CHALLENGES OF PACKAGING PHOTONIC DEVICES

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CHALLENGES OF PACKAGING PHOTONIC DEVICES

PROBLEMS

- Must be positioned to submicron tolerances
- Must be fastened in place while maintaining the position to within submicrons
- Must not move more than a fraction of a micron with time
- Must maintain submicron tolerances under high vibration, humidity, and temperature extremes

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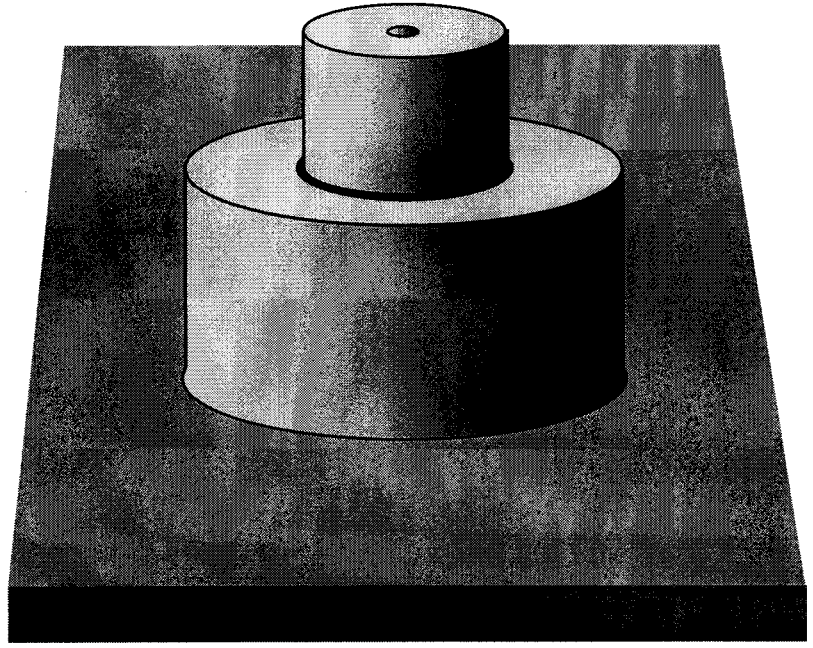
TYPICAL POSITIONING TECHNIQUE USED TODAY



MOUNTING PLATFORM IS NOT DECOUPLED FROM THE FASTENING MECHANISM

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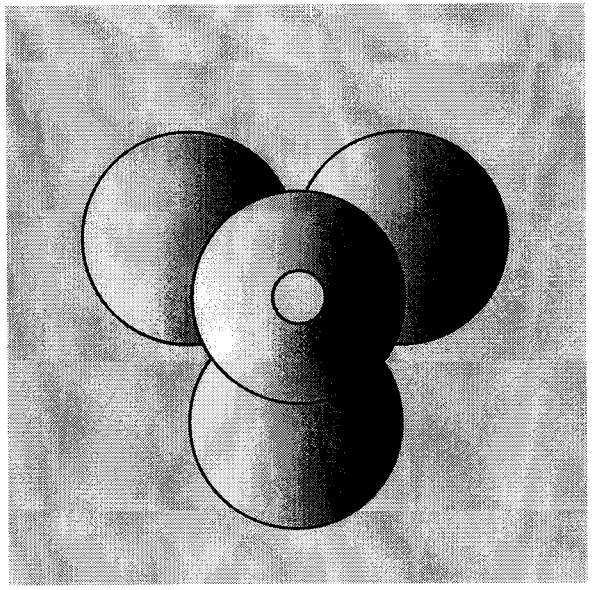
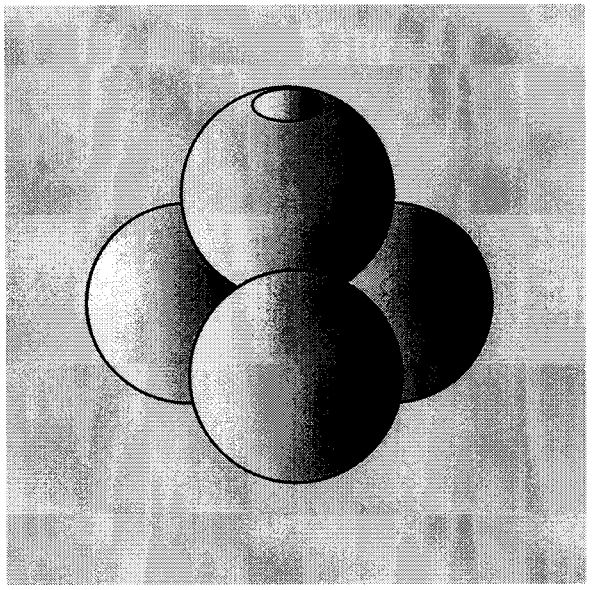
CHALLENGES OF PACKAGING PHOTONIC DEVICES

