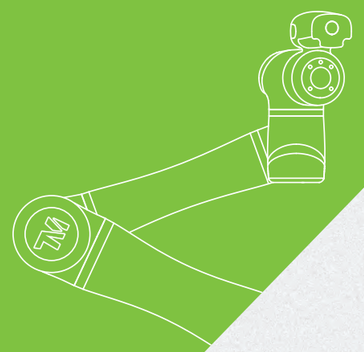

TECHMAN ROBOT

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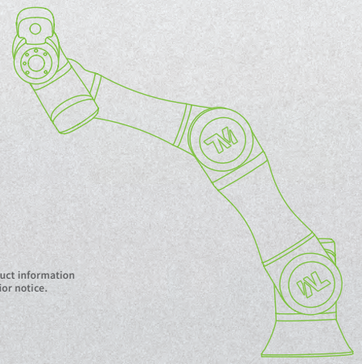
Techman Robot



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TM ROBOT

CLOSING THE GAP™

- Solve Technical Challenges
- Overcome Integrating Difficulties
- Realizing Smart Factory

About Us

Hi! We're Techman Robot.

We are a leading collaborative robot and vision technologies company, dedicated to improving the world of work for businesses and their people through robotic technology applications.

We truly believe the right robotic technology applications can make a world of difference to performance, efficiency and productivity, even creating a lasting positive impact on whole industries. We think that every business should have access to beneficial technology to advance their position.

Therefore, we are determined to use our technological knowledge and skills to create all things smart and simple, to break boundaries, solve challenges, and meet industries' needs.

At Techman Robot, we close the gap for every business.

Our Profile

Established in 2016, **Techman Robot** is the only collaborative robot manufacturer based in Taiwan. We offer collaborative robots with embedded visual systems, software and application-based solutions to the market, through our more than 100 distributors around the globe.

Our company's HQ and streamlined production process are based locally, inside the Hwa Ya Technology Park of Northern Taiwan, covering product research, development, production and manufacturing functions.
We benefit from the global resources of our parent company, Quanta Computer, the world's largest notebook manufacturer. With strict manufacturing and quality control standards in our factories that are verified by ISO9001, ISO14001, ISO10218-1 and ISO/TS15066, Techman Robot is known for delivering excellent products, bearing the reputation of 'Made in Taiwan equals the best quality'.

In just three years after launching the first TM5 robot, we became the world's second-largest collaborative robot brand. We have been rapidly expanding into the international market ever since. Due to the high demand, we expanded our factory in early 2019, increasing our capacity of production and ensuring exceptional production quality. We have also established branches in Shanghai, China, and multiple overseas sales offices located in Changshu, Shenzhen, Chongqing of China, Busan of Korea and Alblasserdam of Netherland, offering our global customers localized service to support their smart manufacturing and automation ventures.

Techman Robot has obtained many patents in Taiwan, the United States, and China, with dozens more currently under review. Our industry-leading collaborative robots have also earned recognition from prestigious awards bodies including the iF Product Design Award, Red Dot Award, Golden Pin Design Award, COMPUTEX d&i Award, and Taiwan Excellence Awards.

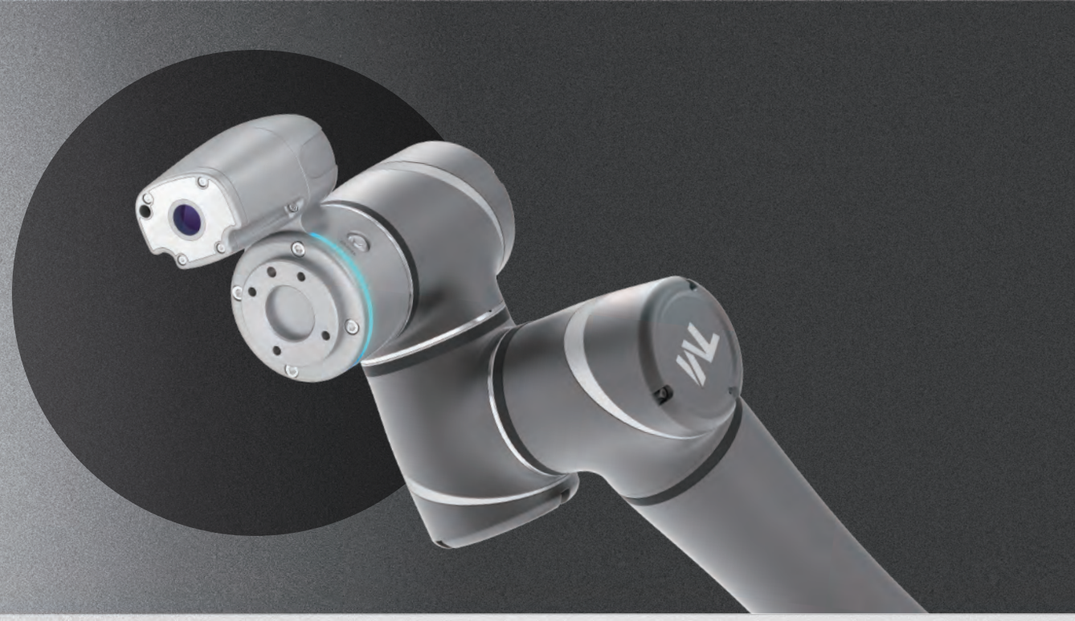
reddot award product design · iF DESIGN AWARD 2018 · GOLDEN PIN DESIGN AWARD · TAIWAN EXCELLENCE · COMPUTEX d&i gold award 2017

