www.tongtai.com.tw

Tongtai

Trust & Technology

Automation System

Tongtai **Tongtai Machine & Tool Co., Ltd.**

Headquarters

No.3, Luke 3rd Rd., Luzhu Dist., Kaohsiung City 82151, Taiwan

TEL：886-7-9761588

FAX：886-7-9761589, 886-7-9761590

Website：www.tongtai.com.tw

Taoyuan Office	TEL：886-3-4551399	FAX：886-3-4559730
Taichung Office	TEL：886-4-23589600	FAX：886-4-23589993
Japan Branch	TEL：81-4-71438355	FAX：81-4-71438360
Europe Branch	TEL：31-161-454639	FAX：31-161-454768
Malaysia Branch	TEL：603-78597113	FAX：603-78597115
Vietnam Office	TEL：84-4-62766090	
Thailand Office	TEL：66-2-7443440	FAX：66-2-3986518
Indonesia Office	TEL：62-21-45850875	FAX：62-21-45850876

China Operation Center

Shuzhou Tong-yu Machine & Tool Co., Ltd.

No.555 Huahong Rd., Economic Development Zone of Wujiang, Suzhou City, Jiangsu Province, China

TEL：86-512-63430168

FAX：86-512-63431622

E-mail：sales@tong-yu.com.cn

Wuhan Branch	TEL：86-27-59409109	FAX：86-27-59409110
Chongqing Branch	TEL：86-23-67865925	FAX：86-23-67867717
Guandong Branch	TEL：86-755-27222119	FAX：86-755-27222115
Tianjin Branch	TEL：86-22-24417640	FAX：86-22-24416738
Shanghai Office	TEL：86-21-24208138	FAX：86-21-34073262
Shenyang Office	TEL：86-24-24142968	FAX：86-24-24115782

Affiliates

Honor Seiki Co., Ltd.
TEL: 886-7-9759888
FAX: 886-7-9759999
Website : www.honorseiki.com.tw

Asia Pacific Elite Corp.
TEL: 886-4-23589313
FAX: 886-4-23588913
Website : www.apeccnc.com

Quick-Tech Machinery Co., Ltd
TEL: 886-6-3841155
FAX: 886-6-3841177
Website : www.quicktech.com.tw

Automation System : 2015.02/2E

Most cost-efficient automation solutions for you

Driven by the rapid development of automation technology in recent years, the automated production systems have been introduced to the enterprises, not only to enhance the competitiveness and reduce the labor costs but also improve the productivity and yield. The benefits and technology brought by automated production has become one of the cornerstones to create customer values and enhance industrial competitiveness.

Tongtai manufactured the first automated production line in 35 years ago, working with the special purpose machine to produce the engine valve of the motorcycles. Until now, Tongtai has already manufactured more than 300 sets various automated production systems. You will be satisfied with the automation solutions from Tongtai as the reliability has been approved by the automotive parts makers around the world.

Benefits:

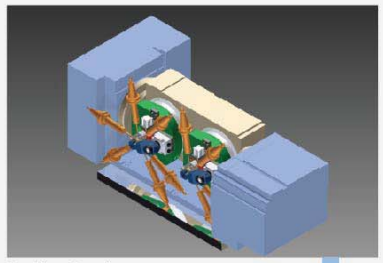
- Increase productivity.
- Enhance machining quality and yield rate.
- Decrease labor costs.
- Speed up return on investment.
- Improve floor space turnover.
- Prevent operation mistakes.
- Enhance production flexibility.
- Lower workplace hazards & labor limitation.

Tongtai – Expert of customization & turnkey projects

Tongtai started the business as the manufacturer of the special purpose machines. The capabilities of the customized design and the complete turnkey lines are our core values. According to the machining requirements of the customer's workpieces, the process analysis, complete line layout, tool and fixture design, and machining application are all carried out and fully tested in Tongtai. The customers can start the production directly after installation.

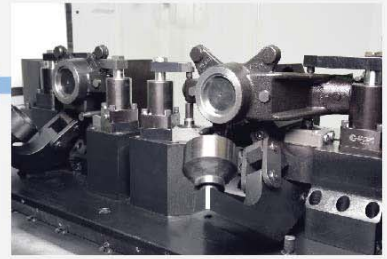
Utilizing more than 40 years experiences and technology in customization and turnkey projects, from parts & materials, production, inspection, to stock and production management, Tongtai will provide you the most cost-efficient automation solutions.

Engineering Analysis

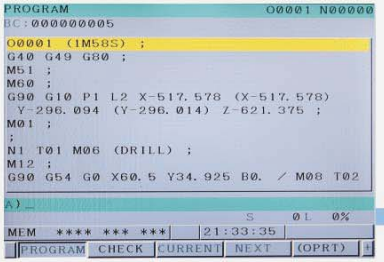


Tooling Design

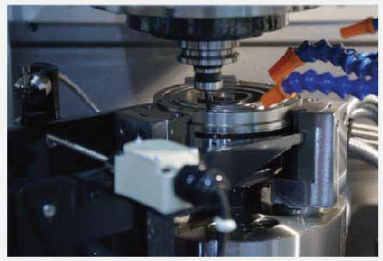
Production Line Layout



Jig & Fixture Design



Programming



Cutting Test

Tongtai Automation System

Single Machine

Most efficient robot configuration is designed according to the machine structure, such as the universal joint type robot, the special purpose robot for the specific machines, or the customized loading/unloading system.

Machine Q'ty: 1

Flexible Manufacturing System (FMS)

Flexible manufacturing system (FMS) is a complete production management system of the materials and information, including the material storage and scheduling, machining/manufacturing, inspection, stock and production management. FMS satisfies the targets of the small-volume large-variety production because of its rapid adjustment capability to the production demand changes.

Machine Q'ty: 1 ~ 2 (or more)

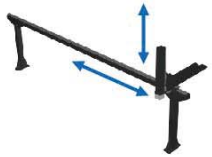
Multiple Machines

Most efficient connection between the machines establishes the automation system suitable for production line; no matter similar machine type (e.g. CNC lathe + CNC lathe) or different machine type (e.g. CNC lathe + machining center).

