity, contributing to our operational efficiency.