# TM ROBOT

# TECHMAN ROBOT

## SMART
## SIMPLE
## SAFE

**Industrial 4.0 enabled**

**Highly flexible deployment and quick job change**

**Low automation and maintenance costs**

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www.tm-robot.com

iF DESIGN AWARD 2018

GOLDEN PIN DESIGN AWARD

TAIWAN EXCELLENCE 2018

COMPUTEX d&i gold award 2017

reddot award product design

# Our Company

Techman Robot entered the world of robotics in 2012 with the aim of revolutionising the market. Our robots combine 4 years' worth of research and development, utilising our 100+ team of experts focused on eliminating the traditional inconveniences often associated with industrial robotics. Guided by Chairman Ho Shi-Chi, we have managed to deliver the world's first collaborative robot with built-in vision as standard.

## Quality, Innovation, and Service

As the world focused on industrial type robots that have been utilised for decades, Techman focused on investing in the development of collaborative robotics. Traditional industrial robots are often costly, require total safe guarding and are notoriously hard to programme and repurpose. utilising our extensive expertise and innovation from design, through to development and production, Techman have produced the number 1 choice in robotics for future industry 4.0 smart factories.

## Our Future

Based on innovative science and technology, through our brand we hope to improve productivity and efficiency across a variety of applications and industries. In response for the global call for industry 4.0, IoT and cloud computing, Techman are invested in continuously creating industry innovations.
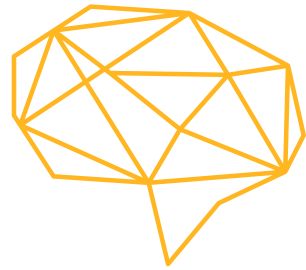
# SMART

## 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 standard 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.
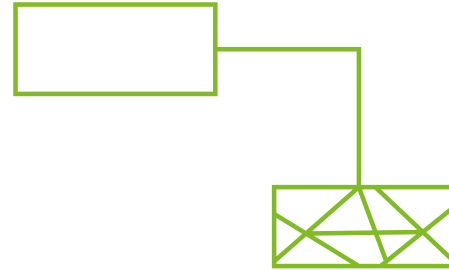
# SIMPLE

## Revolutionary user interface

No more coding! You can implement your automation task with our revolutionary simple-to-use user 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.

## Use your hand

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 & ISO/TS 15066 human-robot co-operation safety requirements for collaborative robots, allowing the robot to be programmed with both speed and force limits.
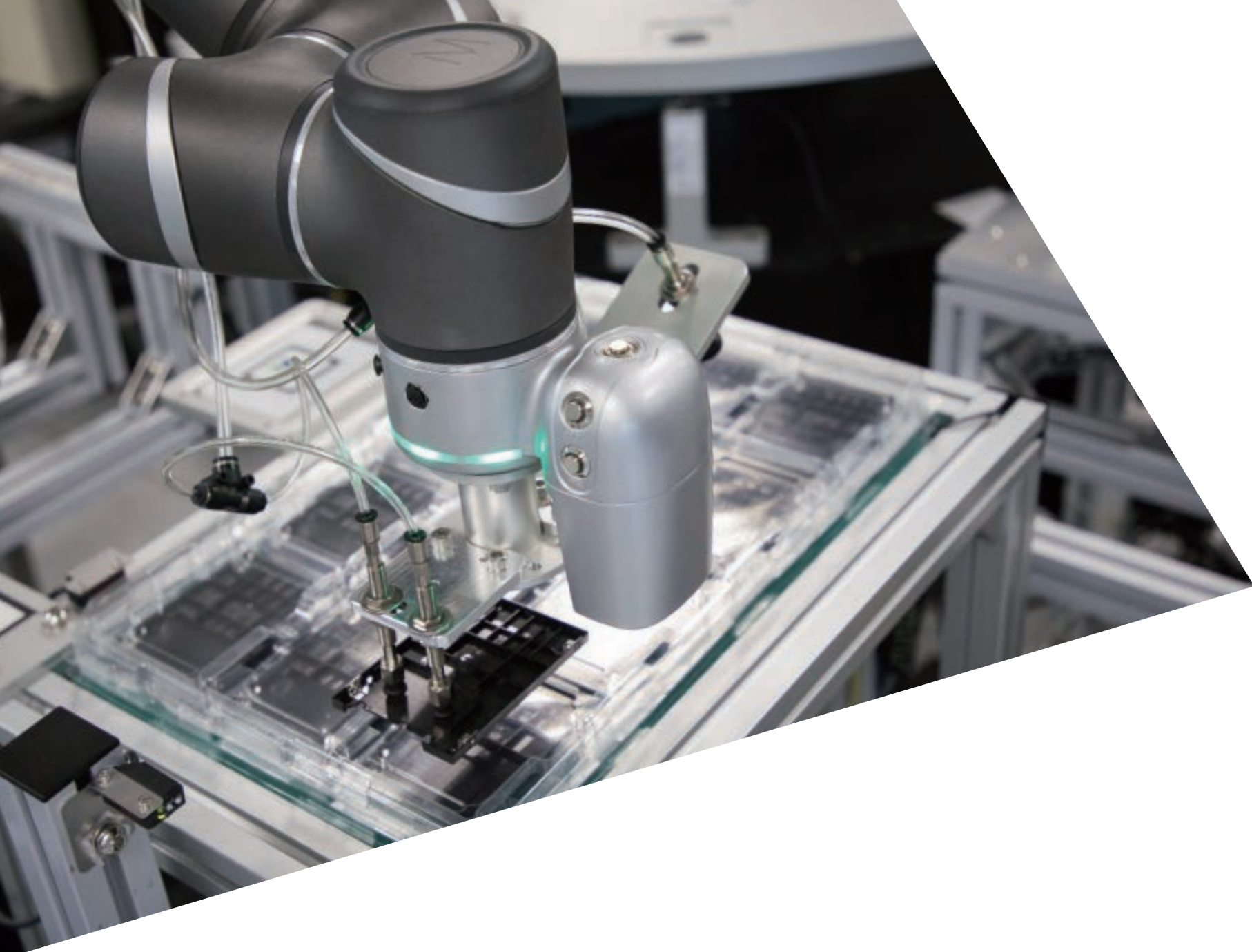
## Safety is our priority