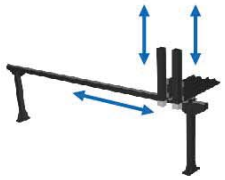
Machine Q'ty : 2～10

Modular Units

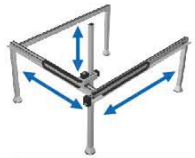
Feeding System



Gantry type single arm feeding axis



Gantry type double arm feeding axis



Area gantry type single arm feeding axis

Multi-joint robot system

Six axis robot

Robot + Travel axis

Four axis robot

Clamping arm system

90 degree turn-over clamping arm

180 degree turn-over double clamping arm

180 degree turn-over single clamping arm

Special jaws

Stocker/Stocker

Conveyor type

Drawer type

Plate circulation type

Pallet stack type

Standard single machine automation

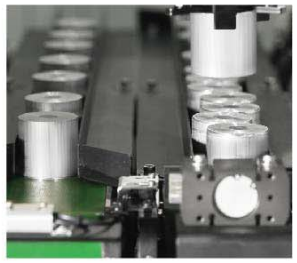
HS-22+Loader

For compact workpiece quick loading/unloading

- Loading/unloading within 5 sec. significantly reduces idle time.
- Servo-driven feeding axis with ball screw works flexibly and fast.
- Various stocker/stocker can be equipped.
- Workpiece diameter range : Ø35~Ø100 mm
- Max. workpiece length : 60 mm
- Max. workpiece weight : 3 kg/pc×2
- Robot arm rapid traverse : 30 m/min

Modular Stocker

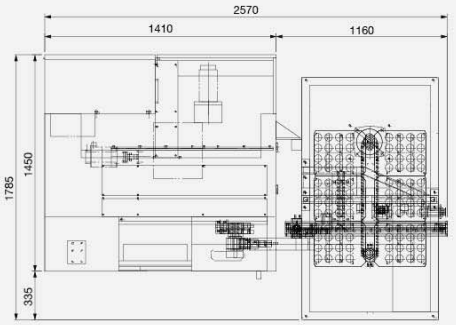
Pallet stack type



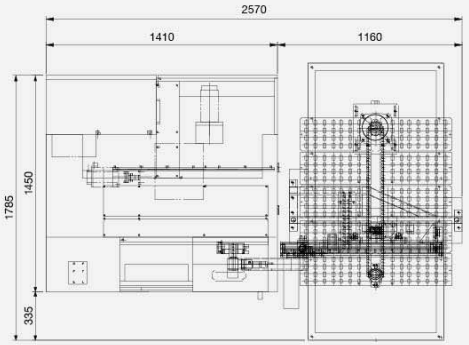
Conveyor type

Machine layout

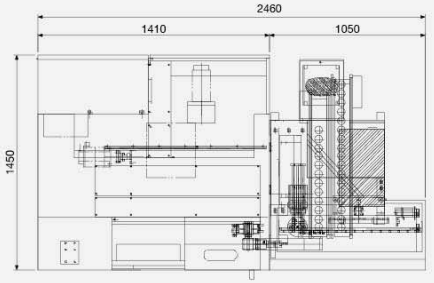
Solution 1: (Rotary plate type stocker)



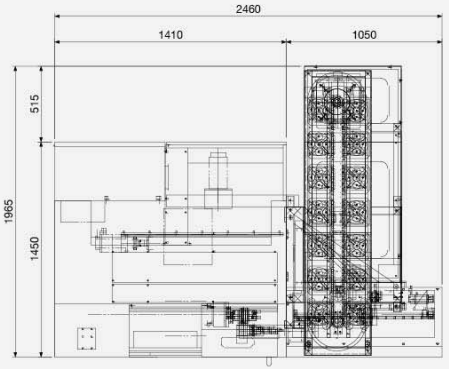
Solution 2: (Rotary plate type stocker)



Solution 3: (Conveyor type stocker)



Solution 4: (Rotary pallet stack type stocker)



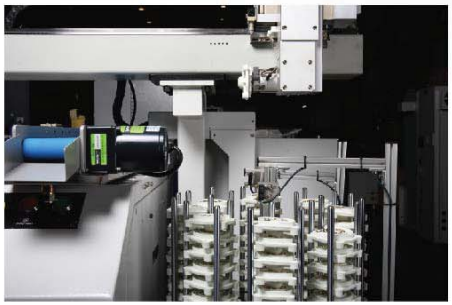
Unit : mm

Standard single machine automation

Q5+Loader

Compact gang type CNC lathe Q5 with 3-axis robot (2 orthogonal axes + 1 rotating axis) achieves the best floor space efficiency. Best for auto production on the small bar or disc materials, the gripper of the robot can be customized based on the workpieces. Pallet stack type or plate type stockers are available.

- Auto loading/unloading within 5 sec.
- Pallet stack type or plate type stockers are available.



Pallet stack type stocker

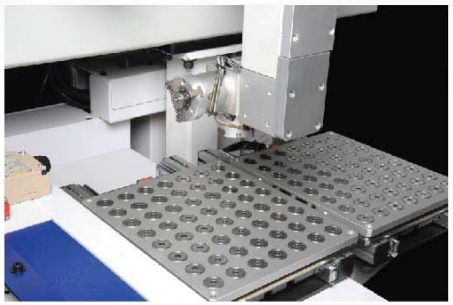
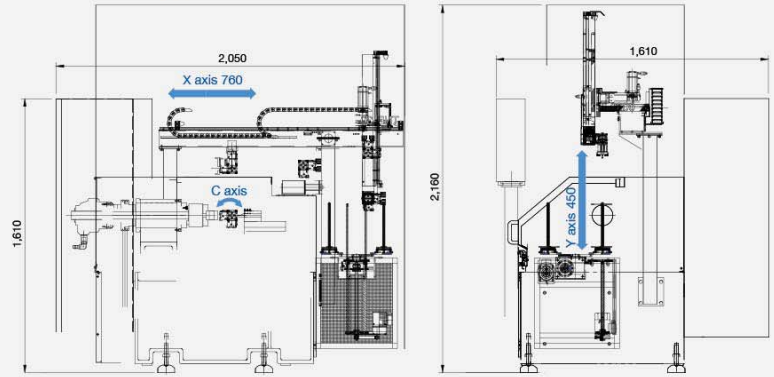


