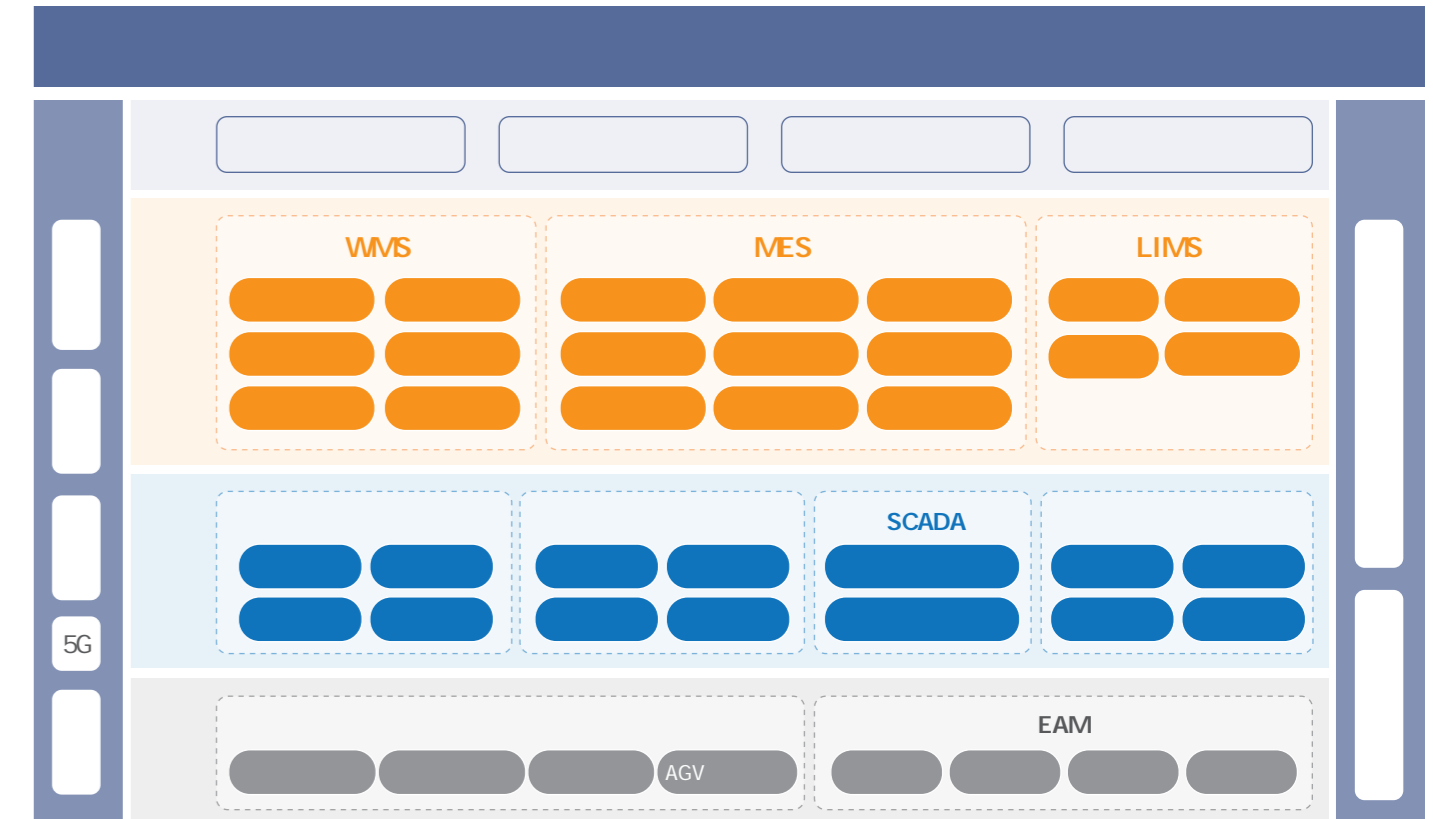


T-MES

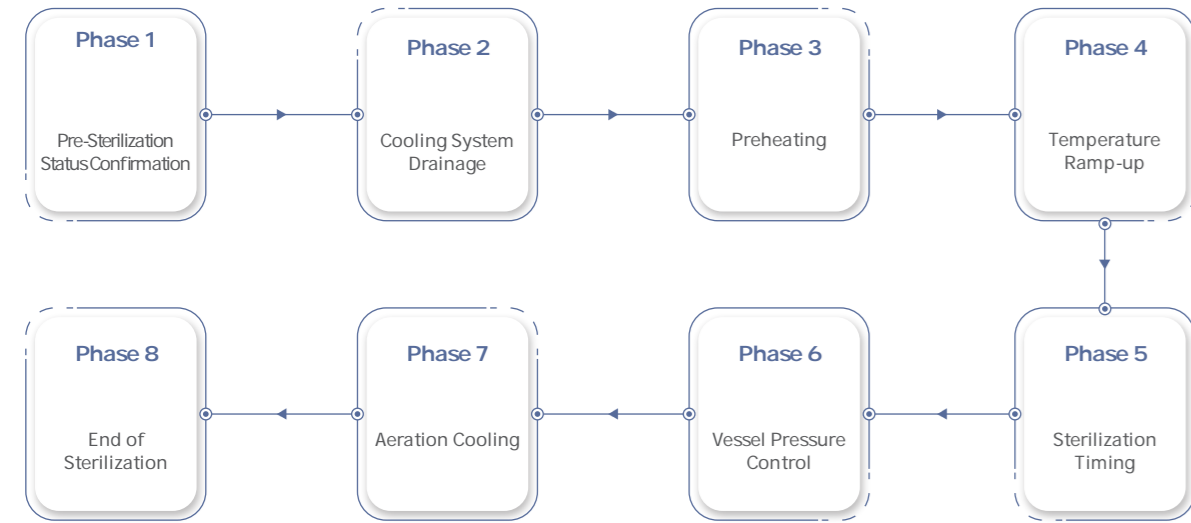
To address the fermentation industry's drive for upgrading, the Dual Carbon goals, and intelligent transformation, TIAN'S leverages its deep industry KNOW-HOW to deliver a **full-process automation solution for bio-fermentation**. Integrating high-precision batching, continuous sterilization, fermenter sterilization (in-situ sterilization/empty sterilization), sterile pipeline sterilization, strain cultivation, and system cleaning, the solution significantly improves aseptic control, cuts energy consumption, reduces labor reliance, and enhances production efficiency and fermentation performance. Meanwhile, the **Fermentation Enterprises Digital Management Platform** and **Simplified T-MES Production Management System** enable real-time monitoring of the entire production process, break down information silos, and provide robust data support for lean management, scientific decision-making, and continuous improvement. Widely applied in biopharmaceuticals, biomaterials, food and health, medical aesthetics, natural products, and agro-veterinary pharmaceuticals, the solution empowers customers to achieve digital transformation and build sustainable competitive advantages.



CORE MODULE OF FULL PROCESS AUTOMATION FERMENTATION TECHNOLOGY

Automatic Sterilization Process Control for Fermentation Production

Based on the fermentor disinfection process and route design, the system enables automatic and precise control of key processes including vessel emptying, jacket emptying, preheating, temperature ramp-up, pressure holding, timing, aeration, and cooling during sterilization. This ensures sterility, reduces steam consumption and manual intervention, provides a reliable environment for microbial fermentation, and achieves energy conservation and emission reduction.



Material Continuous Sterilization Process Control

Batch sterilization has a long duration, which causes significant degradation of medium components and high steam consumption. Based on the Arrhenius equation and equivalent sterilization theory, TIANS applies intelligent continuous flash sterilization technology to heat, hold-sterilize, and cool the prepared medium during its transfer to fermentors and other cultivation equipment, thereby effectively improving production efficiency and saving energy.