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.

CE   ISO 10218-1   ISO/TS 15066

# TM5

The most intelligent collaborative robot with built-in vision



## The first choice for flexible automation applications

The TM5 collaborative robot features simple programming, innovative integrated vision capabilities together with the latest safety functionality, all leading to rapid deployment in a huge variety of applications. Having vision identification functionality completely integrated within the collaborative robot platform, provides an easy and intuitive way to achieve robot calibration to work piece or tooling, product selection, 1D or 2D barcodes and a host of other vision applications, delivering a true Industry 4.0 solution.

- Achievable range: 700mm, 900mm
- Load capability: 6kg, 4kg

## Industrial application:

- 3C industry
- Automobile industry
- Food industry
- Other

# High Payload Series

## Greater payload capability with increased range
Featuring a payload capability greater than other collaborative robots on the market with a similar arm length, the TM12 and TM14 still remain, simple, smart and safe. These robots are easy to operate and still offer rapid redeployment, reducing your automation and maintenance costs whilst increasing precision and production for various industries.

## Built-in vision system
The TM built-in vision system offers template matching, item positioning, image enhancement, barcode identification and colour categorisation. All these functions have been integrated into our remarkably easy-to-use user interface for simple programming.

# TM14

## The highest load capability in the TM product series
- Achievable range: 1100mm
- Load capability: 14kg

## Industrial application:
- Semiconductor industry
- Panel industry
- CNC industry
- Other

# TM12

## Strong load function + wide work area
- Achievable range: 1300mm
- Load capability: 12kg
- Loading capability is greater than similar arm length collaborative robots on the market

## Industrial application:
- Semiconductor industry
- Panel industry
- CNC industry
- Other

# TM Mobile Series

The ultimate solution for integrating collaborative robots with automation transfer vehicles

## TM5M, TM12M, TM14M

### Highly flexible and compatible thanks to DC.

TM Robot's high performance mobile series utilise an inbuilt vdc supply, making them compatible with most brands of AGV/MR in the market today.

### Built in vision for precision positioning

By utilising the "TM-Landmark", the mobile robot can orientate itself within a 3D space, like an auto datum sequence, to multiple machine surfaces. This allows the TM-M robots to operate between two or more locations seamlessly. This solution is optimal for mobile stacking and machine tending applications.