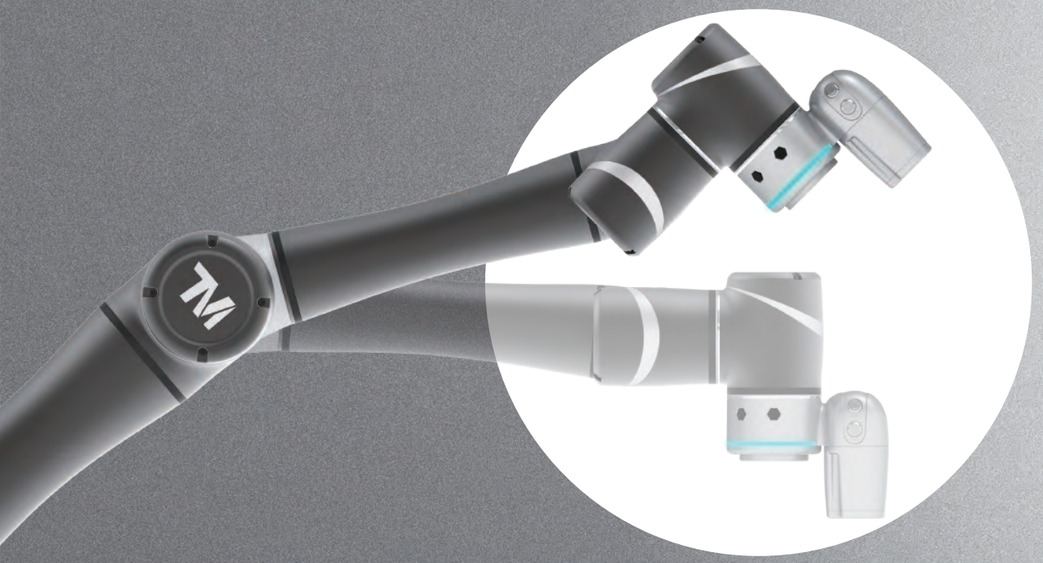
SMART

Built-in vision system
TM Robot is equipped with a built-in vision system, which integrates into both the hardware and software perfectly, whereas traditional add-on vision solutions to robotics are complicated, time consuming and costly to implement.

Masters in robot vision
Many robot vision functions are already built into our system: pattern matching, object localisation, image enhancement, bar code reading, colour recognition, etc. All these functions have been integrated into our remarkably easy-to-use user interface.

5 Minutes to achieve a visual pick & place task
Combining our smart vision system and our hand-guiding functions, everyone, even those without robotic programming experience, can achieve a visual pick & place task within 5 minutes.





SIMPLE

Revolutionary user interface
No more coding! You can implement your TM Robot using our revolutionary simple-to-use interface, an all-graphic flow chart based HMI. Users, even those without coding experience with industrial robots, can learn to use TM Robot easily and quickly. You can program every built-in vision function on the GUI. Furthermore, the traditional heavy umbilical wired pendant is gone. Our user interface can be operated on PCs, notebooks or tablets.

Hand-guide functionality
Another reason TM Robot is more simple to program than the other modern robots is our well designed hand-guiding functions with servo assist. You can lock selected axes to allow adjustment in defined planes and then fine tune the co-ordinates with easy editing of those co-ordinates within the programming package.

Easy to deploy
Because TM Robot is so simple to program, it is very easily deployed into different applications, reducing your time-to-production and saving your total cost in automation.

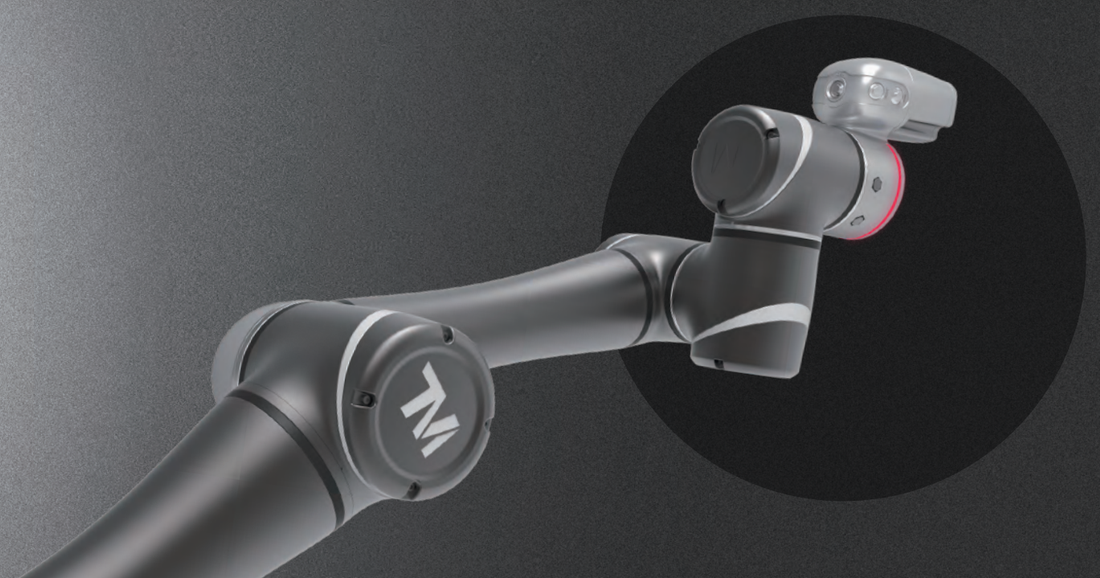
SAFE

Force limiting
TM Robot complies with the ISO 10218-1:2011 & ISO/TS 15066:2016 human-robot co-operation safety requirements for collaborative robots, allowing the robot to be programmed with both speed and force limits.

Safety is our priority
TM Robot is serious about safety in every aspect of the design of the whole robot system, through hardware, software and operational design.

Ergonomic design
TM Robots are physically designed to be safe to their surroundings, soft end caps and no sharp edges are all part of the collaborative experience.

ISO 10218-1:2011 **ISO/TS 15066:2016** CE



CLOSING THE GAP™

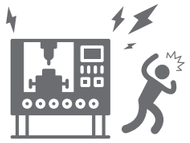
Techman Robot is aware of the gaps existing in the world of industrial automation. We developed the smart, visual-embedded cobot and a series of software to help enterprises overcome the difficulties, CLOSING THE GAP™ between human-machine and machine-machine, to seize the bright future of Industrial Automation 4.0!

Human-Machine gap caused by safety concerns

- Techman Robot

Human-machine cooperation

- Traditional Robot



Human-machine separation

Human-Machine gap caused by deploying difficultie

- Techman Robot

Intuitive and graphical compiling process

- Traditional Robot

Complicated coding process

Human-Machine gap caused by maintenance difficulties

- Techman Robot

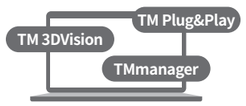
Low maintenance costs

- Traditional Robot

High maintenance costs

Machine-Machine gap caused by system integration difficulties

- Techman Robot



Provide series of SW&HW integrated solution

- Traditional Robot

Required large efforts and cost to integrate different equipment

Techman Robot Automation Solution

Significant Costs Reduction

Time Saving

- Built-in smart vision system can be directly customized for visual detection, recognition, and positioning applications without spending time on vision system integration.
- Peripheral products supplied by TM Plug&Play™ partners allow rapid implementation of automated applications that greatly reduces integration time.

