



通用技术机床研究院
GENERTEC MACHINE TOOL RESEARCH INSTITUTE

CNC System Design Requirements

Shanghai Research Institute



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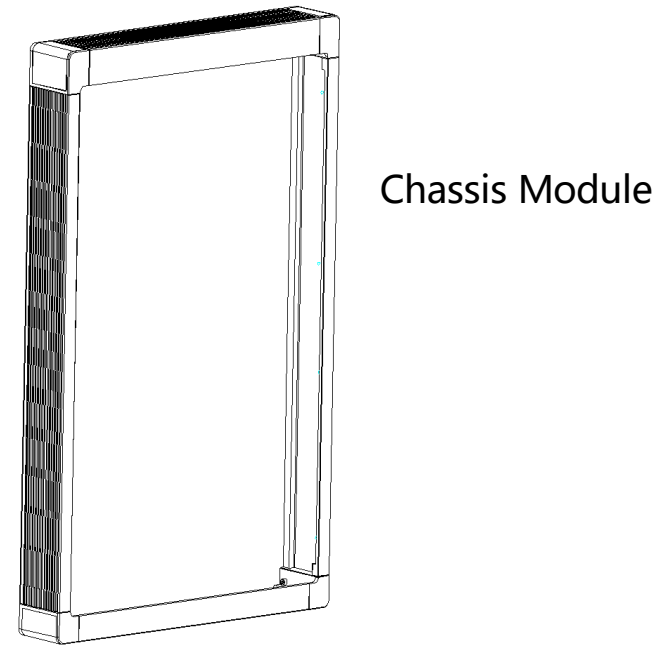
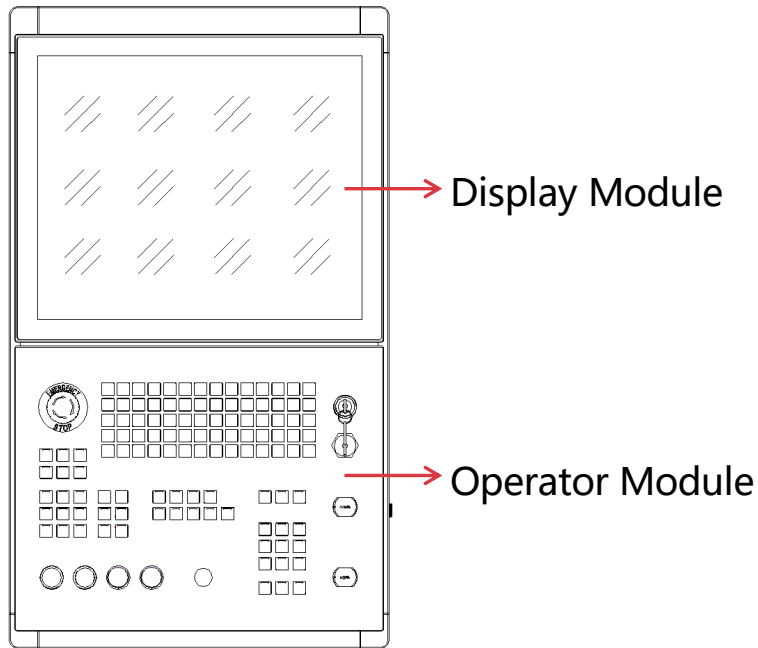
01

Overall demand



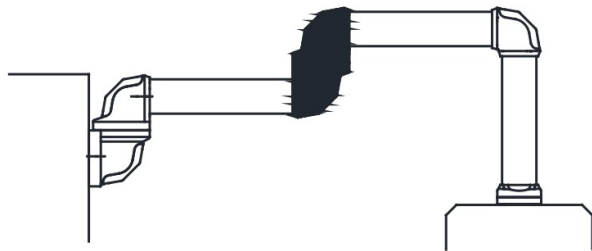
01 Mainframe - product body

CNC host mainly contains three modules, display module, operation module and chassis module, of which the display and operation belong to the necessary components, chassis module according to the customer's requirements for the optional, in the design of the program, we can provide with chassis and without chassis two design options, and try to ensure that the reuse of the first two modules and the installation of the consistency of the first two modules, which facilitates the customer's selection.

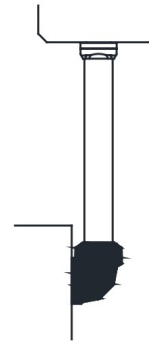


02 Mainframe-mounting method

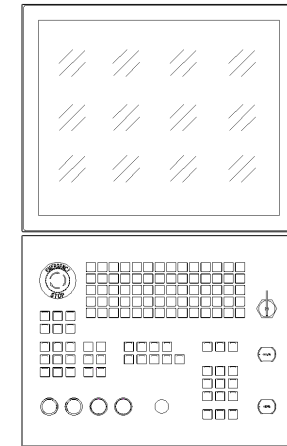
The mounting mode of CNC host needs to meet three kinds: upper support, lower support and split type; in the design scheme, the structure of CNC needs to be compatible with three kinds of mounting modes at the same time, the upper support and lower support are applicable to the environment with chassis module, while the split type is applicable to the environment without chassis module.