### SEMI S2 certified（Option）

Now with SEMI S2 certification for the semiconductor wafer industry, making the TM the robot of choice for automation transferring applications between different work stations.
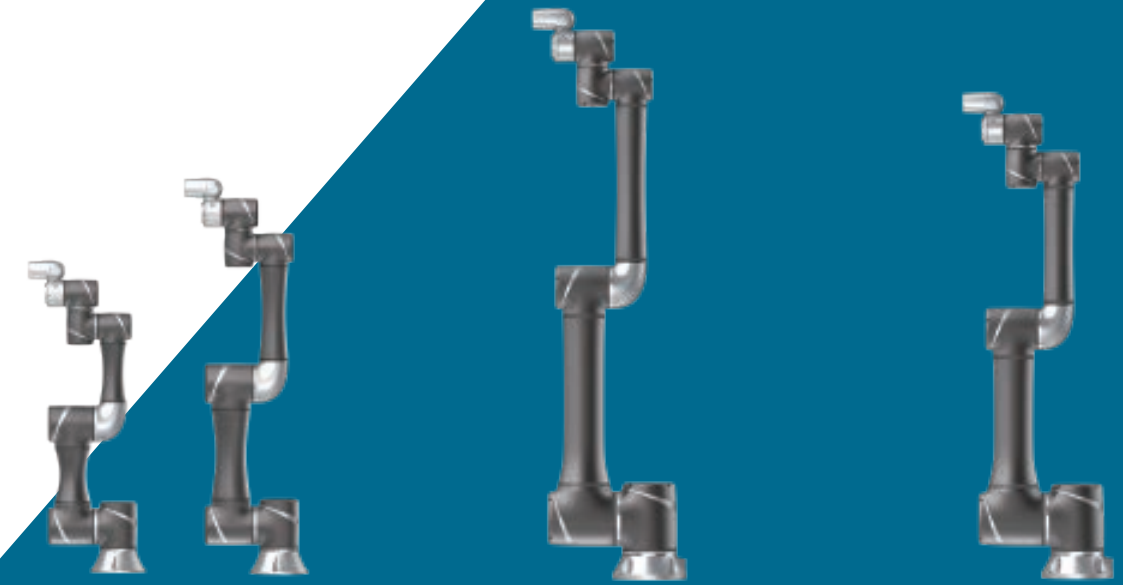
**TM5M：**
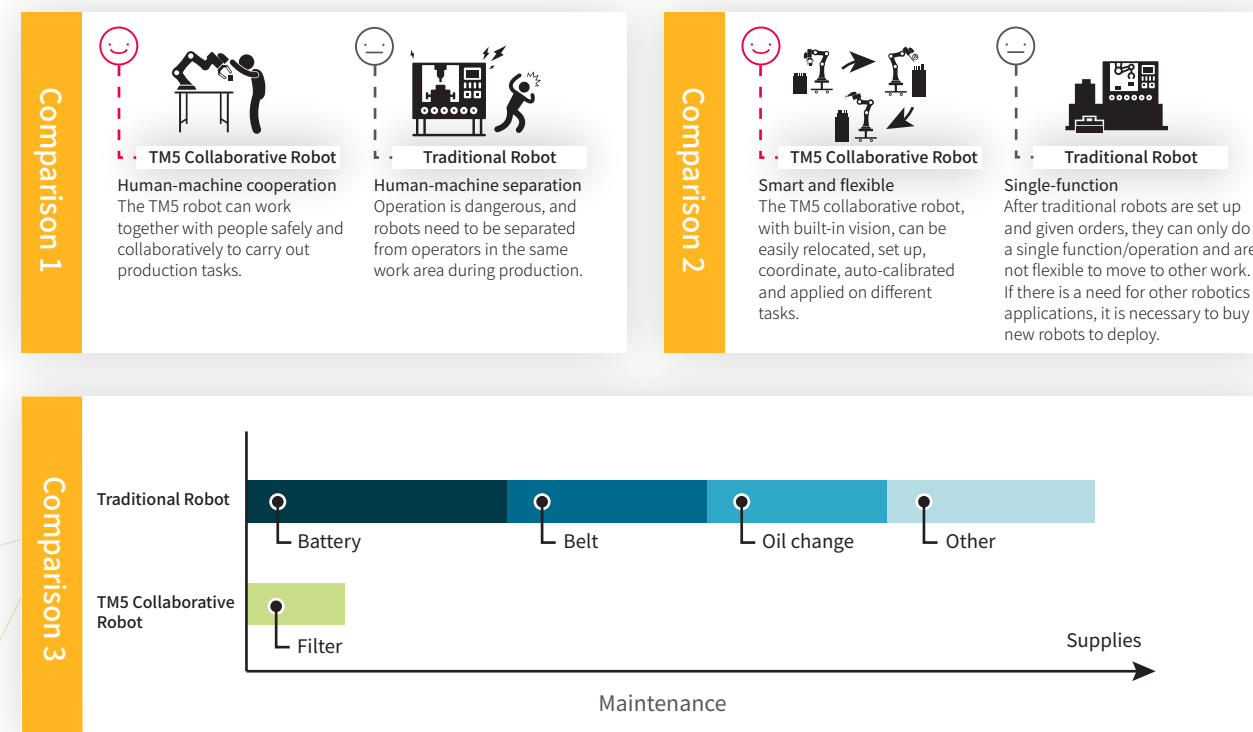Applicable for electronic industry mobile assembly.

