

PRECISE™ 800

Automated Optical Shaping (AOS) System



PRECISE™ 800 AOS SYSTEM

Creating New Connections

Precise™ 800 is Orbotech's latest innovation in Automated Optical Shaping (AOS). It is the world's first one-stop solution that both removes excess copper and precisely completes patterns where copper is missing. It enables top quality 3D shaping of the most advanced PCB designs, including any-layer, HDI and complex multi-layer boards. With Precise™ 800, PCB manufacturers can virtually eliminate scrap.

Benefits

Maximum Scrap Saving – One-stop solution

- New 3D shaping of **opens** and other missing copper defects
- Precise shaping of **shorts** and other excess copper defects
- Enabling solution for PCBs that would otherwise be scrapped
- Flexibility – eliminates any complex defect, in any shape and at any location

Superior Quality with Breakthrough 3DS (3D Shaping) and CLS (Closed Loop Shaping) Technologies™

- 3D analysis, 3D laser shaping and 3D visualization
- Iterative and controlled process
- Automatic comparison with CAM data

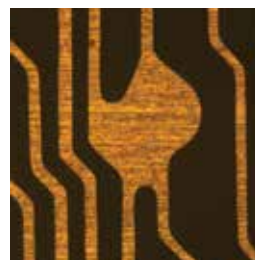
New Deposition and Enhanced Ablation Processes

- High accuracy for advanced HDI applications
- High contrast optical imaging for a wide variety of materials

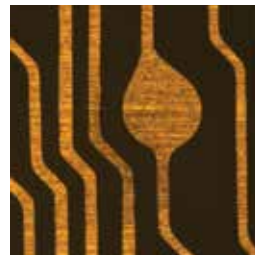
Significant Manpower Savings

- Push to Shape (P2S) Technology™ - saves up to 75% in manpower
- No need for skilled operators
- Remote Image Verification (RIV) – enables monitoring of the shaping process and results from a remote computer
- Automation ready

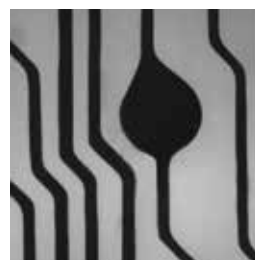
Short - Shaping



Before shaping



After shaping
White light image

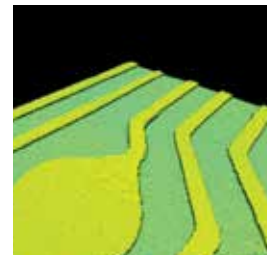


After shaping
UV light image

Open - 3D Shaping



Before 3D shaping



After 3D shaping



After 3D shaping
UV light image



Before 3D shaping



After 3D Shaping



Maximum Scrap Saving

Precise™ 800, Orbotech's one-stop AOS system virtually eliminates PCB scrap by shaping both excess and missing copper defects, all in a single automated process. Saving PCBs that otherwise would have to be scrapped, Precise™ 800 enables correction of any defect of any shape in any location. It significantly increases PCB production yield on even the most complex any layer, HDI and advanced MLB jobs. Precise™ 800 addresses all defects including those on inner and outer layers, multiple lines, corners and pads.

Breakthrough 3DS and CLS Technologies™

Precise™ 800 features two cutting-edge technologies to enable the accurate shaping of PCB defects.

- **3D Shaping (3DS) Technology™** is Orbotech's enabling technology for missing-copper defects. It is based on 3D processes including 3D defect analysis, 3D laser shaping and 3D visualization. 3D analysis compares the defect shape to CAM data in real time, automatically finding where copper needs to be added in 3 dimensions. It then guides the system's laser to the Precise™ Stick and accurately deposits copper onto the missing area. Precise™ Stick is a state of the art metal carrier enabling a high quality deposition process. After completion of this process, the result can be seen by 3D visualization.

- **Closed Loop Shaping (CLS) Technology™** is the key to outstanding accuracy and speed. Orbotech's proven image acquisition capability captures precise images of the defect area. Then, a set of specialized image analysis algorithms compares the images to the CAM data in real time, automatically finding the copper to be removed. It then guides the system's laser as it accurately ablates excess copper.