upper support



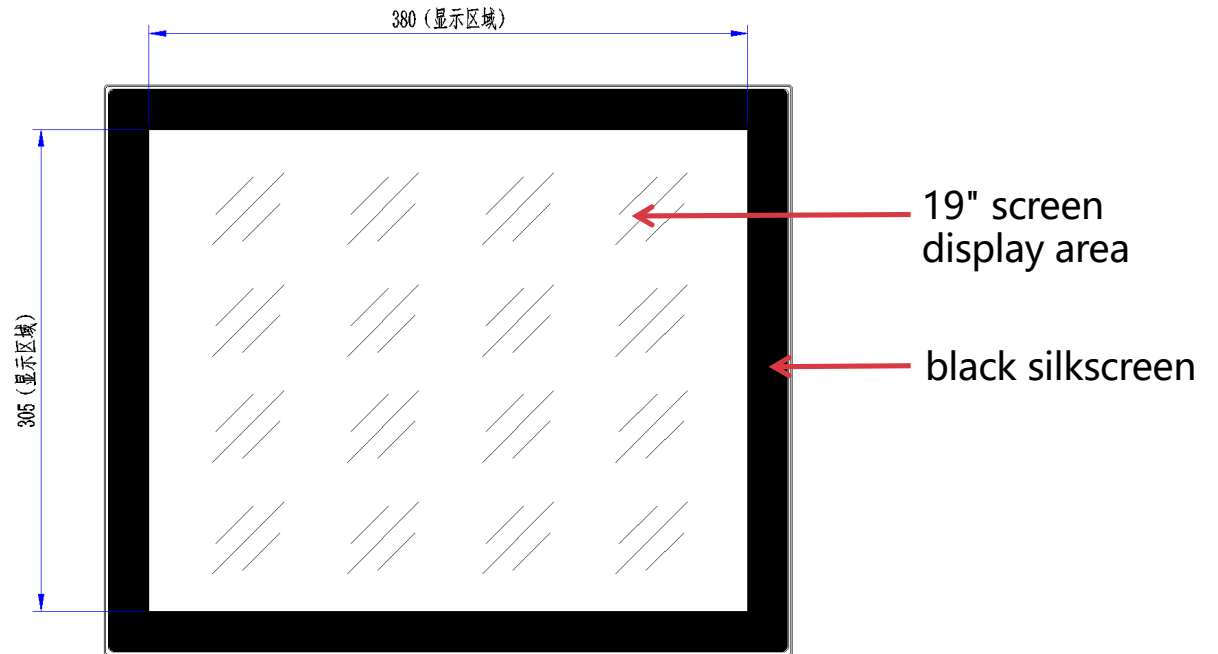
Lower support



split

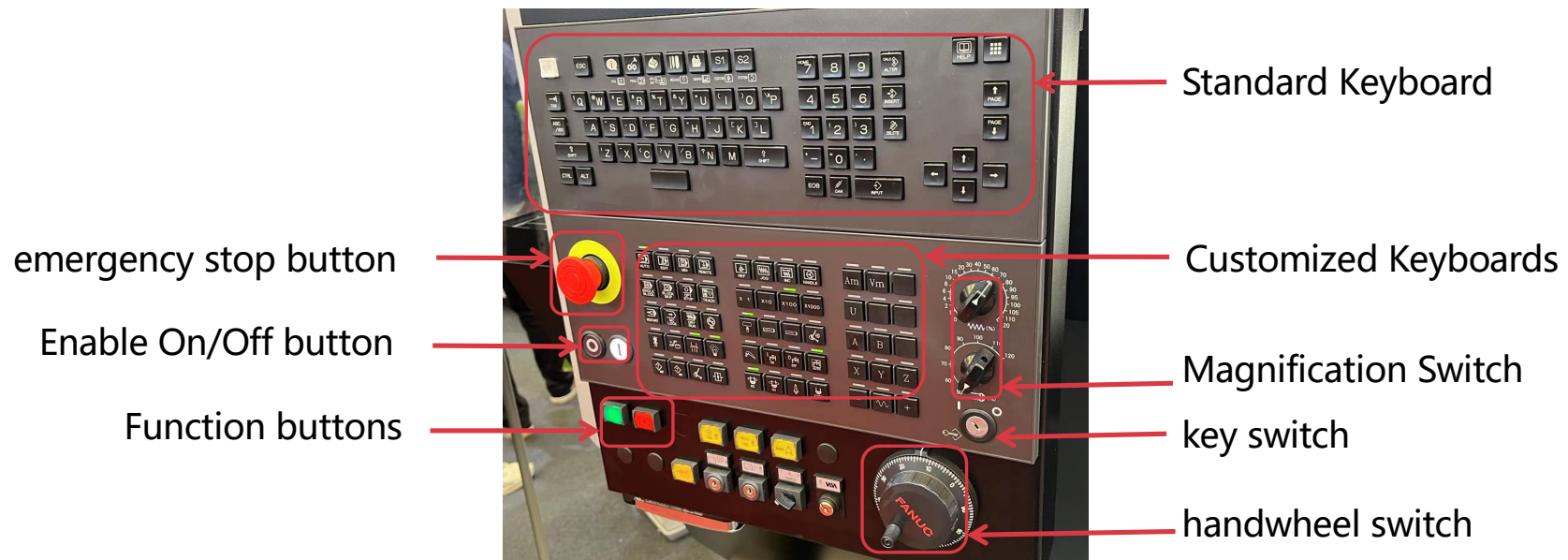
03 Mainframe-Display Module

Currently existing products display module LCD screen and touch screen with 19 inches, resolution 1280x1024, touch screen for the resistive screen, around a circle of black for the silk screen layer, the new design program LCD screen and touch screen is not limited to 19 inches, and horizontal or vertical screen can be, the touch screen can be resistive or capacitive.



04 Mainframe-Operator Module Layout

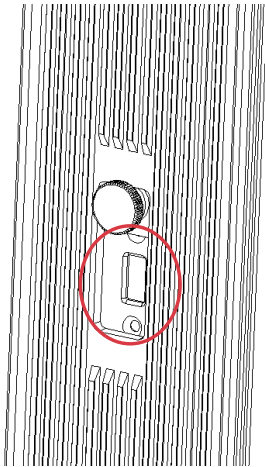
Operation module needs to contain the basic safety buttons, switches, PC keyboards, function buttons, etc., the layout can be played according to the new design ideas, the following figure is the existing products for reference, the new design of the program should be in line with ergonomics, commonly used and infrequently used buttons for a reasonable layout, and at the same time to do a good job of reasonable operation of the anti-dumbness, to increase the convenience of use.