Plate type stocker

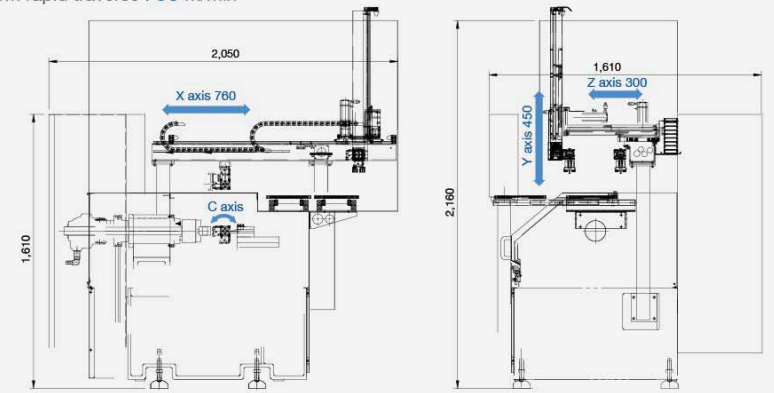
8 pallets rotary type parts stockerV

- Workpiece diameter range : Ø5~Ø50 mm
- Max. workpiece length : 40 mm
- Max. workpiece weight: 0.6 kg × 2
- Robot arm rapid traverse : 90 m/min



2 pallets plate type stocker

- Workpiece diameter range : Ø5~Ø50 mm
- Max. workpiece length : 40 mm
- Max. workpiece weight : 0.6 kg × 2
- Robot arm rapid traverse : 90 m/min



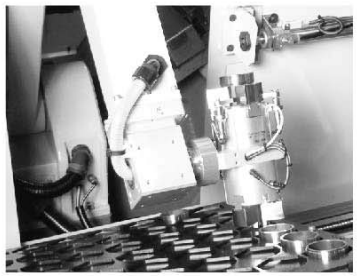
Unit : mm

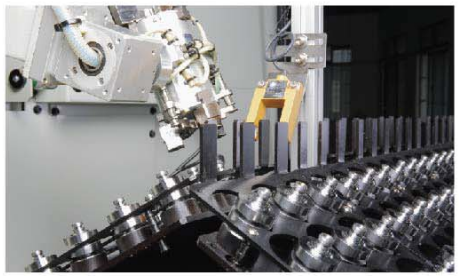
Standard single machine automation

Pendulum type tailstock robot - Suitable for small to medium-sized CNC lathes

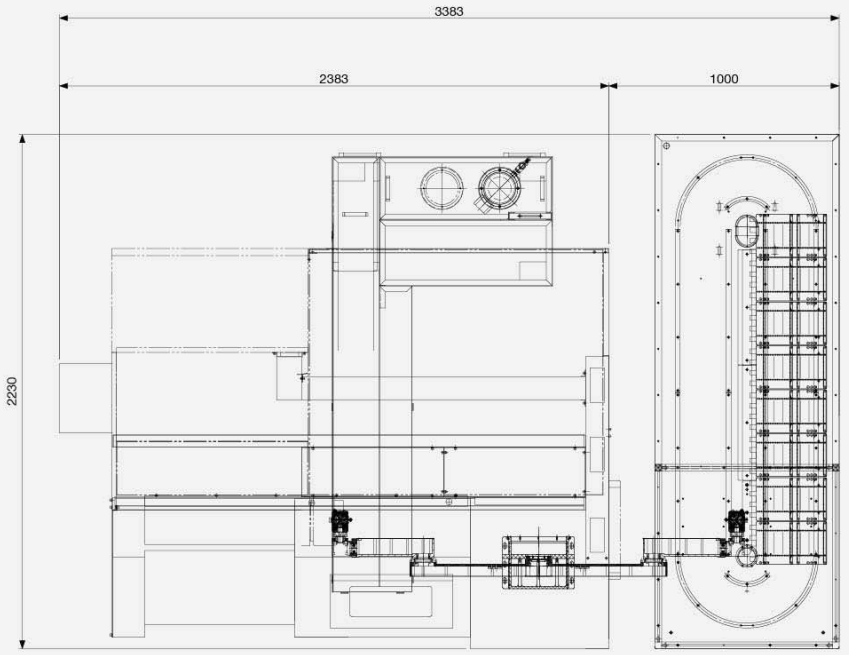
Three rotary axes pendulum type robot Installed on the tailstock position is best for universal CNC lathe automation. All three rotary axes of the robot have the torque detector as the extra protection when operation mistake. Tilt loading table with larger loading capability compared to normal table (larger than 1.4 times).

- Loading/unloading within 7 sec.
- Save auto door open/close time.
- Low maintenance cost/no need full-time lubrication for reducer transmission.
- Workpiece diameter range : Ø10~Ø120 mm
- Max. workpiece length : 100 mm
- Max. workpiece weight : 3 kg × 2





