SIGER DATA

FOR A BETTER INDUSTRY

SIGER

Innovation with Data

SIGER DATA

Leader of CNC Big Data Analysis

Jiangsu SIGER Data Technology Co., Ltd

Tel: +86-512-6742 5209

Mob:+86 189 6235 3927(Manager Zhu)

Email: marketing@siger-data.com

2nd Floor, Building 9, Creative Industry Park, No. 328 Xinghu Street,

Suzhou Industrial Park, Jiangsu Province, China

WhatsApp

Digital and Intelligent Product Selection Guide Of CNC Machining Industry

—— Jiangsu Siger Data Technology Co. , Ltd. ——

Jiangsu SIGER Data Technology Co., Ltd

en.siger-data.com

Table Of Contents

目录

SIGER
Innovation with Data

CONTENTS

ONE

1

SIGER Data Company Introduction

01 SIGER Data Company Introduction

Introduction of SIGER Data Company

70%+ Technology

More than 70% of the company's team focus R&D. Graduated from well-known universities, and have 15+ years of experience of Fortune Enterprises.

95 + Patents

The company has a total of 95 software copyright and patents, focus in technology of innovation.

100% Focus On CNC Domain

Focus on CNC Domain, such as CNC Precision Optimize, Quality Control, Effeciency Optimize, and Collaborative Management.

1000 + Customer

More than 1000+ Customers from different countries select SIGER.

SIGER DATA

Leading Precision Manufacturing Intelligent Conalysis System DT Company
Focusing on Precision Machining industry Digital Plant Solutions

Jiangsu Siger Data Technology Co., Ltd. is headquartered in the Suzhou Singapore Industrial Park. Founded in September 2016 with a registered capital of 18.286 million RMB, we are a leading provider of industrial big data intelligence solutions for precision manufacturing.

Specializing in end-to-end digital factory analytics, Siger Data offers comprehensive solutions including machine tool accuracy control, edge monitoring systems, and digital factory services. Our technologies empower precision machining enterprises with smart manufacturing applications across the entire production chain. With a strong footprint across China, we have successfully served over 1,000 industry-leading clients, delivering cutting-edge digital transformation tools and expertise.

01 SIGER Data Company Introduction

■ Introduction of SIGER Data Company

Vision of SIGER Data

For a Better Industry，by Innovation with Data

Mission of SIGER Data

SIGER Data is committed to industrial interconnection, big data analysis and IT architecture technology, providing intelligent analysis and decision-making services for industrial processes, making the precision manufacturing industry more intelligent, and making SIGER Data a leader in industrial big data.

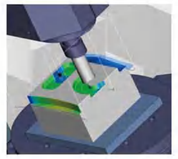
Appendix:Partial Soft Rights and Patent Certification

Software Copyright Registration Certificate	Edition	Registration Number	Date of Certification
SIGER Tool Intelligent management System software V1.0	V1.0	2018SR245339	2018/4/11
Tool status monitoring, data model analysis system V1.0	V1.0	2018SR1081106	2018/12/27
Jiangsu SIGER data tool transfer management system V1.0	Replenish	2020SR0153562	2020/7/14
The SIGER Data Acquisition Master Software V3.0	V3.0	2021SR1181311	2021/8/10
The SIGER Data Real-Time Measurement System software V1.0	V1.0	2021SR1532134	2021/10/19
Keyboard management system V1.0	V1.0	2022SR1056451	2022/8/9
SIGER Data Online detection management system V1.0	V1.0	2022SR1083671	2022/8/11
The SIGER Data Tool Management System Software V1.0	V1.0	2022SR1337318	2022/8/31
SIGER Data TCS collision protection system V1.0	V1.0	2022SR1391681	2022/10/9

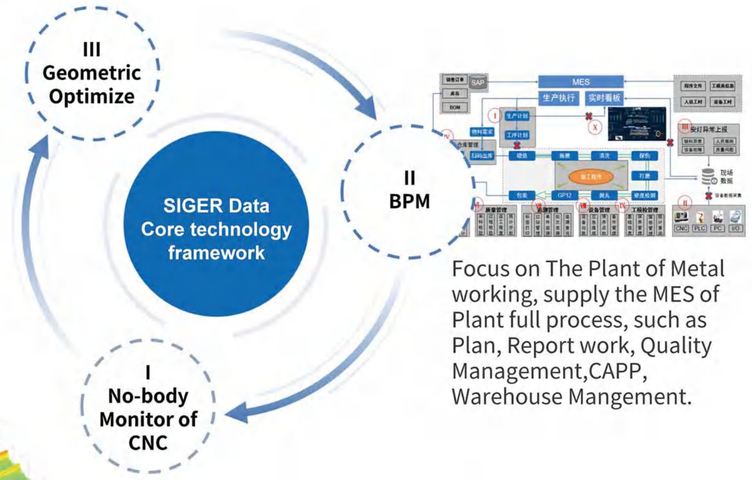
Patent name	Number	Registration Number	Date of Certification
A risk warning method during tool cutting	ZL-2017-0001	CN201710914485.9	2017/9/30
A machine tool monitoring system	ZL-2018-0003	CN201811114222.0	2018/9/25
A monitoring system for the detection of cutting tool status	ZL-2019-0005	CN201910997295.7	2019/9/30
Cutting process parameters optimization method, system, computer equipment and storage media	ZL-2022-0008	CN202210462538.9	2022/4/28
Data separation method and the separation system	ZL-2022-0009	CN202210440074.1	2022/4/28
Tool wear state prediction method, device, and storage media	ZL-2022-0010	CN202210555991.4	2022/5/20
Tool wear prediction method, device and computer application based on transfer learning	ZL-2022-0011	CN202210774410.6	2022/7/1

■ Introduction of SIGER Data Company

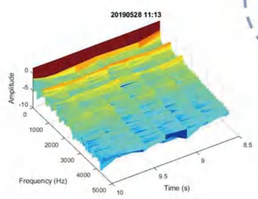
SIGER Core Technology Framework



Base on the Geometric fluctuation, to re-caculate the CNC spatial position to ensure



Focus on The Plant of Metal working, supply the MES of Plant full process, such as Plan, Report work, Quality Management,CAPP, Warehouse Mangement.



Based on the signal of CNC’s Power and Vibration, to Monitor the Tooling and Optimize the efficiency

Our Strengths

SIGER Data Company’s team focus on the R&D of precision machining digital& intelligence technology innovation, have owned more than 100+ Patents in CNC’s field. Until now, we can provide Digital factory solutions of CNC Domain, and Nobody Monitor of CNC, Geometric Optimize of CNC. The strength of these three technology fields, that make us can supply CNC Plants can better management the process of Metal-making process. In the domain of Intelligent solutions of CNC, we have had more than 100+ Patents, and also have more than 70+ engineers focus on R&D, to innovate more valueable products in CNC Domain.

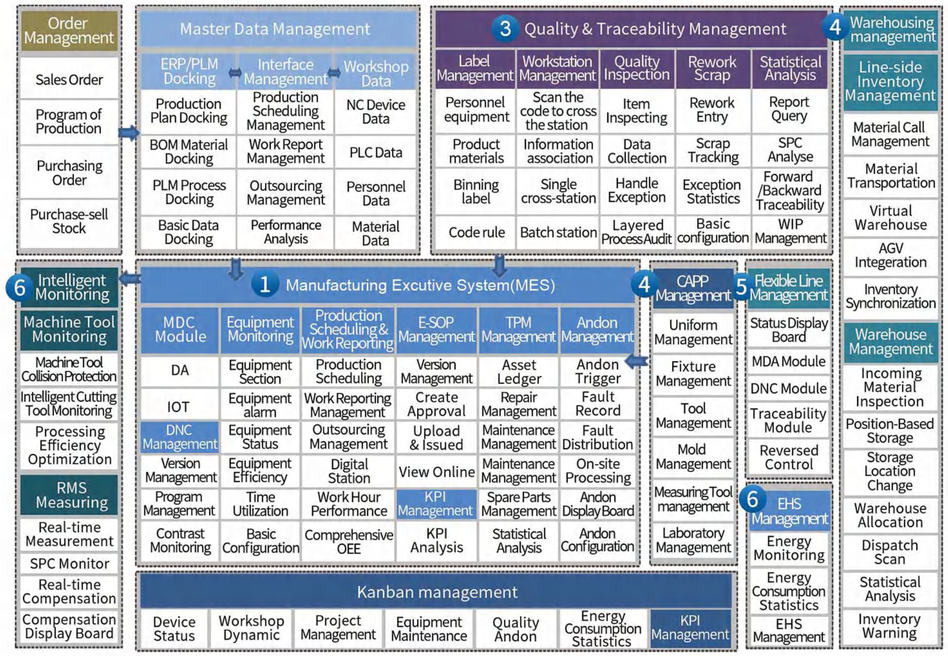
01SIGER Data Company Introduction

■ Introduction of SIGER Data Company

SIGER Data-Product Matrix

Enterprise digitization	1) Production management system 2) The CAPP management system 3) Quality traceability system 4) Warehousing and logistics scheduling	
Geometric calculation	1) Real-time monitoring of the processing process 2) Movement simulation of the machine tool spindle 3) Simulation and optimization of tooling path trajectory 4) The 3D display of the optimization result	
Intelligent monitoring of equipment	1) Tooling Monitoring System 2) Tooling Collision Protection system 3) Adjust Machining System 4) Online Measurement Module	
Intelligent acquisition hardware	1) Data Collect Module 2) Edge Computing Module 3) Vibration Sensor 4) Power Sensor	

