



Bioreactor/Fermenter Systems

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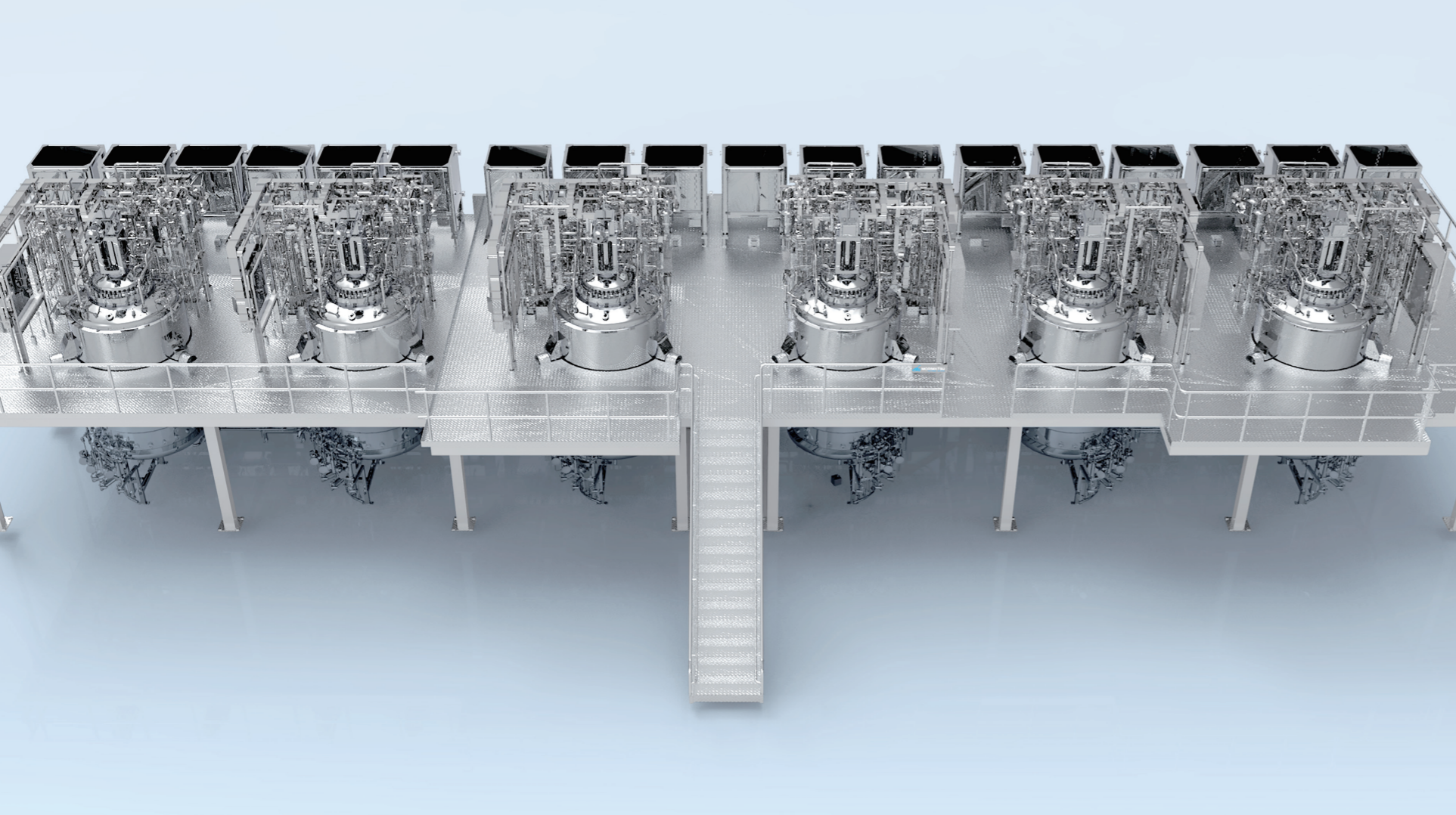
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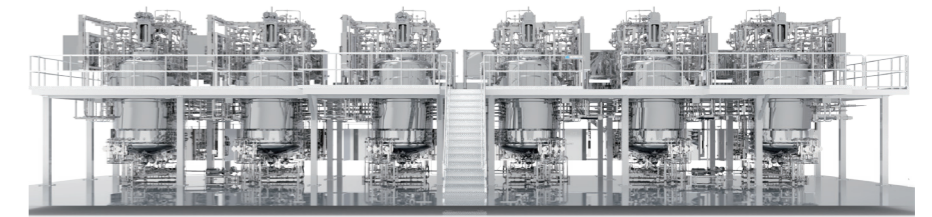
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Morimatsu Bioreactor/Fermenter System includes a whole series of products, such as a benchtop bioreactor/fermenter, a pilot-scale bioreactor/fermenter system and a large-scale bioreactor/fermenter. By providing an integrated one-stop solution from laboratory to commercial scale, it meets client requirements for the technical development and commercial production of cell cultures and microbial fermentations.

