

A PLATFORM APPROACH TO PRODUCTION NEEDS

3SAE's patented PentaPod® is our platform for high-stiffness precision multi axis motion, scanning and alignment. It is the basis for the breakthrough OctaPod™ microrobot for autonomous alignment for production silicon photonics test and assembly. While the PentaPod® serves as the gold standard for sub-micron manual or programmed positioning, the OctaPod™ functions as a task-oriented microrobot with embedded intelligence to automate peak-power seeking, multi-channel I/O alignment, and drift tracking.

- **PentaPod® Precision:** Uses a patented parallel kinematic design to deliver 6 Degrees of Freedom with zero crosstalk. The stiffness inherent in its principle goes directly to fast settling and ambient vibration rejection, with benefits for throughput, yield and precision.
- **OctaPod™ Automation:** Adds an integrated dither module for real-time multichannel optimization and tracking for production test and assembly applications in Silicon Photonics (SiPh).
- **Industrial Build:** Both feature a 20,000-hour MTBF and 20-minute field-serviceable actuator replacement.
- **Easy Integration:** Both have a powerful, fanless controller built in, eliminating moving/sweeping cables and their cost, complication, cleanliness and reliability issues.

Precision alignment is the foundation of photonic performance. When you're working with devices that require sub-micron accuracy, you don't just need a stage that moves; you need a system that thinks. Our micro-positioning solutions range from ultra-stable positioners to fully autonomous microrobots. The PentaPod® Multi-Axis Positioner provides the structural rigidity of a mountain, while the new OctaPod™ adds the functionality of a skilled technician, finding the best coupling and staying there automatically despite thermal and curing perturbations. Integrating these tools into your test and assembly processes ensures your production throughput and yield are world-class.

Choosing Your System: Positioner vs. Microrobot

The choice between a PentaPod® and an OctaPod™ depends on whether your process requires a device you command to move or a device you command to accomplish a task.

The PentaPod®: The Gold Standard for Motion

The PentaPod® is designed for applications where absolute positional stiffness and accuracy are paramount.

- **6-DOF flexibility:** Put the rotational pivot point where it makes sense in your application with a simple software command.
- **High Precision:** Sub-micron precision, long linear and angular travel ranges, high load capacity.
- **Robust Operation:** Never needs tuning. Oscillation and runaway are impossible. Bolt your load on and get to work. No scheduled maintenance.
- **Built-in Controller:** Fanless, no moving cables.
- **Reliable:** 20,000 hr MTBF, and 20 minute MTTR on the rare occasion service is needed.
- **Singularity-Free:** True parallel kinematics ensure smooth motion across the entire workspace.
- **High Stiffness:** The 24 angular-contact rotary bearings used in the best hexapods are eliminated, together with their compliance, cost and wear.

PentaPod is stiffer than a 25mm steel post!

- **High Motion Quality:** Minimal crosstalk ensures that movement in one axis doesn't disturb others.
- **Compact Footprint:** Integrated controllers mean no bulky external electronics racks.
- **Motionless Coordinate Recovery:** On power loss when in-position, automatically recover the position without hazardous initialization motions.

The OctaPod™: The World's Most Productive and Robust Photonic Alignment Microrobot

The OctaPod™ is engineered specifically for the SiPh “Planar Photonics” era, where alignment is the most painful production bottleneck. It moves intelligence from the host PC directly into the hardware. It offers all the benefits of the PentaPod plus:

- **Fast Alignment:** Novel, built-in intelligence optimizes coupling in a flash. Just issue the command and it's automatic. Built-in metrology for voltage and photocurrent figures-of-merit.
- **Real-Time Tracking:** An integrated dither module uses spiraling circular motion to rapidly achieve and optionally track peak power, automatically compensating for thermal and curing stresses.
- **Multichannel Optimization:** Rapidly aligns array devices from PICs to fiber arrays to interposers and complex substrates.
- **Autonomous Tasks:** Uses “Do This” commands to perform scan-and-return-to-optimum tasks without software lag.
- **Production-Ready Interfacing:** Responsive USB-C and Ethernet interfaces and a well-thought-through command set provide platform-independent communications for fast deployment.

Technical Comparison

Feature	PentaPod® Positioner	OctaPod™ Microrobot
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Primary Use	High-precision motion/alignment	Autonomous peak-power seeking
Control Style	External host-side commands	Embedded intelligence & task-based
Dither Module	N/A	Integrated high-frequency dither
Target Applications	Ultra-Precision Laboratory and Industrial Positioning & Scanning	SiPh Production Test & Assembly, Array Device Processing
Both Offer:		
Reliability	20,000-hour MTBF	
Maintenance	20-min actuator replacement	
Cleanroom	ISO-5 suitable. Fanless design; no air/heat disturbance or particle	
Controller	Integrated, Fanless	

Built for Production Economics

The industry must move away from “lab-grade” tools that fail under the pressure of 24/7 manufacturing. Whether you choose the PentaPod® or the OctaPod™, you’re investing in a platform built for the fab.

Programming and integration are easy, for rapid deployment. Our systems are platform-agnostic, using tidy, mnemonic command sets that integrate easily into your existing MES via virtually any OS or language, including Python, LabVIEW, C#, or C++. Because the electronics are embedded, you won’t have to deal with a “rats-nest” of cabling or bulky external cabinets that take up valuable floor space.

Accelerate Your Throughput

Don't let alignment be your production bottleneck or future reliability headache. Whether you're scaling a startup or optimizing a global semiconductor facility, our engineering team is ready to help you choose the right tool for your specific requirements.