SIGER Data-28 Modules of 7 Domains



TWO

2

CNC Machine Tool Monitoring System

02 CNC Machine Tool Monitoring System

■ TMS Tooling Monitoring System

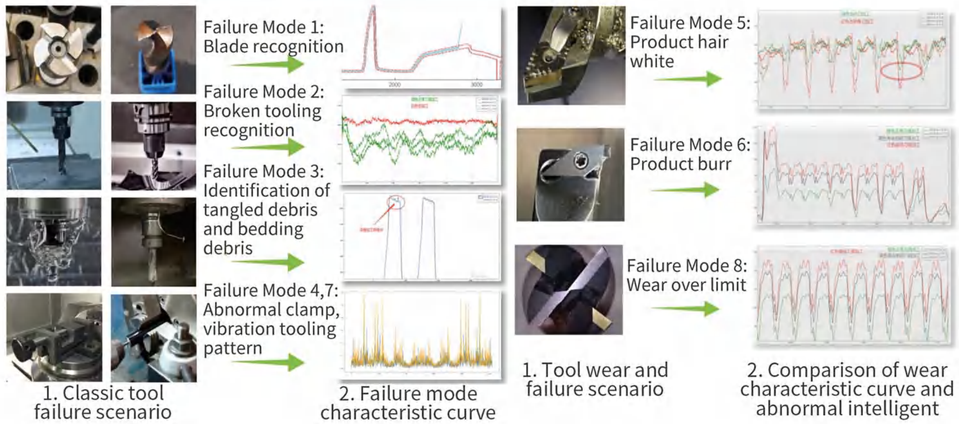
TMS E3 - Tooling Monitoring System

Tooling Wear-out Monitoring | Tooling Broken monitoring | Tooling life predicting | Auto-control of CNC

- Broken tooling / blade monitoring: real-time monitoring of tool status, intelligent identification of broken tooling / blade abnormal, and automatic control of the machine shutdown, broken tooling / blade monitoring accuracy of more than 99%;
- Wear monitoring: real-time monitoring of the spindle load current, reflect the tool wear situation, measuring the real life of the tool, the tool life prediction accuracy of more than 99%;

TMS E3 - 8 Failure Modes of Tooling

TMS E3 - Typical Setting of TMS E3



■ TMS Tooling Monitoring System

TMS E3 - Typle Selection - CNC Machining Center

Index Item	Adapt Content
Machine tool type	Vertical / horizontal / gantry / five-axis machining center, etc
Navar	Fanuc, Siemens, Hedeheim and other 95% + systems
Types of knives	Milling cutter | drill bit, wire cone, reamer | composite tooling
Process type	Mass repeated processing, small batch processing, no NC, etc (Cutting amount not less than 10 wire)
Processing scenarios	Auto parts, construction machinery, molds, medical equipment, military aerospace and other common mechanical plus scenarios
Failure mode	8 common failure modes such as broken tooling, broken blade and wear

TMS E3 - Hardware Configuration

Key components	System indicators	parameter values
Vibration pick-up	Ambient temperature	-40°C-125°C
	Vibration acquisition frequency	200-4000Hz
	Power acquisition frequency	200-4000Hz
Power Transformer	Metre fullscale	70A/2000V
	Monitoring accuracy	0.5%
	Service voltage	DC 12-24V
The SAD conversion module	One-way processing time	⩽30min
	Response time	0.005s
	Receive / send the interface	RS232 serial port
System terminal	SC	Onboard, eMMC 16G
	Downtime response time	300ms

Hardware name	Function declaration	Quantity
Power transformer	Collect the spindle power load information	1 set
Vibration sensor (optional)	Collect the spindle, and collect the vibration signal	1 set
The SAD conversion module	Digital-to analog conversion of edge signal acquisition	1 set
E3 operation module	Data storage, analysis, and output	1 set
HMI display terminal	System configuration and monitoring of the interaction	1 set
Other auxiliary materials	Alarm lights, connecting lines and other auxiliary materials	1 set

Note: The number of sensors depends on the number of spindle and monitoring points!

Typical Applications & Customers

02 CNC Machining Monitoring System

■ TMS Tooling Monitoring System

TMS E3 - Typle Selection -CNC Lathe & Gantry

Index item	Adapt content
Machine tool type	Vertical / horizontal / gantry, lathe, turning and milling compound, etc
Navar	Fanuc, Siemens, Hedeheim and other 95% + systems
Types of knives	Milling cutter | car cutter | boring cutter
Process type	Mass repeated processing, small batch processing, no NC, etc (Cutting amount not less than 10 wire)
Processing scenarios	Construction machinery, auto parts, military aerospace, mold and other related to shaft, plate, set of processing
Failure mode	Blade collapse, wear, product burr hair white and other abnormal

TMS E3 - Hardware Configuration

Key components	System indicators	Parameter values
Vibration pick-up	Ambient temperature	-40℃-125℃
	Vibration acquisition frequency	200-4000Hz
	Power acquisition frequency	200-4000Hz
Power Transformer	Metre fullscale	70A/2000V
	Monitoring accuracy	0.5%
	Service voltage	DC 12-24V
The SAD conversion module	One-way processing time	⩽30min
	Response time	0.005s
	Receive / send the interface	RS232 serial port
System terminal	SC	Onboard, eMMC 16G
	Downtime response time	300ms

Hardware name	Function declaration	Quantity
Power transformer	Collect the spindle power load information	1 set
Vibration sensor (optional)	Collect the spindle, and collect the vibration signal	1 set
The SAD conversion module	Digital-to analog conversion of edge signal acquisition	1 set
E3 operation module	Data storage, analysis, and output	1 set
HMI display terminal	System configuration and monitoring of the interaction	1 set
Other auxiliary materials	Alarm lights, connecting lines and other auxiliary materials	1 set

Note: The number of sensors depends on the number of spindle and monitoring points!

Typical Applications & Customers

Construction machinery & equipment manufacturing

Auto parts

Aerospace manufacturing

Mold tooling manufacturing

Machine tool manufacturer and automation

■ TMS Tooling Monitoring System

TMS E3 - Typle Selection -CNC Centerless Gather

Index item	Adapt content
Machine tool type	Tianjin, West iron city, new generation and other common walking series
Navar	FANUC, Mitsubishi, Xicheng, Xinye, and other control systems
Types of knives	Drill, silk cone
Process type	Mass repeated processing (cutting amount not less than 10 wire)
Processing scenarios	Auto parts, precision electronics, medical equipment, energy, aerospace, etc
Failure mode	Abnormal monitoring of broken tooling, broken blade and feeding;

TMS E3 - Hardware Configuration

Key components	System indicators	Parameter values
Vibration pick-up	Ambient temperature	-40℃-125℃
	Vibration acquisition frequency	200-4000Hz
	Power acquisition frequency	200-4000Hz
Power Transformer	Metre fullscale	70A/2000V
	Monitoring accuracy	0.5%
	Service voltage	DC 12-24V
The SAD conversion module	One-way processing time	⩽30min
	Response time	0.005s
	Receive / send the interface	RS232 serial port
System terminal	SC	Onboard, eMMC 16G
	Downtime response time	300ms

Hardware name	Function declaration	Quantity
Power transformer	Collect the spindle power load information	3 set
Vibration sensor (optional)	Collect the spindle, and collect the vibration signal	1 set
The SAD conversion module	Digital-to analog conversion of edge signal acquisition	3 set
E3 operation module	Data storage, analysis, and output	1 set
HMI display terminal	System configuration and monitoring of the interaction	1 set
Other auxiliary materials	Alarm lights, connecting lines and other auxiliary materials	1 set

Note: The number of sensors depends on the number of spindle and monitoring points!