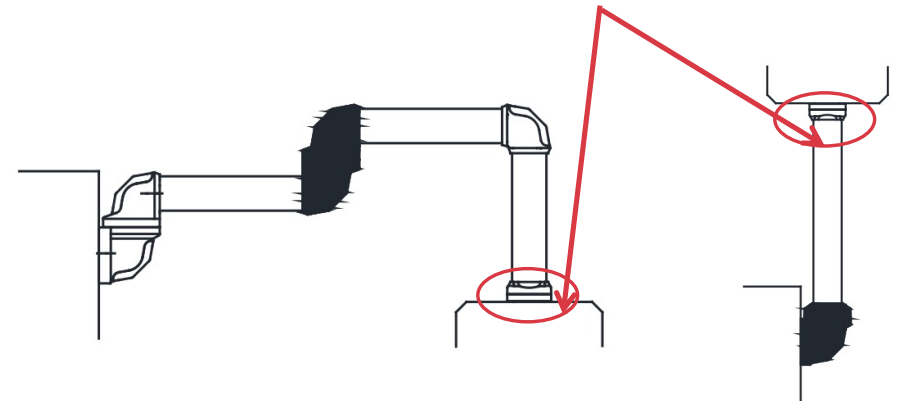
05 Mainframe-Chassis Module

Chassis module in addition to consider the structure of the installation of convenient and dust and oil, the design program needs to meet the basic interface requirements, the current system contains the basic interface usb interface and internet ports, as well as power supply interface, the need to retain the above interfaces in a reasonable and convenient for users to access the location.

The chassis shell needs to be reserved for a USB port, and the USB port has a dustproof and waterproof features, the following reference picture



In the case of the CNC mainframe upper or lower support, the size of the space for 2 RJ45 pass-throughs and a set of power cord-to-plugs needs to be taken into account at the adapters.





06 Mainframe - Maintenance and Weight



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The CNC mainframe equipment is a key functional component of the machine tool equipment and needs to be designed to meet easy maintenance and basic weight requirements:

- Compact structure, good closure, no shaking during use
- Modular design (display module, operation module and chassis module) modules are independent, can be loaded and unloaded individually
- Easy maintenance, the equipment can be disassembled directly on the bed when maintenance is required on the client side
- Easy installation and support for a single person to do all the work of maintenance

07 Mainframe - thermal requirements

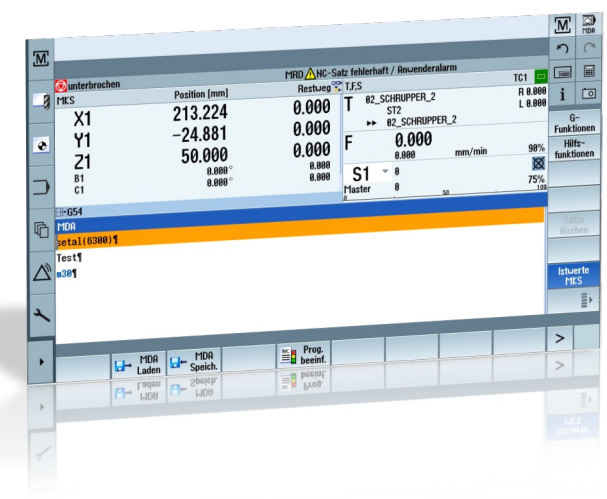
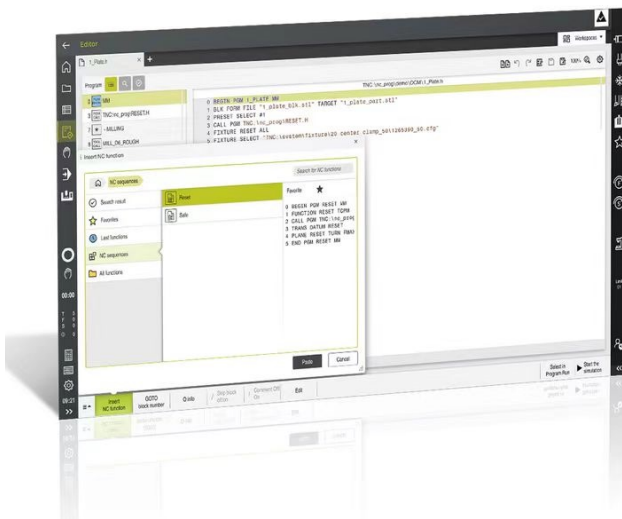
The protection level of the whole machine is IP65, the internal industrial motherboard power consumption (65 watts ~ 80 watts), the design scheme needs to include active heat dissipation and the whole machine shell of the overall heat dissipation, shell materials and structural features to meet the characteristics of the heat dissipation fast, the following reference picture of the shell of aluminum alloy and the appearance of the structure of the heat dissipation of the teeth characteristics of the mounting to increase the heat dissipation area, but also to meet the demand for the appearance.



Pictures for reference

08 Mainframe-Interface Design

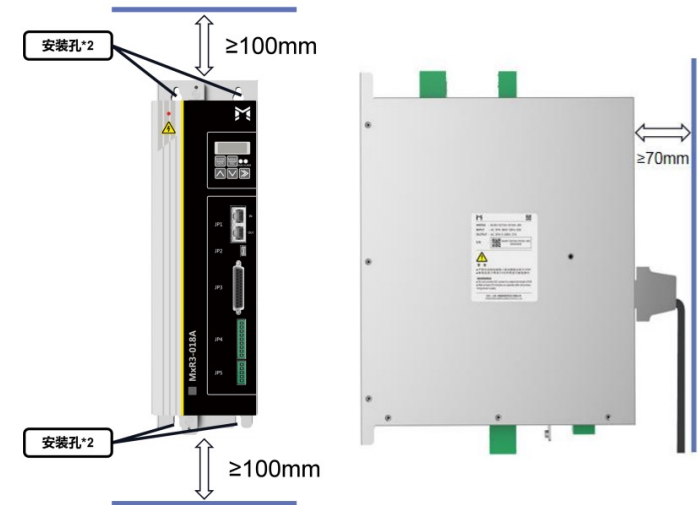
The interface design mainly focuses on the characteristics of the touch screen, highlighting the consistency of the overall style, with a good operating layout and the concept of module division, at the same time to meet the operating habits of the mainstream system, the overall style of the industry to do further optimization, and better enhance the ease of use of the product.