**TM12M：**
Applicable for mobile stacking and mobile Machine Tending.

**TM14M：**
Applicable for heavy load pickup/ placement and semiconductor wafer box automatic transfer.
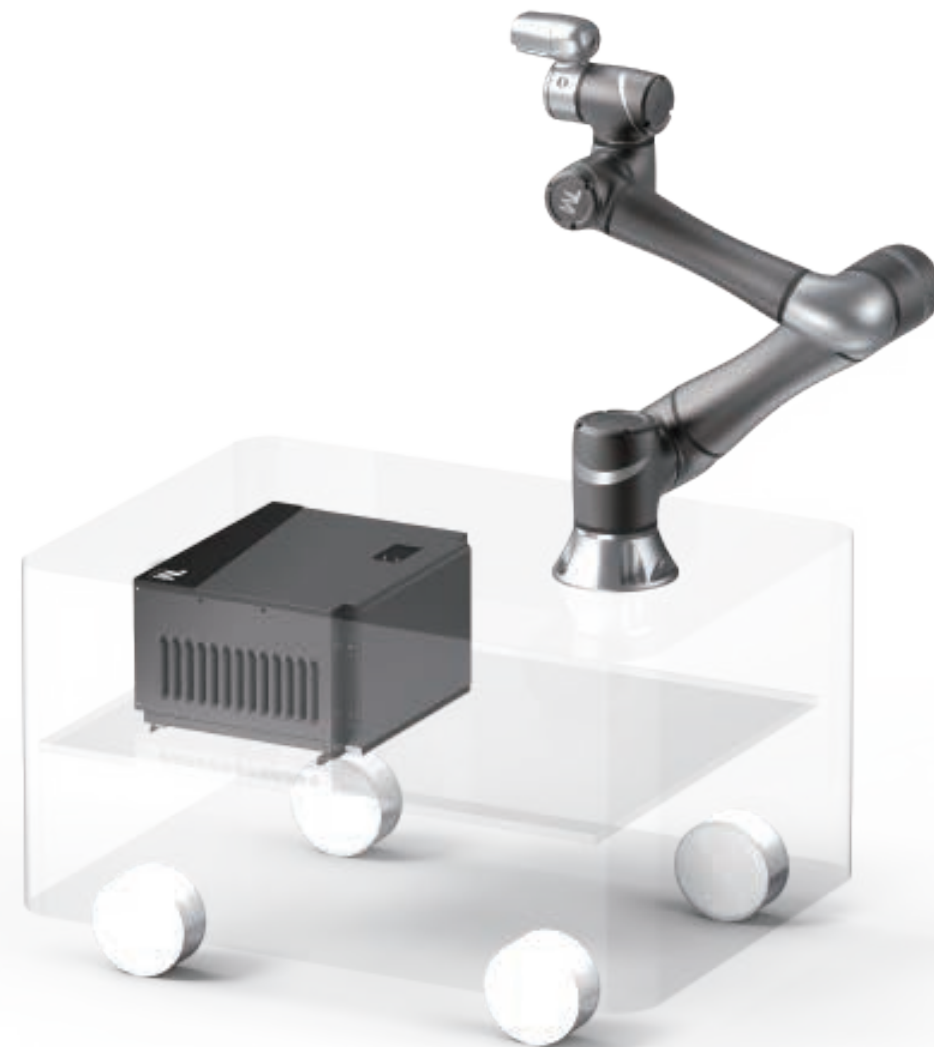
## What is the difference between the TM smart collaborative robot and traditional industrial robots?
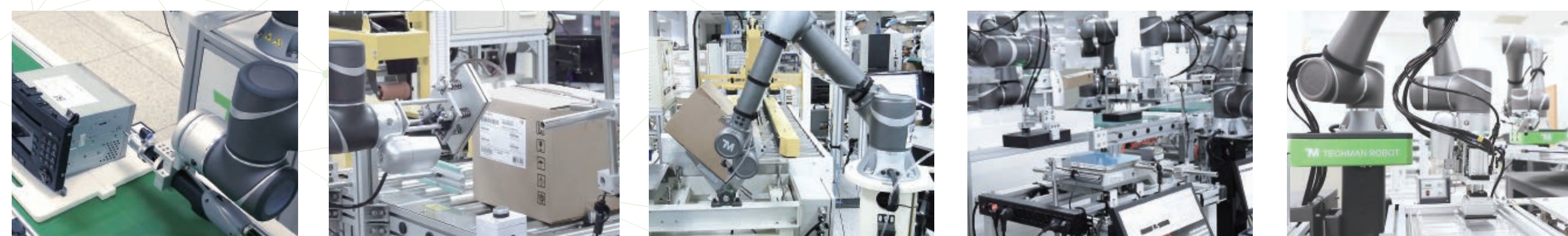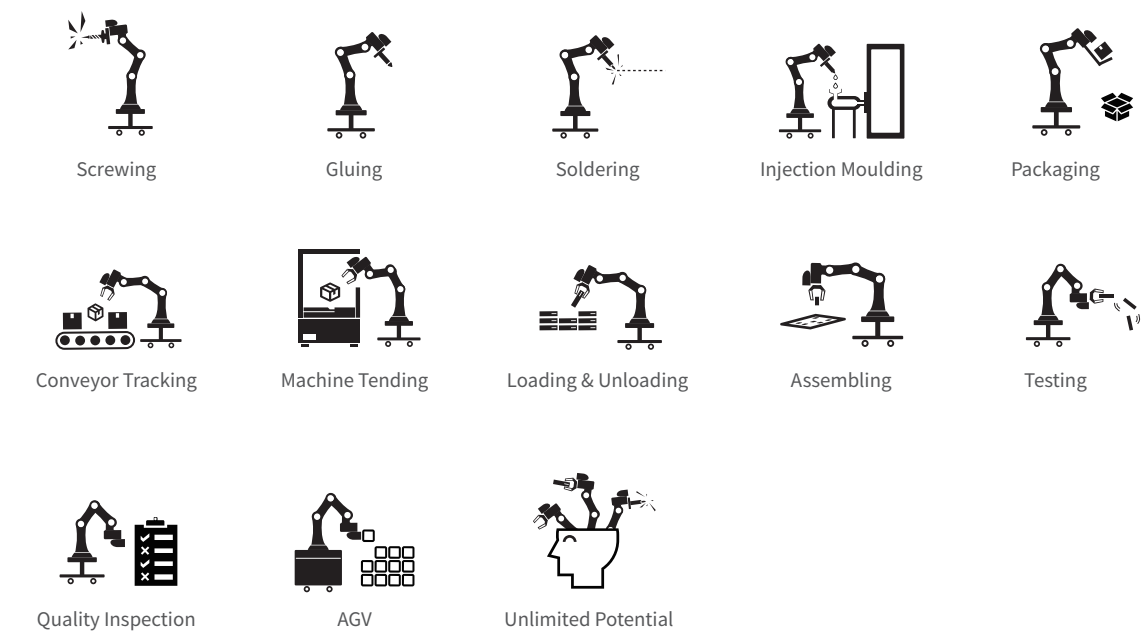
Collaborative robots are designed to be safe to operate around people, working alongside their 'colleagues' without the need for additional safety precautions. Collaborative robots are very easy to program unlike traditional industrial robots that require advanced programming skills, cobots can be given work instructions without coding. TM's range of collaborative robots can achieve human-machine collaboration by combining its safe robotic technology, simple user interface and smart integrated vision system, significantly increasing efficiency and decreasing costs.