Typical Applications & Customers

Automotive precision instrument processing

3C electronics

Aerospace / military

The sources of energy

Aerospace electronics devices

02 CNC Machine Tool Monitoring System

■ TCS Tool Collision Protection System

TCS E3 - Tool Collision Protection System

- Vibration real-time monitoring
- Anomalous 0.25ms response
- Automatic alarm output
- Intelligent downtime control

■ Based on the vibration sensor real-time collection of the spindle vibration signal, control the machine to stop automatically when the impact occurs;

■ Real-time collider alarm: in order to avoid greater loss caused by impact, the impact monitoring rate reached more than 99%;

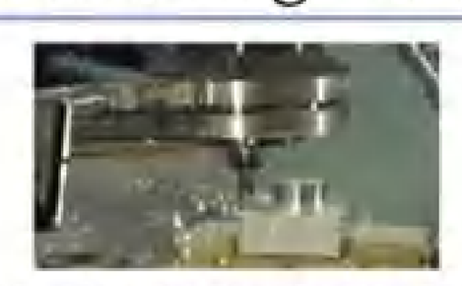
■ Response time of collision system: after collision, the system responds within 0.25ms, and output alarm signal within 2.3ms, and cooperate with the machine tool to complete shutdown control;

TCS E3 - Typical Failure Mode of Collision

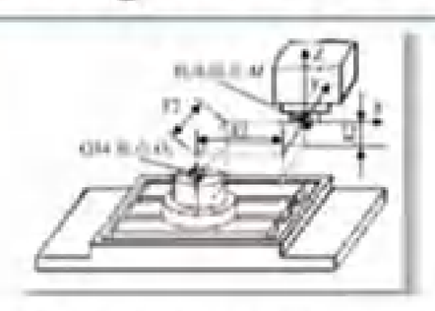
■ How to detect the collision event in time?

■ How to stop stop in time after collision?

■ In G00 fast feed state, the work size and origin setting are wrong



■ In G01 / 02 / 03 insertion state, the parameters of the tool or grinding wheel are wrong

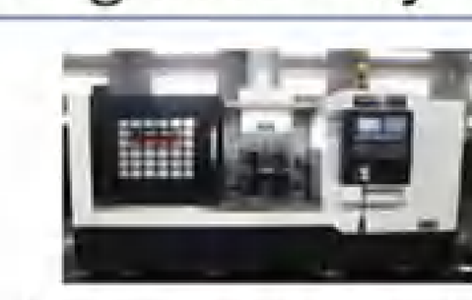


■ The G54 / G59 workpiece coordinate system setting is wrong, or the machine origin is reset during machining

■ Studies have shown that most of the damage is not caused by the collision itself, but by the constant pressure state immediately after the collision, and the longer the interval between the collision and the stop, the greater the damage

■ Key components reduce life or even damage

■ Machine tool spindle machining accuracy is lost



■ Machine tool long time fault shutdown, causing major economic losses, seriously affect the scientific research and production of enterprises

TCS E3 - Typical Application of TCS

X \ Y \ Z axis multiple spindle vibration signal acquisition

G00 / 01 / Handwheel operation multi-status monitoring

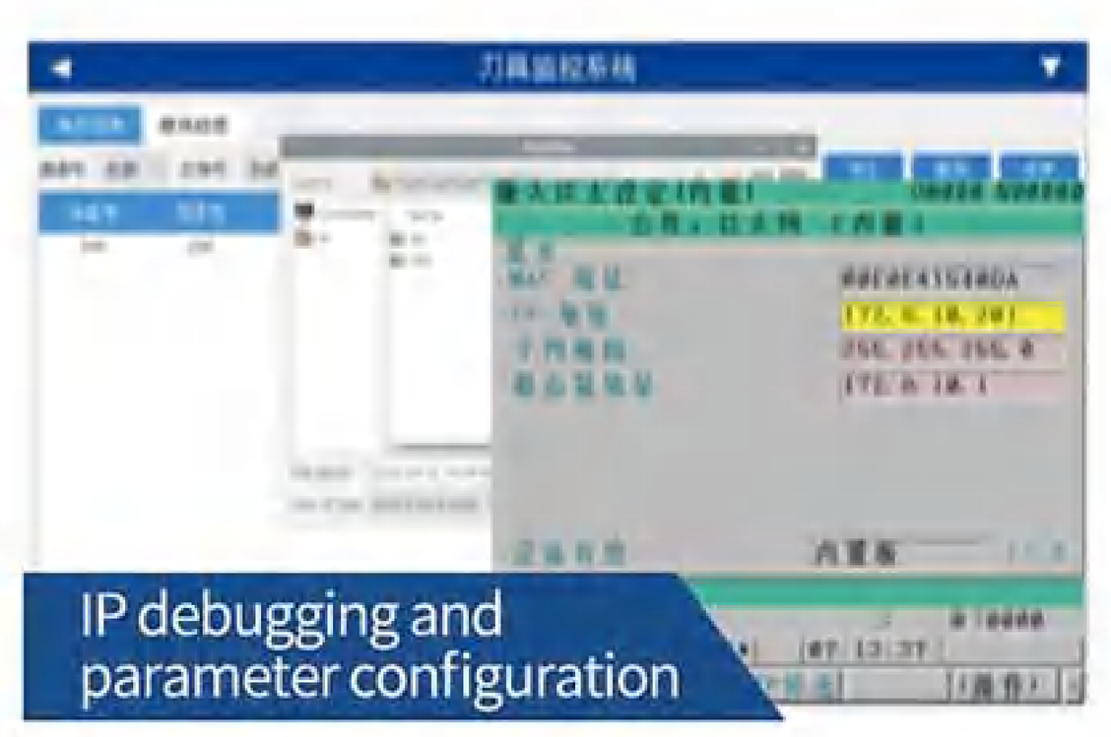
Workpieces / fixtures

Normal processing

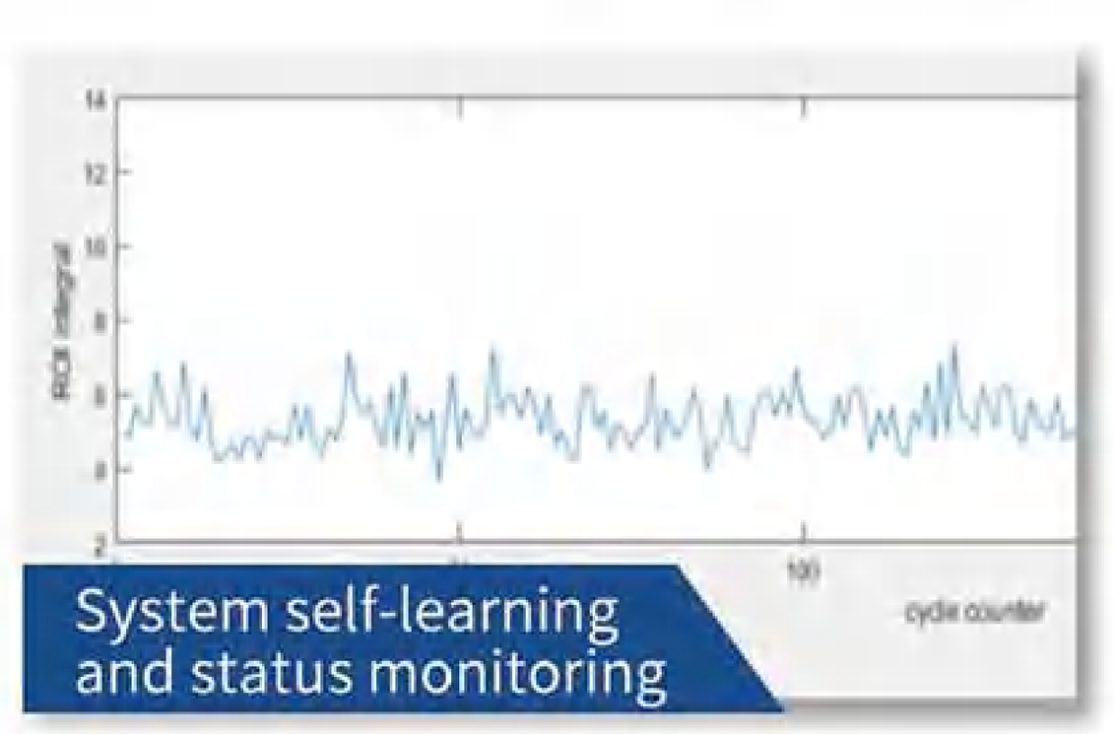
The system learns the normal processing vibration state