Machine Layout



Unit : mm

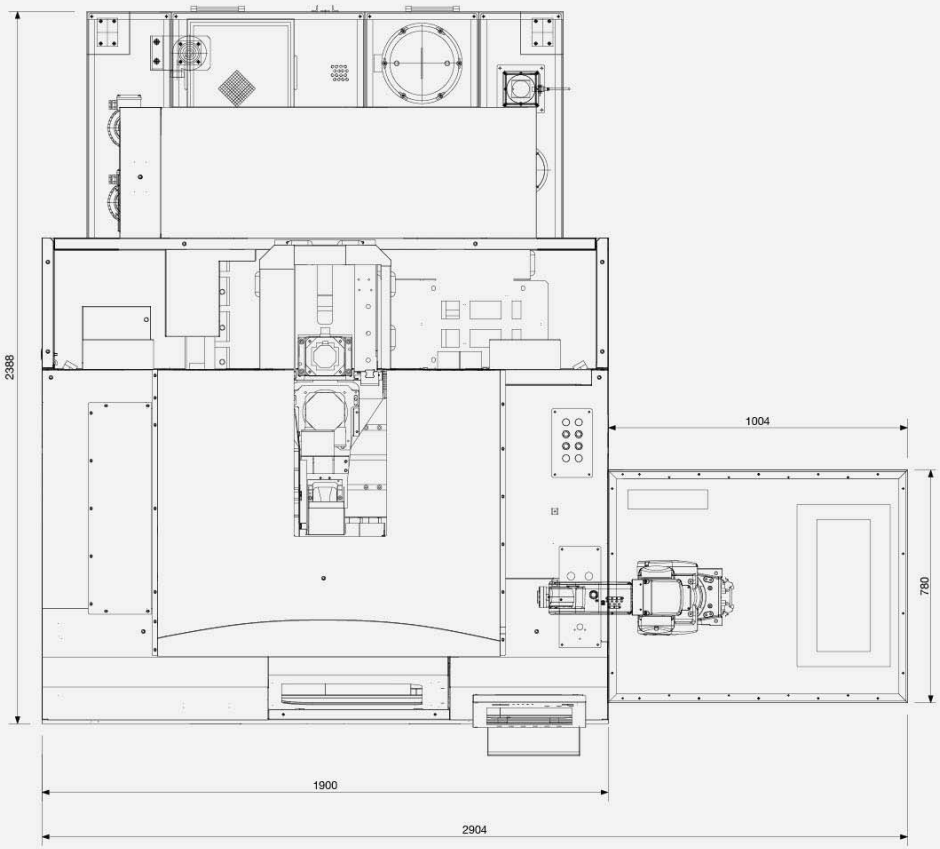
Standard single machine automation

Compact 6-axis robot – Suitable for small to medium-sized machining centers & CNC lathes

Compact 6-axis robot is best for auto loading/unloading on small to medium-sized machines (such as TMV-510AII/CII, TMV-710A/C and CNC lathes, etc.) and save the floor space and time and bring high flexibility. Besides the stocker, the tool magazine is available for the auto spare tools supply to achieve the long-period, non-human automation.

- Save Floor Space/Area Occupied: 1,000×780 mm
- Max. Workpiece Weight: 5 kg / 10 kg
- Various Workpiece Stockers Available
- Easy Change Clamping Jaws/High Flexibility

Machine Layout



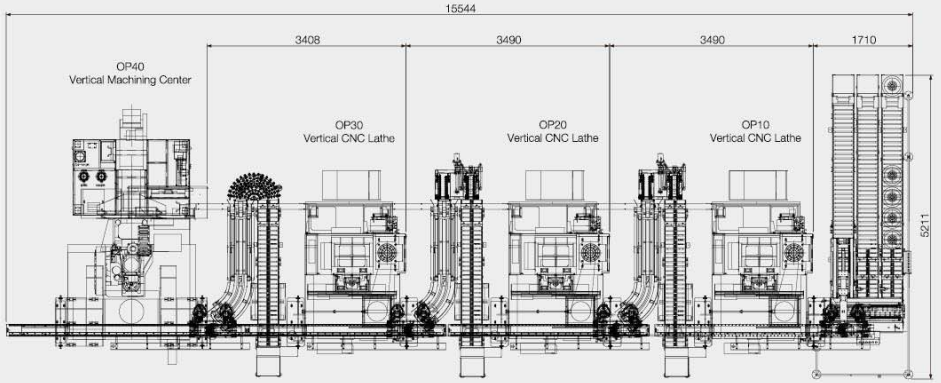
Unit : mm

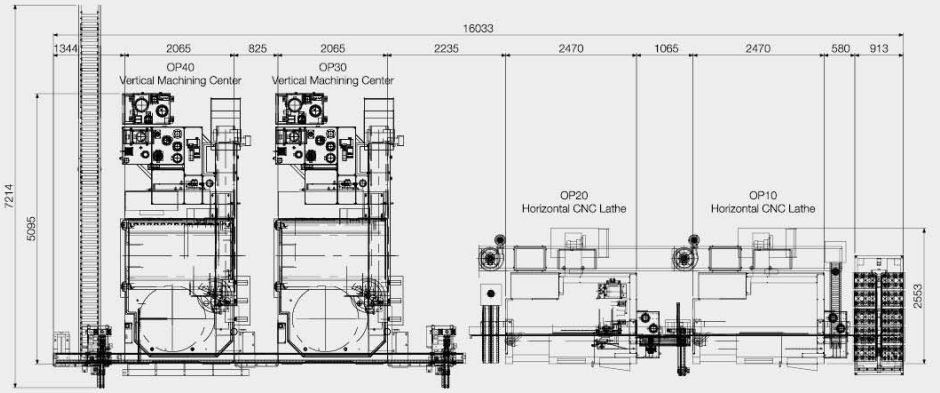
Production Line Type Multi-Machine Automation

Comparing to multi-axis robot, the gantry type robot with the simpler structure is an economic solution to the multi-machine automation. According to the customer's requirements, the single or separated workpiece feeder/stocker is available. The various stations for measurement, air blowing, turnover, positioning and cleaning can be installed.

- Max. Workpiece Weight : 15 kg/pc
- Robot Rapid Traverse : 120 m/min
- Flexible Configuration: One/One, One/Two or Two/Two
- Less Floor Space Occupation
- Integration of Measurement, Turnover, Positioning & Cleaning
- Various Workpiece Stockers Available