Morimatsu's project execution team, comprising engineers from Asia, Europe and North America, provides high-quality solutions for our clients. We incorporate an aseptic design concept into our products to establish a high-quality cell culture/microbial fermentation system. We can provide clients with early-stage experimental services in our clean laboratory and supporting facilities, which help them to efficiently scale up to the commercial production of their products.



Product Features

Flexible solution

Standardized and customized products meet individual client needs.

Stable control system

High-quality industrial-grade PLC, E&I components, and control configuration platform with unique control loop algorithm.

User-friendly interface

Powerful functionality, simple design, comfortable operation.

Rapid project implementation

Full 3D modeling and ultra-fast modular fabrication, fast on-site installation, commissioning, and handover.

Complete verification system

Morimatsu's professional validation team helps meet the GMP requirements of FDA, EMA, NMPA, etc.

Efficient operation & maintenance management

Morimatsu provides maintenance services, including data collection and analysis as well as remote technical assistance and support.

Product Functions

Application field

- ① Screening cells and strains
- ② Process development and optimization
- ③ Process scale-up

Process

- ① Batch / Fed-batch
- ② Continuous cultures
- ③ Perfusion cultures

Applied industries

- ① Antibodies
- ② Vaccines
- ③ Peptides
- ④ Insulin
- ⑤ Antibiotics
- ⑥ Immunotherapy
- ⑦ Cosmetic
- ⑧ Food & Healthcare

Benchtop Reactor System



The benchtop reactor system is equipped with industrial PLC, E&I components, and a commercial control configuration platform to control multiple equipment and realize remote monitoring and data collection. Great flexibility allows it to be applied to single or parallel testing. Optional system volumes range from 1L to 10L and 2 to 16 units can be connected in parallel for both batch and continuous perfusion cultures. This shortens production cycles, improves efficiency, and reduces costs.

Benchtop Reactor Standard Configuration Bioreactor

Bioreactor (MBio Lab-B)

Glass vessel (1~10L)

Stainless steel feed pipe, sampling pipe and tank support

Magnetic stirring system. Stainless steel stirrer included
(Three-blade push type, 2)

Electric heating blanket, exhaust gas condenser, exhaust gas heater

Surface vent, deep vent (large/micro bubble gas)

Console / Control panel

Surface vent (Air|CO₂, Rotameter)

Deep vent (Air|CO₂|N₂|O₂, Mass flow controller (MFC))

Integrated peristaltic pump (4 sets, variable speed)

pH, DO electrode and defoaming | Liquid level sensor

15" Touchscreen + industrial computer

Siemens PLC+WinCC configuration software

Fermenter (MBio Lab-F)

Glass vessel (1~10L)

Stainless steel feed pipe, sampling pipe and tank support

Magnetic stirring system. Stainless steel stirrer included
(Six straight-blade disk opening turbine type, 2)

Electric heating blanket, exhaust gas condenser, exhaust gas heater

Surface vent, deep vent

Console / Control panel

Surface vent (Air, Rotameter)

Deep vent (Air|O₂, Mass flow controller (MFC))

Integrated peristaltic pump (4 sets, variable speed)

pH, DO electrode and defoaming | Liquid level sensor

15" Touchscreen + industrial computer

Siemens PLC+WinCC configuration software

Dimensions of glass fermenter

| Single-layer glass tank | 1L | 2L | 5L | 7L | 10L |
|-------------------------|--------------------|--------|----------|-------|-------|
| Material | Borosilicate Glass | | | | |
| Working volume(L) | 0.2~1,2 | 0.47~2 | 1.5~3.75 | 2~5.4 | 1.5~7 |
| Weight(KG) | 2 | 6 | 8.5 | 11.5 | 16 |

In addition to the above standard sizes, customized equipment can also be provided.

| Recommended space requirements | 1L | 2L | 5L | 7L | 10L |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Single unit (W*H*D) | 650 x 650 x 400 mm | 650 x 650 x 400 mm | 650 x 650 x 400 mm | 650 x 690 x 400 mm | 680 x 700 x 400 mm |
| Double units (W*H*D) | 950 x 650 x 400 mm | 950 x 650 x 400 mm | 950 x 650 x 400 mm | 950 x 690 x 400 mm | 980 x 700 x 400 mm |

