

Automated Laser Diode Alignment and Attach System

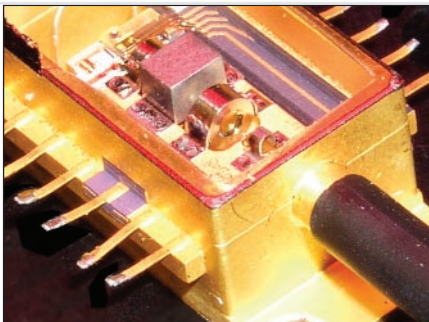
FAST 35

Fast, Flexible, Laser Diode Fiber Attach

Palomar Technologies FAST™ 35 is a scaleable automation platform for the alignment and fiber attach of active photonic devices such as laser diodes.

KEY FEATURES

- ▶ **Automated material handling** of device and fiber insertion maximizes throughput, repeatability, and yield
- ▶ **Direct drive alignment stages** result in superior optical repeatability through nanometer-level step sizes
- ▶ **Optimized process control** aligns active device in minutes, including material presentation, first-light, fine alignment/attach
- ▶ **Flexible Attach options** support laser weld, solder, or epoxy attach
- ▶ **Programming wizard** enables the automation of new devices through easy, parameter-based program tool
- ▶ **Machine vision routines** for device placement, attach spotting, and high-speed first light acquisition



TYPICAL DEVICES

- ▶ Laser Diodes
- ▶ Tunable Lasers
- ▶ Pump Lasers
- ▶ SOAs

PACKAGES

- ▶ 14-pin Butterflies
- ▶ Mini-DILs
- ▶ Mini-Flats



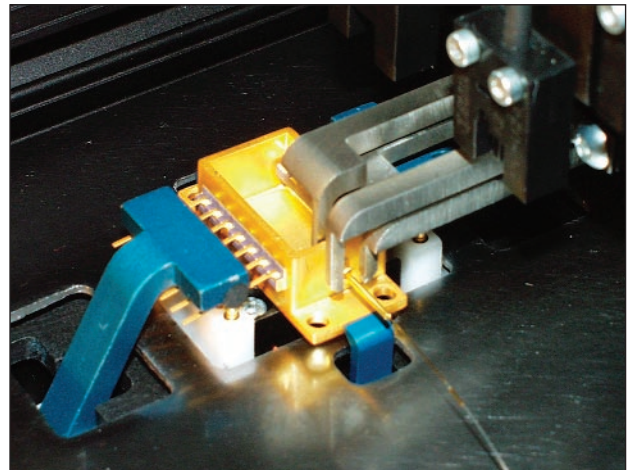
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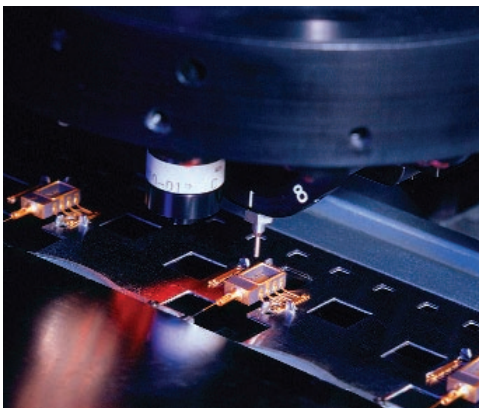
Automates Optical Alignment & Attach of Active Components — Automates critical fiber handling function to deliver high yield

WHY CHOOSE THE PALOMAR TECHNOLOGIES FAST™ 35?

- ▶ The FAST 35 is the only standard active device assembly system based on direct drive/linear motor/voice coil nano-positioning technology
- ▶ Flexible platform is configured to support a range of fiber attach techniques from a single platform
- ▶ Production-grade construction and non-contact drive system ensure long-term, reliable operation in lab or manufacturing environments
- ▶ Turnkey solutions of proven, tested, standard processes bring manufacturing online quickly
- ▶ Comprehensive product line ranging from component solutions to full in-line automation specifically optimized for photonics applications
- ▶ Advanced Process & Photonics Labs available to assist in new device process development
- ▶ Worldwide applications and service support.



▲ **Yield:** Automation of device and fiber handling, including power-up and fiber feedthrough (shown), increases component yield by eliminating manual handling.



▲ **Throughput:** Palomar's in-line material handling option is capable of high device throughput, greatly reducing component cost.

