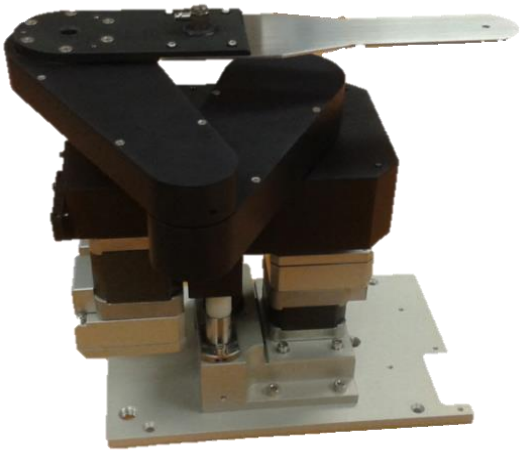
HINE AUTOMATION

Moving Your Technology



Hine Automation
HAtm-4.0 Product Presentation

26 March 2019

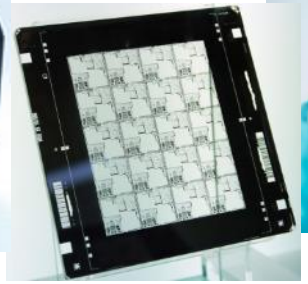
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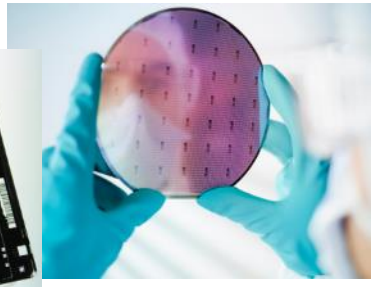
Who is Hine Automation?

- Hine Automation Designs and Manufactures Vacuum and Atmospheric Automation Systems and Robotic Components
- Serving Customers from St. Petersburg, Florida since 2009
- Specializing in Semiconductor Automation
  - Silicon & Compound III-V or II-VI Materials
  - Tape Frames
  - Photomask & Reticles
  - Solar & Flat Panel Display











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Why the name “Hine”?

- Our robotic components are based on the quality and reliability of the original Hine Design and Asyst robotics

- Concept for Hine Automation products
  - Use State of the Art Technology
  - Provide Improved Reliability
  - Provide a Experienced Support Structure
  - Provide Plug-and-play replacements for Hine Design and Asyst robotics
    - This means Form, fit and function with existing products





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Why Hine Automation is Growing

- Hine has been successful with its current Customers thanks to:
  - Appropriate product mix for its target market.
    - Flexible product offering allows for high level of customization
  - Excellent service and repair program for Hine Design/Asyst legacy products.
  - Great customer service.

Customized Automation Solutions	•Custom substrate sizes •Unique applications •New markets and technologies
Standard Automation Systems	•Cluster Systems •Load Locks
Standard Robotic Components	•Robotic Handlers •Elevators •Aligners

+



Hine Automation Support, Service & Repairs

=



Improved Performance

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Mission, Values & Strengths

Our Mission

- To deliver Customers the most cost effective automation solutions and provide expert customer service and support.

We Value

- Partnerships that produce Quality Products
- Collaborating with our Customer to find the Best Solutions
- Acting with Integrity so we can do the right thing for our Customers

Our Strengths

- Experience-Driven Designs
- Cost Effective Solutions with Demonstrated Reliability
- Quick Response for Customized Solutions
- Service Oriented with Knowledgeable and Fast Response Times