09 Server - Overall Requirements

Product appearance, installation method and operating environment

Define product specification by rated output current, 09A~160A product appearance serialization;
Book-style exterior, back panel mounting hole fixing, suspension mounting;
Upper and lower spacing $\geq 100\text{mm}$ for ventilation and heat dissipation;
IP20, air-cooled;



温度	工作温度：0~45℃； 储存温度：-40℃~65℃
湿度	5%~95%，无凝露
振动	10~55Hz， $\leq 5.88\text{m/s}^2$
允许使用海拔	2000m（高于1000m 需降额使用，每升高100m 降额1%）
防护等级	IP20
冷却方式	强制风冷
污染等级	PD2



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02

Available Products





01 Mainframe 3° gen. - overall characteristics



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This mainframe is one of the current product lineups with a large inventory on the market, has some customer acceptance, and incorporates some of the basic characteristics of the needs just described.

Aluminum body

Machined and molded, recyclable

Suitable for all types of industrial environments

Fanless, fully sealed design, waterproof and dustproof

RFID swipe zone

Cloud-based user rights management system with multiple login method implementations



Application desktop

Access to all available applications

Rigorously tested keys

Passed EMC test, up to 1 million times service life, 2~3N key force control

Humanized design

Friendlier, more intuitive, more concise

01 Mainframe 3° gen. – specifications

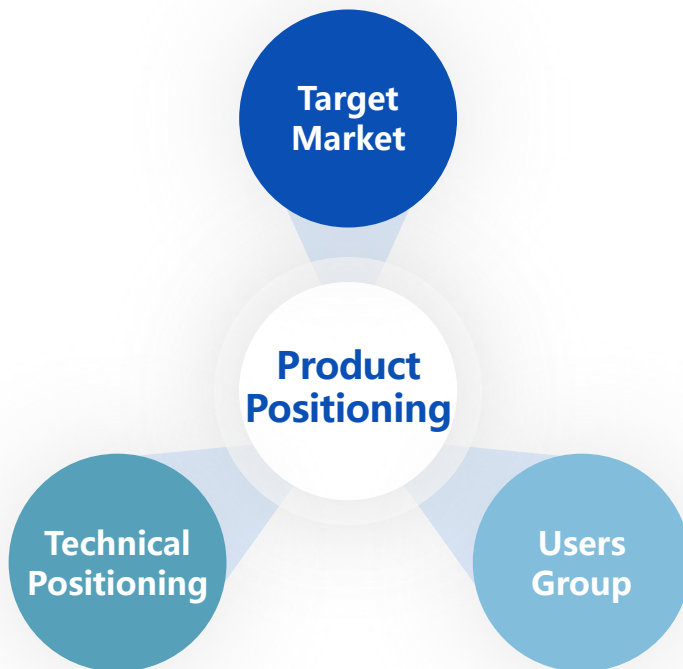
The product specification parameters can meet the application requirements of mainstream products and have a certain degree of brand recognition.



- 12-inch color touch screen
- 4Gb RAM/32Gb hard disk
- One-piece aluminum alloy body for better heat dissipation
- Sealed design, waterproof and dustproof
- More than 1,000,000 keystroke life
- Power failure data protection
- Suitable for all types of lathes and milling machines up to 5 axes

02 New Large Screen - product positioning

The product positioning of the new large screen is centered on application scenarios in key areas, solving performance bottlenecks and highlighting the demand characteristics of high-performance mainframes.



Target market

The first target market is to support high-grade CNC machine tools within the Group's segment, and to adapt to vertical five-axis, horizontal five-axis, gantry five-axis, large-scale boring machine, gear machine, horizontal gantry milling machine, turning and milling machine tools with complex control requirements.

Technical positioning

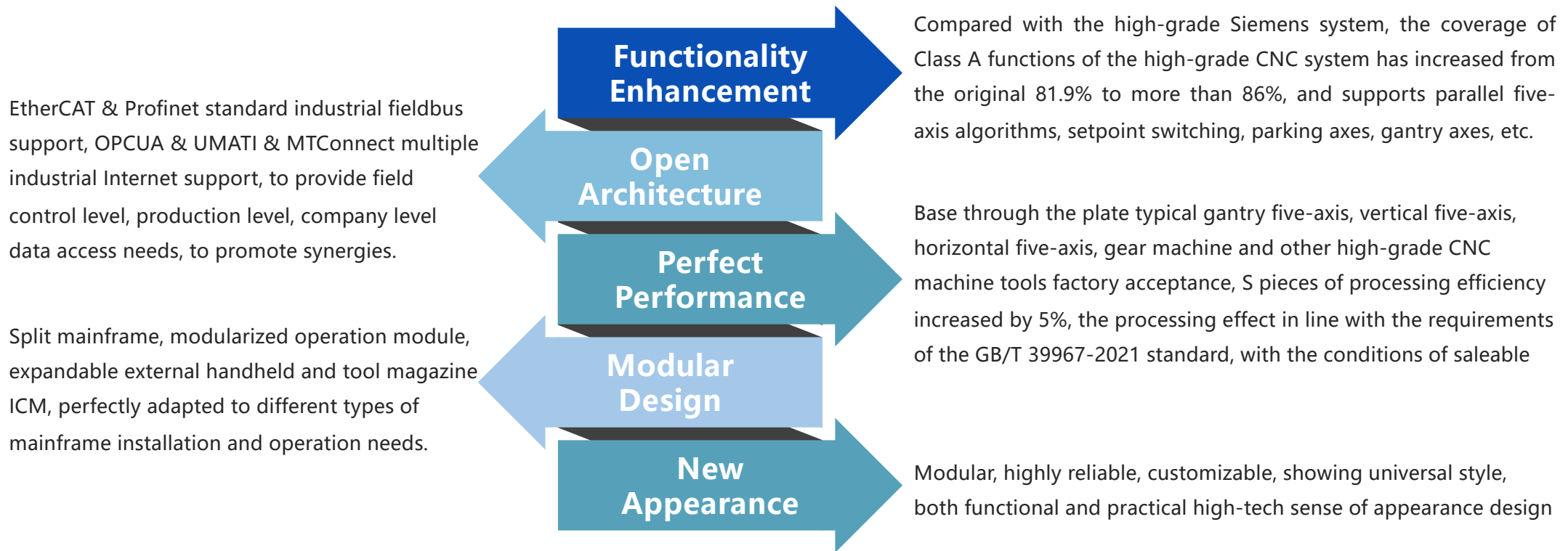
High algorithmic complexity, requiring high CPU performance
Diversified usage scenarios requiring high customizability
High level of data security in key areas requires secure and reliable hardware and software design
Complex machining processes requiring visualization and simulation capabilities

