

## TAIWAN

### Taiwan (Hsinchu)

SYNTEC Technology Co., Ltd  
ADD : No.25, Yanfa 2nd Rd., East Dist.,  
Hsinchu City 300, Taiwan (R.O.C.)  
TEL : +886-3-6663553  
FAX : +886-3-6663505  
EMAIL : sales@syntecclub.com.tw

### Taichung

SUN-CNC Co., Ltd  
ADD : No. 22, Lane 428, Section 1, Fengyuan  
Boulevard, Fengyuan District  
TEL : +886-4-25337731  
TAX : +886-4-25349224

### TANLU-CNC Co., Ltd

ADD : No. 42, Jingming Road, Xitun District,  
Taichung City, Taiwan (R.O.C.)  
TEL : +886-4-23102626  
TAX : +886-4-23102636

### Tainan

ADD : No. 218, Denan Road, Rende District,  
Tainan City, Taiwan (R.O.C.)  
TEL : +886-6-2796707  
TAX : +886-6-2796705

## AROUND THE WORLD

### Malaysia

ADD : No.2, Jalan Astana 1D, Bandar Bukit Raja, 41050  
Klang, Selangor, Malaysia.  
TEL : +603-33115887  
EMAIL : sales.malaysia@syntecclub.com

### Thailand

ADD : 78/38 Kheha Romkiao Rd., Khlong Song Ton Nun,  
Lat Krabang, Bangkok, 10520  
TEL : +662-006-5738  
EMAIL : thanawat@syntecclub.com.tw

### Vietnam

ADD : 3F, No. 36, A4 Street, Ward 12, Tan Binh District,  
Ho Chi Minh City, VietNam  
TEL : +84938332829  
FAX : +842822535556  
EMAIL : andyngo@vnsyntec.com.vn

### Turkey

ADD : Kücükbakkalkoy Mah. Vedat Günyol Cd. Defne Sok.  
No.1 D:1502 Flora Residence,34750 Atasehir/Istanbul, Türkiye  
TEL : +90-216-2662475  
EMAIL : daisy.cheng@syntecclub.com.tw

### USA (South California)

ADD : 2841 Saturn St, #D, Brea, CA 92821  
TEL : +1909-551-0187  
EMAIL : info@syntecamerica.com

### Indonesia

PT. OTOMASI BERSAMA INDONESIA  
ADD : Ruko Arcadia Mataram Blok B, No 15, Kelurahan  
Cibatu, Kecamatan Cikarang selatan, 17530, Indonesia  
TEL : +6221 2210 4832  
EMAIL : yulius@otomasi.co

### India (Distributor)

Luna Technologies Pvt. Ltd.  
ADD : W-200 ,TTC Industrial Estate , Khairne ,  
Thane Belapur Road , Navi Mumbai -400708  
TEL : +91-22- 61786110  
E-mail : sales@lunabearings.com

## CHINA

### Jiangsu

SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd  
ADD : Building B, No.9 Chunhui Road,Suzou Industrial  
Park,China  
TEL : 0512-69008860  
FAX : 0512-65246029

### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd WuXi Office

ADD : B906, Yuye Network Building, 68 Exploration  
Road, Huishan District, Wuxi City, Jiangsu Province,  
China  
TEL : 15295664580

### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd Changzhou Office

ADD : Room 2217, Yatai Fortune Center, No. 1  
Huayuan Street, Hutang Town, Wujin District,  
Changzhou City, Jiangsu Province, China  
TEL : 18168828572

### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd XuZhou Branch

ADD : Room 1503, South of Territorial Sea Office  
Building, No. 66, Kumpeng Road, Xuzhou Economic  
Development Zone, Jiangsu Province, China  
TEL : 13656201020

### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd NanJing Branch

ADD : Room 712, Research Building 1, Lianggang  
Park, 117 Suyuan Avenue, Jiangning District, Nanjing  
City, Jiangsu Province, China  
TEL : 025-52717702  
FAX : 025-52717710

### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd NanTong Branch

ADD : Room T3-1301, No. 108, Gangzha District,  
North Street, Nantong City, Jiangsu Province, China  
TEL : 0513-89077025  
FAX : 0513-89072057

### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd NanTong Branch Yanchen Office

ADD : Room 401, building 13, phase 9, Zhongnan  
Century City, Yandu District, Yancheng City, Jiangsu  
Province  
TEL : 18625235150

### Shaanxi

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd XiAn Branch

ADD : Room 1\_1328, Building 4, Yicui Garden I  
Duhui, No. 10, South Tangyan Road, Xi'an  
High-tech Zone  
TEL : 029-88287423

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd BaoJi Office

ADD : Room 1702, Unit 3, Building 8, Dongling Xinsiji,  
Binhe North Road, Jintai District, Baoji, Shaanxi  
Province, China

### Guangdong

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd GuangDong Branch

ADD : Factory 201or 301, Building A, No.10 Nanjiang  
Third Road, Zhuijiang Street, Nansha District, Guangzhou,  
City  
TEL : 020-39089367  
FAX : 020-39089791

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd DongGuan Branch

ADD : 0769-81661ing 1, Mobile Group, No. 522, Zhen  
'an East Road, Chang 'an Town, Dongguan City,  
Guangdong Province, China  
TEL : 0769-81660318

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd GuangZhou Branch

ADD : Room 404, Building 2, Seven Friendship Building,  
No. 8 Luojiajun Section, Fuyi Road, Dalong Street,  
Panyu District, Guangzhou City, Guangdong Province  
TEL : 020-34583040  
FAX : 020-34583220