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Our Product Portfolio



Vacuum Robotics



Load Locks

Design and Service





Cassette Handlers



Atmospheric Robotics



Aligners



Elevators

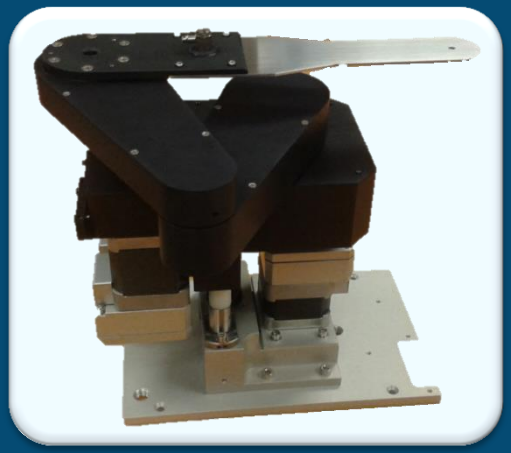


Load Ports



Custom Solutions

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Atmospheric Robot

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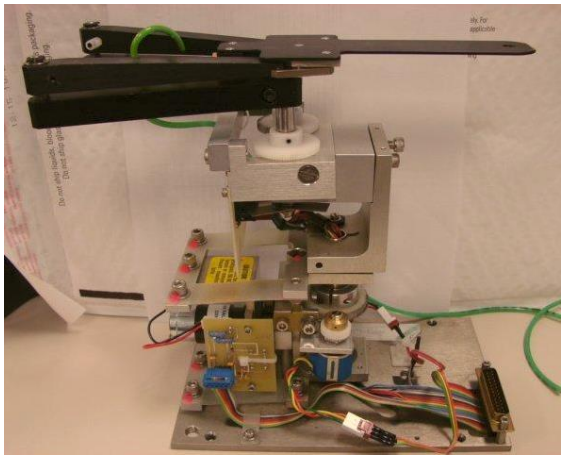
Satellite HAtm-4.0
The Market Need

- After years of service and millions of wafer transfers with the Matrix 105 and Eclipse Star and Mark II PVD systems, normal wear and tear is compromising the accuracy and repeatability of the Orbitran robots.
- The most common failure modes can take your system down
  - Z, R & θ axis motors, gear assemblies, as well as PCBs have a high probability of failure
- The current solution is to repair or rebuild the Orbitran which leads to:
  - Decreased life cycle
  - Increased cost
- Adapting newest technology to an old design makes reducing costs challenging (result: low volumes and/or longer lead times)

A new product is necessary to increase longevity and reduce the cost of Matrix and Eclipse Systems