Intelligent Instantaneous Sterilizing Equipment
No.1 in sales volume in China

Sterility Rate up to 99.99%

90% Cooling Water Saving

70% Steam Saving

Patented Technology Investment Repaid in Average 10Months

Intelligent Control One-Click Operation

Instantaneous Sterilization Reduce Media Destruction

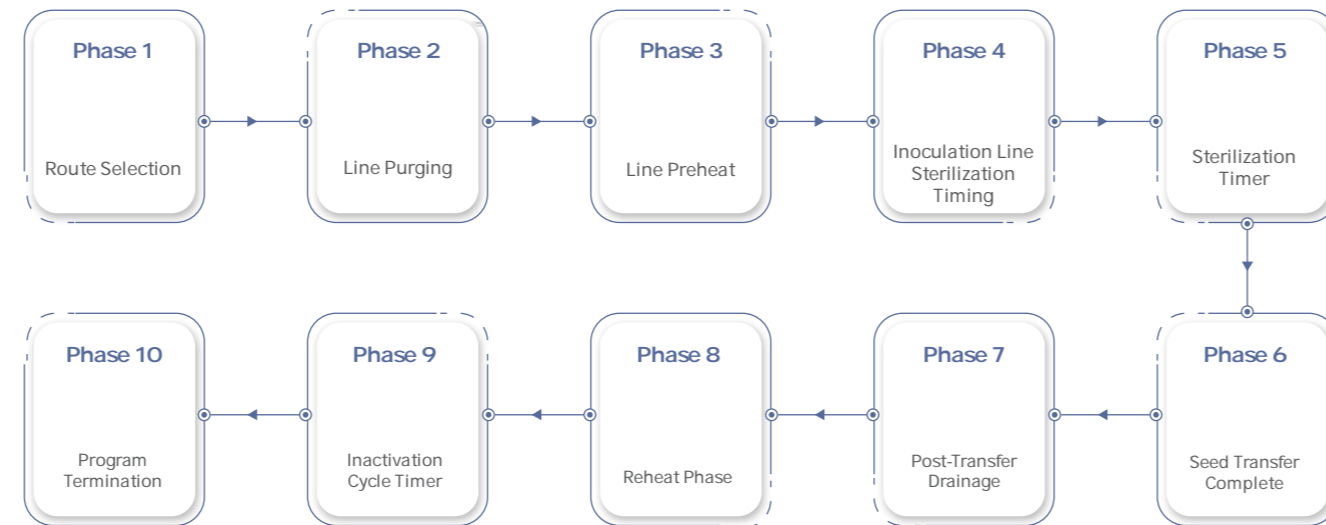
Ingenious Design Precise Detail Engineering

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2024

Fully Automatic Process Control of the Seeding Station

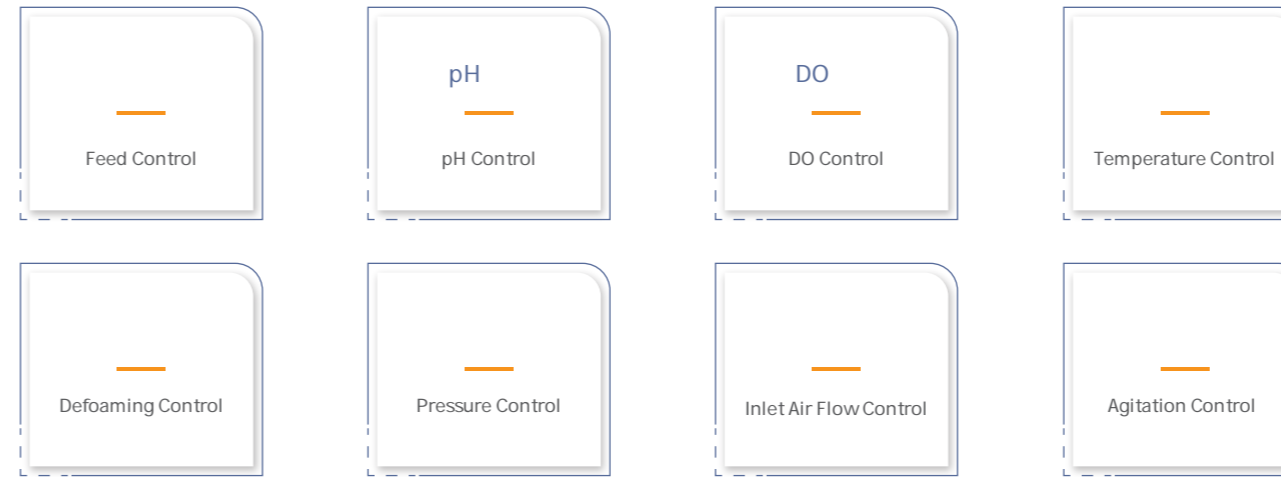
Based on process specifications, the system automatically matches the seeding route and performs automatic operations on the inoculation pipeline, including line purging, preheating, hold-sterilization, cooling, and seeding, to achieve fully automatic control of the seeding process.