Set the RMSE threshold value based on the normal processing data

Collision alarm



IP debugging and parameter configuration



System self-learning and status monitoring

Real-time monitoring of the abnormal alarm

■ TCS Tool Collision Protection System

TCS E3 - CNC Collision Protection System

Index item	Adapt content
Machine tool type	Processing center, vehicle and milling compound, lathe, grinder, etc
Control system	Fanuc, Siemens, Hedeheim and other 95% + systems
Tool types	Milling cutter | car cutter | boring cutter
Process type	Mass repeated processing, small batch processing etc(Feed distance above 1 m)
Processing scenarios	Auto parts, construction machinery, aviation days, military ships, large mold tooling and other manufacturing scenarios
Failure mode	Loss of accuracy of the cutter collider and spindle

TCS E3 - Hardware Configuration

Key components	System indicators	Parameter values
Vibration pick-up	Ambient temperature	-40°C-125°C
	Power acquisition frequency	100-4000Hz
	Monitoring accuracy	0.5%
The SAD conversion module	Service voltage	DC 12-24V
	One-way processing time	0.1s-30min
	Response time	0.005s
System terminal	Receive / send the interface	The RS232 serial port
	SC	Onboard, eMMC 16G
	Downtime response time	2.3ms

Hardware name	Function declaration	Quantity
Vibration pick-up	Collect the spindle, and collect the vibration signal	1 set
The SAD conversion module	Digital-to analog conversion of edge signal acquisition	1 set
E3 operation module	Data storage, analysis, and output	1 set
HMI display terminal	System configuration and monitoring of the interaction	1 set
Other auxiliary materials	Alarm light, connecting lines and other auxiliary materials	1 set

Note: The number of sensors depends on the number of spindle and monitoring points!

Typical Applications & Customers

Construction Machinery & Equipment Manufacturing

Wind power bearing

Longmen processing

Construction machinery

Large-scale processing equipment

Aerospace / military

Large processing parts

Mold tooling manufacturing

Mold tooling processing

Machine tool manufacturer and automation

Disc class

Column/ sleeve type

Robotization

XCMG 徐工集团 | 中国中车 CRRC | 中国中铁 | CSIC 中船重工 | TUOPU 拓普 | BOZHI | WEICHAI 潍柴 | CHERVON-Auto | WOODWAY

02 CNC Machine Tool Monitoring System

■ Thermal Error Compensation System

Thermal Error Compensation System

Comparative analysis of accuracy | Error compensation model | Optimization of the cooling and heating machines | Optimize the macro variable compensation

- Based on the X axis and Z axis guide rail and bearing the spindle temperature collection, real-time monitoring of spindle temperature information;
- Through polynomial regression analysis of temperature rise and thermal error, the temperature difference compensation model is constructed;
- Combined with the temperature change of machine tool cooling machine to heat machine, combined with the algorithm analysis results, calculate the error compensation value, call the number acquisition service, based on the macro variable assignment method, to send the error compensation value to the machine tool;

Thermal CMS - Typical Failure Mode

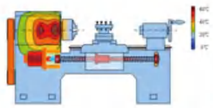
- Machine tool control technology development, machine tool processing accuracy requirements are increasing day by day;

- The thermal error caused by the temperature change of the machine tool is large and difficult to avoid;

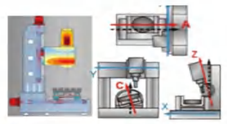
- The processing environment is complex, the electromechanical hydraulic coupling, it is difficult to isolate thermal errors;

Digital controlled lathe

Machining center

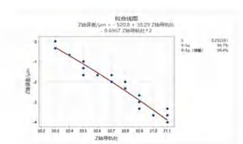


- Thermal compensation is performed based on the device XZ axis

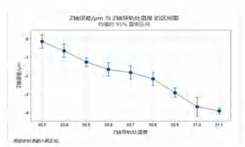


- Thermal compensation is performed based on the device XYZ axis

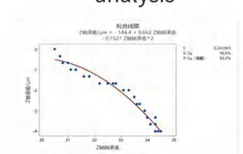
Compensation Principle and Function Realization

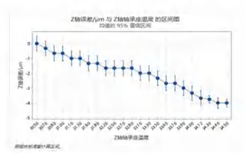


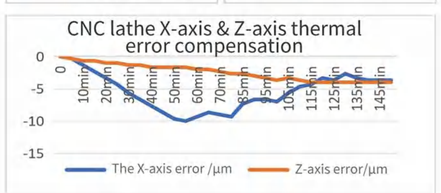
Polynomial regression analysis



One-factor ANOVA



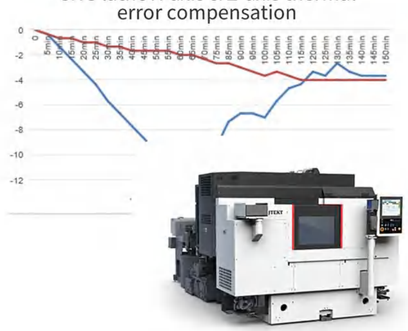




■ Thermal Error Compensation System

Thermal CMS - System Application Scope

CNC lathe X-axis & Z-axis thermal error compensation



Index item	Adapt content
Machine tool type	Processing center, vehicle and milling compound, lathe, etc
Control system	Fanuc, Siemens, Hedeheim and other 95% + systems
Process type	Mass repeated processing, mass nested process processing, long time mold processing, small batch processing, rough / finishing and other process types
Processing scenarios	Mold processing, equipment manufacturing, large auto parts and aerospace and other long-time processing scenarios

Hardware Configuration

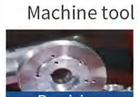
Key components	System indicators	Parameter values
Deformation measurement (Head / cutter)	Temperature acquisition frequency	100-4000hz
	Cable length	1.0m
	Induction direction	±X±Y+Z
	One-way repeatability	2.0μm2
Thermal temperature measurement	Measuring the measuring force of needle	Measurement: 0.49N-0.90N,92.21gf; + Z-direction: 6.79N
	Gas source supply (working pressure)	4.55-6.0bar
The MDC acquisition terminal	Pneumatic joint	3 (extended, retracted, and optional blow)
	levels of protection	IP68

Hardware name	Function declaration	Quantity
Probe/ Tool Setter	Collect processing product size and tool pair tooling data	1 set
Thermal temperature measurement	Collect the spindle temperature information in real time	1 set
The MDC acquisition terminal	Data storage, analysis, and output	1 set

Note: The number of sensors depends on the number of spindle and monitoring points!

Typical Applications & Customers

Machine tool manufacturer and automation


Precision equipment


Machine tool manufacturing


Autoline

Auto parts industry


Engine processing


Bearing class


Transmission processing


Knuckle

Construction machinery manufacturing


Equipment manufacturing


Construction machinery

Aerospace


Aerospace & military industry

Medical device manufacturing


Large scale processing equipment

02 CNC Machine Tool Monitoring System

■ AMS Adjust Machining System

AMS - Function Introduction

Spindle load monitoring | Production beat improvement | Dynamic adjustment feed | Machine tool efficiency optimization

- Based on the power load signal acquisition, the real-time monitoring of the machine tool processing process and the power changes;
- Automatic identification of tool cutting process processing smooth stage, acceleration and deceleration stage, instead of manual monitoring!
- Automatic analysis of the stationary stage and acceleration and deceleration interval optimization strategy, optimize the feed rate, processing beat reduced by 25%!

AMS - Typical Application Scene

- How to complete the process design by combining with the machine tool working conditions?
- How to provide the most efficient process solution?
- How to combine the process process and product quality requirements?

