PIXID 500s: SYSTEM SPECIFICATIONS

System Modules, Test Packages, and Timing Chart

DESCRIPTION

The Pixid 500 single head system (the 500s) is a modular alignment system. It is comprised of several functional modules that are integrated into one complete system used for high-volume manufacturing of narrow and wide FOV camera modules. The modular design of Pixid systems allows for streamlined assembly and delivery of systems as well as simplified maintenance and operation.

ALIGNMENT MODULE

The Pixid 500s alignment module comprises of a 5- or 6-axis (X, Y, Z, θx, θy, and θz) motion stack for lens positioning during the active alignment process.

ALIGNMENT MODULE SPECIFICATIONS

DEGREES OF FREEDOM	5 (X, Y, Z, θx, θy) or 6 (X, Y, Z, θx, θy, and θz)
LINEAR (X,Y,Z) RESOLUTION	< 0.2 µm
ANGULAR (θx, θy, θz) RESOLUTION	< 0.01 deg
LINEAR TRAVEL RANGE (X,Y,Z,)	50 mm (extended travel available)
ROTATION TRAVEL RANGE (θx, θy, θz)	+/- 5 deg
UV CURE SOURCE	365nm, 385nm LED, or broadband
UV DELIVERY	Integrated into lens grippers

DISPENSE MODULE

The dispense module offers automated, precision dispensing of UV-curable adhesive.

Dispense Technology	Positive Displacement Pump	Micro-jetting Technology
Site Recognition & Dispense Verification	Machine vision camera with illumination	Machine vision camera with illumination
Dispense Pattern Options	Lines, arcs, dots (or any combination)	Lines, arcs, dots (or any combination)
Linear Positional Resolution	< 1 µm	< 1 µm
Dispense Positioning Accuracy (X, Y, Z)	< 25 µm	< 25 µm
Minimum Bead Width	300um	100um

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TARGET MODULES

There is a large range of target modules from camera module targets of different wavelengths and field of views to collimators for far object distance to speckle-free targets and beam profilers for projected images. Targets can be customized to your application.

NARROW FOV TARGET MODULE SPECIFICATIONS

AVAILABLE TARGET OBJECT DISTANCE WITHOUT RELAY OPTICS	100mm – 1200mm
SIMULATED TARGET OBJECT DISTANCE WITH RELAY OPTICS	600mm-infinity
MAXIMUM LENS FOV WITH RELAY OPTICS	70 degrees
OPTICAL FIELD HEIGHT FOR ALIGNMENT AND TEST	Configurable
NUMBER OF OFF-AXIS FEATURES FOR ALIGNMENT/TEST	4 to 16+
NUMBER OF ON-AXIS FEATURES FOR ALIGNMENT/TEST	1
FEEDBACK FOR ALIGNMENT	MTF
BACKLIGHT UNIFORMITY MAX VARIATION	10%
STANDARD BLACKLIGHT COLOR (INCLUDED)	White
OPTIONAL BLACKLIGHT COLORS	Red (625nm), Blue (470nm), Green (530nm), NIR (850nm or 940nm), FWIR, other wavelengths available as well

WIDE FOV TARGET MODULE SPECIFICATIONS

AVAILABLE TARGET OBJECT DISTANCE	1.2m
MAXIMUM LENS FOV WITHOUT RELAY OPTICS	190 degrees
OPTICAL FIELD HEIGHT FOR ALIGNMENT AND TEST	Configurable
NUMBER OF OFF-AXIS FEATURES FOR ALIGNMENT/TEST	4 to 8
NUMBER OF ON-AXIS FEATURES FOR ALIGNMENT/TEST	1
FEEDBACK FOR ALIGNMENT	MTF (ISO12233)
BACKLIGHT UNIFORMITY MAX VARIATION	10%
STANDARD BLACKLIGHT COLOR (INCLUDED)	White
OPTIONAL BLACKLIGHT COLORS	Red (625nm), Blue (470nm), Green (530nm), NIR (850nm or 940nm), FWIR, others available

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PROJECTOR TARGET MODULE SPECIFICATIONS

Kasalis offers any combination of the following options for projector alignment targets.

