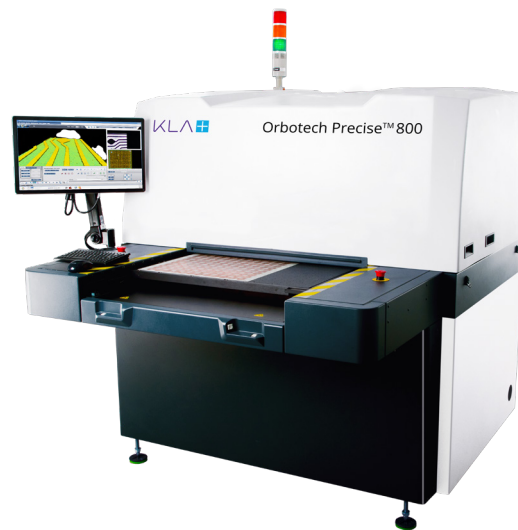


# Orbotech Precise™ 800

Automated Optical Shaping (AOS)

## Orbotech Precise 800 AOS

Orbotech Precise 800 is KLA'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 Orbotech 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
- Saving PCBs that would otherwise be scrapped
- Eliminating complex defects regardless of their shape or location

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

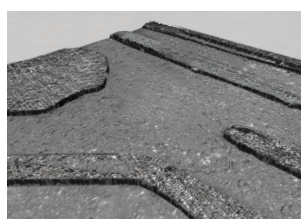
- 3D analysis, 3D laser shaping and 3D visualization
- Iterative and controlled process
- Automatic comparison with CAM data

### New Deposition and Enhanced Ablation Processes

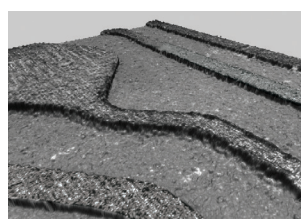
- High accuracy for advanced HDI applications
- High contrast optical imaging for a wide variety of materials

### 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 remotely
- Automation-ready

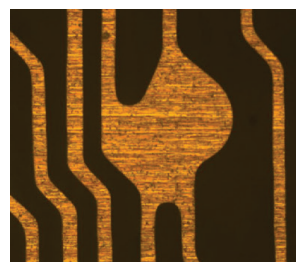


Before 3D shaping.

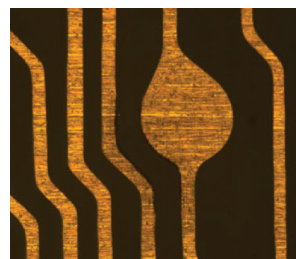


After 3D shaping.

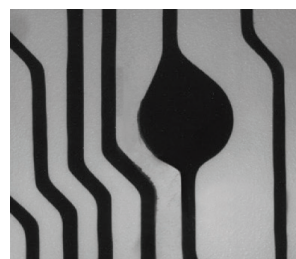
### Short - Shaping



Short before shaping.

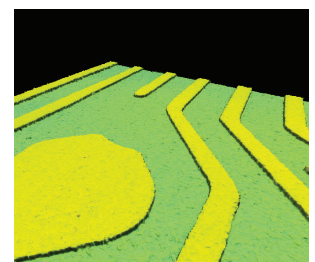


Short after shaping.  
White light image.

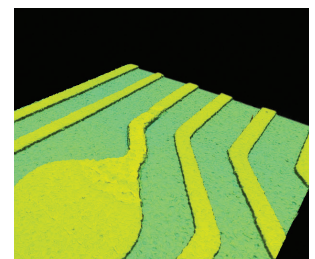


Short after shaping.  
UV light image.

### Open - 3D Shaping



Open before 3D shaping.



Open after 3D shaping.



Open after 3D shaping.  
UV light image.

## Maximum Scrap Saving

Orbotech Precise 800, KLA'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, Orbotech 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. Orbotech Precise 800 addresses all defects, including those on inner and outer layers, multiple lines, corners and pads.