Lower Integration and Equipment Costs

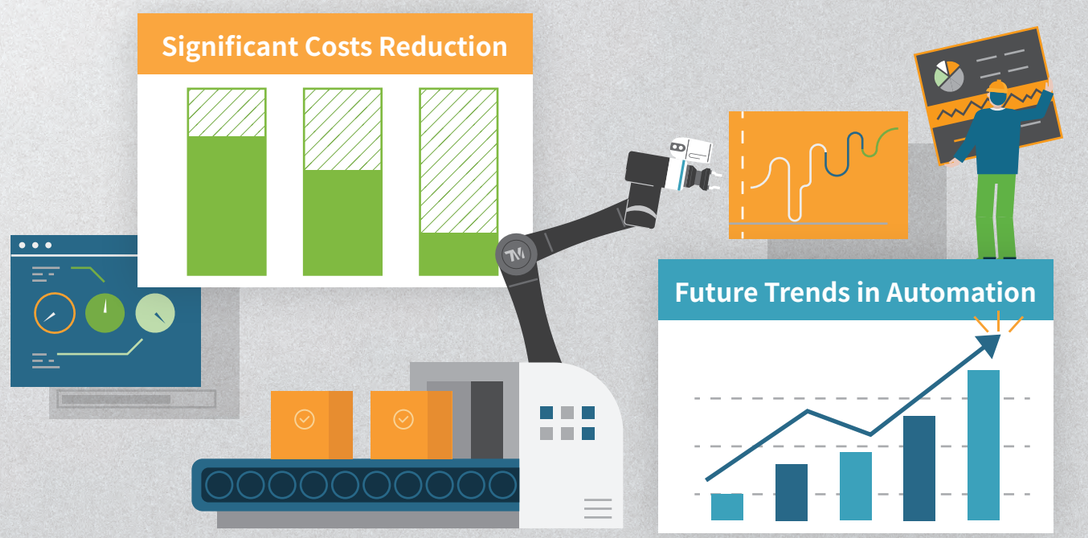
- The built-in smart vision system accelerates production processes so there is no need to spend extra money on integrating a third party vision system.
- Smart vision can identify the location of objects, eliminating the cost of expensive jigs. This will benefit the current trend of low-volume and high variety production.

Lower Manpower Costs at Every Stage

- Reduce the number of engineers needed for preliminary integration of machine vision and workstation processes.
- The intuitive user interface of TMflow™ is designed to replace complex program coding, and also allows for manual hand-guide teaching.
- Highly intelligent design lowers the overall complexity of automation and reduces after-sales maintenance manpower.

Fulfill Future Trends

- Built-in smart vision system enables fast and flexible production line reconfiguration to meet the market's demand for low-volume and high variety production.
- TMmanager combined with smart AI decision-making software makes a powerful tool for AI automation. Effective management and analysis of gathered data from robotic arms and factory equipment enables real-time production status monitoring



TM Robot Series

SEMI S2 ISO 10218-1:2011 ISO/TS 15066:2016 CE

The stand-alone cobot solution offers a variety of payload capacities, reach radius, and a mobile series for automated guided vehicle that can satisfy the needs of different types of industry.
Our collaborative robots solutions are designed smart and simple to provide the optimal performance businesses needs, allowing them to be operated with ease, minimizing the efforts of business and accelerating deployment.

TM Robot Series is also available in the SEMI S2 certified version, suitable for semiconductor industry and is also the best choice for automated guided vehicle applications.

- Reach: **700 mm**
- Payload: 6 kg

- Reach: **900 mm**
- Payload: 4 kg

- Reach: 1300 mm
- Payload: **12 kg**

- Reach: 1100 mm
- Payload: **14 kg**

TM5-700 / TM5-900 Regular Payload Series

▪ The hand, eye, and brain have traditionally been separate systems for traditional industry robots. TM5 has integrated all three into one robot. The built-in vision system allows the robot to identify different objects, carry out self-calibration, and perform visual tasks. The innovative and intuitive user interface and hand-guide teaching mode makes cobots operations as easy as using a mobile phone for operators.

TM12 / TM14 Medium-Heavy Pay load Series

▪ Our payload capacity exceeds that of other collaborative robots with the same reach on the market. The cobot can move heavy objects weighing up to 12kg (TM12) and 14kg (TM14). The work area of the robot is also expanded due to the long reach radius of the TM12 (1300mm) and TM14 (1100mm).
The ease of use allows for high flexibility and rapid re-configuration of production lines. Reducing the deployment and maintenance costs for automation, greatly increases return on investment and production quality for all industries.

TM5M / TM12M / TM14M Mobile Series

▪ TM Robot's mobile series can be powered by DC power. The integrated DC power circuitry is compatible with all AGR/MR brands, making it the best combined solution for cobots and AGV machine. The TM Landmark function of the vision system makes accurate positioning easy in 3D, and is suitable to use with mobile palletizing and machine tending applications.

Industry Application

Pick & Place

TM Robot can independently complete pick & place applications with the aid of our built-in smart vision system. Its high flexibility in deployment schedule helps you improve your productivity across the factory.

Pick & Place

Assembly

The exclusive TM Landmark technology uses smart vision to accurately locate and assemble parts. It can also be used with TM Plug & Play™ force control sensors to help assemble more sophisticated parts and components.

Assembly

Smart Palletizing

The smart vision system can accurately identify and automatically correct the location of objects and pallets. The innovative TMflow™ also provides users to do quick program editing.

Smart Palletizing

Quality Inspection

TM Robot's smart vision system can used with the optional TMvision™ function to carry out automated optical inspection, for monitoring product quality, and reduce the risk of human errors.

Quality Inspection

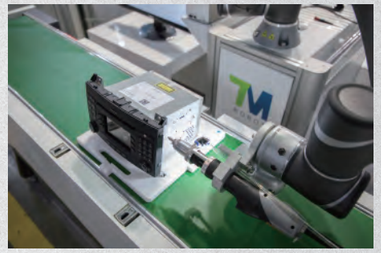
Glue Dispensing

TM Robot is a cobot that supports rapid production line re-configurations, which is especially suitable for manufacturing low-volume but high-variety production. Third-party software can also be implemented to allow gluing on curved surfaces.

Glue Dispensing

Screw Driving

The built-in vision system can accurately locate every screw position, and can also be combined with force sensors to ensure the assembly of every screw and component during the production process.



Screw Driving

Polishing & Deburring

The force sensors from TM Plug & Play™ partners can be used to control the polishing process, with third-party programming software, it can also be used operate polishing and deburring of complex curved surfaces.