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ChangPing Branch

ADD : Floor 5, HuiLong Building, No. 8, Zhanqian 1st  
Road, Banshi Village, Changping Town, Dongguan City,  
Guangdong Province, China  
TEL : 0769-82826802  
FAX : 0769-82826820

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ShenZhen Branch

ADD : 406, Block E, Haowei new material industrial  
park, No. 8, Qinglan 1st Road, Zhukeng community,  
Longlan street, Pingshan District, Shenzhen,  
Guangdong  
TEL : 0755-84320380  
FAX : 0755-84559490

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd JiangMen Branch

ADD : Room 02, 7th Floor, Torch Building, Hi-Tech  
Zone, 288 Jinou Road, Jianghai District, Jiangmen City,  
Guangdong Province · China  
TEL : 0750-3762143

### Henan

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd LuoYang Branch

ADD : Room 704, Runsheng Building, Intersection of  
Heluo Road and Sanshan Road, Hi-tech Zone, Luoyang,  
Henan Province, China  
TEL : 0379-65110352  
FAX : 0379-65110352

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ShiJiaZhuang Office

ADD : 4-3-801, Reyi Community, No. 8 Huaxing Road,  
Qiaoxi District, Shijiazhuang City, Hebei Province, China  
TEL : 18622728669  
FAX : 0379-65110352

### Fujian

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd XiaMen Branch

ADD : Floor 3, No. 2, Jixiang West Road, Xinmin Town,  
Tong'an District, Xiamen City, Fujian Provinc  
TEL : 0592-7191901  
FAX : 0592-7220536

### Zhejiang

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd HangZhou Branch

ADD : 1202, Unit 2, Building 1, Dikai Building, No.471  
Jincheng Road, Xiaoshan District, Hangzhou City,  
Zhejiang Province, China  
TEL : 0571-82751187

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd HangZhou Branch Jinhua Office

ADD : Room G204, No. 1729, Dongshi North Street,  
Xinshi street, Wucheng District, Jinhua City, Zhejiang  
Province  
TEL : 1599-0026533

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd WenZhou Branch

ADD : 1205-3, Honghai building, Ouhai District,  
Wenzhou City, Zhejiang Province  
TEL : 0577-86158619

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd NingBo Branch

ADD : Room 1207, Ivy league Building, No.262, Lane  
416, Zhaohui Road, Jiangdong District, Ningbo City,  
Zhejiang Province, China  
TEL : 0574-87750305

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd WenLing Branch

ADD : Room 509, Haocheng Service Building, No. 838,  
Wanchang Middle Road, Chengdong Street, Wenling  
City, Taizhou City, Zhejiang Province, China  
TEL : 0576-86138372  
FAX : 0576-86119106

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd YuHuan Office

ADD : Room 302, Unit 2, Building 1, Hualong Times  
Square, 226 Provincial Road, Chunmen Town, Yuhuan  
County, Taizhou City, Zhejiang Province, China  
TEL : 13088638567

### Chongqing

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ChongQing Branch

ADD : 1007, Building 4, No.62, East Section of Taishan  
Avenue, Yubei District, Chongqing  
TEL : 023-67913296  
FAX : 023-67634382

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ChengDu Office

ADD : ADD : Room102, Unit 1, Building 24, Jiazhaoye  
Modern City, No.898, Section 2, Xingxing Road,  
Dongsheng Street, Shuangliu District, Chengdu City,  
Sichuan Province, China  
TEL : 18302866229

### Tianjin

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd TianJin Branch

ADD : No.37, Area A, Qiao Ruirong Garden, No.7  
Waihuian West Road, Qixing District, Tianjin, China  
TEL : 022-23739192

### Shandong

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd JiNan Branch

ADD : 502, Unit 3, Building 11, Luneng Kangqiao, No.  
28, Sankongqiao Street, Tianqiao District, Jinan,  
Shandong  
TEL : 0531-85807208  
FAX : 0531-85905708

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd QingDao Office

ADD : Room 1004, Unit 2, Building 14, Jinri Zidu,  
Tianshan Road, Chengyang District, Qingdao,  
Shandong  
TEL : 18663779803

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd TengZhou Office

ADD : 13 households, row 1, Xiaocang village, Yucai  
Road community, Beixin street, Tengzhou City,  
Shandong Province  
TEL : 15098706233

### Hubei

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd WuHan Branch

ADD : 2003-2006, Building A, Optics Valley  
International, Jiayuan Road, No.456 East Luoyu Road,  
Hongshan District, Wuhan City, Hubei Province, China  
TEL : 027-87638876  
FAX : 027-87204137

### Liaoning

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ShenYang Branch

ADD : Room 1212, Tianxin Building, 17 Jianshe West  
Road, Tixi District, Shenyang City, Liaoning Province,  
China, China  
TEL : 18698806526

### Anhui

#### SYNTEC TECHNOLOGY(Suzhou)CO.,Ltd ShenYang Branch

ADD : Room 1005, block B, Wanda Ginza, rongchuang  
Mao, Binhu, Hefei, Anhui Province,China.  
TEL : 0551-63814183  
FAX : 0551-63814183