- The process design is focused on the CAM end, and the actual machine tool working conditions are separated;
- Processing process lacks effective monitoring, it is difficult to evaluate the effectiveness of the process;
- The overall production capacity depends on manual experience, and it is difficult to optimize the algorithm model;

AMS - Optimization Principle and Function Implementation

Edge Acquisition Unit	Edge Sensors Capture the Spindle Power Signals in Real Time			
	Power Load Collection	Processing Procedure Learning	Acceleration and Deceleration Process Identification	Idle Cutting Process Separation and Optimization
Analyze Optimization Unit	Idle Cutting Process Separation and Optimization		Cutting Process Separation and Optimization	
	Acceleration and Deceleration Interval	Acceleration and Deceleration Phase Optimization Strategy 1	Stable Cutting Process Interval	Stable Cutting Interval Optimization Strategy 2
Adjust Control Unit	Real-Time Feed Adjustment for Efficiency Optimization			
	Dynamic Adjustment Strategies Issued to Machine Tools	Real-Time Adjustment of Machining Parameters by Machine Tools	Adaptive Spindle Feed Adjustment	Efficiency Improvement Records and Statistics

■ AMS Adjust Machining System

AMS - System-Scope of application

Index item	Adapt content
Machine tool type	Processing center, vehicle and milling compound, lathe, etc
Control system	Fanuc, Siemens, Hedeheim and other 95% + systems
Process type	Mass repeated processing, mass nested process processing, and other process types
Processing scenarios	CNC milling, turning, drilling, tooth surface / curved surface, etc

Hardware Configuration

Key components	System indicators	Parameter values
Power sensor	Power acquisition frequency	200Hz
	Metre fullscale	70A/2000V
	Monitoring accuracy	0.5%
	Service voltage	DC 12-24V
The SAD conversion module	One-way processing time	0.1s-30min
	Response time	0.005s
	Receive / send the interface	The RS232 serial port
System terminal	SC	Onboard, eMMC 16G
	Downtime response time	300ms

Hardware name	Function declaration	Quantity
Power sensor	Collect the spindle, and collect the vibration signal	1 set
The SAD conversion module	Digital-to analog conversion of edge signal acquisition	1 set
E3 operation module	Data storage, analysis, and output	1 set
HMI display terminal	System configuration and monitoring of the interaction	1 set
Other auxiliary materials	Alarm light, connecting lines and other auxiliary materials	1 set

Note: The number of sensors depends on the number of spindle and monitoring points!

Typical industry & customers

Auto parts industry

Construction machinery manufacturing

Aerospace manufacturing

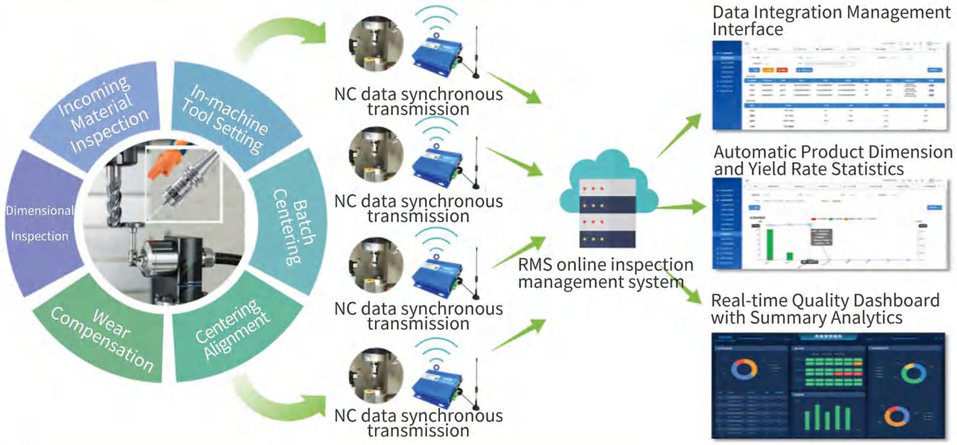
Medical device manufacturing

Hardware and other machining industries

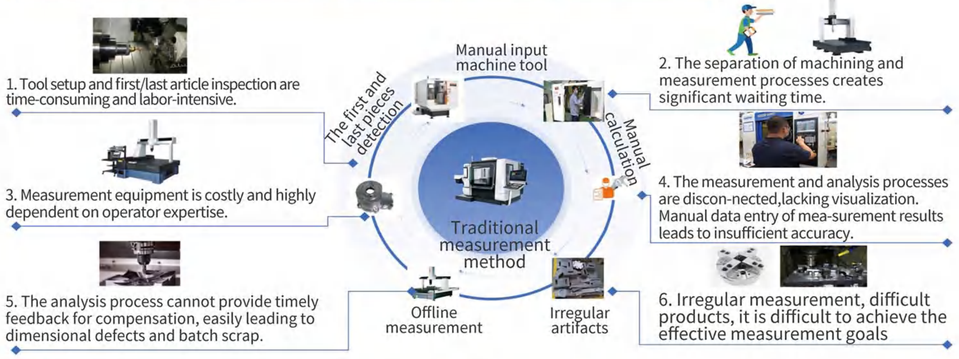
02 CNC Machine Tool Monitoring System

■ RMS Real-time Measurement System

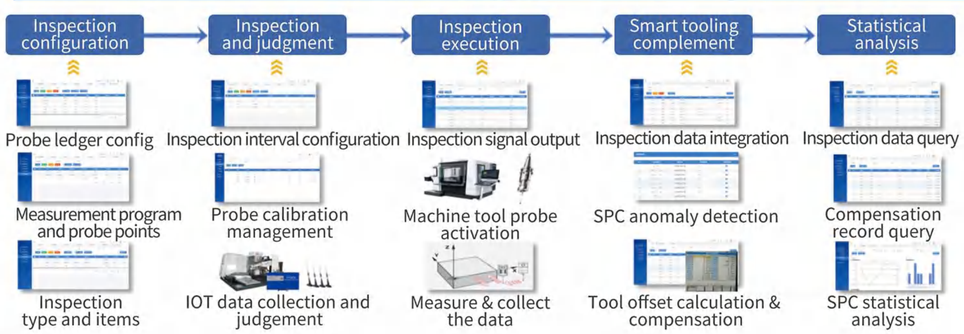
RMS - Product Introduction and Hardwares



RMS - Management Status and Pain Points



RMS - Real-time Measurement System-Function Implementation



■ RMS Real-time Measurement System

RMS - Hardware Parameters and Selection

Probe Stylus Hilt

Infrared Receiver

Radio Frequency Receiver

Installation effect

Parameter items	Probe-IR 40 / 60	Probe-RF40 / 60
Size	Diameter 40MMX70/46MMX75	Diameter 40MMX70/46MMX75
Accuracy	<1um	<1um
Battery type	2X lithium battery, LS15250	2X lithium battery, LS15250
Continuous use time of the battery	150 Days	120 Days
Transmission method	Infrared ray	Radio
Number of channels	3 (high frequency, medium frequency, low frequency)	/
Head measuring signal transmission distance	Maximum 5 m (near 150 degrees transmission)	The maximum is 15 meters
The fastest response speed	/	5MS (Adjustable)
The fastest measurement speed	1.5 sec / measurement point	1.5 sec / measurement point
Classification of waterproof	IP68	IP68
Applicable processing scenarios	Processing center class	The lathe class
Transfer on	Voluntarily	Voluntarily
Abnormal alarm	Very few	Very few
Working temperature	0-60 degrees	0-60 degrees
Product life	Greater than or equal to 12 million times	Greater than or equal to 12 million times

RMS- In-machine Tool Setter Hardware Parameters and Selection

T20 Tool Setter T26 Tool Setter

Installation effect

Technical parameter items	1-D tooling-T26	3 D tooling-T20
Transfer type	Hardline connection transmission	Hardline connection transmission
Fix of the tooling surface	Stationary type	Stationary type
Tool setting types	Ball tooling, milling cutter, drill bit, boring cutter	Ball tooling, milling cutter, drill bit, boring cutter
Tool setting diameters	Φ20	0.3mm~20mm
Touch plate specifications	Hard metal	Hard metal
Cable length	10m	4m
Induction direction	Z	±X、±Y、+Z
One-way repeatability	1μm	1μm
Stylus trigering force	1.5N (Installation status must be vertical)	0.9N to 2.20N, 95g to 225g (depending on the induced direction)
Protection structure	The IP68 depth is also waterproof	The IP68 depth is also waterproof
Working temperature	-10°C to + 60°C	-10°C to + 60°C