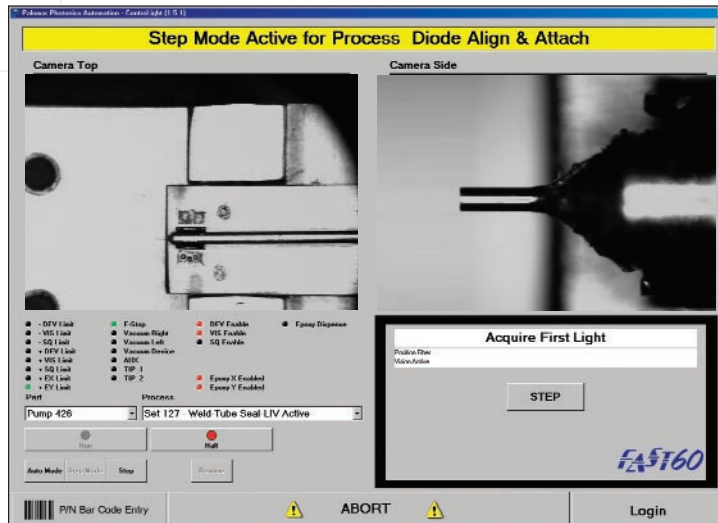
AUTOMATED MATERIAL HANDLING

The FAST 35's modular design enables automation to be deployed based on current requirements. All configurations utilize the same fully automated align and attach process, ensuring upward compatibility.

- ▶ Fully automated fiber feedthrough, active alignment, and fiber attach
- ▶ Patented fiber carrier for convenient fiber management
- ▶ Linear motor gantry for high-speed pick-and-place
- ▶ 3 levels of material handling automation:
 - 1.) *Manual* — single part load / unload
 - 2.) *Island* — batch load of fiber and devices
 - 3.) *In-line* — unattended, in-line operation with Palomar up- and down-stream machines.

AUTOMATED PROCESS CONTROL

Palomar's powerful software is designed for active photonic device applications and as such incorporates all of the critical functionality into a single, user-friendly yet powerful front end.



- ▶ Programmable device library allows users to select any of the pre-programmed devices or attach schedules
- ▶ Networkable database enables remote monitoring and data transfer to/from shop floor control
- ▶ Automated machine vision system detects parts, computes offsets and command adjustments for optimal first-light coupling
- ▶ Integral laser diode control and optional LIV testing ensures device quality pre- and post-attach.

▲ **Flexibility:** A programmable parts library and intuitive user interface makes switching between device runs fast and easy.

ATTACH PROCESS OPTIONS

By design, the FAST 35 is capable of supporting a wide range of fiber attach methods including laser weld, solder, epoxy, and hermetic tube seal.

- ▶ *Laser Weld* — Multi-beam lasers with vision-assisted weld spotting / positioning, proprietary PWS correction and fiber clip
- ▶ *Solder* — Predictive attach method utilizing fluxless solder preform
- ▶ *Epoxy* — Optimal bonding recipes with fast cure / attach
- ▶ *Tube Seal* — Hermetic seal of fiber output port.



▲ **Accuracy:** Palomar has taken the guesswork out of fiber attach by fully characterizing machine and process performance, providing the user an optimal solution geared towards their unique device requirements.



MACHINE SPECIFICATIONS

EQUIPMENT SPECS	Alignment Stage	Dual FAST™ 6
	Alignment Stage Travel	X=20mm, Y=5mm, Z=50mm, Pitch / Roll / Yaw up to 5°
	Motion Controller	32-axis, 150MHz DSP, PCI bus
	Motion Software	ControLight MMI and process development software

VISION	Framegrabber	Cognex® 8100 Series
	Cameras	CCD, 760 x 574 pixel
	Positioning	Automated - programmable

INSTRUMENTATION	POWER METER	
	Wavelength	850-1650nm
	Power	-70 to +20dBm

DEVICE	Mechanical Interface	Electrical nest with automated contactors
	Control	LIV with optional TEC
	Packages	14-pin Butterflies Mini-DILs, Mini-Flats Other Packages Optional

MATERIAL HANDLING	Input	Distinct device and fiber spool trays (standard) Single- or multi-device tray with fiber spools (optional) Clips or preforms in Gel-pack
	Output	Multi- (standard) or single- (optional) assembly tray with pigtailed devices

LASER WELD ATTACH	Type	Pulsed Nd/Yag regulated power and beam profile
	Beam	2-beam with energy balance
	Delivery	Automated linear and rotary axes
	Angle	Programmable, 30-60°

SOLDER	Heat Source	Laser diode
	Delivery	Automated
	Type	Fluxless preform

EPOXY	Dispense	Computer-controlled dispense and positioning
	Cure	Programmable UV

COMPUTER	PC	1.5 GHz, 512 MB RAM, passive backplane (or better)
	Operating System	Windows 2000®
	User Interface	17" flat panel

FACILITY	Electrical	115VAC or 230VAC, 20A
	Air	60 psi clean/dry compressed air or nitrogen

PROCESS SPECS	PROCESS CYCLE TIMES	
	In-line	~250 sec (typical diode) <i>Includes part presentation, fiber feed, first light, align, attach.</i>
	Manual Load	~200 sec + load / unload
	Repeatability	0.01dB
	Post-Attach IL	<0.1dB

* NOTE: Cycle times shown are approximate. Actual cycle times are dependent on device type; consult factory for detailed analysis.