## LEANTEC Intelligence CO., LTD.

No.25, Yanfa 2nd Rd., East Dist.,  
Hsinchu City 300, Taiwan

☎ 886-3-6663553

☎ 886-3-6663505

✉ sales@syntecclub.com.tw

2F., No.2, Jingke 3rd Rd.,  
Nantun Dist., Taichung City 408

☎ 886-4-23550621

☎ 886-4-23550621

✉ jason.chen@leantec.com.tw

## Suzhou LEANTEC Intelligence Co., Ltd.

Building B, No.9 Chunhui Road,Suzou  
Industrial Park,China

☎ 86-512-69008860

☎ 86-512-65246029

✉ service@syntecclub.com.cn



<https://www.leantec.com.tw/default.aspx>

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Catalog Number : 202306-V1



# Syntec Robot Controller



TRUSTED TECHNICAL SERVICE

# Syntec Robot Controller

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**SYNTEC**

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# ABOUT SYNTEC

25+

25-Year Experience

1

All in 1 Service

50+

50+ Service Locations

NO.1

PCbaseNo.1

SYNTEC specializes in PC-based motion control through excellent research and development for 25 years.

Totally integrated automation

Supply automation, IOT, software and hardware solutions.

With 50+ service locations around the world

Made in Taiwan

Consistent production process

**Company vision:**

Trustworthy intelligent manufacturer partner

**Company mission:**

Comprehensive smart factory solution

Under the industry 4.0 global trend, the industrial sector no longer relies on traditional production methods. What replaced them are diverse, customization centered, and small quantity productions. LEANTEC is able to respond to global industrial changes in providing comprehensive solutions to clients, thereby realizing our vision of achieving smart manufacturing and creating smart factories.

In moving towards industry 4.0, LEANTEC uses its smart manufacture system integration as its core advantage in accumulating experience through small quantity & diverse productions, cyber physical system integration, on-site services, and complemented by multiple sales channels, in providing one-stop comprehensive solutions.

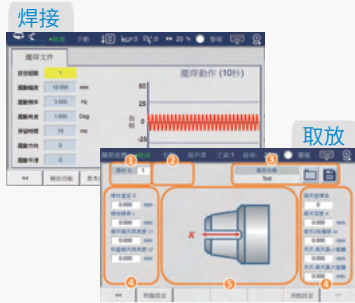


# SOLUTION INTRODUCTION

## Solution Introduction



SYNFACTORY Syntec Cloud



Industry Process Package



IO Solution / Peripheral Components



Servo Package



Open Servo



Commercially Available Motors

## Features

- Multiple industry process packages that can be directly applied in practical applications.
- Standard configuration includes 16 inputs and 16 outputs, which can be expanded up to 128 inputs and 128 outputs using plug-in cards. It also supports ADDA, PWM, and MPG functionalities.
- Supports various communication protocols for easy integration with peripheral components.
- Can be connected to the new generation cloud via SMB.
- The electric control package solution provides a one-stop shopping experience, with seamless integration of servo systems for reduced wiring and plug-and-play functionality.
- Supports open servo communication, compatible with various commercially available drives.
- Supports encoders from Nikon, Tamagawa, and others, and can drive various commercially available motors, as well as Mitsubishi and Panasonic motors.
- Standard configuration of 4 axes, with support for up to 12 axes. Can be used with linear tracks and workstations for collaborative motion.

# SOFTWARE INTRODUCTION

## Friendly Use



Easy

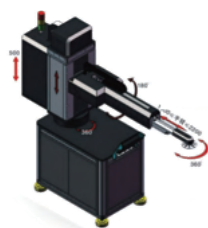
- Easy adjustment, installation, and operation.
- Pain-free integration with robots.
- Reduced setup and programming time.

## Supports multiple types

- Supports over 20 different arm configurations
- Can be used by simply inputting the mechanism parameters



Palletizing Robot



Swing arm Robot



Six-Axis Robot



SCARA Robot



Parallel Robot



# SOFTWARE INTRODUCTION

## Intuitive Operation and Programming

- Conversational programming, no need to learn robot languages
- Supports simplified Pinyin input and multi-language switching



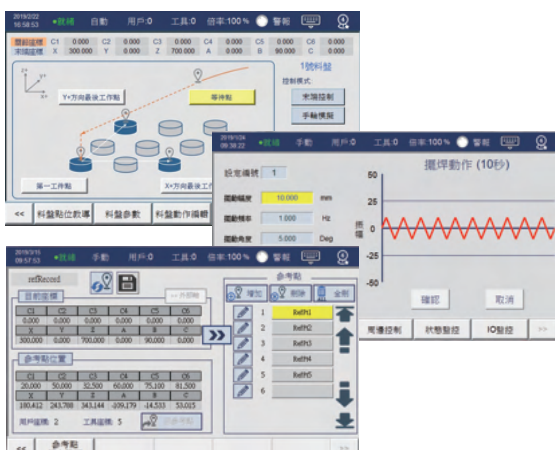
## Sufficient IO commands

- Provide complete IO commands without writing any PLC on your own
- Wait for Point I without deceleration, and output Point O during movement, which can improve the operating efficiency of the machine



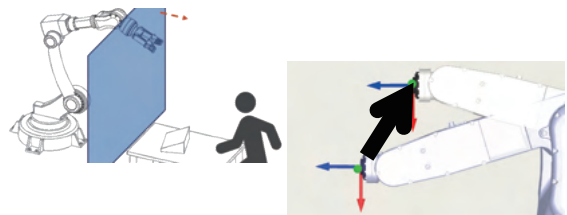
## Quickly introduce it to practical applications

