

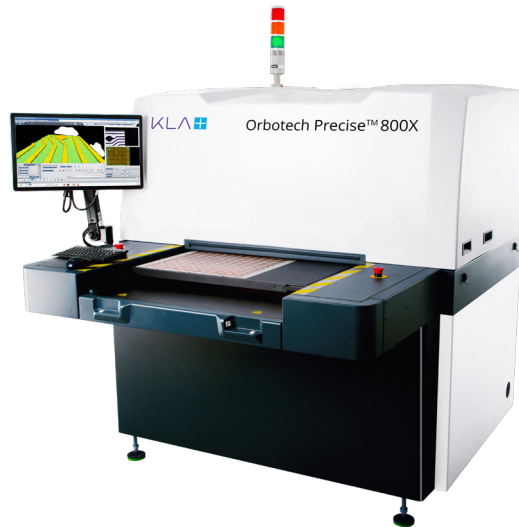
# Orbotech Precise™ 800X

Automated Optical Shaping (AOS)

## Orbotech Precise 800X

### Creating New Connections

Orbotech Precise 800X 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 800X, 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 3D Shaping (3DS)™ and Closed Loop Shaping (CLS)™ technologies

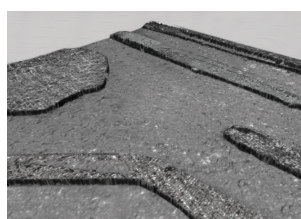
- 3D analysis, 3D laser shaping and 3D visualization
- Iterative and controlled process
- Automatic comparison with CAM data

### New Deposition and Enhanced Ablation Processes

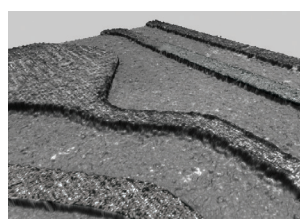
- High accuracy for advanced HDI applications
- High contrast optical imaging for a wide variety of materials

### 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 from a remote computer
- Automation ready

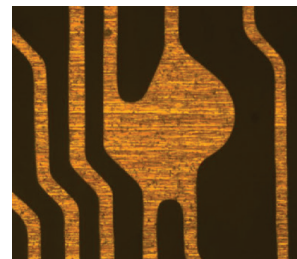


Before 3D shaping

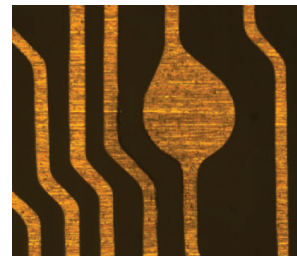


After 3D Shaping

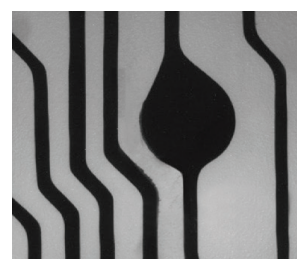
### Short - Shaping



Before shaping

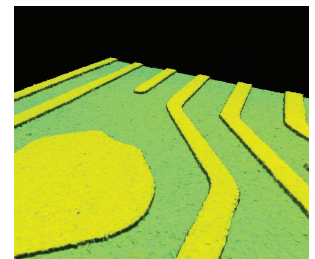


After shaping  
White light image

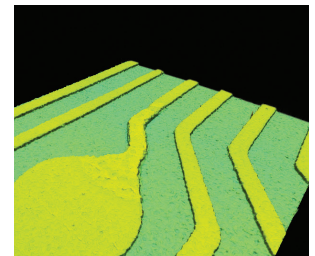


After shaping  
UV light image

### Open - 3D Shaping



Before 3D shaping



After 3D shaping



After 3D shaping  
UV light image

## Maximum Scrap Saving

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

## Breakthrough 3DS and CLS Technologies

Orbotech Precise 800X 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 15µm line/space and open 3D shaping down to 30µm line/space. The high contrast optical imaging technology in Orbotech Precise 800X is designed to perform effectively on a wide variety of materials. Typical HDI short defects can be processed at a rate of 90 excess copper shapes per hour and 40 missing copper 3D shapes per hour (additional details can be found in the specification table). Thoroughly tested to meet the highest industry standards, Orbotech Precise 800X 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 800X 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 800X 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 0.6mil (15µm) 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 (X,Y)	1,000µm 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	87	39
		30µm	50x50	87
30µm	50x200		77	26
	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 KLA's verification stations			
Panel Registration Method	Pin less registration - panel edge alignment			
Options	RIV (Remote Image Verification)			
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

\*\*\*\*\* Actual Orbotech Precise Stick consumption depends on various criteria as open size, orientation, conductor thickness and others

Specifications are subject to change without notice

The Orbotech Precise 800X AOS system 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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