

AUTOMATIC INSPECTION SYSTEM PART NO. ATU-MHV35

CUSTOM-MADE



- Automatic inspection system: delivers unmanned inspection and automatic data collection, fundamentally cutting labor costs, maximizing equipment utilization, enhancing efficiency, ensuring quality, and ultimately achieving visual management of production progress and quality status
- System components:
 - execution layer: the PLC controls the robot(equipped with quick-change grippers) and palletizing elevator to handle workpieces
 - inspection layer: cooperates with the CMM, CNC vision measuring system, and hardness tester to automate measurement tasks
 - scheduling&data layer: includes a digital control system(directs production workflow) and a measurement data management and a quality analysis system(automatically collects all measurement data and performs SPC analysis)
 - monitoring layer: includes a monitoring dashboard(real-time display of equipment status and production progress) and a quality analysis dashboard(dynamically rotation of measurement data and SPC control charts)
- Workflow: palletizing elevator feeding→robot gripping→sequential delivery to inspection equipment→automatic data collection and binding→robot sorting and unloading based on results→real-time data analysis with synchronized panel updates

SPECIFICATION

Robot	robot arm spreading	53.15"
	Max. working speed	≤157.48"/s
	Max. weight of workpiece	22.04lb
	repeat positioning accuracy	±0.001"
	number of control axis	6
	communication protocols	Ethernet Modbus Tcp
CMM	measurement range	19.68×23.62×15.74"
	MPEE	±(2.3+L/250)μm
	MPEP	2.4μm
	supply pressure	0.6-0.8MPa
CNC vision measuring system	measurement range	8.66×4.72×5.90"
	view field(diagonal length)	.06-.43"
	accuracy of X/Y axis	≤(98.4+10L)μin(L is the measurement length in inch)
	repeatability	.00008"
	objective	0.7X-4.5X(zoom)
Hardness tester	hardness scale	HRA, HRB, HRC, HRD, HRF, HRG, HR15N, HR30N, HR45N, HR15T, HR30T, HR45T
	preliminary test force	Surface Rockwell: 29.4N(3kg), Rockwell: 98N(10kg)
	test force	Surface Rockwell: 147N(15kg), 294N(30kg), 441N(45kg) Rockwell: 588N(60kg), 980N(100kg), 1471N(150kg)
	test force accuracy	±1%
	resolution	0.05HR
	Max.workpiece height	11.81"
	Max.testing width	7.87"
Power supply	AC 110, 50Hz	
Environmental requirement	temperature: 20°C±2°C, relative humidity: 30%~70%	

STANDARD DELIVERY (OPTIONAL)

CMM	1 set
CNC vision measuring system	1 set
Hardness tester	1 set
Robot	1 set
Quick-change grippers	1 set
Visual positioning station	1 set
Palletizing elevator	1 set
Vertical storage system	1 set
Servo stacking&unloading	1 set
PLC control system	1 set
Digital control system	1 set
Quality analysis system	1 set
Monitoring dashboard	1 set
Quality analysis dashboard	1 set

Demonstration workpiece (shaft Workpiece)



Demonstration workpiece (disc Workpiece)



OPERATION PROCESS

- Step 1: Loading(the operator places workpieces into the vertical storage system automatically or manually)
- Step 2: Visual positioning(the palletizing elevator conveys pallets from vertical storage system to the visual positioning station for workpiece placement verification)
- Step 3: Shaft workpiece inspection with CNC vision measuring system(the robot grips the shaft workpiece and places it on the CNC vision measuring station, starts measuring and output inspection results)
- Step 4: Shaft workpiece inspection with CMM(the robot removes the shaft workpiece and places it on the CMM station, starts measuring and output inspection results)
- Step 5: Shaft workpiece sorting(after all measurements are completed, the robot removes the shaft workpiece and places it in the corresponding OK or NG position on the servo stacking&unloading based on the inspection results)
- Step 6: Gripper changeover and disc workpiece inspection with CMM(the robot quickly changes grippers, grips the disc workpiece, positions it on the CMM station, starts measuring and outputs inspection results)
- Step 7: Disc workpiece inspection with hardness tester(the robot removes the disc workpiece and places it on the hardness tester station, starts measuring and output inspection results)
- Step 8: Disc workpiece sorting(after all measurements are completed, the robot removes the disc workpiece and places it in the corresponding OK or NG position on the servo stacking&unloading based on the inspection results)

The palletizing elevator automatically takes the workpiece pallets from vertical storage system



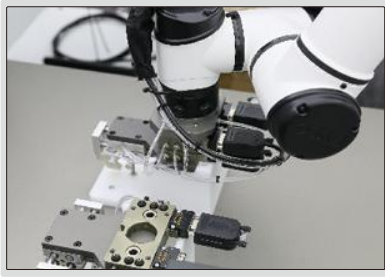
The palletizing elevator automatically conveys the workpiece pallets to the vision positioning station



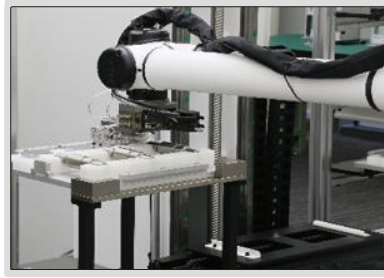
The vision positioning station automatically verifies the workpiece placement position



The robot automatically changes grippers



The robot automatically grips the workpiece on the vision positioning station



The robot automatically places the workpiece on the CNC vision measuring station for automatic measurement