- Provide the batching tray and track tracking and workstation reservation functions
- Provide various process packages, such as welding, picking and placing, etc.
- Record important points according to reference points and reuse them in the program



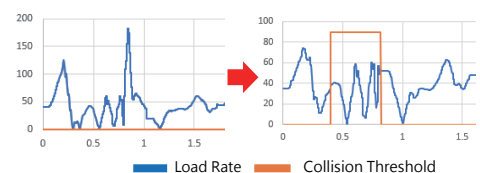
## Easy advanced programming function

- The anti-collision area function can prevent the arm from entering a specific area to increase safety
- The dynamic anti-collision function can prevent the arm from colliding during movement
- Able to automatically pass the singular point without writing any bypassing program on your own

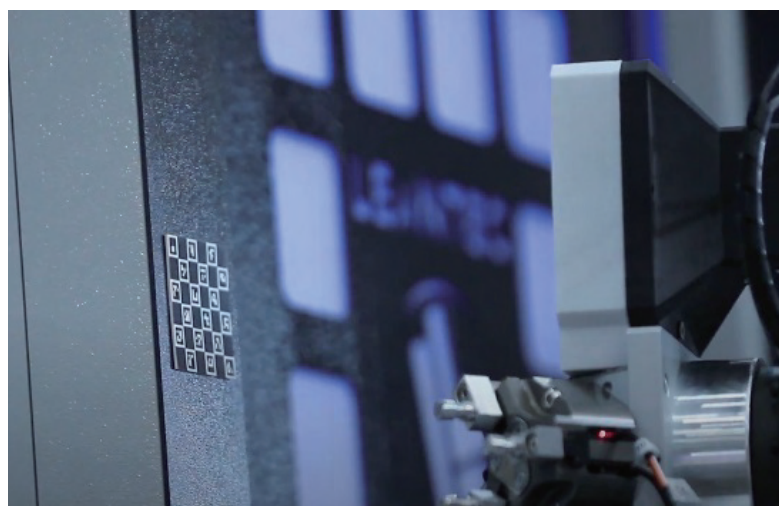


Disable Collision Detection

Enable Collision Detection



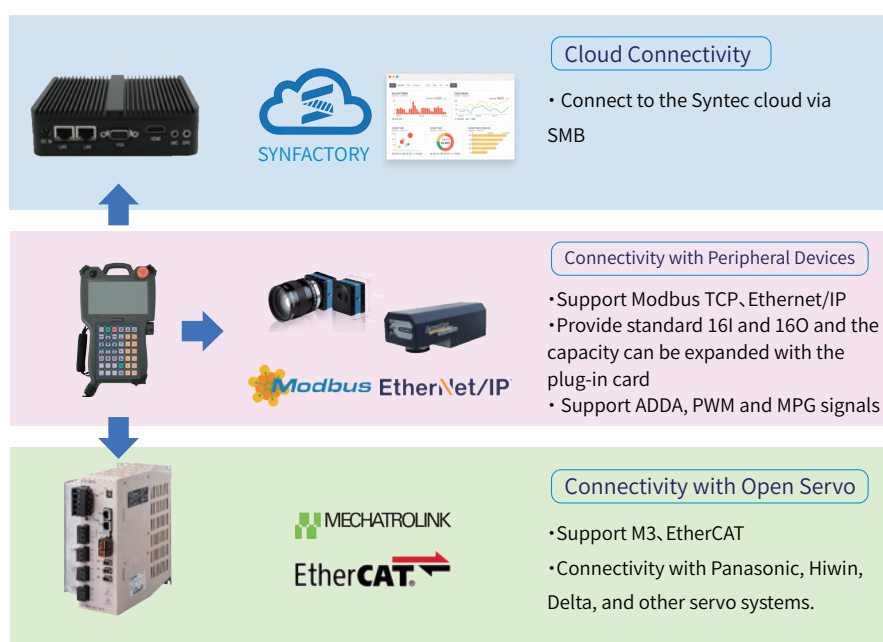
### Connection



#### Connection

- Machine-to-Cloud, Machine-to-Machine, Machine-to-Drive communication
- Support for multiple standard communication protocols
- Enhance value-added applications in the peripheral ecosystem

### Comprehensive Connectivity



#### Connect to the machine and PC



- NetPLC connects to the next-generation controller via Ethernet cable, enabling quick communication setup
- SMB connection allows linking with third-party machine controllers
- NetDNC connects to a PC via Ethernet cable, facilitating large file processing

# SOFTWARE INTRODUCTION

Open



Open

- Highly customizable and flexible
- Packaging processes for different application scenarios
- Master industrial know-how

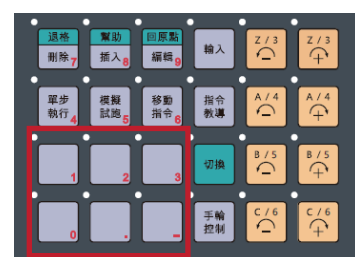
## Common action flow of packaging

- Perform Syntec PLC programming with a special editor
- Provide PLC peripheral control and peripheral subprograms
- Quickly import peripheral equipment and common actions for packaging



## Design industrial operating habits

- Complete screen development through dragging and dropping of the eHMI tool
- The custom entity can expand button functions



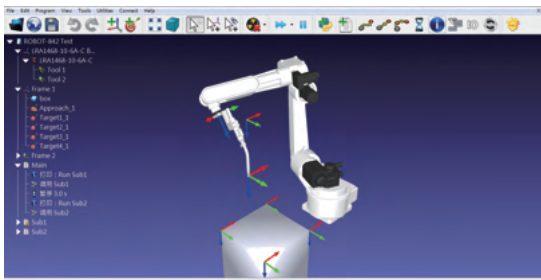
### Off-line programming application solution