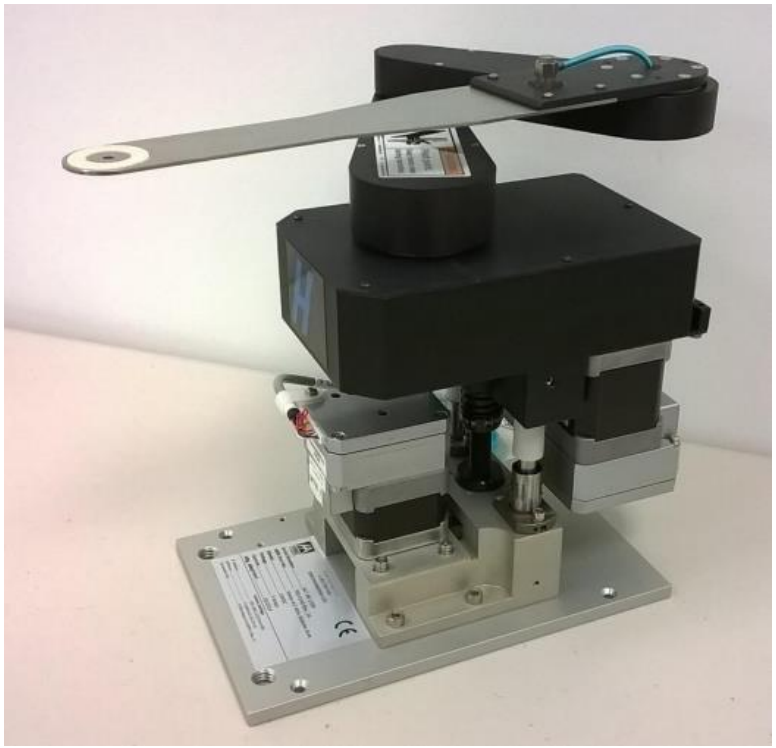
Matrix 105



Orbitran Robot

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Hine Automation Solution

- Robotic Arm designed as a replacement for the Orbitran family of robots in **Matrix and Eclipse** Systems
  - Similar dimensions
  - Simplified integration
    - Self contained control system
    - Identical command set as Orbitran
    - Identical mounting interface
  - New options available
    - Mapping sensor
    - Ethernet communication
    - Windows 8.1 application available using Ethernet or Wi-Fi for Teaching and Setup
  - Off the shelf components



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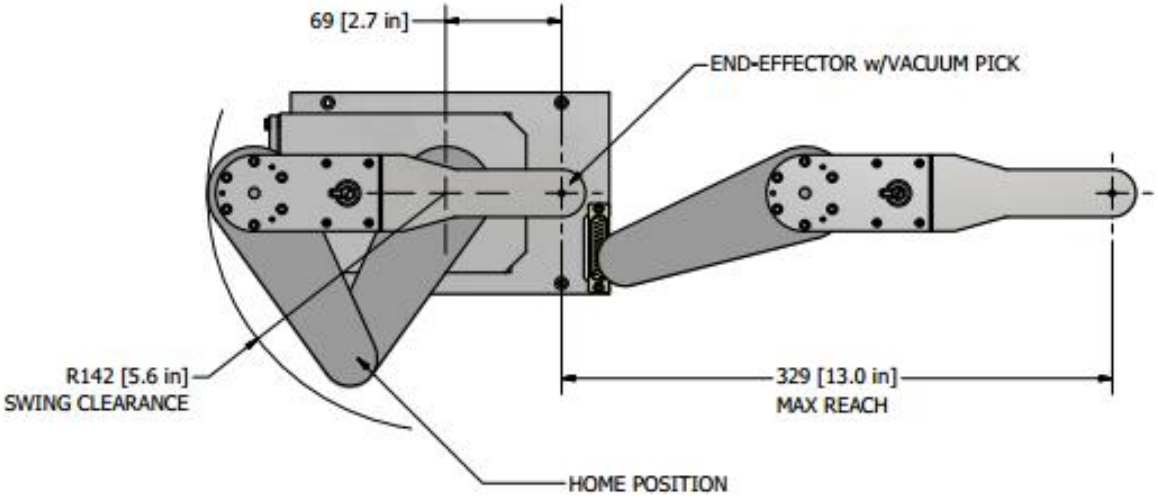
Satellite HAtm-4.0
Matrix 105 Installation

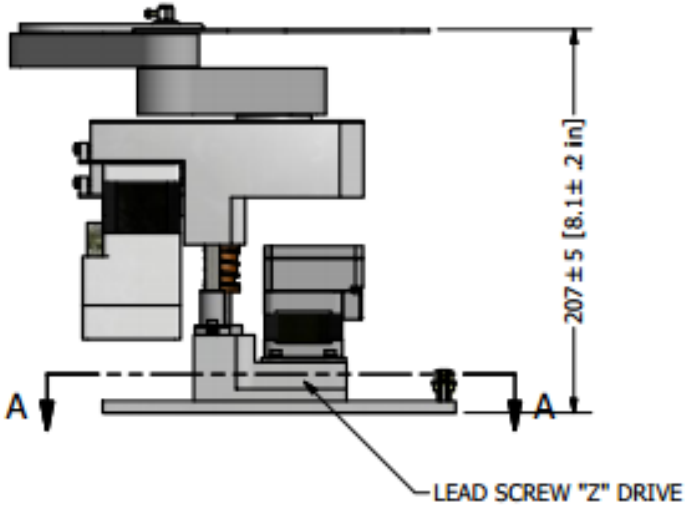
- Video Available on YouTube under Hine Automation