Machine Layout

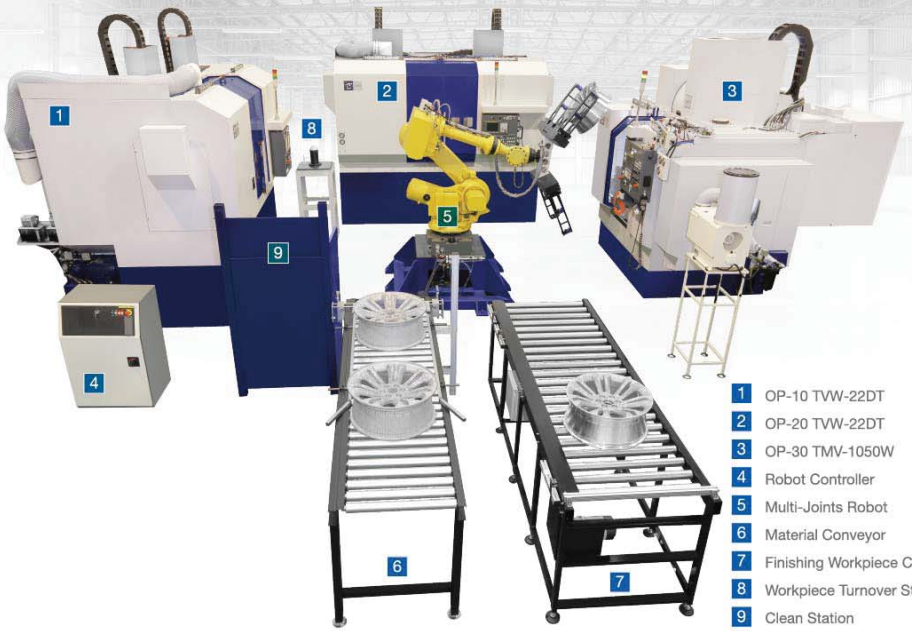




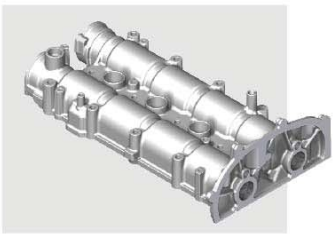
Unit : mm

Production Line Type Multi-Machine Automation-With 6-Axis Robot

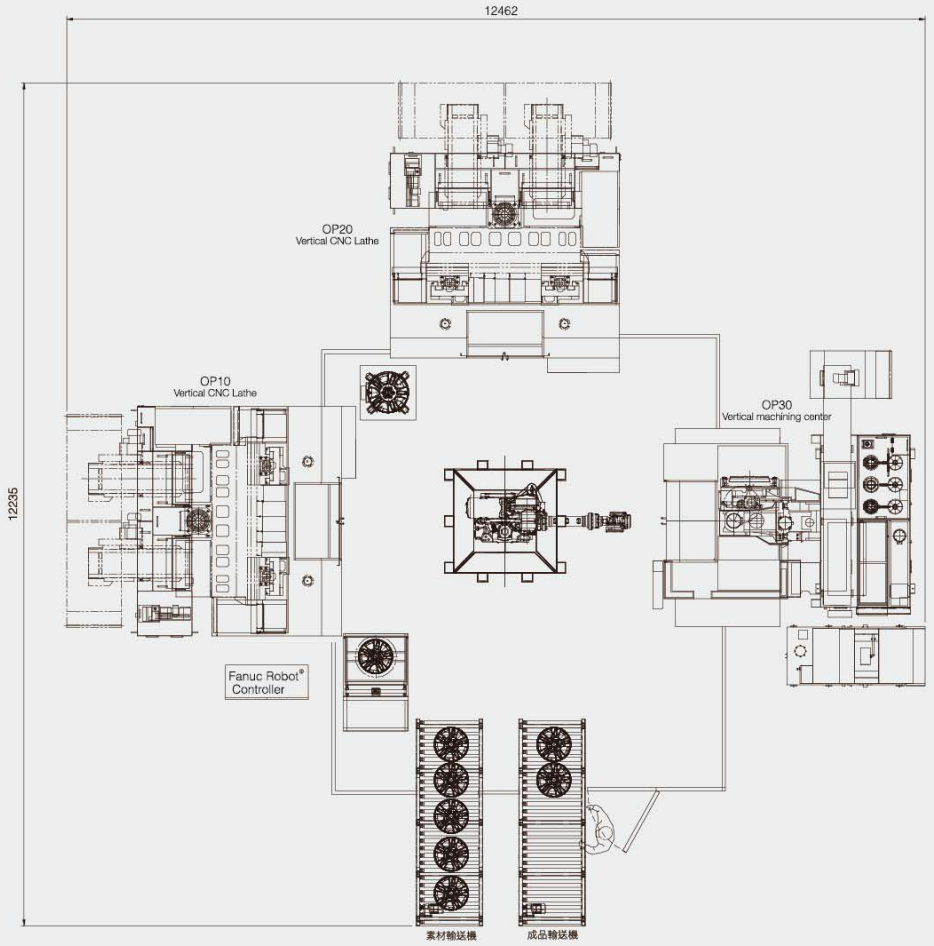
Large multi-axis robot is suitable for the automation among the various medium to large machines; for example, the connection between the vertical/horizontal CNC lathes and the vertical/horizontal machining centers. Tongtai can design a complete logistics and information management system according to the customer's requirements. The logistics includes the supply system, machining facilities, inspection station, cleaning station, etc. The information flow includes the production operation management (such as the workpiece, jig/fixture, tools, programing, etc.), production information management and production schedule management.



1. OP-10 TVW-22DT
2. OP-20 TVW-22DT
3. OP-30 TMV-1050W
4. Robot Controller
5. Multi-Joints Robot
6. Material Conveyor
7. Finishing Workpiece Conveyor
8. Workpiece Turnover Station
9. Clean Station



Machine Layout



Unit : mm

Flexible Manufacturing System

FMS (Flexible Manufacturing System) is the rational production system with flexibility and variety, including machines, automatic moving system and software function, to meet the production type of small-volume but large variety. The more detailed units include the machining unit, storage unit, moving unit, auxiliary unit and control unit. The first 4 items are hardware equipment; the function of control unit is to integrate the hardware equipment and coordinate the parts flow and information flow among all units in order to keep the rationality and flexibility.

1 Container

It allows temporary storage of machined parts and finished goods. The basic storage capacity is 10 sets and possible to expand to 20 sets maximum.