Polishing & Deburring

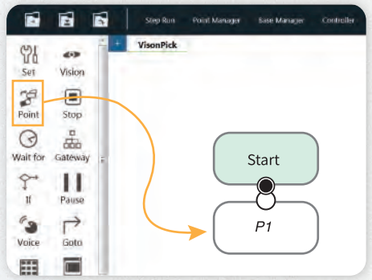
Machine Tending

It is easy to teach the robot to preform visual tasks, and you can also quickly integrate robots to the material production machine. It can complete the material loading and unloading application quickly, and also have high flexibility to deploy incoming materials.

Machine Tending

TMflow™

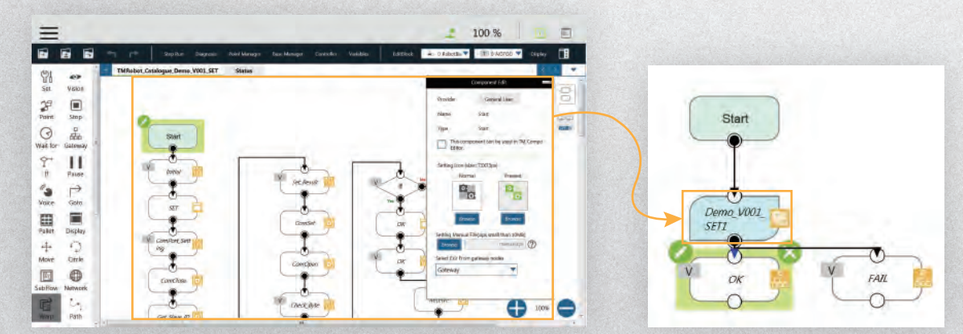
Developed by Techman Robot, TMflow™ is our innovative flow-based robot editing software. Each function is shown as a different image and features intuitive click and drag methods. Users without coding experience of industrial robots can complete a visual pick & place program in as little as 5 minutes.



- All-graphic procedure flow
- Simply click and drag image to easily complete robot program editing

TM Component Editor™

TM Component Editor™ provides developers with components compiled by TMflow™ projects as independent nodes for users to compose with other projects easily or for applications in parallel developments with simplified data density.



NODE

Provide a variety of nodes, allowing users to quickly and easily task programming.

Circle
Command
Compliance
Display
F-Point
Force Control
Gateway
Goto
If
Listen
Log
Move
Network
New Base
Pallet
Path
Pause
Point
Set
Smart Insert
Stop
SubFlow
Touch Stop
Vision
Voice
Wait for
Warp
M-Decision
Collision Check
CVPoint
CVCircle
CVNewObj

TMvision™

TMvision™ is a software built-in feature of TM Robot. The software comes in two functions: Standard and Licensed. The Standard function supports most robot applications, while the Licensed function consists of separate modules that may be purchased as needed.

TMvision™ comes with such functions as feature identification, object location, enhance mode, barcode identification and color classifier. These diversified functions have been integrated into TMflow™'s robot control system for you to set up the robot tasks by defining setup steps.

Standard module

Item detection module (Find)

- Template Matching (shape-based pattern matching): use the item's shape characteristics to find its location on the image.
- Position Alignment (fiducial-mark matching): use two points on the target for positioning
- Anchor Point: Change home coordinates of object detection by manually adjusting the anchor point.
- Template Matching (image-based pattern matching): use the item's pixel value distribution to find its location on the image.
- Irregular Item Detection (blob finder): use the item and background color difference to find the foreground item.
- External Detection Module: Use external image processing system to perform object detection and send back the result

Image enhancement module (Enhance)

- Contrast enhancement is used to adjust image contrast
- Image thresholding converts the image into black and white
- Image smoothing
- Morphology can turn lines thicker or thinner, patch holes, or break apart lines
- Color plane extraction can extract specific color planes such as red, blue, green, or saturation
- Image flipping

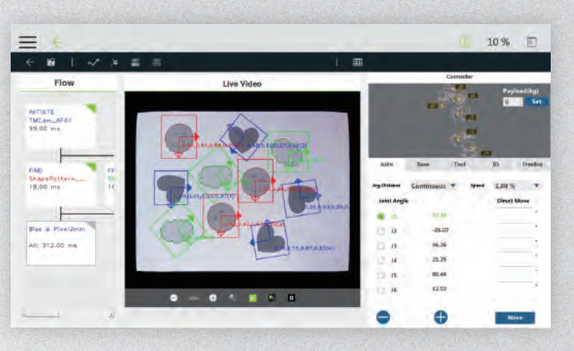
Image Identify Module (Identify)

- Read the barcode, the 2D DataMatrix, or the QR code.
- Color classifier
- String Match
- External Classification: Use external image processing system to perform classification and send back the result

Built in vision system

Vision Node UI

TMflow™s vision node UI was designed to be simple, process-oriented and easy-to-use. Users only need to stack up the process step by step and adjust the parameters or settings in each step, users may preview the outcome in the center of the UI, then the task is ready to be deployed!

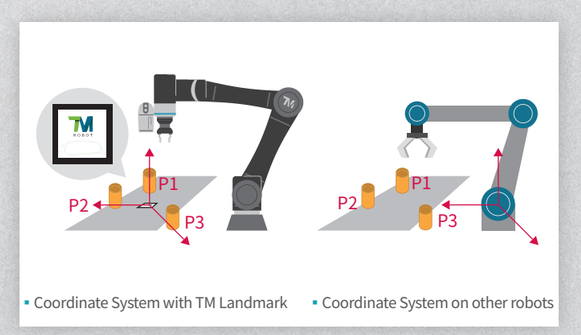


Visual Calibration

TM Calibration board can largely reduce the complexity of visual calibration process. Whether users are using EIH, ETH or Upward-looking camera, just simply place the calibration board under the camera, press the button and our vision software will do all the work!

TM Landmark

General robot has the coordinate system built on its base, when the relative position between the objects and the robot changes, the robot require re-adjustment.
With TM Landmark, the coordinate system is built on the landmark, the robot will only need to scan the landmark and the coordinate info can be updated without re-adjustment. This is especially recommended to robot with AGV!