**Comparison 1**

**TM5 Collaborative Robot**

Human-machine cooperation
The TM5 robot can work together with people safely and collaboratively to carry out production tasks.

**Traditional Robot**

Human-machine separation
Operation is dangerous, and robots need to be separated from operators in the same work area during production.

**Comparison 2**

**TM5 Collaborative Robot**

Smart and flexible
The TM5 collaborative robot, with built-in vision, can be easily relocated, set up, coordinate, auto-calibrated and applied on different tasks.

**Traditional Robot**

Single-function
After traditional robots are set up and given orders, they can only do a single function/operation and are not flexible to move to other work. If there is a need for other robotics applications, it is necessary to buy new robots to deploy.

**Comparison 3**

Traditional Robot
└ Battery    └ Belt    └ Oil change    └ Other

TM5 Collaborative Robot
└ Filter

Supplies

Maintenance

For reference only

## TM Robot's industry applications

The ease of the TM collaborative robot operation means that it can be applied to various different industries, such as electronic assembly, metal processing, testing etc... TM's built-in vision function features such as shape matching, barcode & QR code reading, colour recognition, OCR etc are all easily configured from the integral robot design toolbox. Furthermore, The TM-M series are powered by vdc supply, making them compatible with most brands of AGV's and mobile vehicles.

| Screwing | Gluing | Soldering | Injection Moulding | Packaging |
| --- | --- | --- | --- | --- |
| Conveyor Tracking | Machine Tending | Loading & Unloading | Assembling | Testing |
| Quality Inspection | AGV | Unlimited Potential | | |

# 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.
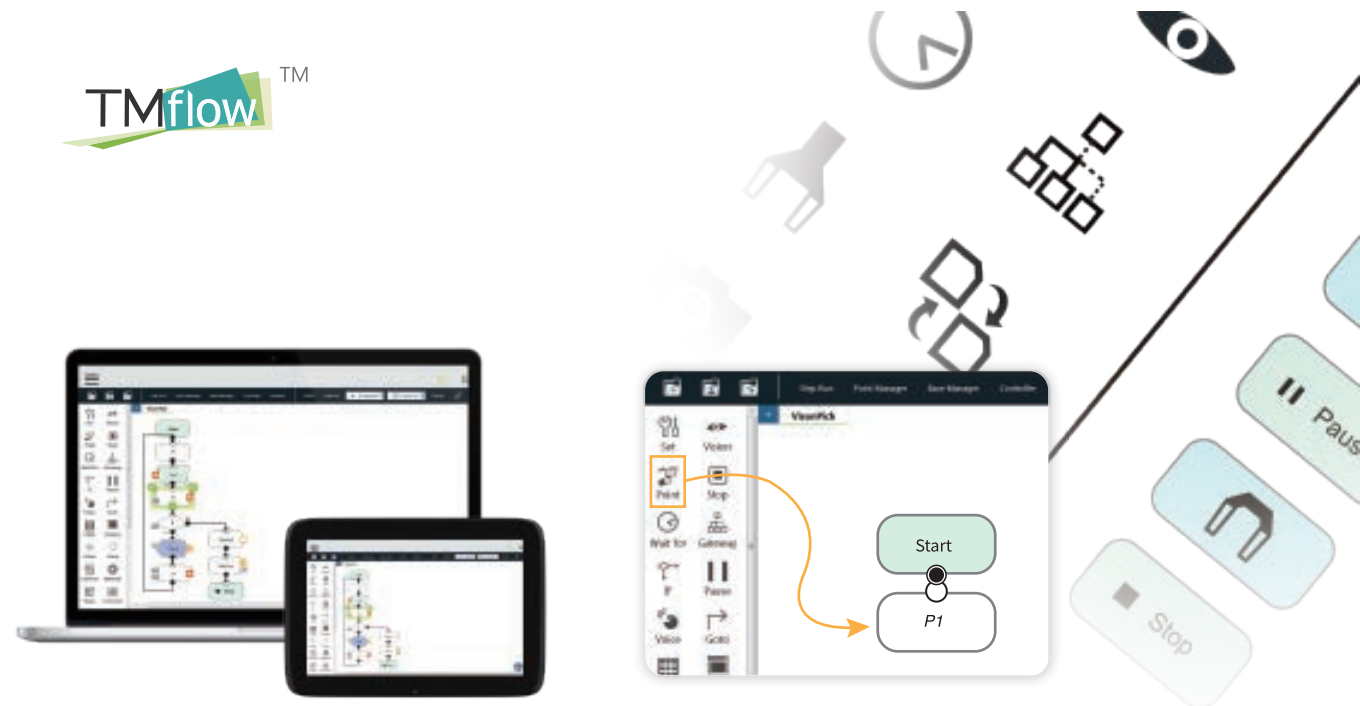
All-image procedure flow