2 Stacker Crane

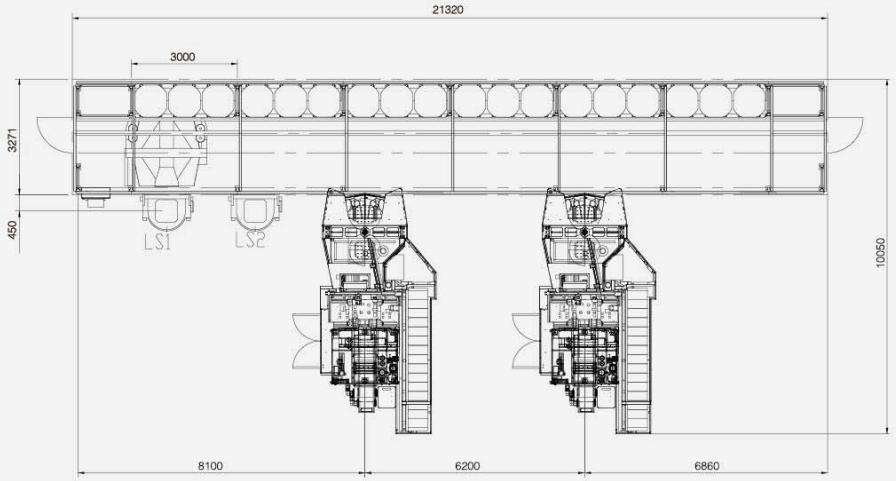
- Intelligent Scheduling :
  Four different workflow strategies to create the priority Vdecision: first-in/first-out, optimal path decision, machining intelligent decision and manual priority adjustment.
- Flexible Material Scheduling Control :
  Operator can control the material input, adjust the priority and inquire the material history.
- The production can continue under connection when one single machine is down.

3 Loading/unloading station

4 Manufacturing Management System, MMS

Item		Specification
Parts Storage System	Elevator Quantity	1
	Elevator Max. Loading Capacity (kg)	1000
	Quantity of Material Storage Area	1 (2)
	Quantity of Working Table Storage	10 (20)
	Quantity of Material Storage Loading/Unloading	1 (2)
	Min. Machining Time Limitation (min)	4.5 (10)
MMS	CC1 Control System	1
	MMS-5000 (Machine Status Monitor)	Option
	MMS-5100 (Remote Monitor Service)	Option
Quantity of Equipped Machines		1 (2)

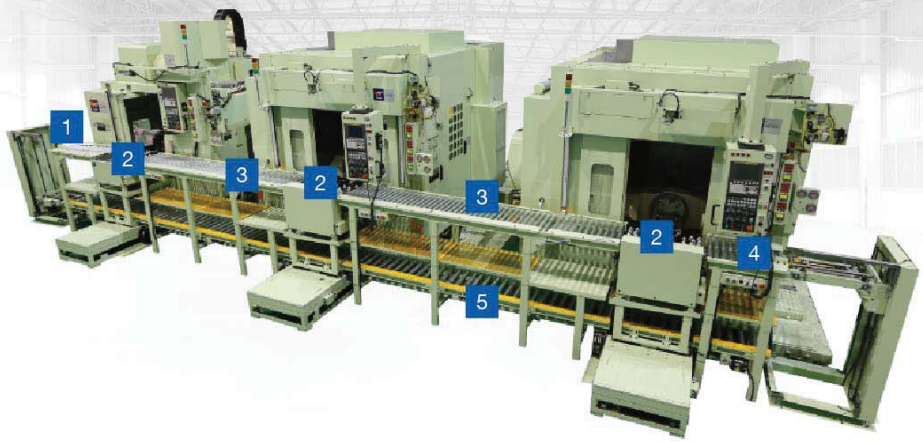
Machine Layout



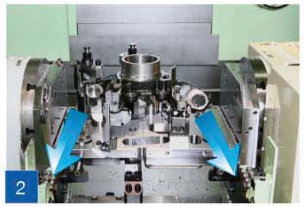
Unit : mm

Simple Semi-Automatic Parts Flow System

To meet the demand of semi-automatic production line, this system is able to provide the benefit of manpower-saving, time-saving and safety. The example below is for semi-automatic parts process of steering knuckle production line.



Manual Loaning/Unloading Station



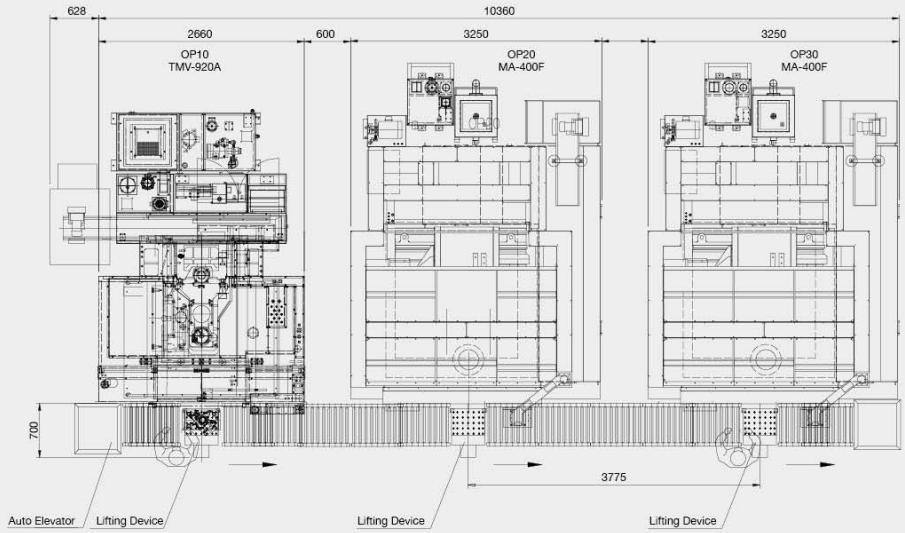
Automatic Loading/Unloading

Manual Parts Feeder

Manual Jig/Fixture Disassembly

Jig/Fixture Auto Return to Manual Loading/Unloading Station

Machine Layout



Unit : mm

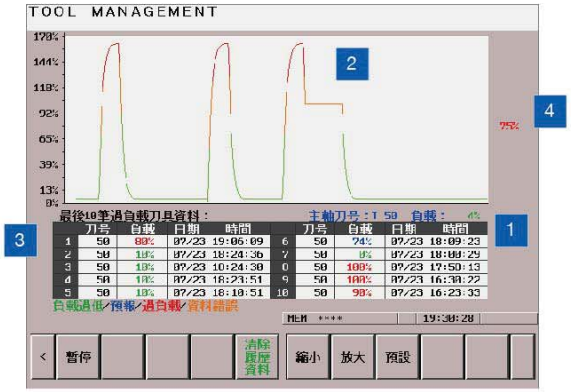
Automatic peripheral equipment

To ensure automatic system running stably and safely, besides automatic moving and machining equipment, Tongtai can provide tool magazine management function, raw material type confirmation, parts measurement station and cleaning station.