▪ Coordinate System with TM Landmark ▪ Coordinate System on other robots

TMvision™

Software License

TM OCR

OCR

Number OCR

TM Identify& Measure Module

Pose Variation (Shape)

Pose Variation (Image)

Specific Color Area Size

Subtract Reference Image

Line Burr

Circle Burr

Count (Irregular Object)

Count (Shape)

Count (Image)

Edge Count

Distance and Angle Measurement

3DVision Module

Geometry (Compare with geometric shape to find the object)

CAD (Compare with pre-defined CAD to find the object)

Points Pose (Observe point pose to find the object)

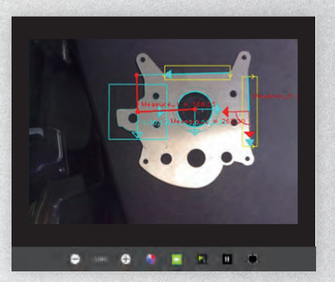
AI Module

AI+ Classification

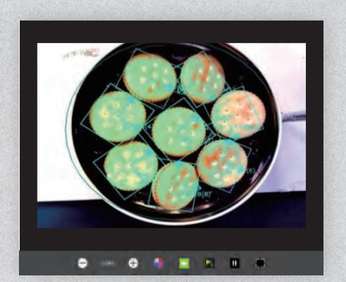
AI+ Detection

Built in vision system

Counting and Gauge

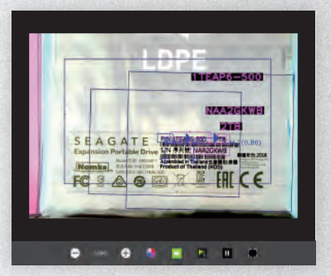


▪ Gauge: Pixel Distance or Angle

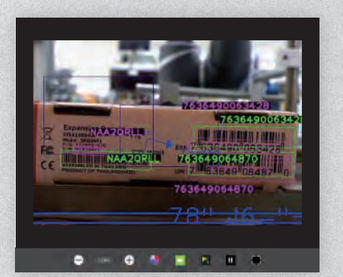


▪ Counting (Blob)

TM OCR



▪ Identifying S/N



▪ Identifying barcode

3DVision

▪ T-pipe

▪ T-Pipe Point Cloud

AI Module

▪ AI+ Classification
Classifying good bottles from NG ones by observing the center posititon

▪ AI+ Detection
Detecting the affection on the flange surface

TM 3DVision™ Solution

TM 3DVision™ solution includes an external 3D camera, that will enhance the flexibility of the visual function.

When a visual task is involved with height/depth changing, or the working object contains various shape and pose, 2D vision solution will not be able to identify the object correctly.
TM 3DVision™ solution can overcome this disadvantage.

TM 3DVision™ Solution Concept

TM 3DVision™ can be easily operate by only using TMflow™. The task editing process is basically the same as the process for 2D vision, except for the additional object modeling Stage. User can follow the detailed instructions in the UI to complete the editing easily.

Calibration

Modeling

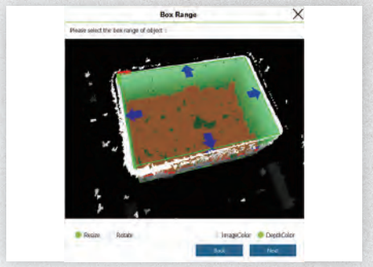
Task Editing

- **An All-around visual system solution**

Product Feature

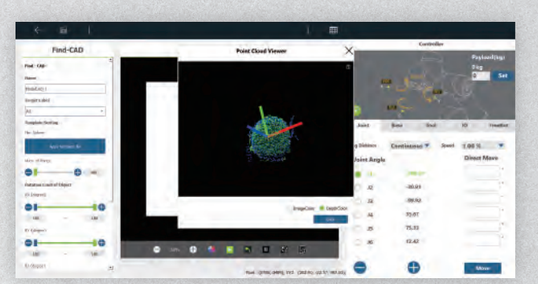
- Integrated with TMflow™, no additional software to install or learn.
- User can either use 3D camera-generated object model or predefined CAD for modeling
- Support using geometric shapes, CAD models or point pose to defined the pattern and identify the object. Can further use with AI function to perform object clustering
- Collision check function preventing the robot arm to collide with surrounding objects while moving or picking up/placing objects

Function interface



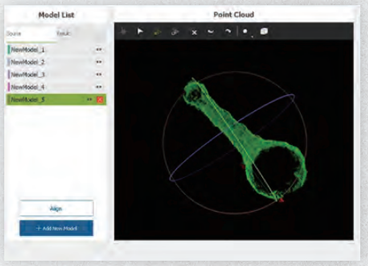
- **Setting ROI**

Select a region of interest (ROI) within the working area



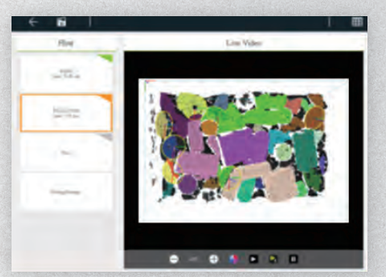
- **Find**

Using geometry shapes (EX: box, sphere),CAD model or point pose as reference pattern to find the object



- **Modeling**

Use the 3D camera to perform modeling
Or use pre-defined CAD models



- **Clustering**

Use certain algorithm to separate the objects into several smaller groups. This will reduce the calculating efforts and speed up the process