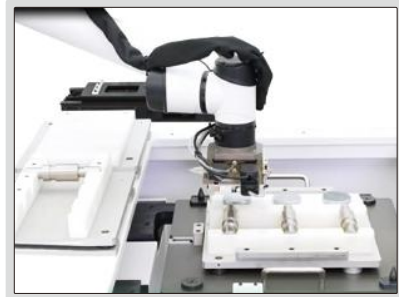
The robot automatically places the workpiece on the CMM station for automatic measurement



The robot automatically places the workpiece on the hardness tester station for automatic measurement

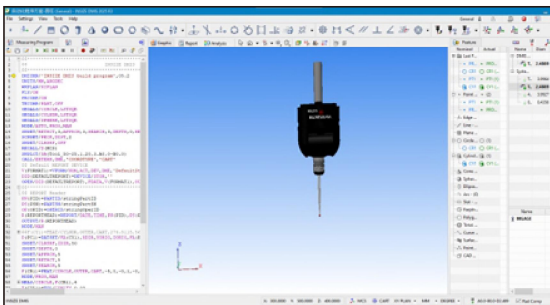


The robot automatically places the workpiece into OK or NG positions on the servo stacking&unloading



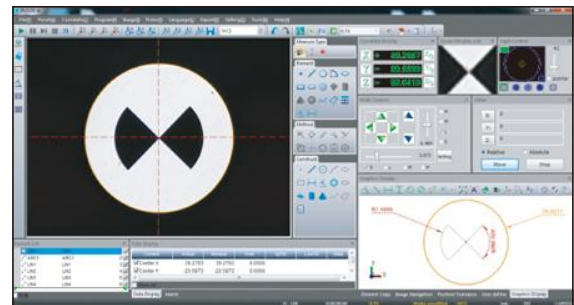
CMM measuring software(included with CMM)

- The software is designed and developed based on the DMS standard, with excellent compatibility and versatility
- Geometric element measurement, evaluation of shape and position
- Measuring result can be stored automatically



CNC vision measuring software (included with CNC vision measuring system)

- Automatic edge-detection, focus, measuring, contour scanning, calibration, etc.
- SPC function for large quantity measurement
- Measuring result can be stored automatically



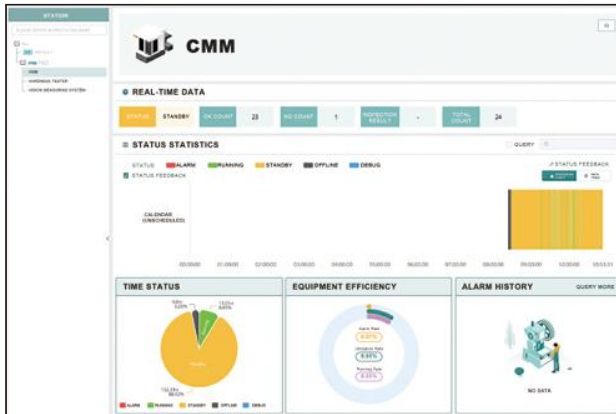
Hardness tester measurement software(included with hardness tester)

- CNC system, close-loop electronic control system applies test force
- Bluetooth, RS232 data transmission to computer, data management using hardness management software



Digital control system

- The digital control system offers comprehensive equipment network monitoring, production scheduling, vertical storage system, and a monitoring dashboard
- Equipment monitoring: real-time collection of equipment status and alerts, with statistical analysis of OEE, utilization, output, and fault data
- Production traceability: binds workpieces via QR codes or RFID, records full-process inspection results, and enables complete workpiece traceability
- Task management: end-to-end management from plan creation and process maintenance to task assignment and progress tracking
- Vertical storage system: manages pallets, fixtures, and material storage locations, with support for integration with AGV/RGV logistics systems
- Monitoring dashboard: a customizable dashboard that displays workshop status, equipment efficiency, production cadence, and work order progress in real time
- System Integration&expansion: capable of connecting with PLC, ERP, MES, PDM, SPC, and other systems. supports multiple interface methods including TCP, API, RS232, and file exchange



Quality analysis system

- A universal multi-source quality data collection, analysis, and management system that Integrates with MES/ERP/QMS systems
- Inspection planning: support custom workpiece dimensions, tolerances, and traceability rules
- Multi-source data acquisition(compatible with over 90% of measurement tools):
 - supports direct device connection: keyboard, USB, Bluetooth, RS232, TCP/IP, etc.
 - supports file parsing: data files from CMM, vision measuring system, etc.
 - supports screen capture: data from measurement system screens
- SPC analysis: provide variety of quality analysis control charts
- Quality analysis dashboard: real-time display of SPC charts of multiple dimensions on the dashboard to monitor production quality
- Quality Report: export Excel/PDF reports

Seq. Code	Name	Inspection Workpiece	Processing Instrument	2020-12-11	2020-12-11	2020-12-11	2020-12-11	2020-12-11	2020-12-11	2020-12-11
1	Z1001	Shaft Workpiece #1	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
2	Z1002	Shaft Workpiece #1	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
3	Z1003	Shaft Workpiece #2	Shaft Workpiece	28.0000	28.0000	28.0000	28.0000	28.0000	28.0000	28.0000
4	Z1004	Shaft Workpiece #2	Shaft Workpiece	14.0000	14.0000	14.0000	14.0000	14.0000	14.0000	14.0000
5	Z1005	Shaft Workpiece #3	Shaft Workpiece	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000
6	R1001	Shaft Workpiece #1	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
7	R1002	Shaft Workpiece #2	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
8	R1003	Shaft Workpiece #3	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
9	R1004	Shaft Workpiece #4	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
10	R1005	Shaft Workpiece #5	Shaft Workpiece	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000