Simply click and drag image to easily complete robot program editing

# Smart Vision System

## TM5 Built in Vision system

### 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

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.

### Image enhancement module (Enhance)

Contrast enhancement is used to adjust image contrast

Morphology can turn lines thicker or thinner, patch holes, or break apart lines

Image smoothing

Color plane extraction can extract specific color planes such as red, blue, green, or saturation

Image thresholding converts the image into black and white

### Identify – Barcode/QR code module support 1-Dashboard, QR code and 2-D DataMatrix decoding

One dimension/two dimension barcode identification

Color identification

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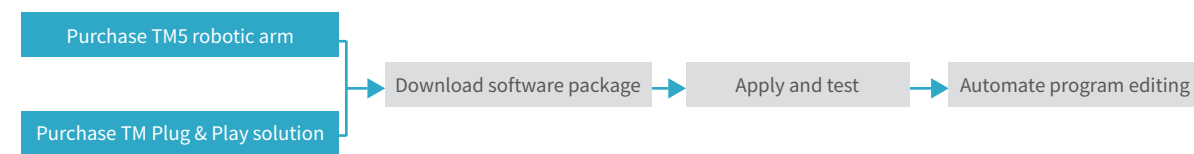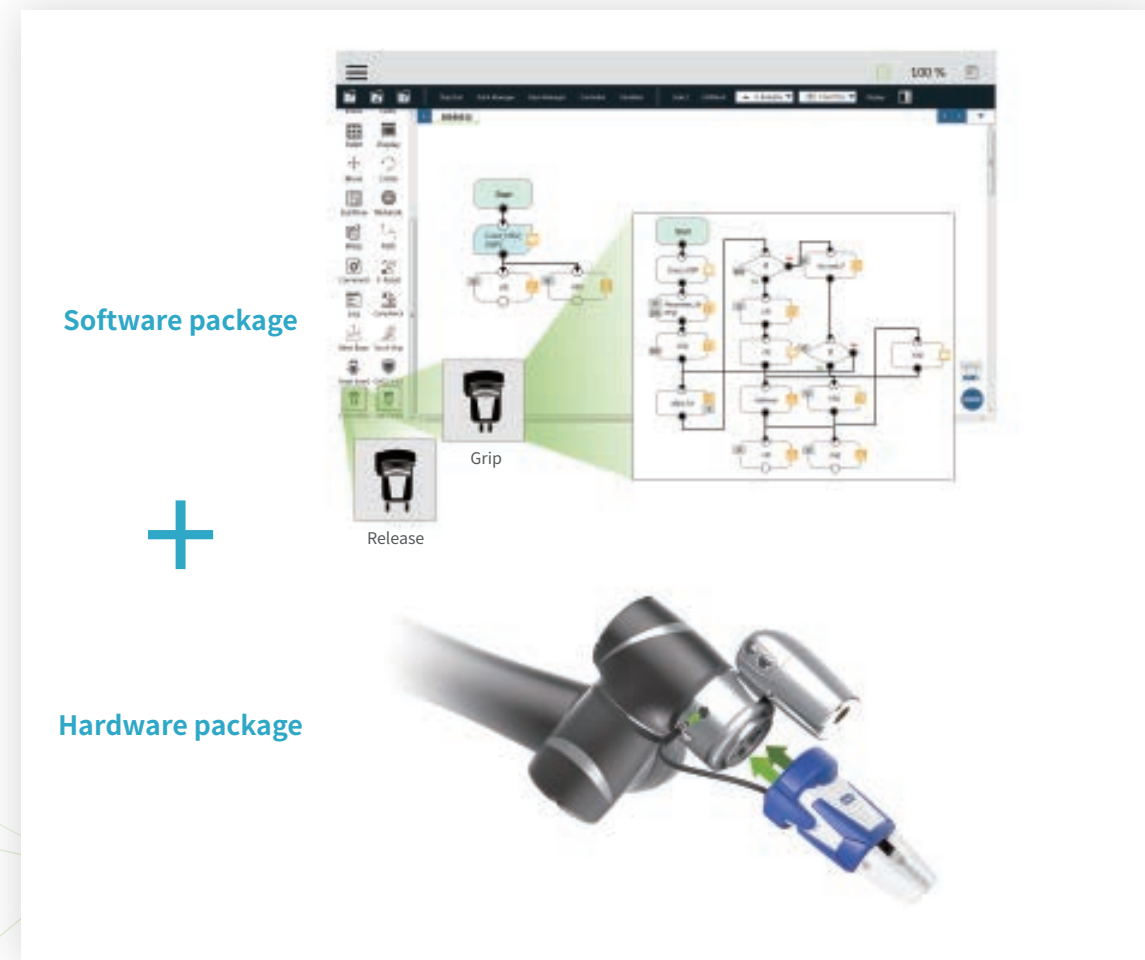
With the help of TM Plug&Play, TM Robots can connect to multiple robotic peripheral products available on the market. TM Plug&Play is available as standard allowing users to easily integrate third party peripherals to the robot, considerably reducing time and cost.