User's group

Key areas of enterprise equipment commissioning personnel, senior process personnel, with a high degree of system commissioning and process optimization capabilities

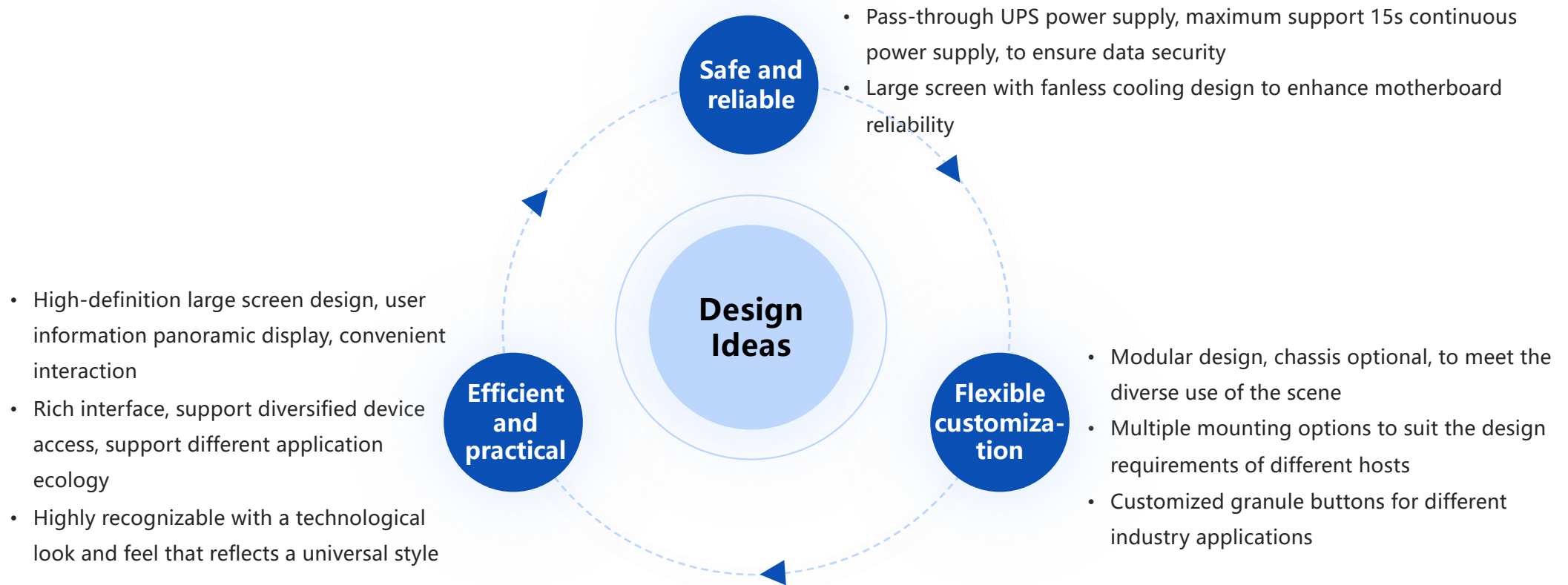
02 New Large Screen - Design Goals

The product design goal of this item, in terms of function, performance and openness, to comprehensively improve some of the shortcomings of the original product.



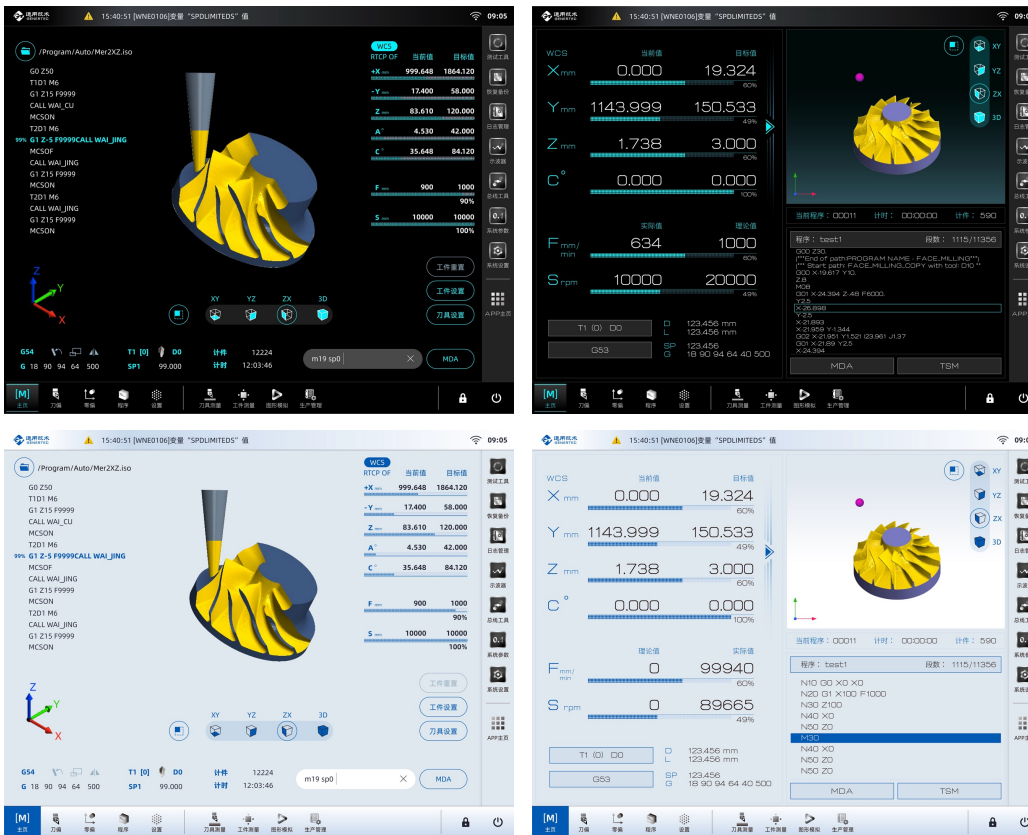
02 New Large Screen - Design Ideas

We do the overall solution improvement of the product around the three directions of safety and reliability, flexible customization, and high efficiency and practicality.