- Support offline programming and CAD/CAM software
- Provide arm models and the syntax post-processor



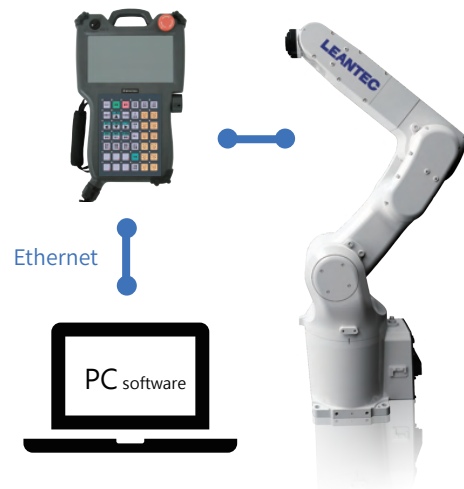
**RoboDK**

**SprutCAM**



### PC software application

- Connect to PC with the network cable and provide the RemoteAPI function
- Develop custom PC software upon the customer requirement to monitor and operate machines



### Machine visual application

- Compatible with ImagingSource and Hikvision cameras
- Monitor the visual screen and adjust the visual parameters through the handheld box
- Provide visual solutions and produce tailored visual products according to requirements



### Tool (TCP) calibration application

- The Leantec laser calibrator is optional for TCP calibration to improve the production accuracy
- Provide optional built-in solutions for software calibration to calibrate tools in an online or off-line manner

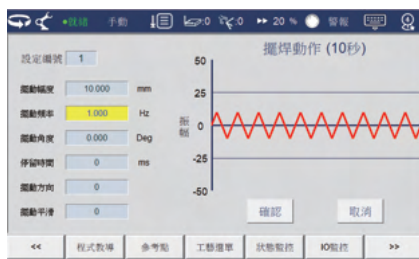


# Industrial Process Package.

## Welding process

### Arc welding process

- Complete welding commands, including swing welding and intermittent welding, to meet requirements on different processes.



### Laser welding process

- Standard special laser welding process package
- Support the time power and speed laser functions and precisely control the received optical power to prevent over-welding



## Welding process-sensor

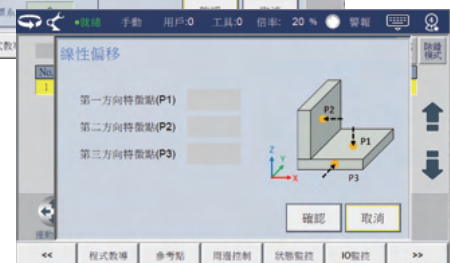
### Sensor application - Laser positioning and tracking

- The laser positioning and tracking functions can solve the clamping error and thermal deformation of workpieces, which make the production more flexible
- The built-in tracker can perform hand-eye correction for easy adjustment



### Sensor application - Contact positioning

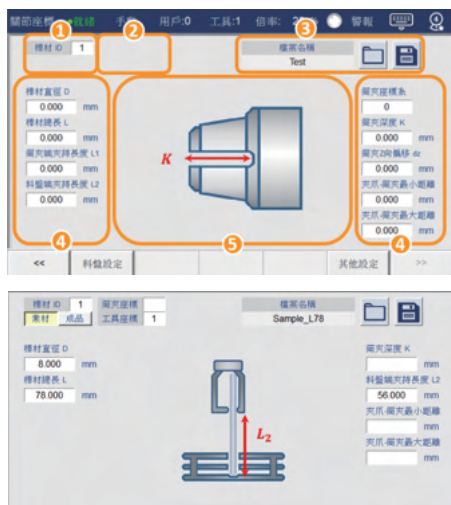
- The contact positioning function is used to solve the workpiece clamping error
- Automatically teach to find the target point and it is easy to make adjustment
- Provide several shift methods



# Pick-and-place of the machine tool

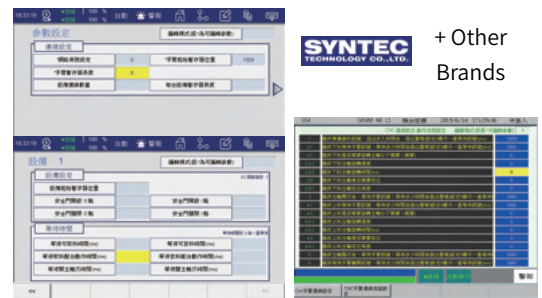
## Pick-and-place of the sharpener

- Fast refueling parameter settings
- Parameter graphization makes operation more intuitive



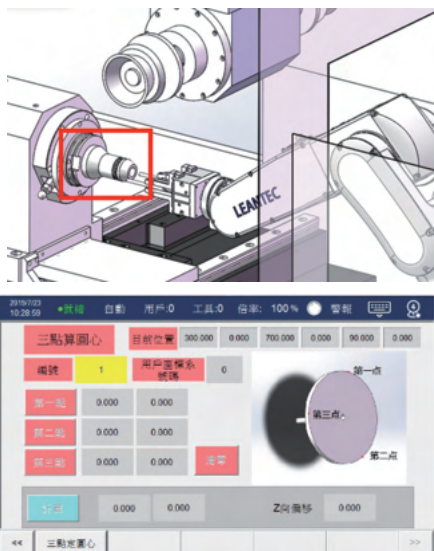
## CNC quick connection

- The Network cable is connected after parameter settings
- The built-in program template enables the signal handshake to be completed at one time
- Integrate the current support and future support into the following



