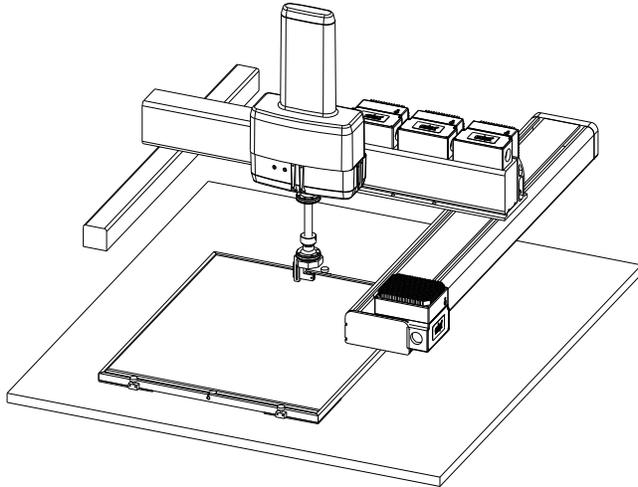# High Accuracy Position System

RobotDoctor, LLC. • 9220 Nottingham Way, Mason, OH 45040 • 1-513-702-3709 • www.RobotDoctor.com

HPS is a calibration method that compensates for the individual machine inaccuracies present in the system as a result of the slight production differences in each robot arm. The HPS utility allows the user to precisely map a region of the robots' workspace and then use this 'map' to compensate for mechanical inaccuracies of the robot during run-time. Within the region of the map boundaries, the *accuracy*[1] of the robot is guaranteed. This is especially crucial for software-driven applications where a CAD file with placement locations is imported into the robots' application software (i.e. electronic assembly). In addition, nearly every vision-guided application can benefit from this product.

Technical Specifications

Features	Advantages	Benefits
Accuracy Specification	Users will be able to determine the accuracy limits of the mechanism	CAD driven robotic applications can now be implemented with a guaranteed accuracy capability
Mechanism independent	HPS can be used with any Adept controlled mechanism	No custom coding is not required to integrate the HPS product with third party mechanisms
Thermal & Backlash compensation	All possible accuracy influences are taken into account to derive the error lookup table	HPS can compensate for the thermal expansion of the mechanism and any backlash in the drive train of the robot mechanism
Smaller Map Region	Users can specify any size rectangular mapping region within the 690 x 590 mm boundary of the grid	User can specify the map region size as required by the application
Fast Mapping Time	The new HPS mapping utility can map a region as much as 16 times faster than the previous version.	The system can be quickly remapped when new perpheral components are added to the workcell. Installation time is reduced for system integrators.

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[1] Accuracy – the ability of the robot software to drive the robot mechanism to a location that the mechanism has never been to before.

Features

HPS Kit

The HPS kit include the following components:

- HPS grid (18"x18"), with backlight, and power supply
- HPS camera, lens and standard flange adapter for Adept Robots
- Software: Mapping Utility and Runtime Libraries
- Storage/travel case
- Manual

Grid features:

- Physical Dimensions: 757.9 x 618.2 x 22.2 mm
- Mappable area: 690 x 590 mm (any smaller size region is possible)
- Weight: 20 lb.
- Embedded backlight
- Leveling Screws

System Requirements

- Adept MV controller
- V$^+$ 12.x or later
- AdeptVision Guidance Option installed[2]
- AIM software is completely HPS enabled. No upgrades are necessary.

Accuracy Specifications

Robot System	Accuracy Specification w/HPS
Adept Cartesian Robot System	± 0.002 " (± 0.05 mm)

The Mapping Process

During the mapping process a region within the robot workspace is mapped using a precision grid and a vision camera mounted on the tool flange of the robot. The grid and camera serve to precisely determine any inaccuracy regarding where the robot tool tip actually is versus where the system thinks it is. These inaccuracies are characterized and a lookup table for the mapped space is stored to disk.

The Runtime Process

During run-time, the application program uses the lookup table (through a CALL to the provided run-time library) to correct a transformation[3] for any inaccuracies. The application software may then use the corrected transformation to drive the robot mechanism to its destination during a motion. A run-time software license is required for each target system.

Storage case

HPS Grid w/ backlight

Backlight power supply

Camera and tooling

Camera Body

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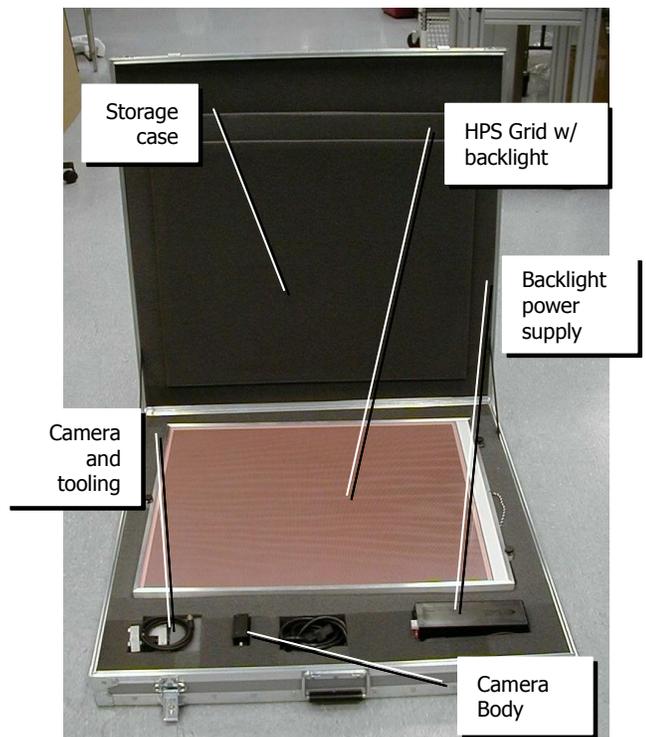
[2] **Note**: Vision is required for the mapping procedure, regardless of whether the robot application will use vision. For applications in which HPS will be used without vision in the final application, the system integrator will be required to purchase AdeptVision

[3] Transformation – a robot location consisting of X,Y,Z,Yaw,Pitch,Roll values that describe position in space for the robot mechanism