02 New Big Screen - Page Design

The new large screen host in the human-machine interface, mainly in the page navigation to make certain improvements, while combining some special features, do part of the layout optimization.



Two sets of dark and light configuration colors for users to choose different styles, windowed view, horizontal and vertical rows of buttons, more ergonomic interaction design, more efficient way of guidance

02 New Large Screen - Design Details

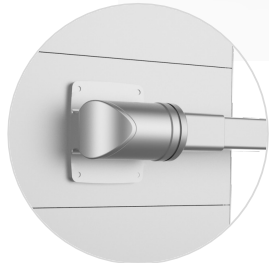
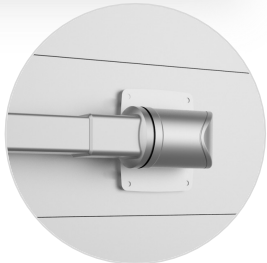
Segmented design, user can customize the operation panel to enhance the user application scenarios

Compatible with a variety of mounting chassis design, to solve the upper suspension, lower arm, left-handed, right-handed a variety of chassis design



19-inch full lamination process design, clarity increased by 1.6 times, while equipped with a full keyboard input, more convenient operation

Pass-through UPS power supply with key switch for more secure data protection mechanism



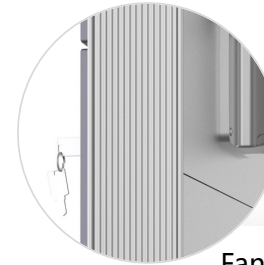
02 New Large Screen - Design Details



Snap-on connection for quick connection and disconnection, durable and environmentally friendly



Fanless, integrated low power consumption, fast heat dissipation, maintenance-free pure metal structure model, rugged, anti-interference high



Concealed connector design solves the problem of accidental touching during placement and installation.



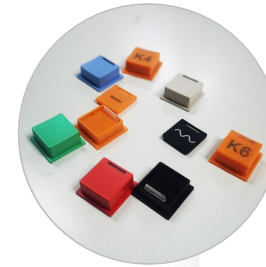
Three-section rear panel design, easy to remove and install
Front panel replacement can be disassembled independently



02 New Large Screen - Design Details

Adoption of a common technology unified visual identity system color scheme, and design style with a certain degree of continuity

Customizable buttons can be replaced, flexible to match different hosting customization needs, support for Chinese and English versions



Keycaps are replaceable and support user-defined functions

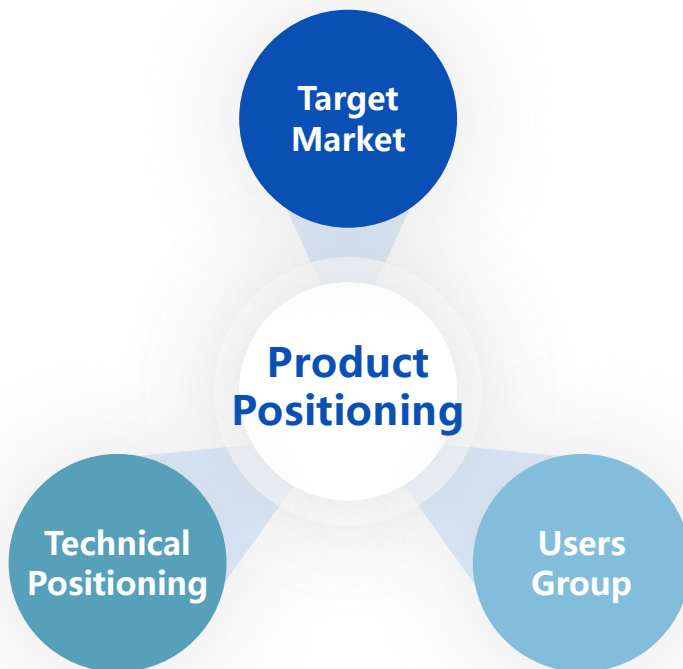


The operation area is divided into common function area, customized function area, manual control area, reasonable layout, more efficient operation.



03 New Control Unit - Product Positioning

The new control unit is designed and positioned to focus on market traffic models and improve product stability and ease of use.



Target Market

Focus on general-purpose machine tools with high stability requirements such as vertical machining centers, lathes, mill-turn machines, milling machines, engraving and milling machines, trusses, etc., mainly within the segment and gradually expanding to external markets.