Requirements of common purpose works

| | |
|--------------|--|
| Power supply | • 220V, 50Hz, 20A |
| Gas | • Gas supply pressure 1.5~2barg • Dry, oil-free and dust-free |
| Water | • Water supply pressure 1~2barg |

Console dimensions

| | |
|--------------------|--|
| Console weight | 15 30 kg |
| (single/double) | |
| Dimensions (W*H*D) | 350 x 650 x 400mm |
| Material | Inner frame: 304SS, outer frame: aluminum alloy |
| Display screen | 15" Touchscreen |

Pilot-scale and Commercial-scale Bioreactor/Fermenter Systems

Pilot-scale and commercial production-scale bioreactor/fermenter systems integrate bioengineering technology with automation, modular design, and intelligent production to create a full series of stainless steel 10L-300KL (and above) fermentation systems and 10L-20KL bioreactor systems.



Technical Advantages

• Advanced gas-sealing technology

Ensures that the system maintains a long-term stable aseptic environment after SIP and provides a safe aseptic environment for cell/strain cultivation.

• Monitorable culturing process

Monitoring and control of process parameters ensures the best culture environment for cells/bacteria.

• Flexible and stable control system

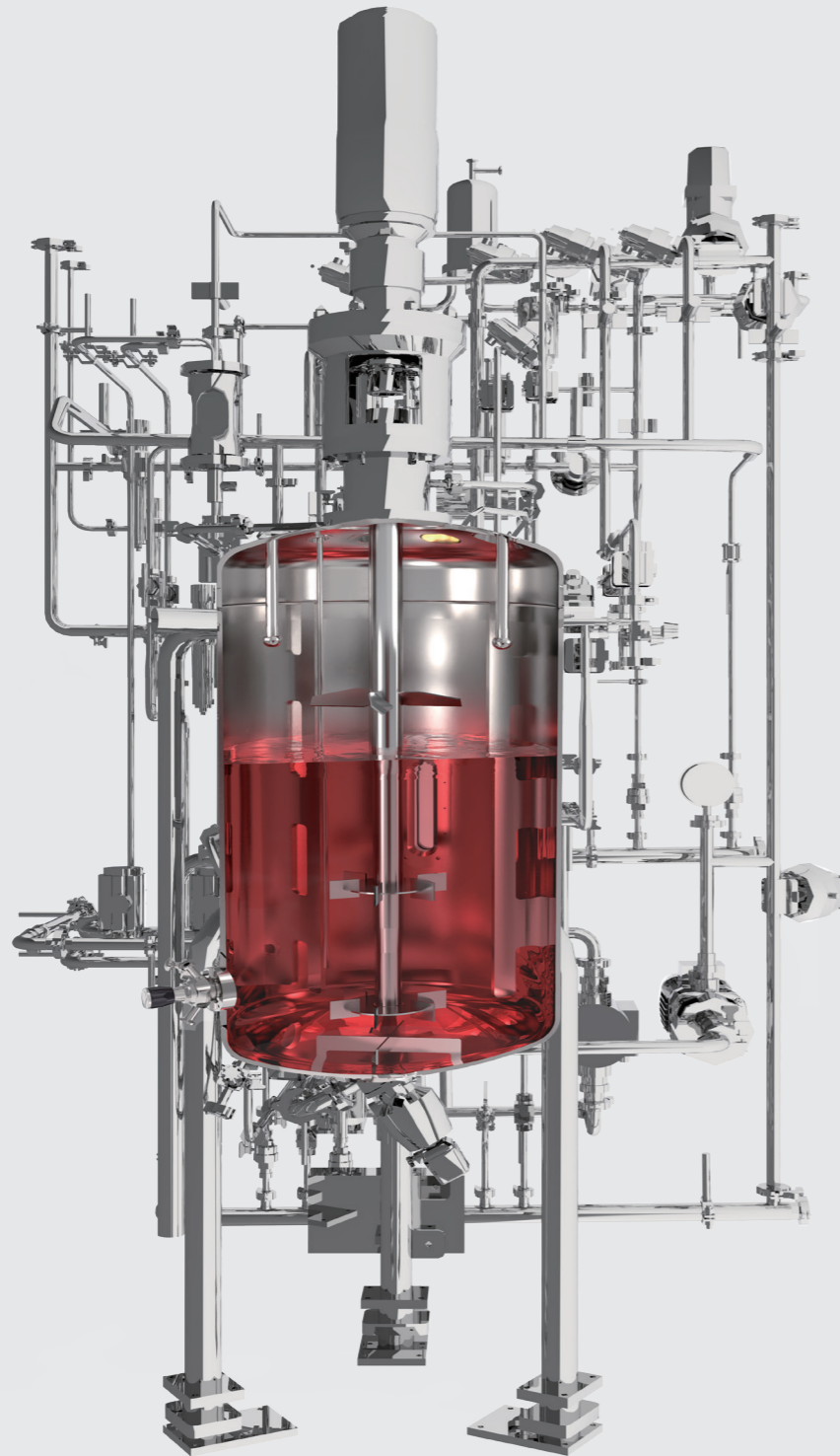
Controlling hardware, which features commercial industrial-quality PLC and E&I components, supports Profinet, Profibus-DP, Modbus-TCP, Ethernet, OPC and other industrial communication interfaces, making it convenient for communicating with third-party equipment. Optional PLC or DCS system control as well as a self-control program meet ISA88 requirements, and reports can be customized. In addition, the system has electronic signature and audit-tracking functions, thus fulfilling the verification requirements for computer systems in accordance with 21 CFR Part 11.