## Can automatically edit program in five minutes

Purchase TM5 robotic arm

Purchase TM Plug & Play solution

Download software package → Apply and test → Automate program editing

## Simple, efficient, and fast production line introduction

Software package

Grip

Release

+

Hardware package

Screw Plug&Play example

## TM certified, perfect integration, and usable upon installation

TM Robot works with peripheral equipment vendors to co-build a comprehensive TM Plug&Play integrated habitat. 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.

| | | | | |
|---|---|---|---|---|
| TOYO CHG2-S30-002 | SCHUNK Gripping System for TM WSG-25 | SCHUNK Gripping System for TM- WSG32 | SCHUNK Gripping System for TM - WSG50 | ROBOTIQ Adaptive Gripper 2-Finger 85/140 TM Kit |
| HIWIN XEG-16-TM | HIWIN XEG32-TM | HIWIN XEG-64-TM | HIWIN SEG-04-TM | HIWIN SEG-24-TM |
| Schunk Co-act | HIWIN STG-16-TM | RGK EGN66 | KILEWS Screwing Solution | BASLER Industrial Camera |
| ATI Force Sensor | Robotiq FTS-300 TM-KIT | WACOH QRS-W200-K101-KIT | igus 3D e-chain TM Kit | NABELL Robot-Flex |
| ADVANTECH Serial Device Server | ADVANTECH Modbus to PROFINET Gateways | ADLINK EtherCAT I/O Expansion Modules | AUTOMAPPPS Offline Programming Software for TM | More Information on www.tm-robot.com |

# Specification

SEMI S2  CE  ISO ISO 10218-1  ISO ISO/TS 15066

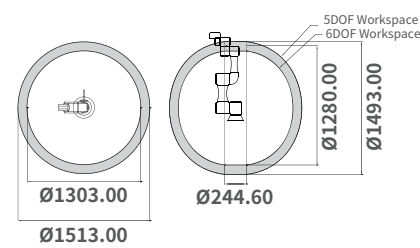| Model | | TM5-700 | TM5-900 |
|---|---|---|---|
| Weight | | 22.1kg | 22.6kg |
| Payload | | 6kg | 4kg |
| Reach | | 700mm | 900mm |
| Max Speed | | 1.1m/s | 1.4m/s |
| Joint Ranges | J1 | +/- 270° | |
| | J2,J4,J5 | +/- 180° | |
| | J3 | +/- 155° | |
| | J6 | +/- 270° | |
| Speed | J1~J2 | 180°/s. | |
| | J3 | 180°/s. | |
| | J4~J5 | 225°/s. | |
| | J6 | 225°/s. | |
| Repeatability | | +/- 0.05mm | |
| Degrees of Freedom | | 6 Rotating Joints | |
| I/O Ports | | Control Box | Tool Conn. |
| | Digital in | 16 | 3/4(by regional model) |
| | Digital out | 16 | 3/4(by regional model) |
| | Analog in | 2 | 1 |
| | Analog out | 1 | 0 |
| I/O Power Supply | | 24V 1.5A for control box and 24V 1.5A for tool | |
| IP Classification | | IP54(Arm) | |
| Power Consumption | | Typical 220 watts | |
| Maximum Power Capacity① | | Max. 1300/1400 watts(by regional model) | |
| Temperature | | The robot can work in a temperature range of 0-50°C | |
| Power Supply | | 100-240 VAC, 50-60 Hz(Regular Model) / DC24V/48V(Mobile Model) | |
| I/O Interface | | 3×COM, 1×HDMI, 3×LAN, 4×USB2.0, 2×USB3.0 1×VGA(Reginal model) | |
| Certification | | CE(regional model), SEMI S2(Option) | |
| Variation Models | | X: without hand eye camera, M: Mobile(DC Version),SEMI: SEMI S2 certified | |
| Robot Vision | | | |
| Eye in Hand (Built-in) | | 1.2M/5M pixels, color camera | |
| Eye to Hand (option) | | Support Maximum 2 GigE cameras | |