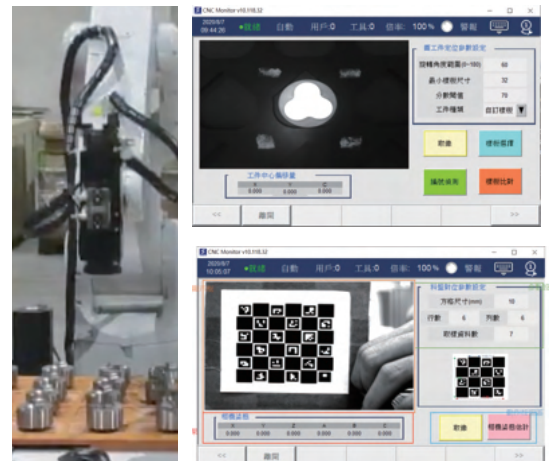
## Alignment

- Quickly align the bar with the tray and the spindle direction
- Significantly reduce the time that the arm teaches points



## 2D visual alignment module

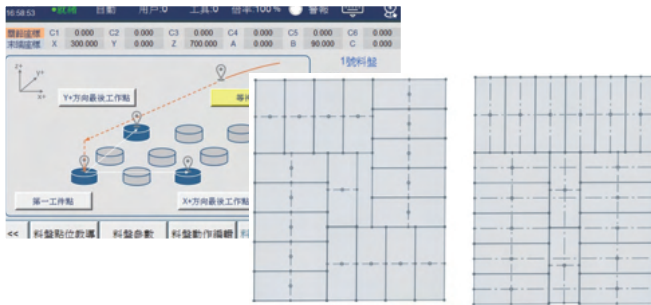
- The controller is integrated with the visual function and works with commercially available cameras
- Workpiece positioning, QR code recognition and machine tool/tray position calibration



# CASE STUDIES

## Case Studies 1

- Application case: Palletizing and packing
- Scenario description: Food industry production line automation solution
- Software function:
  - Provide the tray and singular point avoidance functions and the stack application can be quickly imported
  - Perform custom development according to different stack styles
  - Support the standard palletizing, heavy-duty palletizing robots and other structure robots



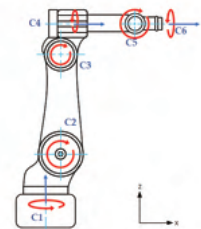
Style 1

Style 2



## Case Studies 2

- Application case: Wood plank punching
- Scenario description: Curved seat back panel punching solution
- Software function:
  - Able to pack special industrial functions, such as plane punching and curved surface punching
  - Provide the reservation function to improve the production efficiency of multiple workstations
  - Provide standard 6-joint and 4-joint robots and other standard structure robots



工位	工位类型	主程序名称	工位状态	就位	运行次数 (报警清除)	下次运行时间	报警清除时间
1	工位启用	RobotProgram	待预约	-	0	0	0
2	工位启用		待预约	-	0	0	预约时间
3	工位启用		待预约	-	0	0	预约时间
4	工位启用		待预约	-	0	0	预约时间
5	工位禁用		未启用	-	0	0	
6	工位禁用		未启用	-	0	0	



### Case Studies 3

- Application case      Spraying application
- Scenario description      Spraying automation of the motor production line

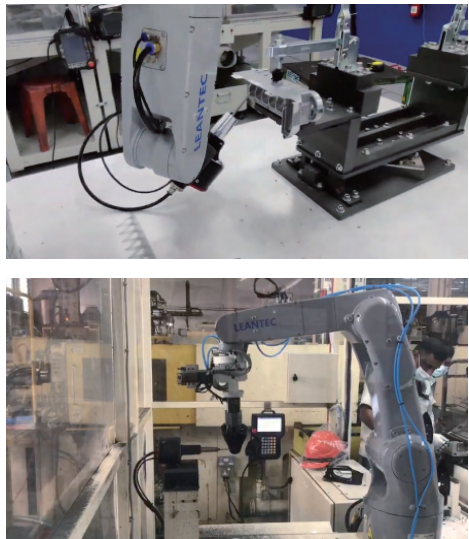
- Software function
  - Standard track tracking function, which can be used with vision and sensors
  - Smooth corners facilitate the realization of the high-speed pick-and-place function
  - Support SCARA, DELTA and other structure robots



### Case Studies 4

- Application case      Metal deburring
- Scenario description      Automation solution of the post-metal forming

- Software function
  - Locate the external axis turntable with the serial PLC axis function
  - Provide an accurate TCP position with the 4-point /6-point /20-point calibration function
  - Smooth corners and independent acceleration and deceleration parameters can increase the efficiency and reduce jitter