New Deposition and Enhanced Ablation Processes

Orbotech's ablation technology is enhanced to optimize the shaping process. Advanced HDI applications benefit from short shaping down to 25um line/space and open 3D shaping down to 30um line/space. The high contrast optical imaging technology in Precise™ 800 is designed to perform effectively on a wide variety of materials. Typical HDI short defects can be processed at a rate of 80 excess copper shapes per hour and 30 missing copper 3D shapes per hour (additional details can be found in the specification table). Thoroughly tested to meet the highest industry standards, Precise™ 800 performs perfect automated 3D shaping, eliminating defects as if they were never there. The system's results meet strict manufacturing specifications for electrical characteristics, durability and visual requirements.

Significant Manpower Savings

Orbotech's Push to Shape (P2S) Technology™ makes automated shaping easy. In fact, a single operator can operate up to four Precise™ 800 systems simultaneously, potentially reducing manpower requirements by up to 75%. The advanced P2S algorithms fully and automatically manage the shaping process and shape defects to perfection without manual intervention. P2S enables connecting the Precise™ 800 to automation which improves production efficiency even further. Remote Image Verification (RIV) enables operators to monitor all defects and verify the shaping process from a remote computer if needed.

Specifications

	Excess Copper	Missing Copper		
Technology Range	Down to 1.0mil (25µm) line/space	Down to 1.2mil (30µm) line/space		
Reshaped Products	Inner layers: signal, power & ground, mixed, cross shielding, inner with holes, build-up Outer layers: signal, mixed, cross-shielding, build-up			
Material	Laminate type: FR4, FR5, Tetra function ¹ Minimum laminate thickness: 40 Microns Copper thickness: 0-100 Microns			
Reshaped Defects	Any excess copper including: shorts, protrusions, copper splashes, minimum space violations, excess features, wrong-larger size of features, under-etched features, under solder mask short defects	Any missing copper including: opens, nicks, pinholes, missing features, wrong-smaller size of features, over-etched features, under solder mask open defects		
Panel Dimensions	Max. panel size/reshaped area: 24" x 30" (610mm x 762mm) Panel thickness: 50-10,000µm			
Maximal 3D Shaping Area for 0.5 ounce copper thickness	800µm x 1000µm ²	550µm x 550µm		
Shaping Width Accuracy	± 10% of nominal line			
Throughput ³ Short/open on line	Copper Thickness	Defect Size (µm)	Shaping (shorts) per Hour	3D Shaping (opens) per Hour ⁴
	30µm	50x200	80	30
		50x50	80	25
		50x200	70	20
Image Processing Methods	Full reference comparison SIP Technology™			
Technology	Orbotech's CLS (Closed Loop Shaping) Technology™		<ul style="list-style-type: none"> • Orbotech's CLS (Closed Loop Shaping) Technology™ • Orbotech's 3DS (3D Shaping) Technology™ 	
Precise™ Stick ⁵	N/A		Up to 120 open defects/Precise™ Stick	
Precise™ Stick Lifetime (Typical)	N/A		Packed: 1 year Unpacked: 1 month	
Setup Data Sources	CAM inspection and classification criteria from Orbotech AOI and Orbotech verification stations			
Connectivity	Orbotech AOI and Orbotech verification stations only			
Panel Registration Method	Pinless registration – panel edge alignment			
Options	RIV (Remote Image Verification)			
Verification Stations Supported	Orbotech VeriSmart™, VeriSmart™-A, VeriFine™, VeriFine™-A, VeriWide™, VeriWide™-A			
Dimensions (W x D x H)	161 cm x 182 cm x 165 cm			
Weight	840 Kg			

¹ Other laminates need to be tested by Orbotech

² Larger size short can be shaped in aggregated mode

³ Based on a test panel with FR4 laminate, including L/U

⁴ Depending on defect quantity & distribution

⁵ Actual Precise™ Stick consumption depends on various criteria as open size, orientation, conductor thickness and others

• Specifications are subject to change without notice

• The Precise™ 800 AOS system is a class 1 laser product.