• Validation service based on risk management

Risk control strategy and risk assessment (RA) report
FAT/SAT plan and report
DQ/IQ/OQ plan and report
PV/CV support and service



The Modular Concept in System Design



Air supply module

Gas can be injected into the bioreactor/fermenter either through the surface layer or via an air distributor. In addition, the system is provided with various gas mixing pipelines for the bioreactor and some specific fermentation systems. Gas (CO₂, O₂, N₂ & Air) is injected into the system through the MFC (Mass Flow Controller), thus achieving accurate control and regulation of DO and pH. The large- or micro-bubble gas supply system meets cell culture requirements for different production processes, or the same culture object in different phases.

Vessel temperature control module

Fitting multi-temperature probes in the system ensures precise feedback adjustment. Flexible and well-proven jacket temperature control hardware meets the diverse application needs of clients.

Controlling software

The standard configuration of the bioreactor and fermentation system is based on the automation solution of Siemens process control products, which uses PCS7 and Win CC automation configuration software. Other control platforms, such as Rockwell, can also be selected.

The fully-automatic system can realize one-key operation of SIP, CIP, pressure testing, culturing, and other production procedures. The design of the automatic control system meets the requirements of GAMP5 as well as client permission hierarchical management and audit-tracking.

Stirring module

The mixing system, whose design is based on the characteristics of the cell line/strain, combines visual computer simulation technologies to provide the most suitable mixing system solution for the client-specific cell line/strain.

Exhaust module

A heat exchanger in the exhaust module will heat or cool the gas to avoid blocking the filter. In addition, it can be equipped with an exhaust gas analyzer to monitor and determine cell/strain growth status in real time, and to link with other controllers to ensure that the strain is always in its optimal growth environment.

Feeding module

The feed pipeline, which is equipped with an independent transplant/inoculation pipeline, can accurately add nutrients into the tank or adjust reagents such as acids, alkalis, defoamers, etc. It meets client needs for a range of working conditions, such as batch cultures, continuous cultures, and perfusion cultures.

Sampling system

After sterilization, the sampling valve and pipeline conduct manual sampling operations to minimize risks in the cultivation process.