Application Video

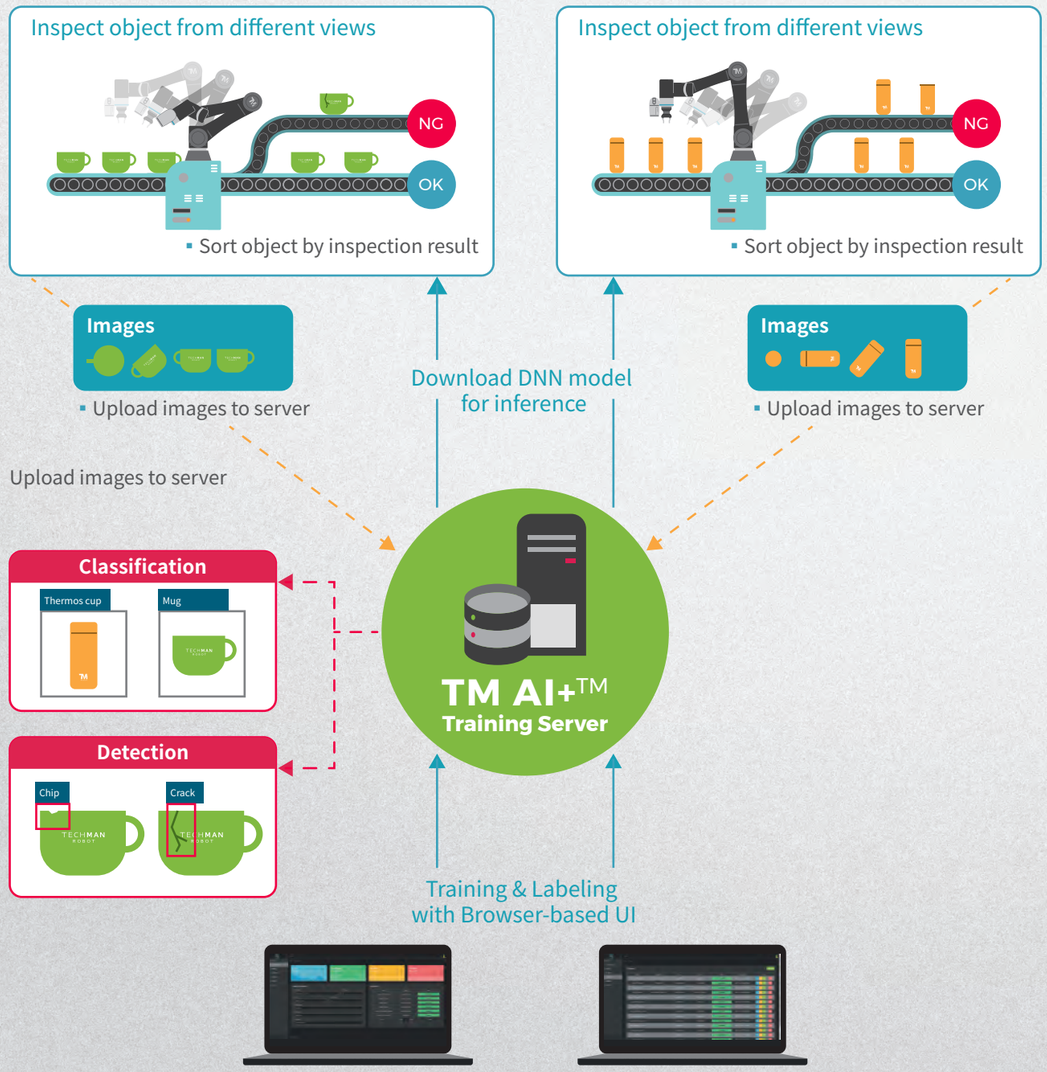
- Please visit Techman Robot official website for more information about the comparing 3D camera of TM 3DVision™ solution.

TM AI+™ Solution

TM AI+™ is a solution which integrate the visual function of the cobot and an AI model training software. It enable the cobot to accumulate experiences during tasks and build a model for making decisions or judgment.

This solution can be widely used in many scenarios, especially when it comes to object classification or quality inspection.

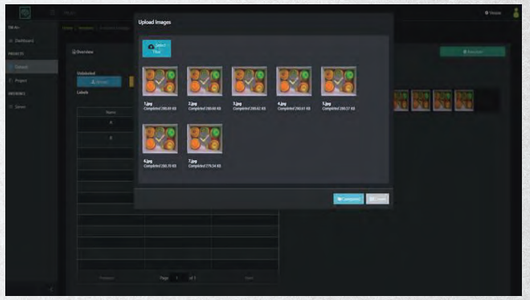
TM AI+™ Solution Concept



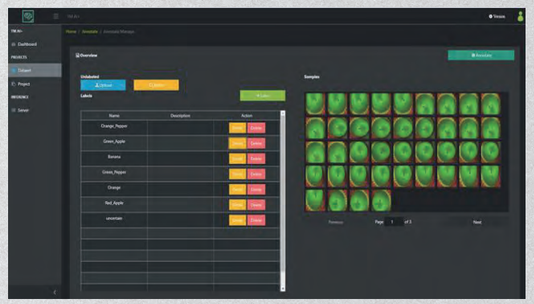
Product Feature

- A browser-based software interface that allows multiple users to access at the same time
- With TM Robot's build-in vision, the robot can directly upload image data to TM AI+™ Training Server. AI models that are finished training can be deployed to the robot
- All data are saved in local server instead of cloud, avoiding the risk of data leakage

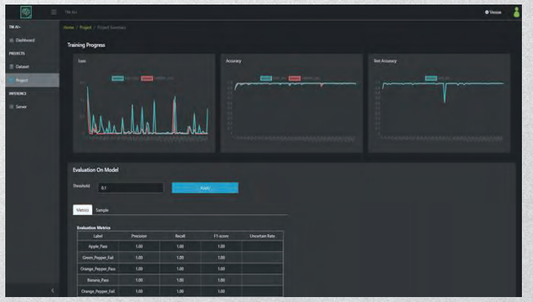
Software Interface



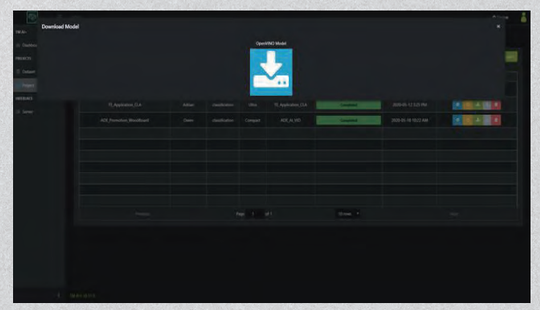
- The image data can be uploaded via build-in vision directly or by users manually



- Label the data into different categories. Training Server will refer to the data labels when training



- Training server software can generate various chart and provide a simulation function to help user evaluate if the training result are acceptable



- Models that are finished training can be downloaded and deployed to the robot

Case Study

Greater Assembly Output and Efficiency in the Electronics Industry

Techman Electronics' Thailand factory specializes in the processing, assembly, and production of hard disk drives. There are two U-shaped production lines for gluing, and eighteen production lines for system assembly, which all require large amounts of manpower for assembly operations. The biggest challenge they faced is to improve assembly and production efficiency. Highly automated factory management is also essential to meet the requirements of low-volume and high-variety production.

Hsing-Min Lin, the Factory Manager at Techman Electronics, said: “TM Robot with integrated smart vision can be used for fully automated optical inspections. In addition to massive savings on peripheral jigs, they also saved the time and manpower that would have been spent on integration, while ensuring comprehensive inspection quality. Workstations that can be moved around at any time are also very suitable for low-volume and high-variety products. These were all factors that made the implementation of TM Robot attractive to us.”

- Number of TM Robot used：**30+**
- Implementation Time: **6**months, and **80%** of the costs has already been recouped

Robotic Barista – A New Business Model in the Food & Beverage Industry

Crown Coffee is a café with four local branches based in Singapore. As their business continues to expand, Crown Coffee's founder and CEO, Keith Tan, realized that manpower and finding the right talents have become great challenges. In 2019, Keith decided to introduce TM Robot to overcome these challenges. By implementing robots into his store, he has also created a whole new model for the future food & beverage industry.