AVAILABLE TARGET OBJECT DISTANCE	Up to 1m
OPTION	Beam profiler
OPTION	Speckle-free projection screen with imaging camera
OPTION	Optical power meter

INDEXING MODULE

The indexing module includes four positions. It rotates, allowing for parallel processing in the Pixid system.

TIME TO INDEX AND ENGAGE CAMERA FIXTURE	Approximately 2 sec
# OF POSITIONS	4
POSITION 1 FUNCTION	Load/Unload
POSITION 2 FUNCTION	Automated adhesive dispense, sensor tests, adhesive validation
POSITION 3 FUNCTION	Active alignment, adhesive cure, optical test
POSITION 4 FUNCTION	Spare position for additional tests

COLLIMATOR TARGET MODULE SPECIFICATIONS

AVAILABLE TARGET OBJECT DISTANCE	Up to infinity
MAXIMUM LENS FOV W/OUT RELAY OPTICS	190+ degrees
OPTICAL FIELD HEIGHT FOR ALIGNMENT AND TEST	Configurable
NUMBER OF OFF-AXIS FEATURES FOR ALIGNMENT/TEST	4 to 20
NUMBER OF ON-AXIS FEATURES FOR ALIGNMENT/TEST	1
FEEDBACK FOR ALIGNMENT	MTF (ISO12233)
BACKLIGHT UNIFORMITY MAX VARIATION	10%
STANDARD BLACKLIGHT COLOR	White
OPTIONAL BLACKLIGHT COLORS	Red (625nm), Blue (470nm), Green (530nm), NIR (850nm or 940nm), FWIR, others available

BASE MODULE AND SAFETY ENCLOSURE

The base module is built on a compact footprint. The safety enclosure protects the operator from moving parts and UV light exposure and also prevents external light from affecting the alignment and testing.

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BASE MODULE SPECIFICATIONS

SYSTEM FOOTPRINT	1.40m (w) x 1.94m (d) (including loader) x 2.5m (h) (worst case, with servicing door open)
FACILITY POWER REQUIREMENT	110VAC/15A or 220VAC/7.5A
FACILITY AIR REQUIREMENT	80 psi minimum
FACILITY VACUUM REQUIREMENT	House vacuum (if needed)
MACHINE INTERNAL CLEANROOM CLASS	Class 100 (ISO 5)
PRIMARY OPERATOR INTERFACE	Touch panel monitor
CE CERTIFICATION	• EN 60204-1 • BS EN ISO 12100:2010 • EN ISO 13849

CONTROL SYSTEM

The control system software is designed to allow for process setup, modifications, process sequencing and tracking, status reporting, operator prompts, maintenance operations, system calibration, display of align and test results, and data logging to standard database formats. The operator language is configurable for your geographic region.

FIXTURES

Kasalis provides a fixture design service for mechanically and electrically engaging your device (camera module or projection module) to the Pixid system.

CAMERA INTERFACE	Parallel, MIPI, HiSpi, Serial LVDS, sub-LVDS, SLVS-EC
COMMUNICATION	SPI, I2C
SENSOR RESOLUTION	Any

TEST PACKAGES

The Pixid 500 single head system includes a standard test package.
Customers can also choose from several optional test packages, as noted in the table below

PIXID 500s: TESTING PACKAGES AVAILABLE

Test Package Name	Tests in Package	Standard or Optional
Standard Tests	• MTF • Focus Symmetry • Field Curvature • Image Contrast • Centration	Included
Advanced Lens Tests	• Chromatic Aberration • Astigmatism • Field of View	Optional
Advanced Sensor Tests	• Hot/Dead Pixels • Dark Signal • Temporal Noise	Optional
Advanced Camera Tests	• Color Reproduction • Dynamic Range	Optional
Particle Detection	• Advanced Particle Detection	Optional