Tool Management

- Tool Loading Protection Monitor
- Statistics of Tool Machining Time
- Tool Life Counter
- Tool Offset

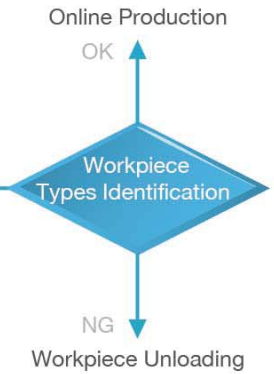
1. Show the current tool number and spindle load
2. Show the relation between spindle load and time
3. Show the recent tool abnormal data
4. Show the tool overload value setting



Display of tool loading

Workpiece Type Identification

Workpiece type identification station is set prior to the automation production line and to avoid the wrong workpiece to be mixed into the production line. Workpiece type identification can be achieved by using the high-resolution camera with software to scan the characteristics of the workpieces.



Online Production

Workpiece Unloading

Workpiece Measuring Station (Auto Measuring)

Auto measuring can work internally or externally. The internal measuring uses the contact type probe on the spindle to measure the workpiece accuracy and the data will be transmitted by infrared to the receiver. The disadvantage of internal measuring is to increase the machining time and the longer production cycle will be resulted. To prevent lowering the production capacity, external measuring station can be installed outside the machine. The external measuring station not only can control the machining accuracy, but also feedback the measuring data to CNC controller for tool offsetting and maintaining the stability of the machining accuracy. Furthermore, the external measuring station can have manual and automatic type.

Workpiece Measuring Station

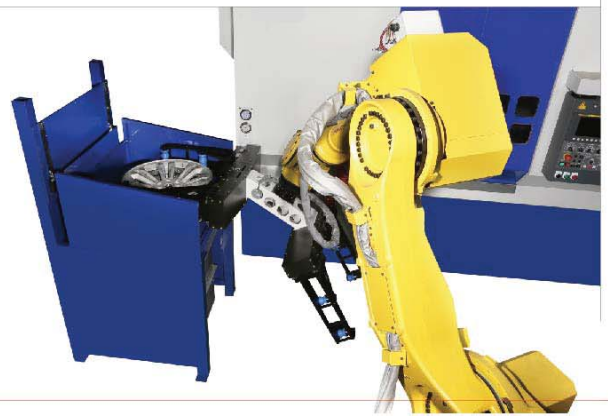
Workpiece Measuring Station (Manual Measuring)

Besides the auto measuring, Tongtai also provides manual measuring as the economic solution. The manual measuring in the automatic production line can be programmed to two different modes “Regular Check” and “Random Check”. Both methods can be processed during operation without stopping the production.

During regular check, the measurement after every fixed machining volume can be programmed. For example, after every 100 workpieces, the robot will take one workpiece to the measuring station for manual measuring. After the manual measuring, the operator moves the workpiece back to the conveyor and presses the “QC Check Done” button, and then the conveyor will send the workpiece to the next machining operation.
During random check, when the operator presses the “QC Check” button, the robot will take the ready workpiece from the last operation to the measuring station for manual measuring. After the manual measuring and the “QC Check Done” button pressed, the conveyor will send the workpiece to the next machining operation.

Clean Station

The cutting chips left on the workpiece surface will affect the positioning and accuracy of the next operation; even leads to the pollution along the workpiece transportation route. The clean station in the automatic production line to remove the cutting chips can ensure the stability of the accuracy and the safety of the operations.



Automatic peripheral equipment

Seal Confirmation

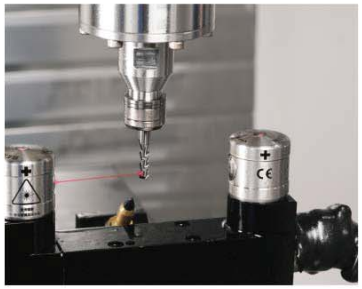
Machining the workpiece not clamped firmly on the jig/fixture will lead to the broken tools, damaged workpieces or injured operators. Seal confirmation is more important for automation to ensure the stable and solid clamping by checking the clamping status of the workpieces on the jig/fixture. After the workpiece is loaded on the jig/fixture by the robot, the system will determine the unsuccessful clamping if no signal of seal confirmation and then the robot will perform the loading again until the seal confirmation is on.

Tool Breakage Detection & External Tool Change

The workpiece, spindle or other components will be damaged in the automatic production when the broken tools can't be found in time. Tongtai can offer various tool breakage detectors according to the customer's budget and requirements; the tool status can be checked regularly during the automatic production.

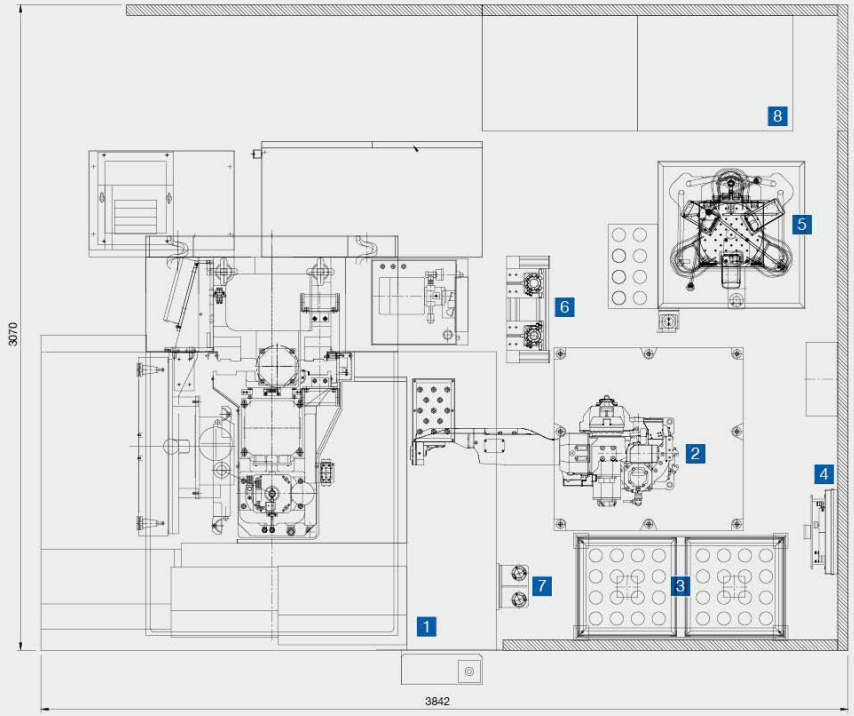
Regarding some tools easier to be broken due to the machining conditions, the spare tools can be prepared in the external tool exchange station. When tool breakage is detected, robot can perform the auto tool change, saving the machine idle time only for manual tool change.