THREE

3

Digital Plant MES System

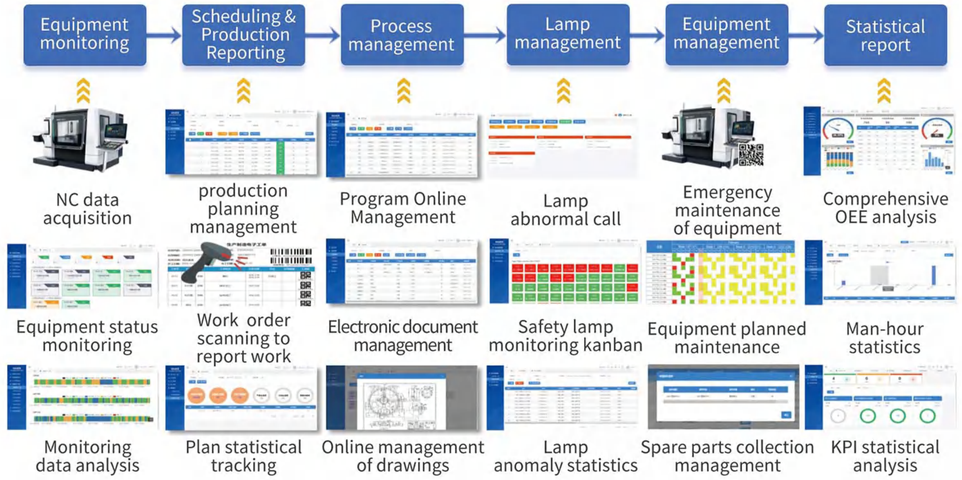
03 Digital Plant MES System

■ MES Manufacturing Execution System

MES-Digital Plant Function Matrix

Large-size screen monitors	Production keyboard	Production state	Production line warning	Production plan	Production quality	Comprehensive production
WEB end / Current operating end	Planned production scheduling	Work order management	Outsourcing management	Plan to produce	Manual adjustment	Plan to issue
	Process management	Program creation	Program audit	Program transmission	Version management	Contrast monitoring
		Document creation	Document audit	Document transmission	Version control	Statistical analysis
	Production control	System landing	Code scanning production	Station management	Task management	Program call
		On-line adjusting machine	Drawings view	On-line Production Reporting	Man-hours statistics	Statistical analysis
	Equipment monitoring	Status data	Machining Parameters	Yield data	Alarm data	Report analysis
	Instrment panel management	Production Order	Equipment status	Equipment maintenance	Production line keyboard	Report push
	Master data Configuration	Production line equipment	Product structure	Material information	Interface engine	Process path
		Station information	Department post	Personnel information	Equipment information	Shift information
APP	Message push	Abnormal push	Production report worker	Equipment status	Report push	Equipment for repair

MES- Digital Factory Service Flow Chart



03 Digital Plant MES System

■ CAPP Production Auxiliary Management

CAPP-Tooling Fixture / Tool / Mold / Measuring Tool, etc

Large-size screen monitors	Keyboard pull	APP keyboard	Web end keyboard	Tooling demand keyboard	Life alarm keyboard
WEB end / Current operating end	Mold Fixtures	Inventory account	Mold list	Production preparation	Label management
		Circulation management	Installation and unloading management	Maintenance	Life management
	Measuring tool management	Measuring tool account management	Gauge Inventory Control System	Inventory early warning	Production control
		Repair and maintenance	Verification calibration	Exception handling	Statistical analysis of measuring tools
	Cutting Tool Management	Inventory management	Process list	Production preparation	Label management
		Code scanning circulation	Installation and uninstall	Tool compensation management	Statistical analysis
APP	Master data configuration	Personnel information	Channel level	Equipment information	Supplier information
		Product information	Tooling information	Authority management	Fault data management

CAPP-System Service Flow Chart

Master data → Tooling parameters → Production preparation → Tooling circulation → Exception management → Verification and maintenance → Warehousing management → Statistical analysis

Tooling label: data docking and association

APP end: scan code / RFID implementation of circulation tracing

Web end: flush inspection, knife analysis, maintenance verification report, tooling scrap statistics...

■ Quality Traceability Management System

Quality Traceability Management System Function Matrix

Large-size screen monitors	Keyboard pull	CPK supervisory control	Retroactive coverage monitoring	Quality management keyboard	Production line qualified keyboard
WEB end / Now make up the operation end	Query statistics	Production data traceability	Retracing of reporting data	Test data traceability	Material frame frame traceability
		WIP in the statistics	Traceability of qualified statistics	Entry and exit statistics	The FTQ statistics of the production lines
	Quality control	acceptance standard	SPC supervisory control	Quality light	Rework scrap
	Data collection association	NC data	PLC data	Textual data	Picture data
		Scan code association	Database docking	Agreement communication	Test results data
	Advanced configuration	Process path	Code rule	Full box number	Personnel skills
APP	Modeling of main data	Personnel information	Channel hierarchy	Facility information	Supplier information
		On-product information	Material information	Authority management	Product BOM management

Flow Charts of Quality Traceability Management System

Master Data Configuration	Advanced configuration	DA	Station inspection	Quality analysis	Query statistics	Automatic report
Personnel information docking	Personnel assignment management	Inspection project maintenance	PDA scan the code on the work	Key SPC monitoring	Cross-station data query	Quality dynamic kanban
Equipment docking	Equipment label management	Scan the code to enter the data	Operate the material	Biasing release statistics	Quality inspection traceability	Automatic report generation
Material information docking	Product material label	Inspection data are obtained automatically	Equipment association	Rework and scrapping management	Product yield statistics	Mobile end report viewing
Process informatio docking	Binning label	Manual entry of data	Scan code to associate operation	Quality correlation analysis	WIP in-service management	Email directional push

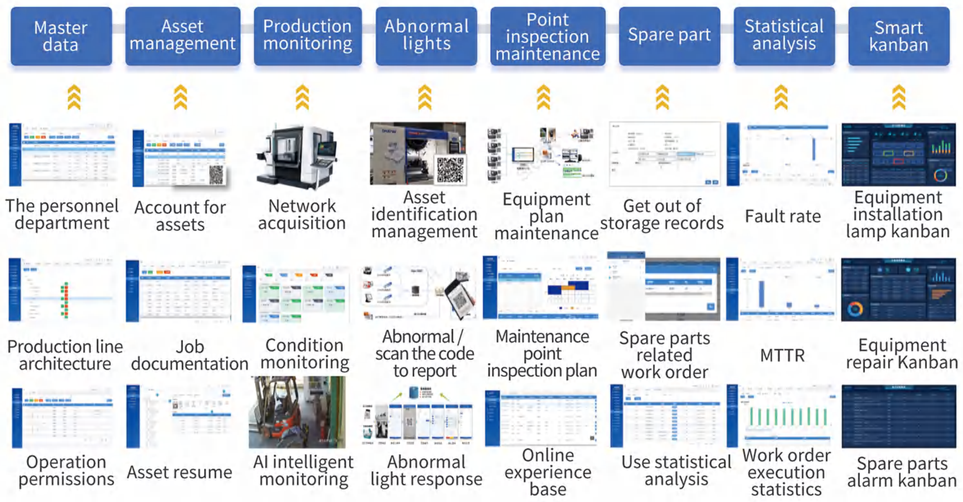
03 Digital Plant MES System

■ EAM Enterprise Asset Management System

EAM-Enterprise Asset Management System Function Matrix

Large-size screen monitors	Keyboard pull	APP spectaculars	Web End Keyboard	Workshop equipment keyboard	Workshop spare parts keyboard
WEB end / Now make up the operation end	Statistical analysis	Work order data statistics	Maintenance effectiveness	Maintenance on time rate	Asset cost management
	Asset inventory	Account for assets	Inventory plan management	Check the difference analysis	Inventory approval management
	Spare parts management	Spare information management	Entry and exit management	Spare parts inventory warning	Advanced first-out management
	Plan maintenance	Maintenance status Kanban	Maintain work order management	Maintenance arrangement management	Predictive maintenance
	Maintenance management	Emergency maintenance	Abnormal report	Failure data collection	Reliability analysis
	Asset management	Filing management	Asset maintenance inventory	Asset into solid transfer	Asset approval management
APP	Modeling of main data	Personnel information	Channel hierarchy	Facility information	Supplier information
		On-product information	Spare parts information	Authority management	Fault data management