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STANDARD FEATURES

- Active alignment for camera module assembly and test in 5-6 DOF
- Fast system: up to 240 UPH
- Adhesive dispense: positive displacement or jet dispense systems
- Small footprint, streamlined modular design
- UV cure with optional secondary UV cure
- Easy maintenance with swap-out, independent, modules

OPTIONAL FEATURES

QUALITY CONTROL

- Automated Load/Unload →
  No manual handling of components
- Post Dispense Inspection →
  Verifies position and quality of each dispense
- Adhesive Weighing System →
  Verifies consistent dispense volume
- Temperature & Humidity Monitoring →
  Checks and logs sensor and system temperature
- Automated UV Measurements →
  Verifies consistent UV output for curing
- Target Intensity Measurements →
  Verifies consistent target illumination
- Bond Gap Measurements →
  Verifies consistent bond lines for adhesive

TRACEABILITY

- Factory MES Integration →
  Tracks material through assembly
- Fixture Tracking →
  Ensures proper machine setup at all times
- SN Tracking →
  Tracks parts by component barcodes and sensor ID

FUNCTIONAL TESTING

- Particle/Blemish Testing →
  Check sensor prior to AA
- Sensor Tests (Pixels, etc) →
  Check sensor prior to AA
- Saturation Test →
  Prevent overstated MTF due to saturation
- Focus and Pointing Test →
  Catch failures after AA

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TOP LEVEL PROCESS FLOW: TIMING CHART FOR CAMERA MODULE

The below process flow chart illustrates how camera modules will move through the Pixid 500s system, in parallel, in order to obtain the optimal TAKT time.

<table>
<tr><th>Seconds</th><th>Load-Unload Station</th><th>Dispense Module</th><th>Align Module</th></tr>
<tr><td>0</td><td colspan="3">Disengage camera fixtures and rotate index table 90 degrees.</td></tr>
<tr><td>1</td><td colspan="3"></td></tr>
<tr><td>2</td><td rowspan="13">Unload completed camera module. Load next sensor and lens.</td><td>Power on image sensor and begin streaming images.</td><td>Power on image sensor, pick up lens, and move lens to align start</td></tr>
<tr><td>3</td><td>Optional particle test and inspect sensor for dispense datum.</td><td rowspan="5">Active alignment: Tip/tilt correction, focus, optical centration, and MTF verification.</td></tr>
<tr><td>4</td><td rowspan="3">Dispense UV curable adhesive with primary dispense head</td></tr>
<tr><td>5</td></tr>
<tr><td>6</td></tr>
<tr><td>7</td><td rowspan="2">Post-dispense vision verification of dispensed bead or dot.</td></tr>
<tr><td>8</td><td rowspan="2">UV Cure</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td><td rowspan="2">Ungrip lens housing and final MTF verification</td></tr>
<tr><td>11</td><td></td></tr>
<tr><td>12</td><td colspan="2"></td></tr>
<tr><td>13</td><td colspan="3"></td></tr>
<tr><td>14</td><td colspan="3"></td></tr>
<tr><td>15</td><td colspan="3"></td></tr>
</table>

Production Throughput	Up to 240 modules per hour

About Kasalis

Kasalis is a proven market leader in active alignment and designs industry leading optical alignment manufacturing systems. Kasalis systems precisely align and assemble optical electronic devices for a variety of products and industries that include AR and VR headsets, LiDAR systems, laptops, cell phones, cameras and automotive displays. With over 20 years of experience, Kasalis has emerged as a premier active alignment technology company driving the enhanced development of current and next-generation capabilities of electronic devices.

Kasalis is a technology division of Jabil, a $26 billion global company with over 50 years of experience delivering technology, manufacturing and supply chain solutions to the world's leading brands.