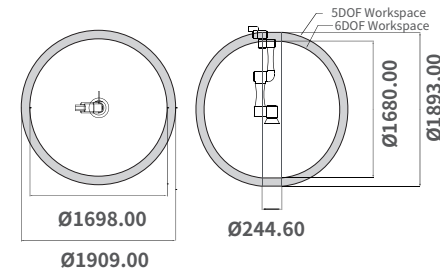① Maximum power capacity is the maximum output capacity of the power supply system designed in the control box.

| Model | | TM12 | TM14 | TM12M | TM14M |
|---|---|---|---|---|---|
| Weight | | 33.3Kg | 32.6Kg | 33.3Kg | 32.6Kg |
| Payload | | 12kg | 14kg | 12kg | 14kg |
| Reach | | 1300mm | 1100mm | 1300mm | 1100mm |
| Max Speed | | 1.3m/s | 1.1m/s | 1.3m/s | 1.1m/s |
| Joint ranges | J1 | +/- 270° | | | |
| | J2,J4,J5 | +/- 180° | | | |
| | J3 | +/- 166° | +/- 163° | +/- 166° | +/- 163° |
| | J6 | +/- 270° | | | |
| Speed | J1~J2 | 120°/s | | | |
| | J3 | 180°/s | | | |
| | J4~J5 | 180°/s | 150°/s | 180°/s | 150°/s |
| | J6 | 180°/s | | | |
| Repeatability | | +/- 0.1 mm | | | |
| Degrees of freedom | | 6 rotating joints | | | |
| I/O ports | | Control box | | Tool conn. | |
| | Digital in | 16 | | 4 | |
| | Digital out | 16 | | 4 | |
| | Analog in | 2 | | 1 | |
| | Analog out | 1 | | 0 | |
| I/O power supply | | 24V 1.5A for control box and 24V 1.5A for tool | | | |
| IP classification | | IP54 | | | |
| Power Consumption | | Typical 300 watts | | Typical 300 watts | |
| Maximum Power Capacity① | | Max. 2200 watts | | Max. 1500 Watts ② | |
| Temperature | | The robot can work in a temperature range of 0-50°C | | | |
| Power supply | | 100-240 VAC, 50-60 Hz | | DC 20V~60V | |
| I/O Interface | | 3×COM, 1×HDMI, 3×LAN, 4×USB2.0, 2×USB3.0 | | | |
| Certification | | CE, SEMI S2(Option) | | | |
| Variation Models | | X: without hand eye camera, SEMI: SEMI S2 certified | | | |
| Robot Vision | | | | | |
| Eye in Hand (Built in) | | 1.2M/5M pixels, color camera | | | |
| Eye to Hand (Optional) | | Support Maximum 2 GigE cameras | | | |

① Maximum power capacity is the maximum output capacity of the power supply system designed in the control box.
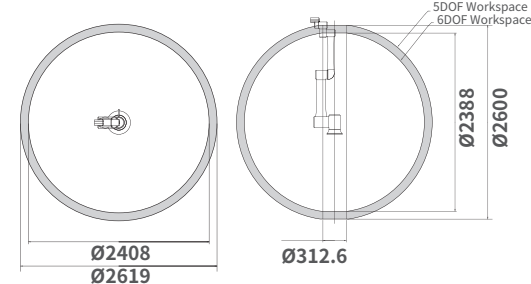② Maximum power capacity can be expanded to 2500 Watts with an external 1000 watts power supply
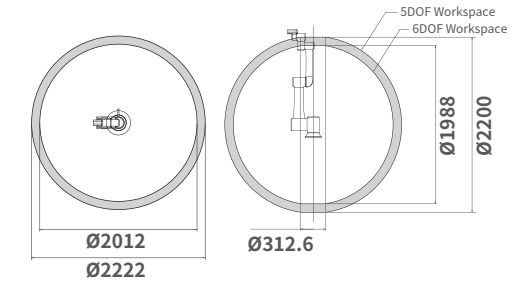
# Operating Area



5DOF Workspace
6DOF Workspace
Ø1280.00
Ø1493.00
Ø1303.00
Ø244.60
Ø1513.00

**TM5-700**

5DOF Workspace
6DOF Workspace
Ø1680.00
Ø1893.00
Ø1698.00
Ø244.60
Ø1909.00

**TM5-900**

5DOF Workspace
6DOF Workspace
Ø2388
Ø2600
Ø2408
Ø312.6
Ø2619

**TM12,TM12M**

5DOF Workspace
6DOF Workspace
Ø1988
Ø2200
Ø2012
Ø312.6
Ø2222

**TM14,TM14M**