## Breakthrough 3DS and CLS Technologies

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

- 3D Shaping (3DS) technology** is KLA'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 Orbotech Precise Stick and accurately deposits copper onto the missing area. Orbotech 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. KLA'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

KLA's ablation technology is enhanced to optimize the shaping process. Advanced HDI applications benefit from short shaping down to 25µm line/space and open 3D shaping down to 30µm line/space. The high contrast optical imaging technology in Orbotech 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 3D missing copper 3D shapes per hour (additional details in the specification table). Thoroughly tested to meet the highest industry standards, Orbotech 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

KLA's Push to Shape (P2S) technology makes automated shaping easy. In fact, a single operator can operate up to four Orbotech 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 Orbotech Precise 800 to automation that improves production efficiency even further. Remote image verification (RIV) enables operators to monitor all defects and verify the shaping process remotely, if needed.



CLS Technology



3DS Technology

## Specifications

	Excess Copper	Missing Copper		
Technology Range	Down to 1.0mil (25µm) line/space	Down to 1.2mil (30µm) line/space		
Reshaped Products	<b>Inner layers:</b> signal, power & ground, mixed, cross shielding, inner with holes, build-up <b>Outer layers:</b> signal, mixed, cross-shielding, build-up			
Material	<b>Laminate type:</b> FR4, FR5, Tetra function* <b>Copper thickness:</b> 0-50 microns			
Reshaped Defects	<b>Any excess copper</b> including: shorts, protrusions, copper splashes, minimum space violations, excess features, wrong-larger size of features, under-etched features, under solder mask short defects	<b>Any missing copper</b> including: opens, nicks, pinholes, missing features, wrong-smaller size of features, over-etched features, under solder mask open defects		
Panel Dimensions	Maximum panel size/reshaped area: 24" x 30" (610mm x 762mm) Panel thickness: 50-10,000µm			
Maximal 3D Shaping Area for 0.5 Ounce Thickness	1000µm x 800µm**	550µm x 450µm		
Shaping Width Accuracy	± 10% of nominal line			
Throughput*** Short/Open on Line	Copper Thickness	Defect Size (µm)	Shaping (shorts) per hour	3D Shaping (opens) per hour****
	30µm	50x200	80	30
		30µm	50x50	80
30µm	50x200		70	20
	Image Processing Methods	Full reference comparison SIP™ technology		
Technology	KLA's Closed Loop Shaping (CLS)™ technology		KLA's Closed Loop Shaping (CLS) technology KLA's 3D Shaping (3DS) technology	
Orbotech Precise Stick*****	N/A		Up to 120 open defects/Orbotech Precise™ Stick	
Orbotech Precise Stick Lifetime (typical)	N/A		Packed: 1 year Unpacked: 1 month	
Setup Data Sources	CAM inspection and classification criteria from KLA's AOI and verification stations			
Panel Registration Method	Pinless registration - panel edge alignment			
Options	RIV, Automation-ready			
Verification Stations Supported	Orbotech VeriSmart™, Orbotech VeriSmart™-A, Orbotech VeriFine™, Orbotech VeriFine™-A, Orbotech VeriWide™, Orbotech VeriWide™-A			
Dimensions (W x D x H)	161cm x 182cm x 165cm			
Weight	840Kg			

\* Other laminates need to be tested by KLA

\*\* Larger size short can be shaped in aggregated mode

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

\*\*\*\* Depending on defect quantity & distribution

\*\*\*\*\* Depending on the size, orientation, and thickness of the conductor. Orbotech Precise Stick consumption can vary significantly.

Specifications are subject to change without notice  
Orbotech Precise 800 AOS is a class-1 laser product.

### KLA SERVICES

From tool installation and system optimization to productivity enhancements and global supply chain management, KLA Services is a trusted partner to customers around the world — delivering an unrivaled experience focused on maximizing tool performance and availability.

KLA Corporation  
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