Technical Positioning

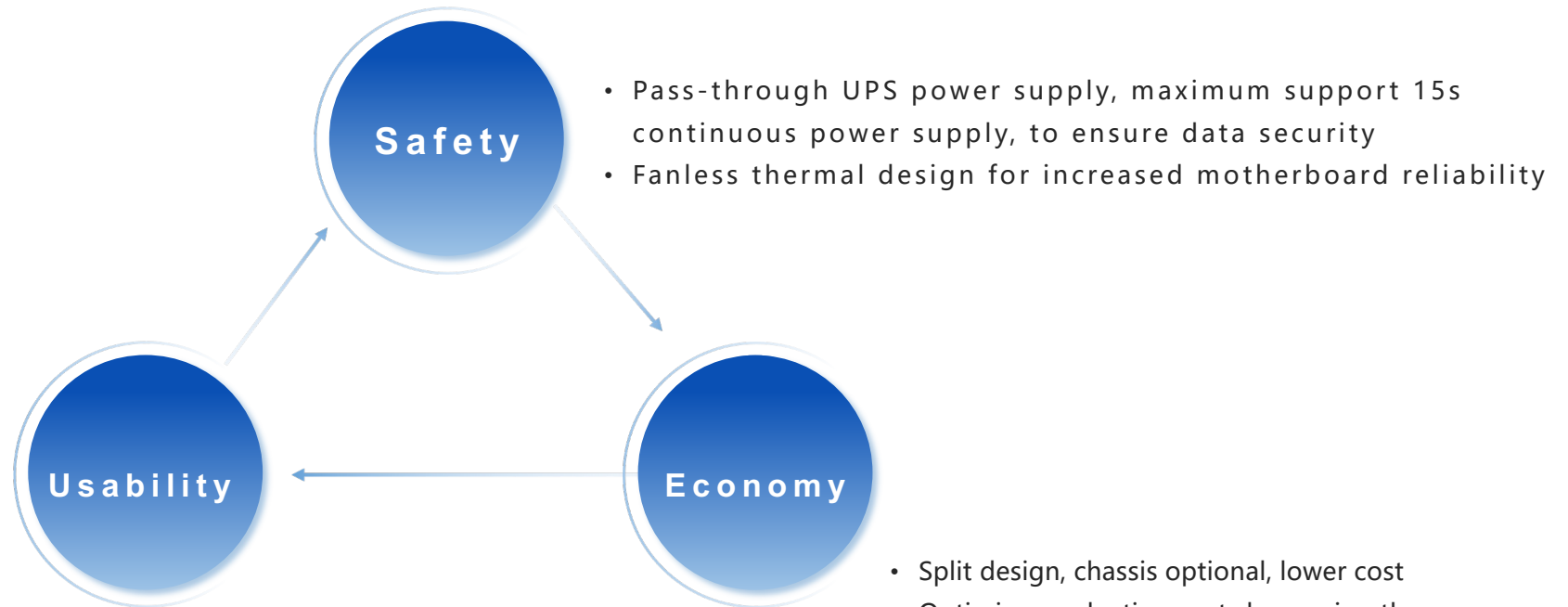
Based on the original hardware and software architecture, adopting the split architecture, through the optimization of the software framework and circuit design scheme, compatible with the market mainstream command system, simplify the debugging tools, enhance the third-party power unit supporting capacity, to provide stable and easy-to-use CNC host computer.

Users Group

General industry CNC machine manufacturers, general operators and programmers need more convenient operation and easier system debugging tools.

03 New Control Unit - Design Ideas

The overall idea of the product is centered around the current scenario needs and is enhanced in three aspects: safety and reliability, affordability, and ease of use.



- Supports both physical and touch screen operation modes, DIN&ISO dual command system, landscape design, close to the mainstream of the market.
- Highly recognizable with a technological look and feel that reflects a universal style

- Split design, chassis optional, lower cost
- Optimize production costs by reusing the dimensions of high-grade chassis modules

03 New Computer - Design Principles

The new standard host design principle is to have the flexibility to customize the ability, while user-friendly operation, with more complete security measures.

All-in-one low power consumption, fast heat dissipation, maintenance-free pure metal structure model, rugged, anti-interference high

Laser engraved silk-screened replaceable pellet button design, color, silk-screened function to flexibly match different host customization needs

The operation area is divided into common function area, customized function area, manual control area, reasonable layout, more efficient operation.



Concealed plug-in connector structure design, to solve the problem of mis-touching in the process of placement and installation.

The 12-inch full lamination process is designed to improve clarity by 1.6 times, while equipped with a full keyboard input for more convenient operation;

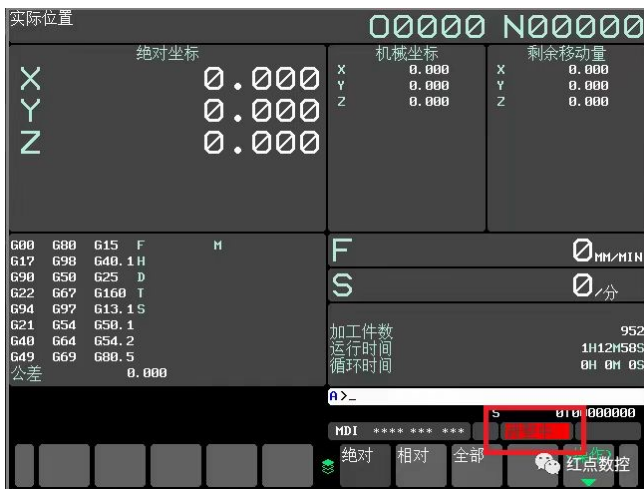
Pass-through UPS power supply, more secure data protection mechanism

Compatible with a variety of mounting chassis design, to solve the upper suspension, lower arm, left-handed, right-handed a variety of chassis design

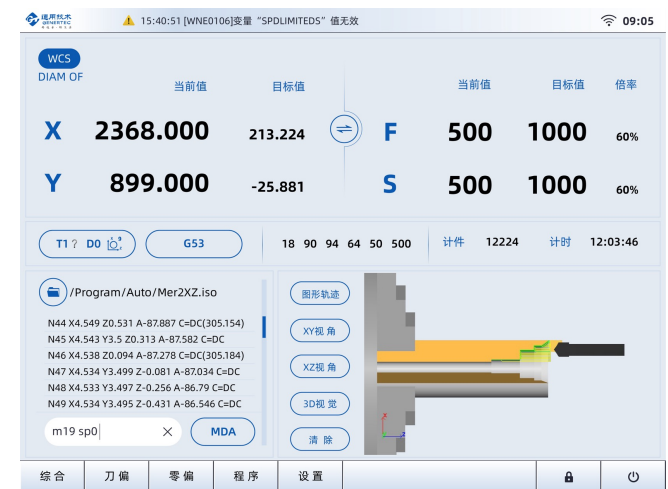
03 New Computer - Page Design

The interface of the new computer has been improved in three aspects: practicality, performance optimization and scalability:

- **Practicality:** the main interface placement function is the collection of functions with the highest frequency of use by users, highlighting key information through appropriate typography, colors and fonts, so that users can quickly access the key content
- **Performance optimization:** economic interface design should try to avoid the use of excessive images and animation effects to reduce the interface loading time and occupy system resources, while optimizing the interface layout and control design to reduce unnecessary gaps and repetitive content
- **Scalability:** the interface design takes into account the scalability of the system and adapts to the future expansion of functions and changes in user needs.