Crown Coffee is now operating their cafe with a robotic barista. “We decided to go with the Techman's TM5 robot as our barista. It has a built-in vision function. There are other robots that allow users to integrate external vision system, but with TM5, it definitely saved us a lot of time and cost on integration,” says Keith during the interview. “Another feature is its user interface. It's very graphical and contains a lot of function icons, we can just drag and pull these icons to construct a logical workflow for the robot, very intuitive and easy to use. I've never had robot operating experience before but I was able to pick this up very quickly. These factors are why we choose TM Robot in the beginning.” This also allows Keith and his employees to utilize the freed-up time to communicate more with customers.

Speaking of the benefit of introducing TM Robot into Crown Coffee, Keith mentioned that the robot can easily perform repeated actions, which helps to keep their coffee quality very consistent. The cobot is also capable of working consecutively in a stable condition that solves the issue of higher labor cost and employee turnover rate. So by assigning repetitive task to the robots, humans can now handle more value-added tasks. Robotic technologies are not meant to replace humans, but instead to assist us, and work with humans in a collaborative manner.

Case Study

Smart Vision, Flexibility and Ease of Use for an Efficient Machine Tending Solution

Ergonit, a system integrator specialized in cobotics and partner of the Italian distributor, Sinta, developed the FeedER130, a solution for machine tending applications. A TM12 robot is used on the FeedER130 to load and unload a tool machine without the presence of an operator. A reduced version, the FeedER90, uses a TM5-900 robot for smaller batches.

TruTorq Italia is a manufacturer which produces pneumatic and hydraulic actuators for industrial valves. When the production demand increased, several machines were used at the same time and the operators could not keep up with them.

With FeedER130, the TM12 robot arm is installed on a compact vertical warehouse. It opens and closes the tray drawers, picks the raw part from the tray, guided by the built-in vision system, unloads the worked part and loads the raw part on the tool machine with a dual gripper, and finally places the worked part on the tray. The operator can safely load and unload the trays while the robot is working on the opposite side of the warehouse.

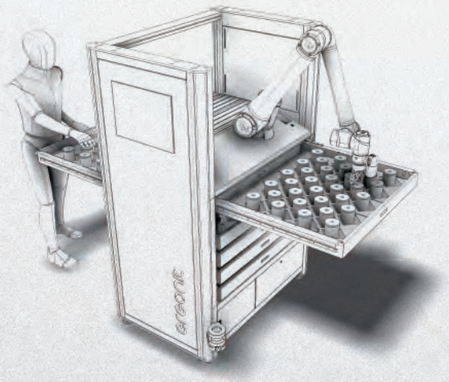
- TM robot model used: **TM12**
- Payback time: **9~12** months
- Reduced production lead time by approximately **90%**

ergonit

www.ergonit.it

SINTA
Soluzioni per la crescita

www.sinta.it



TM Plug&Play™ Solution

With the help of TM Plug&Play™, TM Robots can connect to multiple robotic peripheral products available on the market. TM Plug&Play™ is available as standard allowing users to easily integrate third party peripherals to the robot, considerably reducing time and cost.

Start to use within five minutes

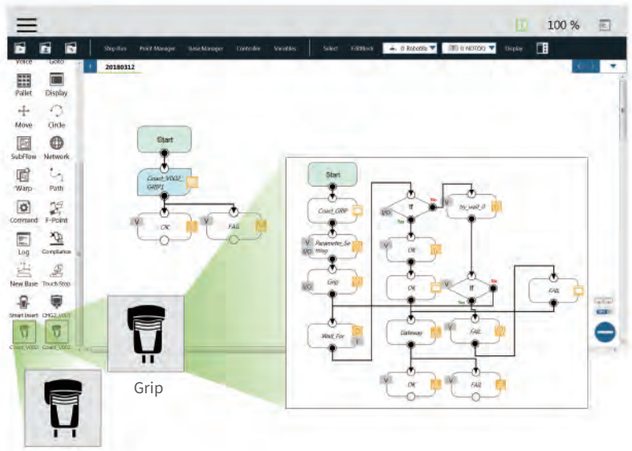
Purchase TM Robot

Purchase TM Plug&Play™ solution

→ Download software package → Apply and test → Editing automation program

Simple, efficient, and fast production line introduction

Software package



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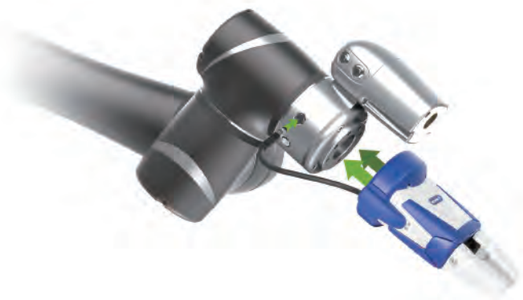
Hardware package



Screw Plug&Play example

TMPlug&Play CERTIFIED

TM certified, perfect integration, and usable upon installation

TM Robot works with peripheral equipment vendors to co-build a comprehensive TM Plug&Play™ eco system. Each certified TM Plug&Play™ product has been calibrated and tested by TM Robot and peripheral equipment vendors. This ensures that users receive the optimal user experience and the most reliable robot operating quality.