Process Control of Fermentation Culture

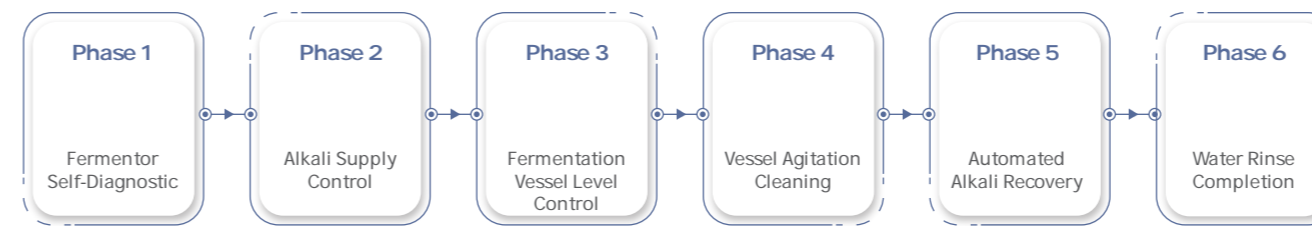
pH DO

Based on the microbial growth characteristics, combined with production experience and expert database, a cultivation control model is established to achieve precise control of feeding, temperature, pH, DO, inlet air flow, tank pressure and defoaming of the fermentation process, so as to ensure stable production, improve fermentation units and improve product quality.



Fully Automated Fermentor CIP Process Control

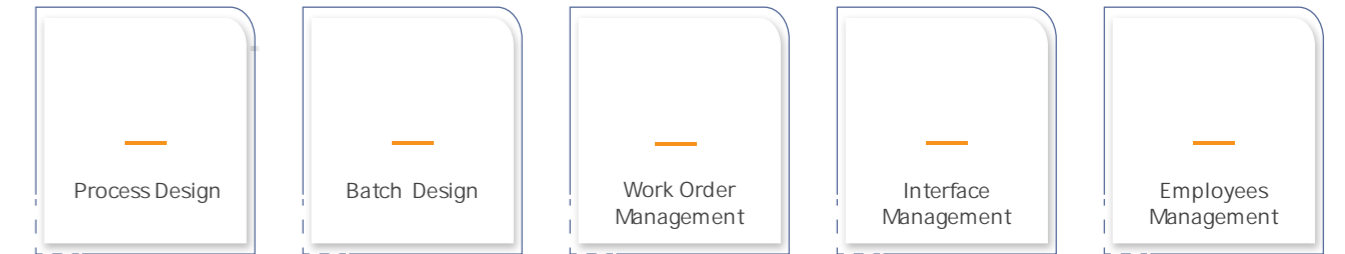
The fully automated alkaline cleaning process for the fermentation vessel uses alkali dosing quantity and liquid level as core trigger conditions. It automatically coordinates valves, pumps, and the temperature control system to complete a closed-loop operation, including alkali feeding, agitation-assisted cleaning, alkali displacement, and a water rinse reset—all without manual intervention.



T-MES
SIMPLIFIED T-MES PRODUCTION MANAGEMENT SYSTEM

T-MES

TIANS T-MES is a Simplified, process-knowledgeable intelligent manufacturing execution system that supports zero-code, low-cost customization based on customers' actual needs. Featuring unique core functionalities, the system is easy to operate and ensures efficient information transmission. It provides immediate decision support through one-click work order issuance, real-time data monitoring, automated workflows, and intelligent analysis. With four software copyrights, the system has been recognized as domestically advanced and has been honored as the "Hebei Provincial Excellent Software Product."



DIGITAL MANAGEMENT PLATFORM EMPOWERING FERMENTATION ENTERPRISES

T-MES DCS

The TIANS Fermentation Plant Digital Management Platform integrates plant production management, real-time monitoring (including material flow and batch numbers), and video surveillance. It can be connected with energy management, T-MES, and DCS systems, leveraging digital twin technology to visualize workshop production in real time. This significantly enhances production management efficiency and supports fermentation enterprises in their digital transformation.

