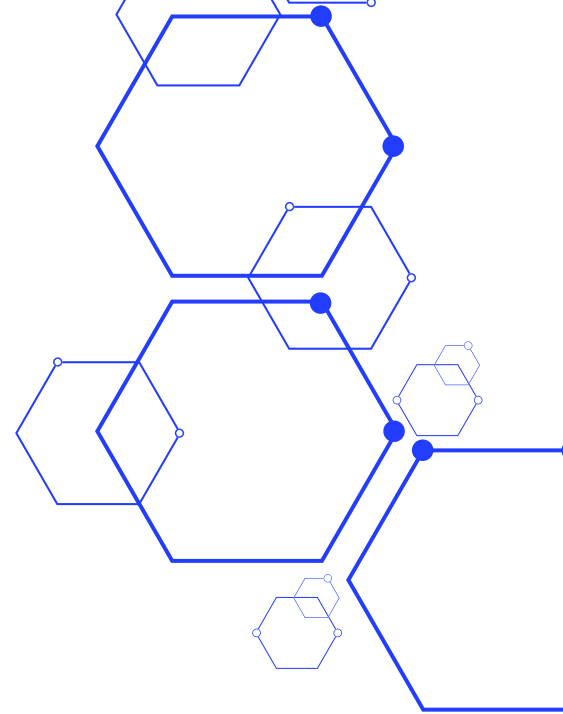


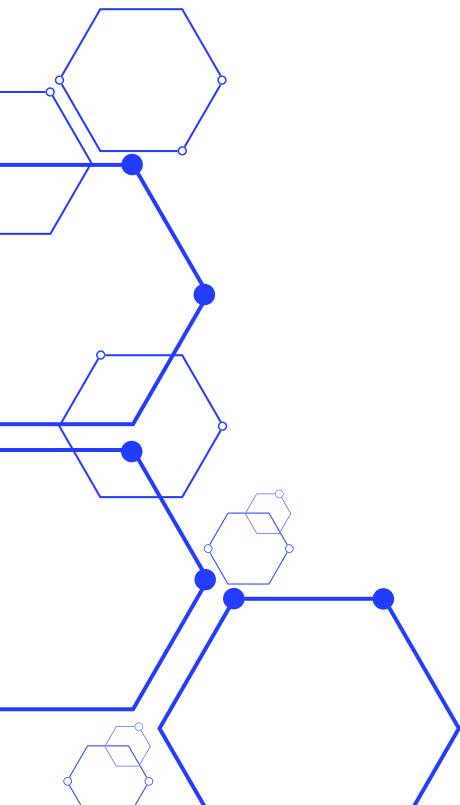


Global solutions for a growing world



FERMENTATION SCALE-UP TRAINS

CUSTOMIZED FERMENTATION TRAINS FROM TECHMI GROUP

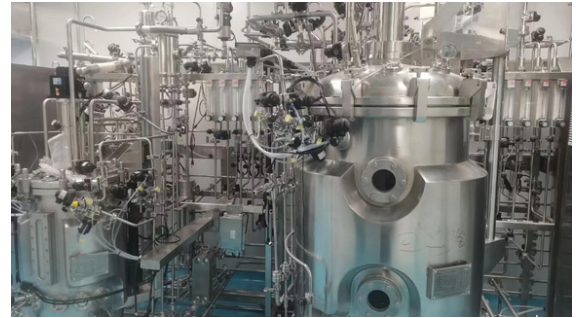


FERMENTATION SCALE-UP TRAINS

CUSTOMIZED FERMENTATION TRAINS FROM TECHMI GROUP

TECHMI BIO

TECHMI Group's customized fermentation trains are designed to maximize efficiency and productivity in biotechnology, pharmaceutical, food and bioenergy industrial processes. These systems integrate fermenters of different volumes, from laboratory equipment to large scale fermenters ideal for in-line production multiplication.