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Dimensions

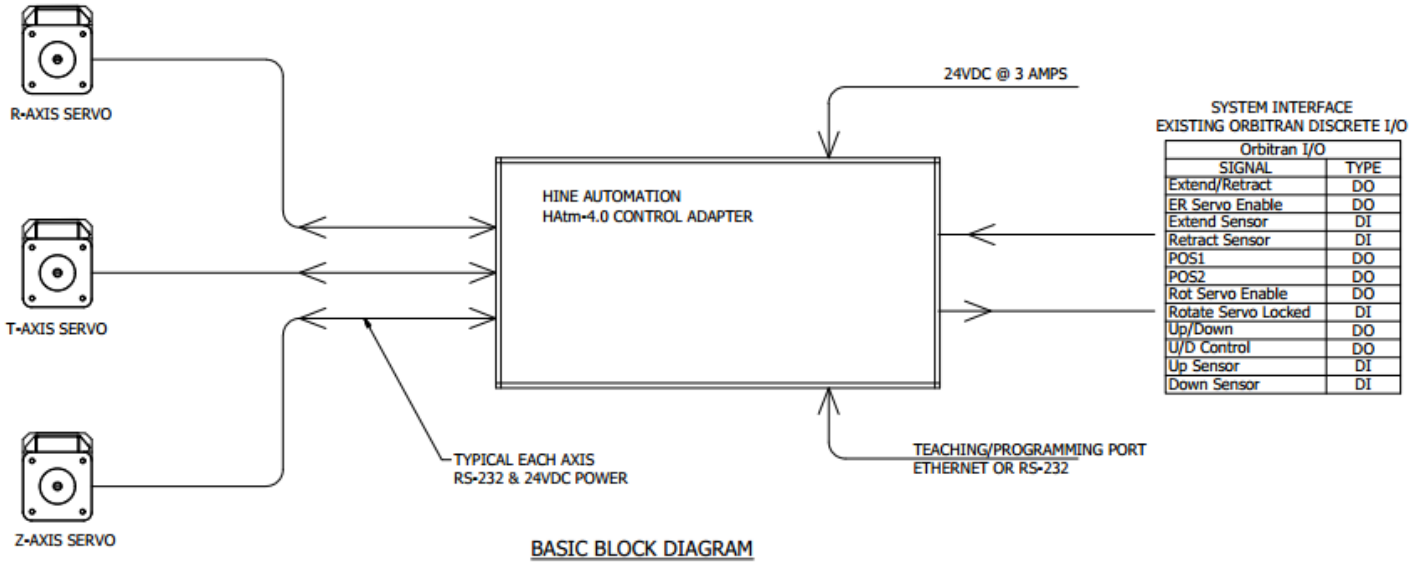
- Robotic Arm was originally designed as a replacement for the Orbitran family of Robots in Matrix systems
  - Max Reach, Transfer Height and Swing Clearance designed to be a drop in replacement in Matrix Systems.
  - Limited Z Height was included for flexibility and new applications





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Controls

- Operating commands are sent to the embedded processor digitally, via 37 pin D-Sub, RS-232 or TCPIP; the embedded processor decodes the command and sends it to the motion processors. The motion processor monitors and controls the servo motor utilizing various feedback devices to ensure that the motion profile is followed.
- Features:
  - Integrated control system utilizes the latest integrated motion control motors.
  - Interface using Discrete I/O with Identical Command Set as Orbitran Robot
  - Ethernet Port available for new and flexibility Communication Control Systems