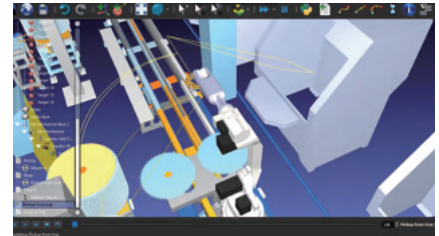
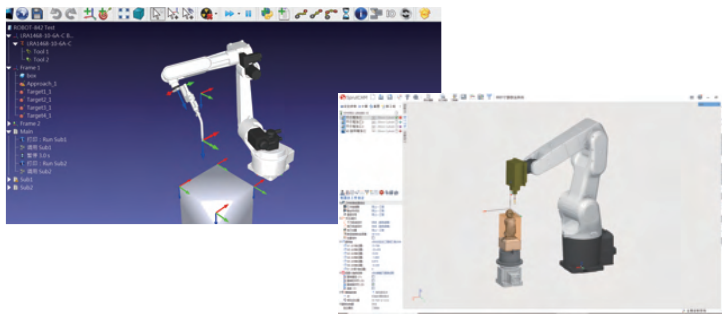




# CASE STUDIES

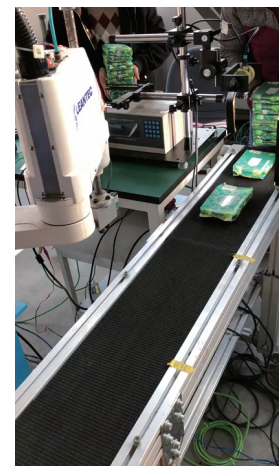
## Case Studies 5

- **Application case** Offline programming software application
- **Scenario description** 3D simulated carved wooden Buddha statue picking and placing solution
- **Software function**
  - Support RoboDK, SprutCAM and other software
  - Provide robot models for offline programming and 3D motion simulation
  - Provide the syntax post-processor for Syntax robots and directly export the program for processing



## Case Studies 6

- **Application case** SCARA and DELTA picking and placing application
- **Scenario description** Automatic production line introduction solution in the electronics industry and food industry
- **Software function**
  - Standard track tracking function, which can be used with vision and sensors
  - Smooth corners facilitate the realization of the high-speed pick-and-place function
  - Support SCARA, DELTA and other structure robots

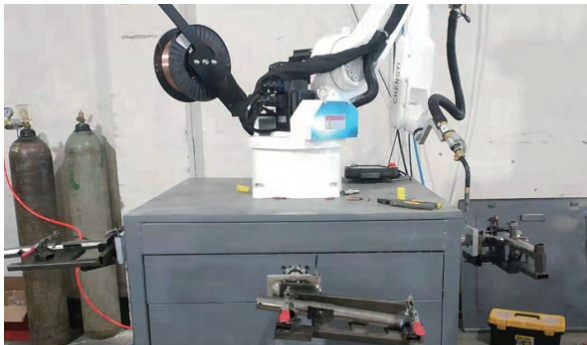


## Arc welding process package

### Case Studies 7

- **Application case** All-around welding of the multi-workstation and corner post
- **Scenario description**

The robot welding method is featured with the high production efficiency, and the clamping and installation of workpieces take time. The multi-workstation reservation function enables the workpiece to be clamped at one workstation and welded at other workstations, which can greatly improve the production efficiency.



3-workstation all-around welding



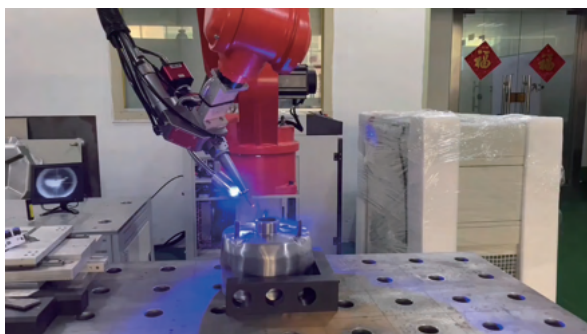
All-around welding of the corner post

## Laser welding process package

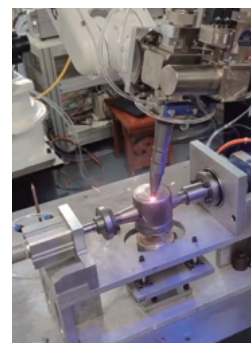
### Case Studies 8

- **Application case** Water meter welding
- **Scenario description**

Because the requirement for welding effect of the workpiece is high, the laser welding process was used to meet the requirement on the low thermal deformation, and the all-around welding process was adopted with the collaborative function.



Laser welding example



Water meter

# CASE STUDIES

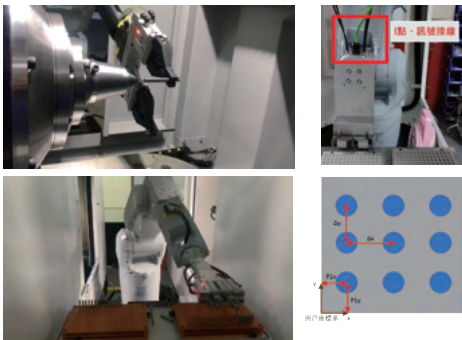
## One sharpener and one hand

### Case Studies 9

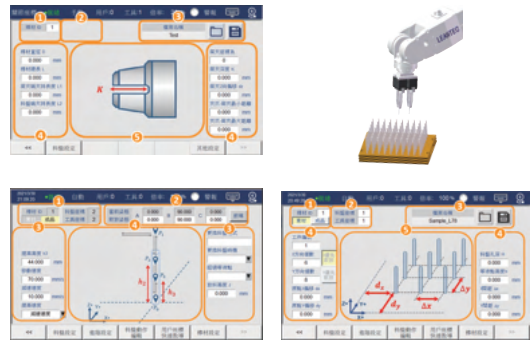
- Pick-and-place process package for the sharpener**
  - Automatic centering of the collet and quick positioning of the tray
  - Settings of parameters related to the picked and placed material (e.g. the knife length, blade, depth, clamping position, etc.)