Fanuc home page



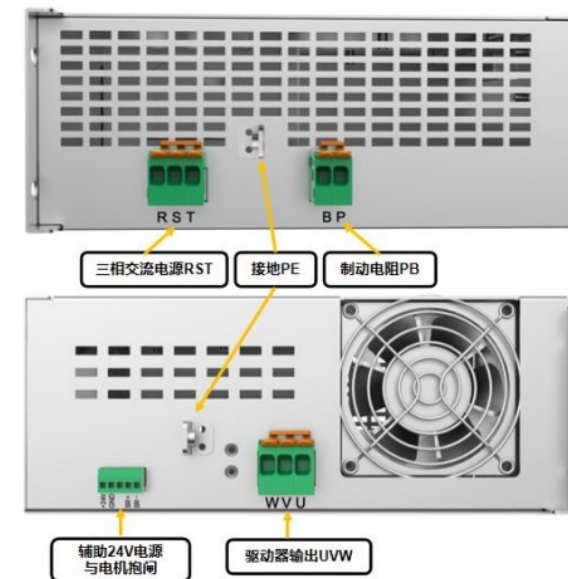
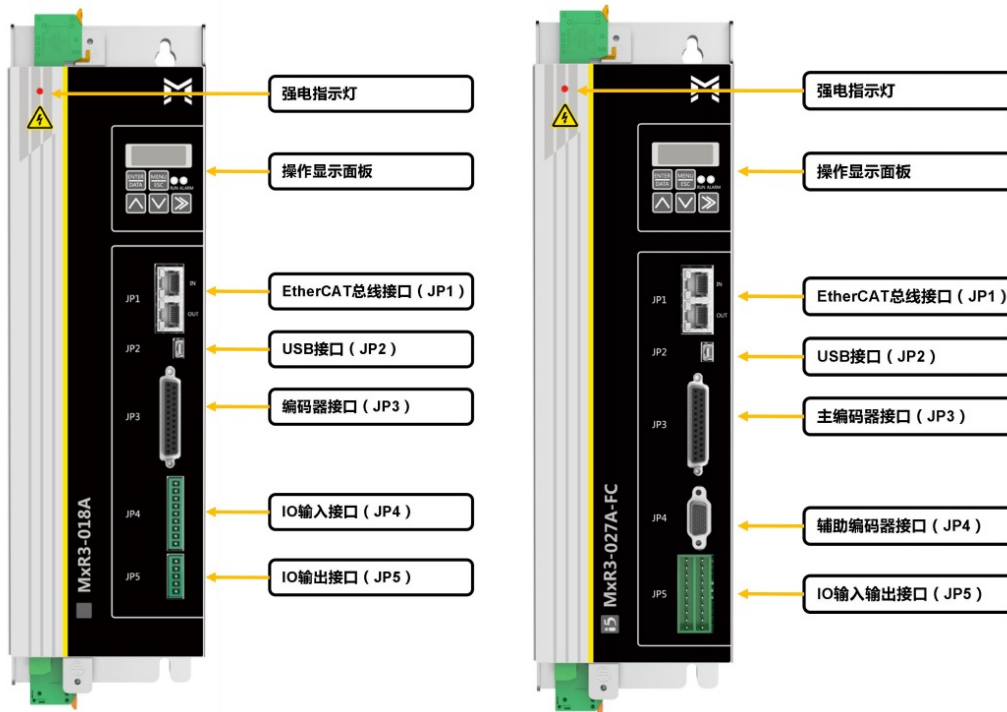
New system home page

04 Servo-interface description

Functional interface

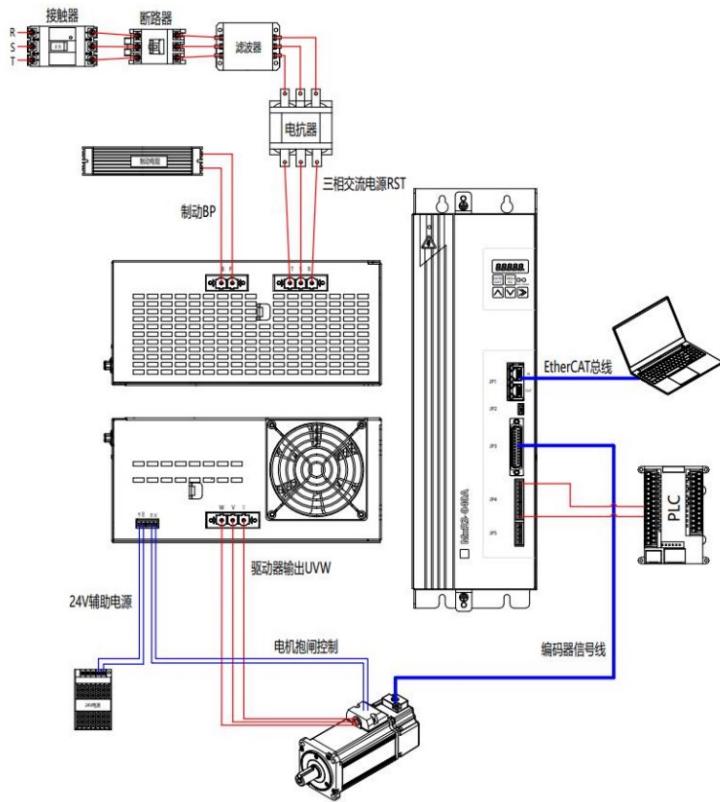
Power supply interface: RST AC380V voltage/current input, UVW voltage/current output

Signal interface: data interaction with peripheral devices



04 Servo-Application Scenarios

Application scenario: multi-axis drive





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03

Reference Competitor





CIMT2024 Reference Exhibit - The main unit



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CIMT2024 Reference Exhibit - The main unit



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CIMT2024 Reference Exhibit- Server



Brand: SIEMENS
Product: S120



Brand: B&R
Product: ACOPOSmulti



Brand: HEIDENHAIN
Product: Gen3



Brand: KEBA
Product : KeDrive D3



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