HIWIN SEG-24-TM

HIWIN STG-16-TM

HIWIN XEG-64-TM

OnRobot RG2-FT

OnRobot RG6

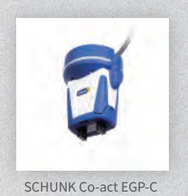
OnRobot VGC10

Robotiq Adaptive Gripper Hand-E TM-KIT

Robotiq Adaptive Gripper 2-Finger 85/140 TM Kit

Robotiq Vacuum Gripper EPick

Schmalz ECBPi TM-KIT


SCHUNK Co-act EGP-C for TECHMAN ROBOT

SCHUNK Gripping System for TM WSG-25

TOYO CHG2-S30-002

Zimmer HRC-03 TM-Kit

ATI 9105-TM-Axia80

AUTOMAPPPS Offline Programming Software for TM

Basler Industrial Camera

IDS Ensenso N35 3D camera

KILEWS Screw Driver Solution

Utrun PRO-Z DK Package Screw System for TM

OnRobot HEX-E / HEX-H

Robotiq FTS-300 TM-KIT

WACOH QRS-W200-K101-KIT

ADLINK EtherCAT I/O Expansion Modules

ADVANTECH Serial Device Server

ADVANTECH Modbus to PROFINET Gateways

Weidmüller u-remote

OnRobot Quick Changer

ROBOTIQ I/O Coupling

ZLÍN ROBOTICS Universal Mobile Stand

igus 3D e-chain TM Kit

Igus® 3D e-chain TM Kit – Velcro® Tape

Murrplastik FHS-C-Set

Murrplastik FHS-RS-Set

NABELL Robot Flex

More Information on www.tm-robot.com

Specification

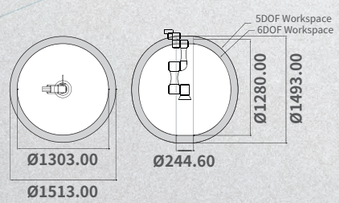
TM5-700 Regular Payload Series
TM5-900

SEMI S2 ISO 10218-1:2011 ISO/TS 15066:2016 CE

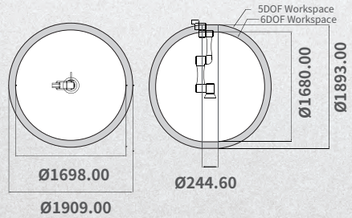
Model		TM5-700	TM5-900	TM5X-700	TM5X-900	TM5M-700	TM5M-900
Weight		22.1kg	22.6kg	21.8kg	22.3kg	22.1kg	22.6kg
Maximum Payload		6kg	4kg	6kg	4kg	6kg	4kg
Reach		700mm	900mm	700mm	900mm	700mm	900mm
Typical Speed		1.1m/s	1.4m/s	1.1m/s	1.4m/s	1.1m/s	1.4m/s
Joint ranges	J1,J6	+/- 270°	+/- 270°	+/- 360°	+/- 360°	+/- 270°	+/- 270°
	J2,J4,J5	+/- 180°	+/- 180°	+/- 360°	+/- 360°	+/- 180°	+/- 180°
	J3	+/- 155°					
Speed	J1,J2,J3	180°/s					
	J4,J5,J6	225°/s					
Repeatability		+/- 0.05 mm					
Degrees of freedom		6 rotating joints					
I/O Ports	Control Box	Digital In: 16 Digital Out: 16 Analog In: 2 Analog Out: 1					
	Tool Conn.	Digital In: 3/4 (by Regional Model) Digital Out: 3/4 (by Regional Model) Analog In: 1 Analog Out: 0					
I/O power supply		24V 1.5A / 2.0A for control box (by Regional Model) 24V 1.5A for tool					
IP classification		IP54 (Robot Arm); IP32 (Control Box)					
Power Consumption		Typical 220 watts					
Temperature		The robot can work in a temperature range of 0-50°C					
Power supply		100-240 VAC, 50-60 Hz				24/48/22-60 VDC (by Reginal Model)	
I/O Interface		3×COM, 1×HDMI, 3×LAN, 4×USB2.0, 2×USB3.0, 1×VGA (by Reginal Model)					
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave), PROFINET (optional)					
Programming Environment		TMflow, flowchart based					
Certification		CE (by Regional Model), SEMI S2 (optional)					
Robot Vision							
Eye in Hand (Built in)		1.2M/5M pixels, color camera		N/A		1.2M/5M pixels, color camera	
Eye to Hand (Optional)		Support Maximum 2 GigE 2D cameras*					

*Refer to the official website of TM Plug&Play for camera models compatible to TM Robot.

Operating Area



TM5-700,TM5M-700



TM5-900,TM5M-900

Specification

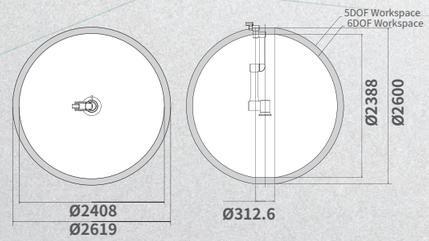
TM12 / TM14 Medium-Heavy Payload Series

SEMI S2 ISO 10218-1:2011 ISO/TS 15066:2016 CE

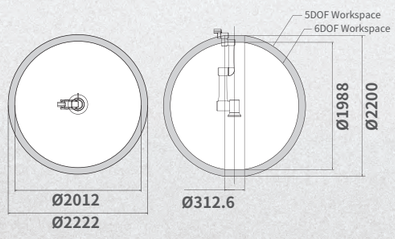
Model		TM14	TM12	TM14X	TM12X	TM14M	TM12M
Weight		32.5kg	32.8kg	32.2kg	32.5kg	32.5kg	32.8kg
Maximum Payload		14kg	12kg	14kg	12kg	14kg	12kg
Reach		1100mm	1300mm	1100mm	1300mm	1100mm	1300mm
Typical Speed		1.1m/s	1.3m/s	1.1m/s	1.3m/s	1.1m/s	1.3m/s
Joint ranges	J1,J6	+/- 270°	+/- 270°	+/- 360°	+/- 360°	+/- 270°	+/- 270°
	J2,J4,J5	+/- 180°	+/- 180°	+/- 360°	+/- 360°	+/- 180°	+/- 180°
	J3	+/- 163°	+/- 166°	+/- 163°	+/- 166°	+/- 163°	+/- 166°
Speed	J1,J2	120°/s					
	J3,J6	180°/s					
	J4,J5	150°/s	180°/s	150°/s	180°/s	150°/s	180°/s
Repeatability		+/- 0.1 mm					
Degrees of freedom		6 rotating joints					
I/O Ports	Control Box	Digital In: 16 Digital Out: 16 Analog In: 2 Analog Out: 1					
	Tool Conn.	Digital In: 4 Digital Out: 4 Analog In: 1 Analog Out: 0					
I/O power supply		24V 2.0A for control box and 24V 1.5A for tool					
IP classification		IP54 (Robot Arm); IP32 (Control Box)					
Power Consumption		Typical 300 watts					
Temperature		The robot can work in a temperature range of 0-50°C					
Power supply		100-240 VAC, 50-60 Hz				22-60 VDC	
I/O Interface		3×COM, 1×HDMI, 3×LAN, 4×USB2.0, 2×USB3.0					
Communication		RS232, Ethernet, Modbus TCP/RTU (master & slave), PROFINET (optional)					
Programming Environment		TMflow, flowchart based					
Certification		CE, SEMI S2 (optional)					
Robot Vision							
Eye in Hand (Built in)		1.2M/5M pixels, color camera		N/A		1.2M/5M pixels, color camera	
Eye to Hand (Optional)		Support Maximum 2 GigE 2D cameras*					

*Refer to the official website of TM Plug&Play for camera models compatible to TM Robot.

Operating Area



TM12,TM12M



TM14,TM14M