QuadAlign – In-Process Component Alignment System

The QuadAlign system is a patented, in-process alignment system based on analysis of lead information instead of merely package geometry. Each spindle in a “Q” Series assembler is equipped with a QuadAlign system. This permits each spindle to independently process components during motions between the pickup and the placement.

A breakthrough in on-the-fly alignment

Our innovative visible, monochromatic light-based technology confirms good components and accurately compensates for X, Y and rotational component errors. The result is a system that places more components from 0201 to QFPs in less time than other assemblers.

Unlike other systems, the QuadAlign system automatically:

- Finds the exact position of the lead set, not just the body for improved placement accuracy of QFPs
- Adapts to pickup offsets
- Rejects wrong components or those which fail to meet the acceptable component profile
- Verifies correct nozzle and performs nozzle tip calibration after each nozzle change
- Maintains extremely low defect rates

How the QuadAlign System works

The optical alignment process begins when the host controller sends a description of the component to the QuadAlign system. After component pickup, the monitoring and alignment process takes place while the placement head travels to the designed PCB coordinate for placement. Using a calibrated pickup nozzle, the component is rotated in the light field between the light emitter and receptor.

The QuadAlign system compares the captured lead information with the SMT component profile. Using the assembler’s built-in adaptive process control, the pickup location, the scan height, and other key process parameters are monitored and altered to optimize the placement accuracy.

Lead alignment advantage

Capturing the lead image is the key innovation of QuadAlign system technology because it is the leads that must be aligned to the PCB, not the component body.

Only “Q” Series assemblers with the QuadAlign system are able to reliably maintain consistent high placement speeds.
The QuadAlign System — Four-step in-process lead alignment for multifunctional assemblers

1. Pick up fine pitch part
2. In-process lead alignment while moving to the placement position
3. Component placement
4. Perfectly placed component

Competing Systems — Seven-step placement with side trip to upward vision system

1. Pick up fine pitch part
2. Move to upward looking camera
3. Wait for motion stability — then acquire an image
4. Determine new placement location
5. Move to placement position
6. Component placement
7. Perfectly placed component

By performing the lead alignment process on-the-fly without the need for side trips to an upward vision camera, QuadAlign maintains high component placement speeds while other assemblers slow to a crawl.

QuadAlign System Specifications

- **X-Y Accuracy**: ±0.001” (±0.025mm)
- **Theta Accuracy**: ±0.1° (Note: chip packages have a Theta accuracy of ±1.0°)
- **X-Y Repeatability**: 0.0005” (±0.0127mm)
- **Theta Repeatability**: 0.05°
- **Minimum Pitch**: >0.020” (0.508mm)
- **Typical Alignment Time**: 200-400msec
- **Minimum Component Standoff**: 0.010” (0.254mm)
- **Component Size**
  - Maximum (l, w, thickness): 1.275” x 1.275” x .394” (32.385mm x 32.385mm x 10.008mm)
  - Minimum (l, w, thickness): 0.020” x 0.010” x .008” (.508mm x .254mm x .203mm)
- **X-Y Component Pickup Error**: <±0.080” (2.032mm)
- **Theta Component Pickup Error**: <±5° to ±15°