EAM-Flow Charts of Enterprise Asset Management System

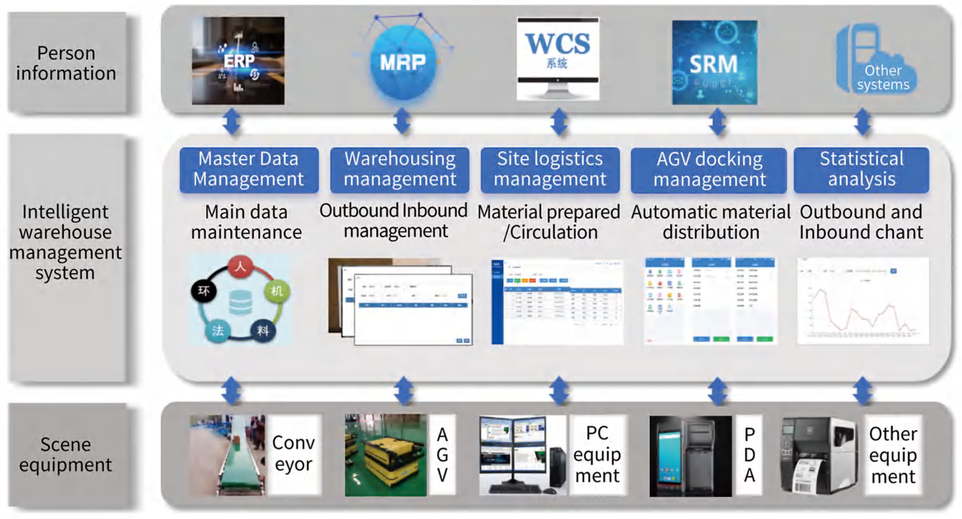


■ WMS Warehouse Management System

WMS-System Function Matrix

Large-size screen monitors	Keyboard pull	Entry and exit keyboard	Logistics status keyboard	Logistics keyboard	Spare parts alarm keyboard
WEB end / On-site programming terminal	statistical analysis	Summary of warehousing	Logistics task progress	Circulation state	Inventory taking summary
	Logistics scheduling	Material preparation	AGV docking	Delayed early warning	Call material distribution management
	Outbound management	Outbound management	Scan to outbound	Get associated	First-in first-out management
	Inventorg management	Receive return	Storage change	Store adjustment	Inventory allocation
	Inbound management	Inbound management	Goods received note	The material label	Warehousing management
	Warehouse setting	Warehouse information	Storage information	Warehouse type	Storage type
APP	Modeling of main data	The personnel department	Channel hierarchy	Facility information	Supplier information
		On-product information	Operation query	Authority management	Parameter setting

WMS-System Construction Framework



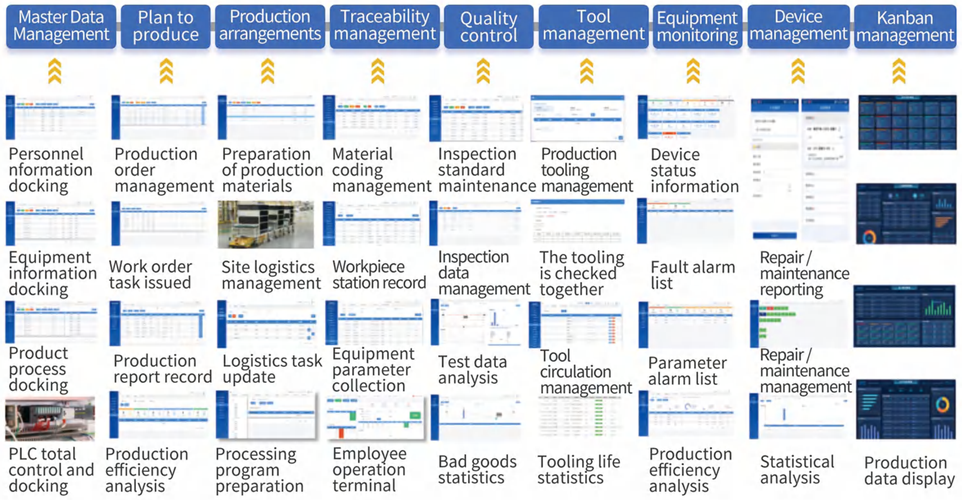
03 Digital Plant MES System

■ FMS Flexible Line Information System

FMS - Function Matrixs

Large-size screen monitors	Production Keyboard	Production information keyboard	Production line warning keyboard	Production plan keyboard	Production keyboard	Production line equipment keyboard
WEB end / Now make up the oper-ation end	Schedule production report work	Work order management	Work order issued	Production newspaper	Automatic row	Production bottleneck forecast
	Production arrangements	Material preparation	Logistics transportation	Program preparation	Tooling preparation	The tooling preparation
	Quality control	Inspection data management	Test data analysis	Bad goods statistics	Automatic inspection management	Suspicion processing
	Traceability management	Associated work order	Report to the station	Station management	Task management	Routine call
		Online error prevention	Manage of tooling fixtures	Forward query	Reverse query	Statistical analysis
	Equipment monitoring	Status data	Parameter data	Production data	Alert data	analysis of statements
	Device management	Maintenance management	Maintenance management	Point inspection management	Spare part	Statistical analysis
	Tool management	Tool parameters	Tool list	Qi-set examination	Tool circulation management	Tool data display
		Tool compensation management	Equipment tooling query	Tool distribution query	Tooling life statistics	Tooling status monitoring
	Dashboard management	Work order task list	Device status kanban	Equipment repair Kanban	Production line kanban	Report push
	Main data docking	Production line equipment	Product mix	Material information	Interface engine	Process path
		Station information	Info on tooling fixtures	AGV abutment	MES system	PLC General Control
APP	Message push	Device exception push	Production line early warning push	Quality problem push	Production report push	Equipment repair

FMS-System Business Flow Chart



FOUR

4

Precision Manufacturing Process optimization

04 Precision Manufacturing Process optimization

■ Mold Precision Management System

Mold Precision Management System-Product introduction & hardware

Improuing processing accuracy

AB mode accuracy optimization

Trajectory optimization simulation

Effectively shorten the delivery period

- Machine tool, measuring system, IOT equipment, i-NCweb system and algorithm engine cooperate with each other to achieve the goal of optimizing the compensation for processing process based on the measurement results, so as to reduce the cost of mold repair;
- AB combined mode optimization based on real-time optimization of CAM trajectory: the trajectory optimization of B module performs adaptive optimization calculation based on the error analysis results of A module and AB module assembly relationship

Mold Precision Management System- Current Status and Pain Points

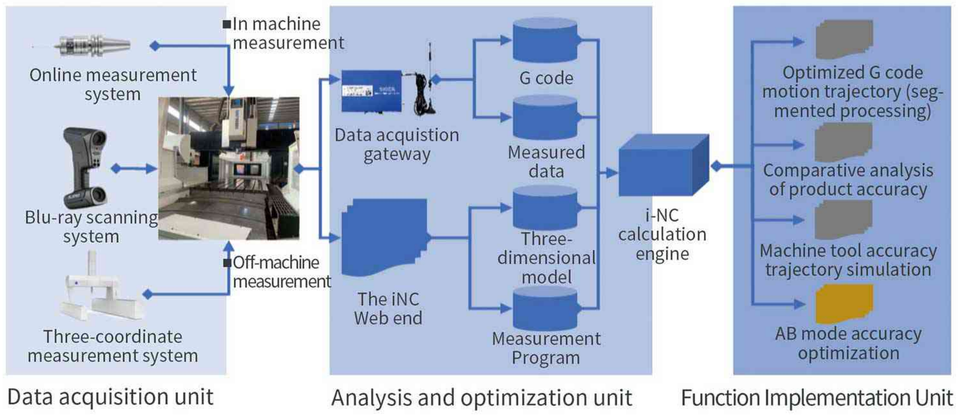
01 Long time processing, movement leads to thermal expansion and cold contraction of wire rod: processing running-in and environmental factors lead to deformation of processing size

02 Product heavy load leads to the deformation of the machine tool: large parts weigh dozens of tons, and the setting of the original coordinate system of the machine tool shifts due to the influence of weight

03 Due to the loss of accuracy, excessive design of coarse, semi-finishing, finishing and other processes, resulting in processing redundancy and long processing cycle

04 Based on the absolute drawing size design trajectory superposition error: AB mode superposition error, resulting in the AB mode can not effectively fit the mode, need manual depth to participate in the repair

Mold Precision Management Function Implementation



Data acquisition unit　　Analysis and optimization unit　　Function Implementation Unit