TECHMI Group's custom fermentation trains are designed to high technical standards to ensure optimum performance at every stage of the process. Key technical parameters offered by these systems include:

- Capacities: from 20 liter laboratory fermenters to large 30,000 liter fermenters.
- Materials: 316L stainless steel, corrosion resistant and suitable for GMP and FDA compliance.
- Temperature control: accurate to $\pm 0.1^{\circ}\text{C}$, adapted to the requirements of each process.
- pH control: adjustable range from 2.0 to 12.0, with an accuracy of ± 0.01 pH units.
- Dissolved oxygen (DO): controlled from 0% to 100% with an accuracy of $\pm 0.1\%$.
- Agitation system: variable from 50 to 1000 RPM, depending on bioreactor size and process needs.
- Operating pressure: configurable up to 3 bar in large scale fermentors.

CIP/SIP cleaning systems: to ensure sterility and compliance with safety and hygiene regulations.

These parameters allow the customization of fermentation trains according to process requirements, ensuring scalability and quality from research to mass production.

FERMENTATION SCALE-UP TRAINS

CUSTOMIZED FERMENTATION TRAINS FROM TECHMI GROUP

TECHMI GROUP biofermenters are equipped with advanced systems that allow precise control of critical parameters such as temperature, pH, dissolved oxygen concentration, agitation speed, and pressure. This control is essential to maintain optimal conditions for the growth and metabolic activity of microorganisms.

Real-Time Monitoring

Thanks to real-time sensors and monitoring systems, operators can observe and adjust process parameters as needed, ensuring that microorganisms develop in an optimal environment and that production is consistent and of high quality.

Automation and Programming

The biofermenters are highly automated, allowing the fermentation process to be precisely programmed and controlled. This includes automated nutrient feeding, aeration regulation, and fermentation time management, which reduces the need for manual intervention and minimizes errors.

High Quality Design and Materials.

Built with 316L stainless steel, TECHMI GROUP's biofermenters offer excellent corrosion resistance and a sterile environment, which is crucial to prevent contamination and guarantee the purity of the culture. In addition, their design facilitates cleaning and sterilization, maintaining high hygiene standards.

Inoculum Scale-up and Multiplication Process

Inoculum scaling and multiplication is a crucial process in biotechnology, especially when seeking to increase production to industrial levels from a small initial amount of microorganisms.

The process begins with the preparation of a starter culture in a small bioreactor or shaker bottle. Here, the microorganisms are grown under controlled conditions to achieve a high cell concentration.

Once the inoculum has reached the exponential growth phase, it is transferred to a larger capacity biofermenter. TECHMI GROUP offers biofermenters of different sizes, allowing a gradual scale-up. For example, the inoculum can be moved from a 10 liter fermenter to a 100 liter fermenter, then to 1,000 liters, and so on, depending on the desired production capacity.

During each scale-up phase, TECHMI GROUP's biofermenters maintain optimal growth conditions by precisely controlling all relevant parameters. The objective is to multiply the biomass efficiently, ensuring that the microorganisms retain their viability and biological activity.

Optimization and Continuous Adjustments

During the scale-up process, it is essential to make adjustments based on the behavior of the culture on a larger scale. TECHMI GROUP's monitoring and control systems allow these adjustments to be made in real time, ensuring that scale-up does not compromise product quality.