#### [Highlights]

- It is not required to teach points if the workpiece dimensions change
- Graphical parameterization reduces learning costs



One sharpener and one hand  
Equipped with the pick-and-place process

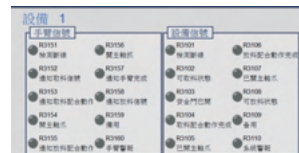


Pick-and-place process package for the sharpener

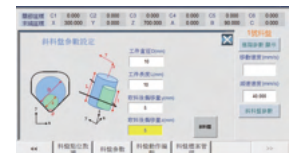
## One lathe and one hand

### Case Studies 10

- Quick setup, quick teaching and quick wire**
  - CNC connection package and tray/spindle alignment function, tray shift function and tool calibration



CNC connection



Tray shift function



Tool calibration



Tool alignment

# APPENDIX

## Controller specifications <<



Item	Specification		
Material code	F21-81RA-X-10	F21-81RS-X-10	F21-81RD-X-10
Supported type	Articulated, Compound-Type	SCARA	DELTA
Displayed language	Traditional Chinese / Simplified Chinese (CHS) / English (E).		
Screen specifications	7-INCH RESISTIVE TOUCHSCREEN		
Operation method	Touchscreen, Button Operation		
Ram	4GB, Unlimited Number of Programs		
Servo communication	M3 Bus, EtherCAT Bus.		
Number of axes	Standard configuration of 4 axes (expandable up to 12 axes).		
IO points	16 inputs and outputs (expandable up to 128 inputs and outputs).		
External interface	USB*1		
Operation button	Operator Panel, Emergency Stop, Mode Selector Switch, Safety Switch, Handwheel		
Cable length	10 M / 17 M		
Protection level	IP65		
Ambient temperature	-10°C~50°C		
Environmental Humidity	20%-90%, No Condensation		
Physical Dimensions	340x207x78 mm		

### Solution Introduction

Overview of highlights of the 81R-P handheld box controller;



# APPENDIX

## Power module specifications <<



Item	Specifications
Material code	F31-FC-M3-PWR
LAN port	RJ45 type, 10/100 Mbps network communication port
M3 port	RJ45 TYPE, SERVO COMMUNICATION PORT
HHB port	15pin D-SUB port
IO points	Slot type, expandable
Support the expansion card	DI16/DO16 card, ADDA card and MPG card
Power input	DC24V, 1A
Installation method	Buckle
Ambient temperature	-10°C~50°C
Ambient humidity	20-90% without condensation
Physical Dimensions	120X27X105MM

## DO board specifications <<



Item	Specifications
Material code	F31-FC_16OUT_T16
Signal type	PNP type
Power input	DC24V, DC0V
Interface specifications	16-channel output signal with the output voltage of 24 V
Single point current	Maximum output current of 0.5 A
Installation method	Buckle
Ambient temperature	-10°C~50°C
Physical Dimensions	120x27x105mm

## DI board specifications <<



Item	Specifications
Material code	F31-FC_16IN_PHO
Signal type	Choose one from NPN and PNP
COM port	DC24V:NPN , DC0V:PNP
Interface specifications	16-channel input signal, DC 24 V or 0 V
Installation method	Buckle
Ambient temperature	-10°C~50°C
Physical Dimensions	120x27x105mm

## LWM board specifications <<



Item	Specifications
Model	F31-FC_LWM
Signal type	Choose one from NPN and PNP
P1	1PWM( 24V ) 1AD(-10V~10V, 12bits) 2DA (-10V~10V, 12bits)
P2	8-channel output signal with the output voltage of 24 V
P3	16-channel input signal, DC 24 V or 0 V (NPN/PNC can be adjusted)
Installation method	Buckle
Ambient temperature	-10°C~50
Ambient humidity	20-90% without condensation
Physical Dimensions	120x27x105mm

## Specifications of the all-in-1 driver <<



Item	Specifications		
Material code	S08-SMD22B20-00	S08-SMD23B20-00	S08-SMD24B20-00
Number of axles	2	3	4
Power	1KW x2	1KW x3	1KW x4
Physical Dimensions	200X110X185MM		
Voltage	Single phase/three phase 220 V		
Driver protocol	Mechatrolink III		
Encoder type supported	Nikon, BissC, Tamagawa, FeeDat, EnDat		

## Software Option << 81R (optional)

Number	Material code	Product name	Remarks
-	S20-OP_1AXIS_AUTO	Add 1 Axis_Automation	
16	S20-OP_VISION	Syntec Vision_OP16	
17	S20-OP_VISION2	Commercially Available Vision_OP17	
18	S20-OP_CAD_CAM	CAD/CAM FUNCTION_OP18	DXF-PATH FILE FUNCTION
22	S20-OP_FIVE-AXIS-ROBOT	5-joint Robot_OP22	4 and 5-joint robots are available
23	S20-OP_SIX-AXIS-ROBOT	6-joint Robot_OP23	4, 5 and 6-joint robots are available
55	S20-OP-ROBOT-ADVMotionCtrl	Advanced Robot Motion Control	Only 81RA/81RS is optional

## Special machine code << 81R (optional)

Number	Material code	Product name
12	S20-MID_R_TENDING	Machine tool picking and placing of the robot
13	S20-MID_R_ARC_WELDING	Arc welding of the robot
14	S20-MID_R_LASER_WELDING	Laser welding of the robot



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