Harvest module

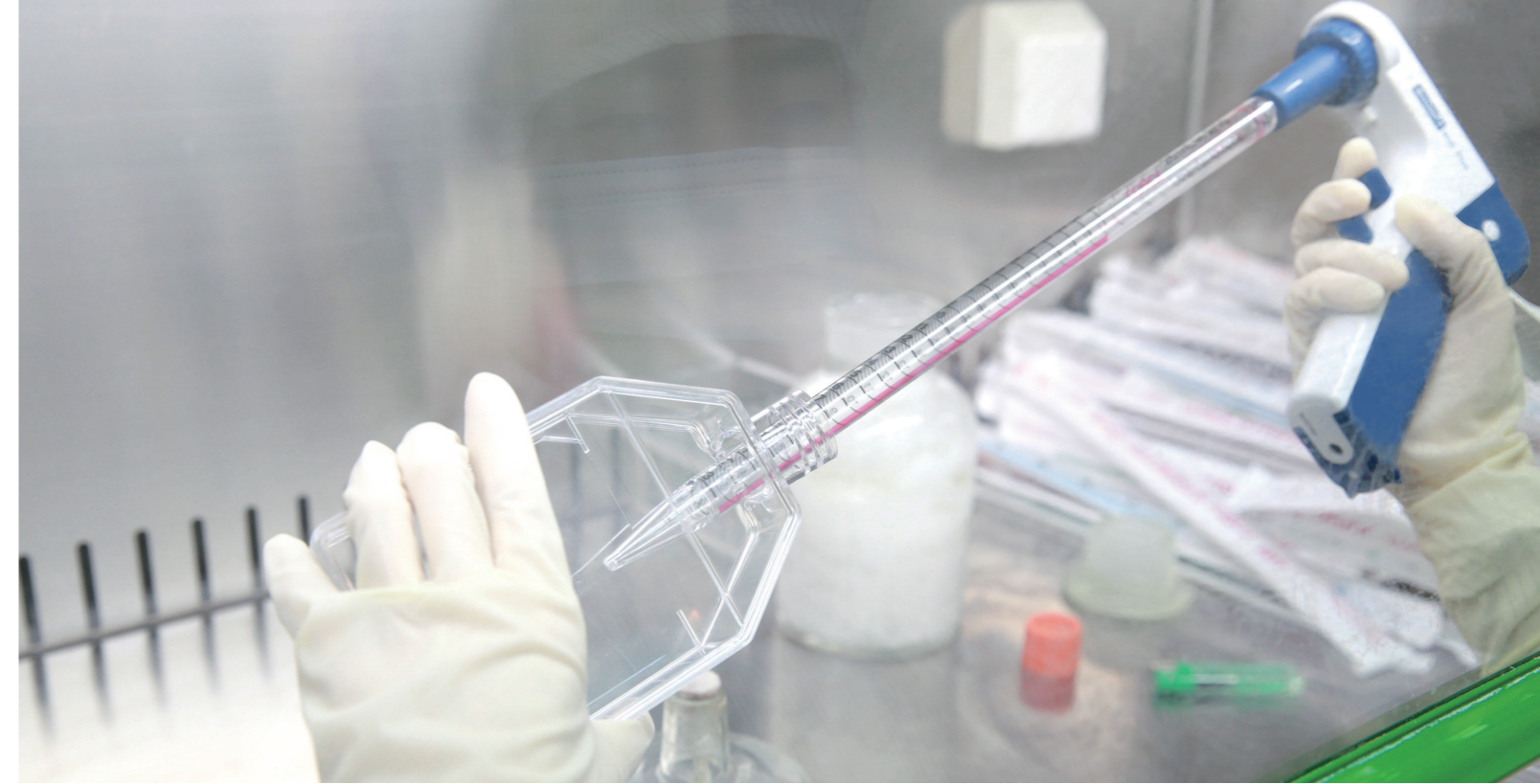
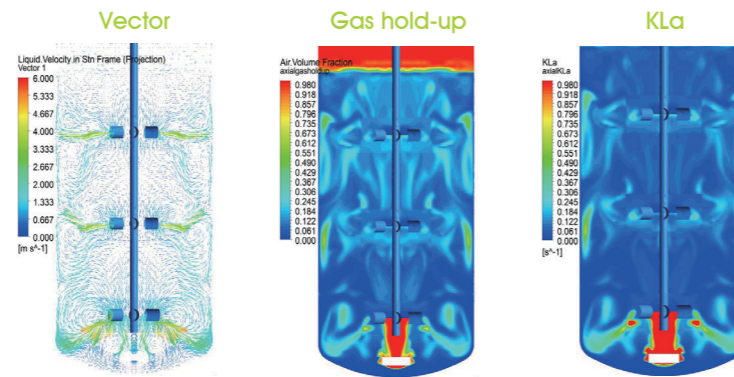
Zero dead-leg tank bottom valves ensure full drainage for material transfer and CIP.

Biological Experiment Platform for Bioreactor and Fermenter Systems

Stirring Laboratory

The stirring laboratory takes care of the actual culture medium or substitutions and determines the situation of mass transfer and mixing in the reactor by means of different stirrers, ventilation systems, advanced detection sensors and analytical instruments. Finally, particle image velocity (PIV) and CFD simulation techniques realize visualization of the whole in-tank flow field, which avoids dead-legs and poor mixing areas during tank design. It also recommends suitable stirrers and ventilation devices for subsequent biological culture experiments.

Distribution diagram of velocity vector, gas hold-up, and mass transfer coefficient obtained by CFD flow field simulation.



Biological Culture/Fermentation Laboratory

The biological culture/fermentation laboratory is equipped with reactors, auxiliary equipment, and analytical instruments that are fully compatible with mammalian cell culture and microbial fermentation experiments. By providing trial services, identifying and optimizing culture process parameters, and accumulating the necessary parameters for reactor scale up, it helps clients to achieve scale up industrialization of their products.