Contact Type Tool Measurement



Laser Type Tool Measurement

Machine Layout



Unit : mm

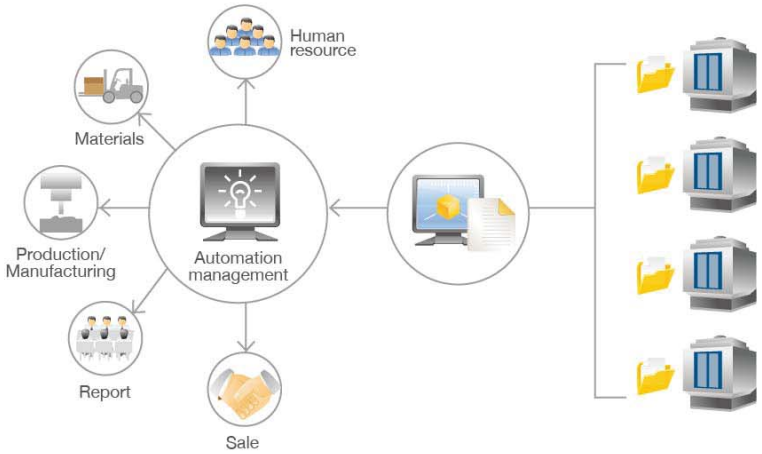
1 TMV-850Q
2 Multi-Joint Robot
3 Workpiece Baskets
4 Workpiece Clapboard
5 Auto Workpiece Measurement
6 Auto Clamping Jaws Exchange Rack
7 Auto Tool Exchange Rack
8 Robot Controller

Integrated Monitoring System

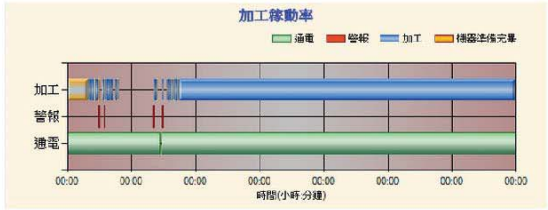
Self-developed TIMS (Tongtai Integrated Monitoring System) is the specialized solution for automation monitoring. TIMS utilizes the connection among the CNC controllers and network transmission to collect and integrate the data from multiple machines. The integrated data can be viewed and tracked directly by the web browser.

From the beginning of production, the machine status and the operation history will be synchronized to the database; no need to download from each machine. The machine status can show “In Machining”, “Wait for Workpiece” or “Alarm”. Any records of change on each machine can be tracked to prevent the defective workpieces. Therefore, the production time and material cost can be lowered.

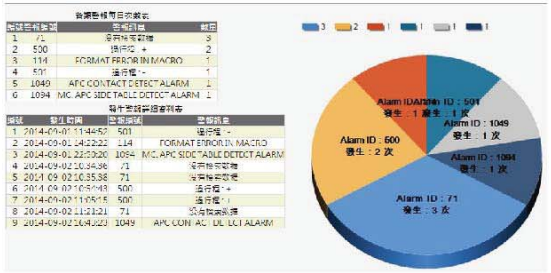
Machine Status



TIMS utilizes the operation history to calculate the machine availability, performance and alarm times. Overall machine availability can be improved by analyzing the machines with lower availability. The performance can be enhanced after comparing the operation history. The record of alarm times is the essential message to show the priority of improvement.



Machine Availability Display



Alarm Times Display

TIMS also provides the optional MACRO variable function to record the data of workpiece measurement. The customer can upload the required information into the MACRO variable which will be saved into the database by TIMS then.

Besides monitoring and downloading data from the machine, it’s very convenient for the customer to analyze the data because the operation history and alarm history can be viewed by the web browser, printed out or export to the Excel format. Furthermore, the transmission of the machining programs can be more efficient because TIMS offers the upload/download and preview of the NC programs.

資料名稱	程式編號	Macro編號	數據
C1_X+方向校正數據	O9101	#550	17.200
C1_X-方向校正數據	O9101	#551	74.272
C1_Z+方向校正數據	O9101	#552	39.904
C1_Z-方向校正數據	O9101	#553	91.296
C2_X+方向校正數據	O9101	#554	50.896
C2_X-方向校正數據	O9101	#555	262.592
C2_Z+方向校正數據	O9101	#556	154.640
C2_Z-方向校正數據	O9101	#557	24.320
C3_X+方向校正數據	O9101	#558	195.744
C3_X-方向校正數據	O9101	#559	70.416
C3_Z+方向校正數據	O9101	#560	68.528
C3_Z-方向校正數據	O9101	#561	128.640
C1_X方向測值	O9102	#562	80.688
C1_測值#562與定義值誤差量	O9102	#563	65.280
C2_X方向測值	O9102	#564	113.504
C2_測值#564與定義值誤差量	O9102	#565	382.224
C3_X方向測值	O9102	#566	403.872
C3_測值#566與定義值誤差量	O9102	#567	23.488
C1_Z方向測值	O9104	#568	101.904
C1_測值#568與定義值誤差量	O9104	#569	158.496
C2_Z方向測值	O9104	#570	101.776
C2_測值#570與定義值誤差量	O9104	#571	101.744
C3_Z方向測值	O9104	#572	87.536
C3_測值#572與定義值誤差量	O9104	#573	40.464
C1-S1_X方向測值(內徑)	O9106	#574	46.016

MACRO Variable Option