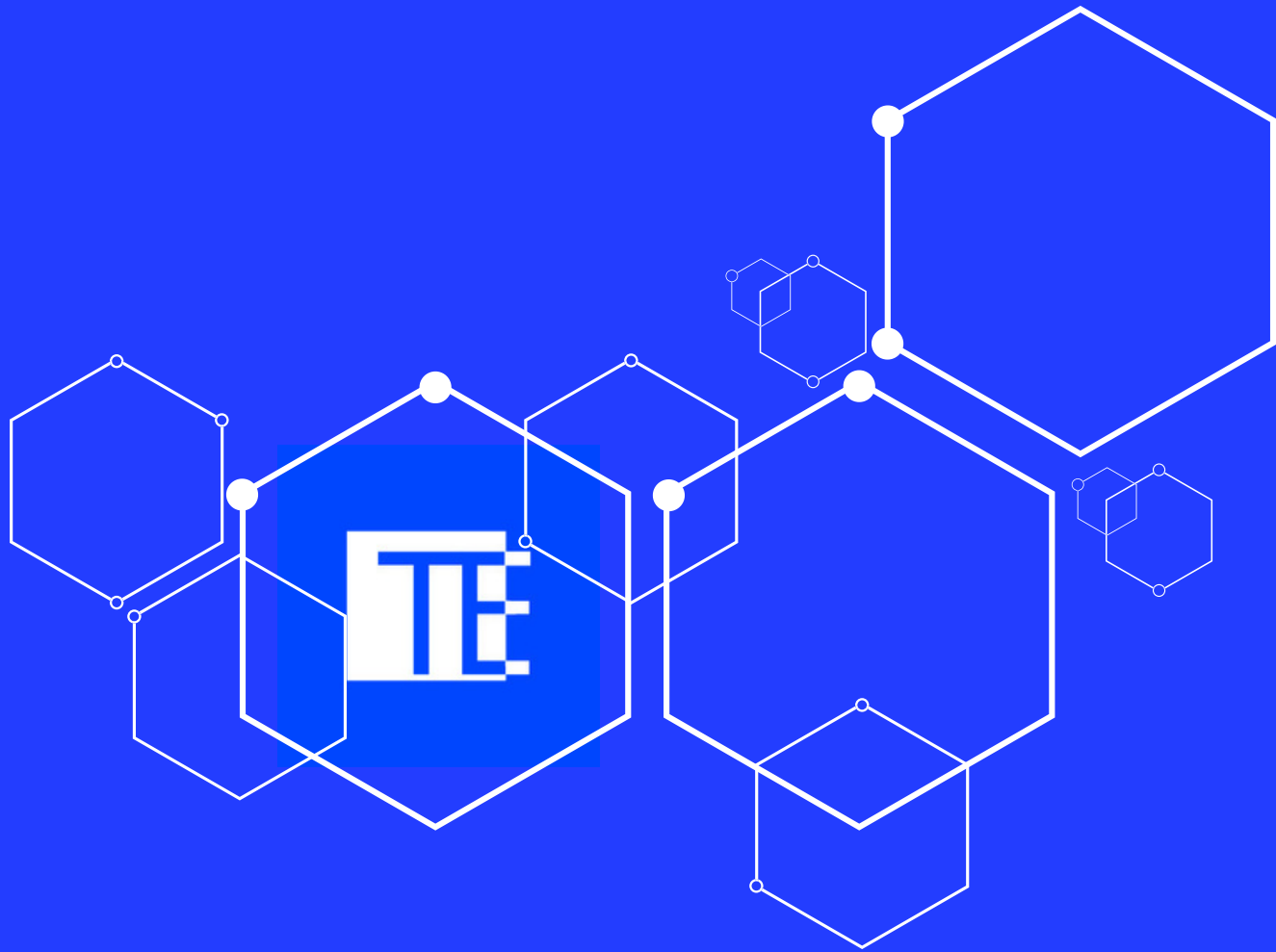
Large Scale Production:

Finally, the large-scale inoculum is used for industrial production of the desired product, which can range from enzymes, probiotics, biofertilizers, to pharmaceuticals. TECHMI GROUP's biofermenters are designed to handle industrial volumes while maintaining efficiency and quality throughout the process.

TECHMI GROUP's biofermenters combine advanced technology, precise control, and high quality materials to offer ideal solutions in the production of biological products. Their scalability and inoculum multiplication capabilities ensure that biotechnological processes can move from laboratory to industrial production efficiently, safely and cost-effectively.

Applications

TECHMI Group's customized fermentation trains are designed to maximize efficiency and productivity in biotechnology, pharmaceutical, food and bioenergy industrial processes. These systems integrate fermenters of different volumes, from laboratory equipment to large scale fermenters up to 30,000 liters, allowing a smooth and controlled scalability. Each train is tailored to specific production needs, ensuring precise control of critical parameters and compliance with international standards. They offer flexibility and customization to optimize each stage of the process, from research to mass production.



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