BASIC BLOCK DIAGRAM

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Components

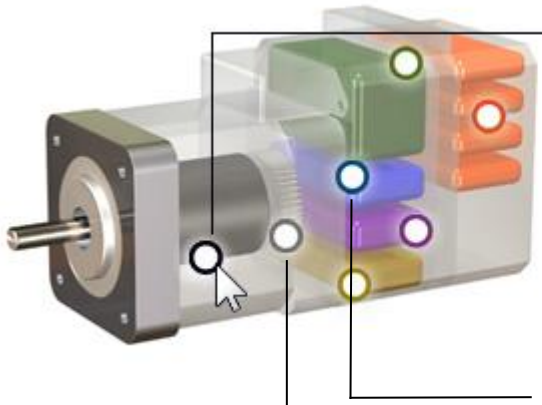
- Mechanical components (off-shelf components)
  - High torque stepper intelligent motors
  - Magnetic encoders
  - Polymer Compound Timing Belt, Fiberglass Reinforced Body with Nylon Tooth Facing for low particulate environments

- Sensor and electrical components (off shelf components)
  - Optical sensor for home position (eliminate/reduce wear and tear)
  - PCB with integrated control system
    - Digital, TCP/IP, RS-232 communication

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Motor with Integrated Servo

- Fully integrated closed loop vector drive servo system.
- Includes and Intelligent driver, a 32-bit RISC CPU, a magnetic encoder and power management built onto the motor.
- Excels in performance, size and cost.
- Supports a wide variety of communication interfaces.
- The motor is used not only in our new products but also for replacing or upgrading legacy systems.
- The motor's high resolution encoder gives exceptional resolution of 50,000 pulses/rotation.
- Combined with vector drive control, the motor is an incredibly smooth and quiet motor.



MOTOR

Brushless, multi-pole, synchronous motor

The CM1 series Cool Muscle is based around high torque stepper motors, driven with servo techniques. The CM1 is a highly efficient motion module providing exceptional torque density.

ENCODER

Magnetic, 50 000ppr

With a resolution of 50 000 points per rotation, the Cool Muscle comes standard with closed loop positioning that is repeatable to ±1 pulse in 25 000, more than enough for most robotic applications.

CONTROLLER

Real-time OS kernel with torque, speed, and 2-axis coordinated positioning

The Cool Muscle's H Infinity controller is wrapped by a custom build real-time operating system. Timing, communications, motion and I/O are all handled simultaneously without any deterioration to performance or responsiveness.

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Satellite HAtm-4.0
Specifications

Z-Travel	10 mm Up from the Home Position
Rotational Travel	365° CW from the Home Position
Reach	329mm from Home Position (114mm standard arms)
Z-Repeatability	±0.05mm (measured at the wrist)
Reach Repeatability	±0.1mm (measured at the wrist)
Rotational Repeatability	±0.01° (measured at the wrist)
Z-Speed	±450mm/s
Reach Speed	±1000mm/s
Rotational Speed	±360°/s
Maximum Payload	0.5 Kg (standard configuration)
Power	24VDC @ 3.0 Amps
Weight	5 Kg
MCBF	> 1.5 x 10^7 Cycles
Stations Available	60
Position Teaching	Teach Utility Included
Control Interface	Digital, RS-232 and Ethernet



Service

Repair Services



Services

Comprehensive Rebuild | **Targeted Repair**



Hine Automation offers two types of service to our customers. Both include a complementary diagnosis, Trouble Failure Report (TFR) and quotes for the repair options available.

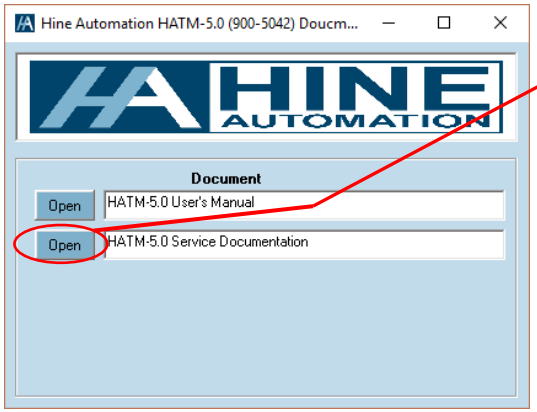
- Comprehensive Rebuild
  - Replacement of worn and out-of-specification components
  - Replacement of all O-rings
  - Resurfacing damaged mounting surfaces
  - 1-year Warranty
- Targeted Repair
  - We analyze and repair only the necessary items.
  - 90-day Warranty

It's Broken?
We can fix it!