FIVE

5

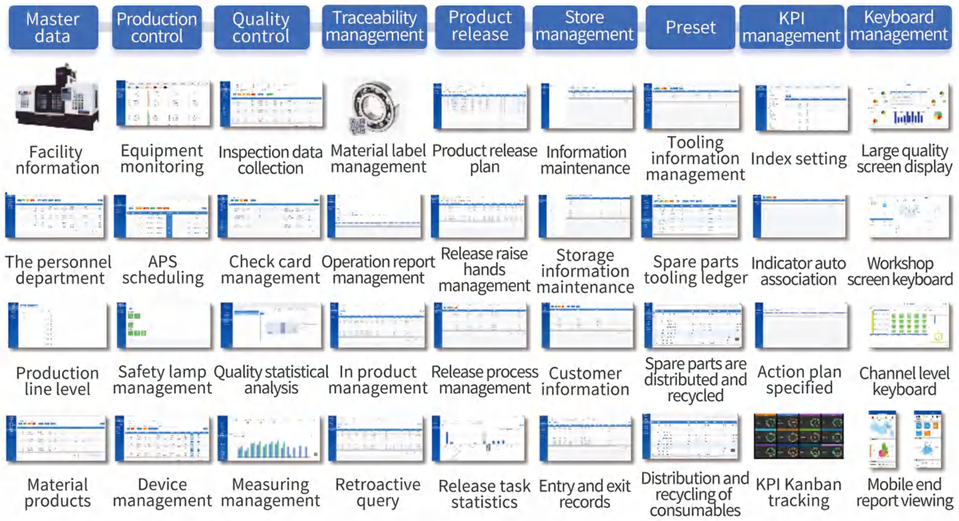
Typical Customer Case Examples

05 Typical Customer Case Studies

■ SIGER-Industry 4.0 Example I

Precision Machining Digitalization Case

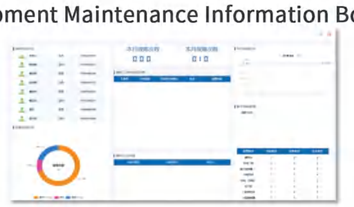
This customer is the world's leading bearing manufacturing enterprises, business throughout 130 countries in the world, producing more than 500 million bearings every year, sales network all over the world. At present, it has 200 branches, 80 manufacturing companies, 41,000 employees and 8,000 agents and dealers;
The implementation module involves quality management, traceability management, equipment management, lamp management, KPI management, kanban management and tool monitoring. Combined with the whole process of production equipment networking and system docking, the online collection, correlation traceability and statistical analysis of process data are realized, and transparent management through visual kanban.



Quality Large Screen

Maintenance Morning Meeting Board

Equipment Maintenance Information Board

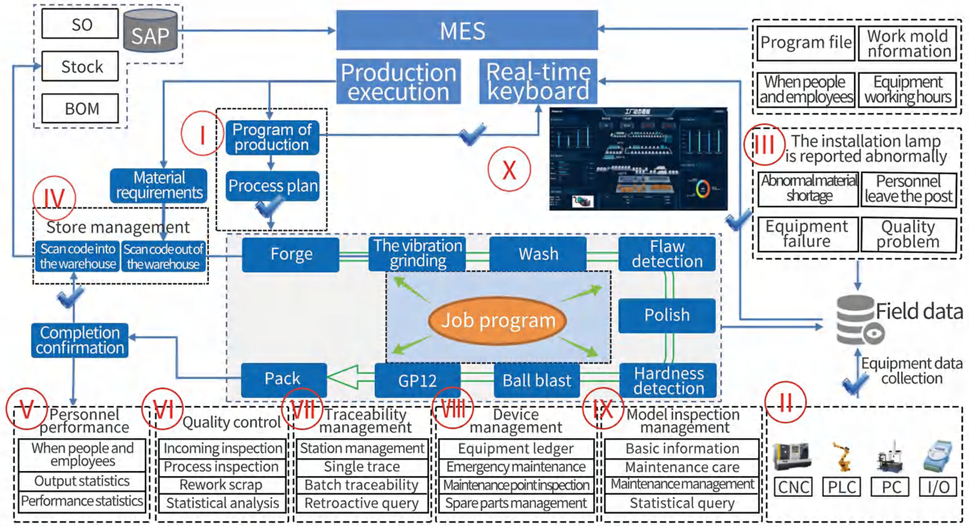


New Product Release

■ SIGER-Industry 4.0 Example II

Precision Machining Digitalization Case

Headquartered in Ningbo, Zhejiang province, it has a R & D center supporting global projects and leading technology. It has power chassis system, trim system, electronic system and other business units, and mainly produces five series of products;
Top supply delivery products, unable to the precise traceability control of abnormal production process, and tesla, geely customers require 1 set of quality traceability system, make the supply of all products have production process data (people, machine, material, method, ring, test), and can be in the background independent report query such as quality qualified rate, SAP storage, abnormal rate.



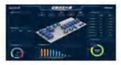
Product Module	Major Function	Improve the Effect
Data Collection	Manual input	Automatic acquisition of production, status, fault, equipment, and planning data, accurate data, reducing the workload of 2 people;
Quality Management	Online collection of inspection data and statistical analysis	Automatic analysis of quality data throughout the process, automatic generation of charts, real-time analysis of quality data, automatic alarm for abnormalities, and response efficiency increased by 90%
Traceability Management	Online collection of production report data and process information based on material tags	Automatic CCD recognition of rough material numbers, laser marking codes, automatic scanning of parts QR codes, automatic collection of equipment parameters, automatic packaging, establishment of rework processes, etc.
Report to Work Management	Manual statistics	Combined with traceability and automated statistical reporting of equipment data, 100% accurate.
Keyboard Management	Static keyboard handwritten display	Real-time dashboards for people, machines, materials, methods, and environment drive production factors and achieve seamless coordination.

05 Typical Customer Case Studies

■ SIGER-Industry 4.0 Example III

Bosch Digital Factory

Bosch Auto Parts (Suzhou) Co., Ltd., founded in 1999, is the business place of four Bosch product divisions.During the manufacturing process,The lack of real-time monitoring in the production process leads to the lack of guarantee of the utilization rate of equipment, and the abnormal on-site production cannot be responded to in time, which greatly affects the production efficiency, and the lack of dynamic visual display, so the construction of digital intelligent factory.

Equipment monitoring	Program management	Safety lamp management	Tool management	Keyboard management
 Device network collection	 Program creation management	 A list of lights	 Tool storage management	 Kanban wheel broadcast Settings
 List of equipment status	 Program remote transmission	 Safety lamp level report	 APP flow execution	 Device status keyboard
 Device section analysis	 Program contrast monitoring	 Installation lamp type configuration	 Tool query analysis	 Safety lamp management keyboard

Before

After

Product module	Major function	Improve the effect
Equipment iot	Equipment networking and data collection, equipment status monitoring, efficiency analysis, output analysis	Based on equipment networking, collect equipment status data, monitor equipment status in real time, improve management efficiency; automatic report statistics and regular email push
Program management	Program online centralized management, remote transmission, program online monitoring	Improve the program transmission efficiency by more than 90%, save the field walking time of process personnel by 1h / day, and reduce the risk of USB interface damage
Tool management	Tool parameter configuration, tool storage and circulation management	Establish an online tool management platform, trace the whole process of tool circulation, reduce the tool inventory cost by 10%, and accurately manage the tool flow direction
Safety lamp management	Production abnormal online call, smartwatch message push reminder	Improve the field abnormal response efficiency, and greatly reduce the unplanned shutdown time
Kanban management	On-site large-screen visual display, watch board rotation Settings	Kanban pull, realize the site visual management, enhance the image of the factory

Partial Customer Showcase

We have served more than 1,000 enterprises, covering automotive parts, aerospace, engineering machinery, high speed rail, 3C and many other industries!

CHERVON-Auto 泉峰汽车精密 · BOSCH · dsbj · TIL · 江汽集团 JAC GROUP
ALFA LAVAL · Continental · Atlas Copco · AW ASIAWAY 海威股份 · HASCO HYTEC
TIMKEN · Global advanced technology · ZF TRW · Johnson Controls · thyssenkrupp
TUOPU 拓普 · REG 中国中铁 · 亨通光电 · ThermoFisher SCIENTIFIC · FESHER
ENGTEK GROUP · BRILLIANT · 南京汽轮电机（集团）有限责任公司 · 碧林 · 长安标志
九邦 价值创造者 · RSM 云海金属 · Allied Automobile part · LIOHO · 橡技工业（苏州）有限公司
BORAN · 孚杰集团 · COOLER MASTER 讯强电子 · 庞野 · 罗美特 FlowmeteK
和鸿科技 HEHONG TECHNOLOGY · FEICE 飞策 · STAL · LUXSHARE ICT · 尤顺智动 ENNOVA
Sunfen aluminium · DF · TORINDRIVE 通润驱动 · BOSSARD Proven Productivity · BAOWU 宝武镁业
TRANE 特灵空调 · CASC 中国航天 · XCMG 徐工集团 · GEELY AUTO 吉利汽车 · CRRC 中国中车
上海电气 SHANGHAI ELECTRIC · sitech · NINGSHING Special Steel · 台朔重工 FORMOSA HEAVY INDUSTRIES
YT 禹田真空 YT VACUUM · XUSHENG · JACK 杰克 快速服务100% · 常达轿配 CHANGDA AUTOMOBILE PARTS · HSG