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Satellite Systems
Documentation



Hine Automation Bill Of Materials Service Documentation

600-900-5042 DOC: Reference Documents, HAtm-5.0, 900-05042, . Rev A Last Update 10/8/2015

Part	Rev	Qty	Description	Reference Designators
S-HAtm5.0-Test	1.3	0	PRG: Hatm 5.0 robot Testing Utility	Reference
S-HAtm5.0-Test-D				
100-3648		0	DWG, Installation Drawing, Atmospheric Robot, Hatm-5.0	50
100-3648-INS				
100-4956	B	0	Drawing, Service Diagram, R-Home Setup, HAtm-5.0	51
900-5042	A	1	ASSY: Hatm-5.0 Robotic Arm w/ 5.5in Armset,	60
100-4831	D	0	DOC: User's Manual, Robot Hatm 5.0	100
100-4831-DOC				
200-0171		0	Doc, Procedure, HAtm-5.0 Installation and Setup	200
200-0171-DOC				
200-0335		0	DOC: Procedure, HAtm5.0, Arm Band Adj.	210
200-0335-DOC				
100-4093	C	0	SCH: Base Control PCB Assy, HA-ATM5.0	505
100-4093-SCH				
100-4098	1B	0	SCH: Interface Panel PCB Assy, HA-ATM5.0	506
100-4098-SCH				
100-4564	B	0	SCH: Ethernet Adapter	507
100-4564-SCH				
100-4904	A	0	SCH: HAtm5.0 Block Diagram	508
100-4904-SCH				

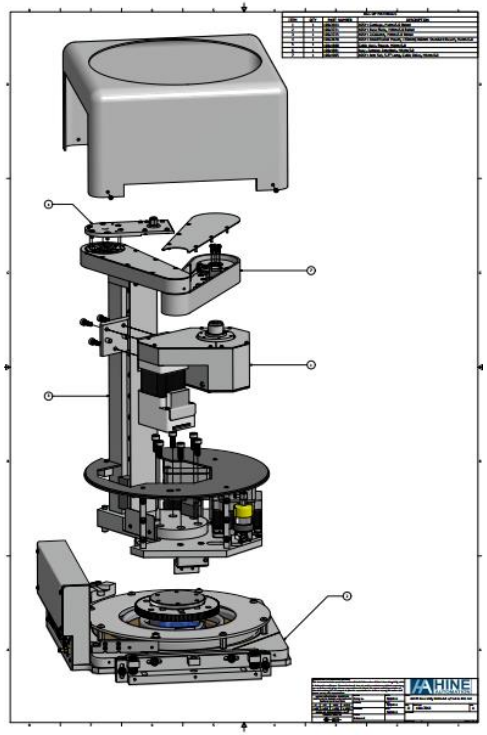
End of BOM

Hine Automation Bill Of Materials Service Documentation

900-5042 ASSY: Hatm-5.0 Robotic Arm w/ 5.5in Armset, Avago Rev A Last Update 1/15/2015

Part	Rev	Qty	Description	Reference Designators
100-7066	2B	1	ASSY: Base Unit, HAtm-5.0 w/ 5.5 in Arm Set	
100-7066-DWG				
900-5042-DOCS	A	1	DOC: USB Service Doc Package, Hatm-5.0, 900-5042,	
S100-AVG-CFG	A	0	PRG: HAtm5.0, customer Specific Velocity Parameters,	
S100-AVG-STN	A	0	PRG: HAtm5.0, Customer Specific Station Parameters,	

End of BOM



- Easily Accessible User's Manual & Service Documentation
- Internally developed Application utilizes hyperlinked PDF documents to view Subassembly BOM's & Drawings instantly without endless searching
- Electronic Service Documentation shipped with each System on a USB key