CURRENT PULSE WELDING



TOP VIEW



ANGLED VIEW

MOUNTING PLATFORM IS DECOUPLED FROM THE FASTENING MECHANISM BUT APPLYING THE HIGH PRESSURE NEEDED IS DIFFICULT

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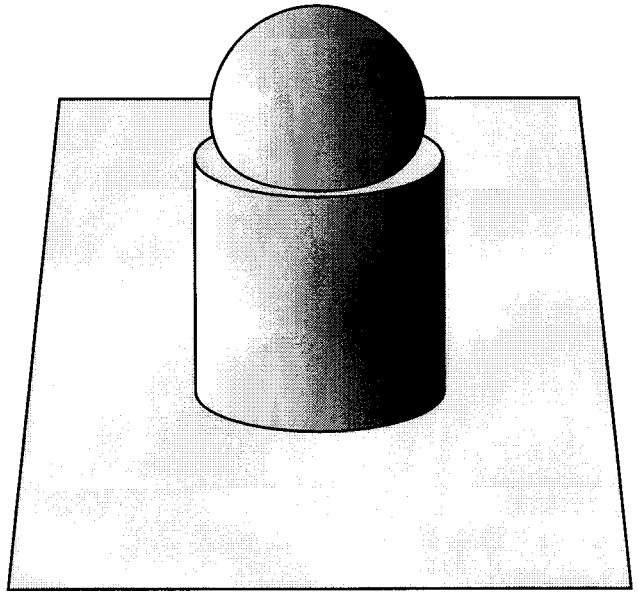
SOLDER BALL METHOD



SOLDER BALL MOUNT

MOVES WHEN COOLING, DIFFICULT TO CONTROL, LABOR INTENSIVE

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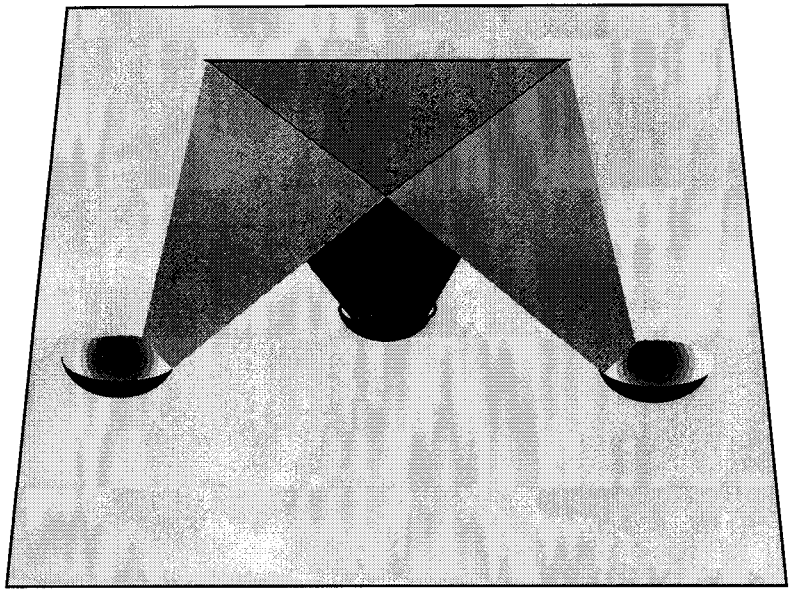
TRIPOD POSITIONING AND LASER WELDING



TRIPOD COMPONENT MOUNT

MOUNTING PLATFORM IS DECOUPLED FROM THE FASTENING MECHANISM, SIX DEGREES OF FREEDOM

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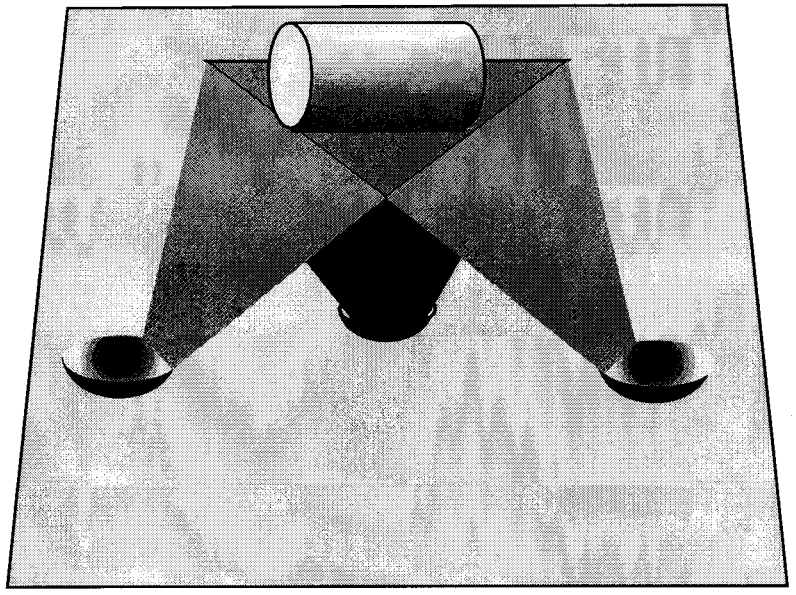
TRIPOD POSITIONING AND LASER WELDING



TRIPOD COMPONENT MOUNT

HORIZONTALLY MOUNTED COMPONENT

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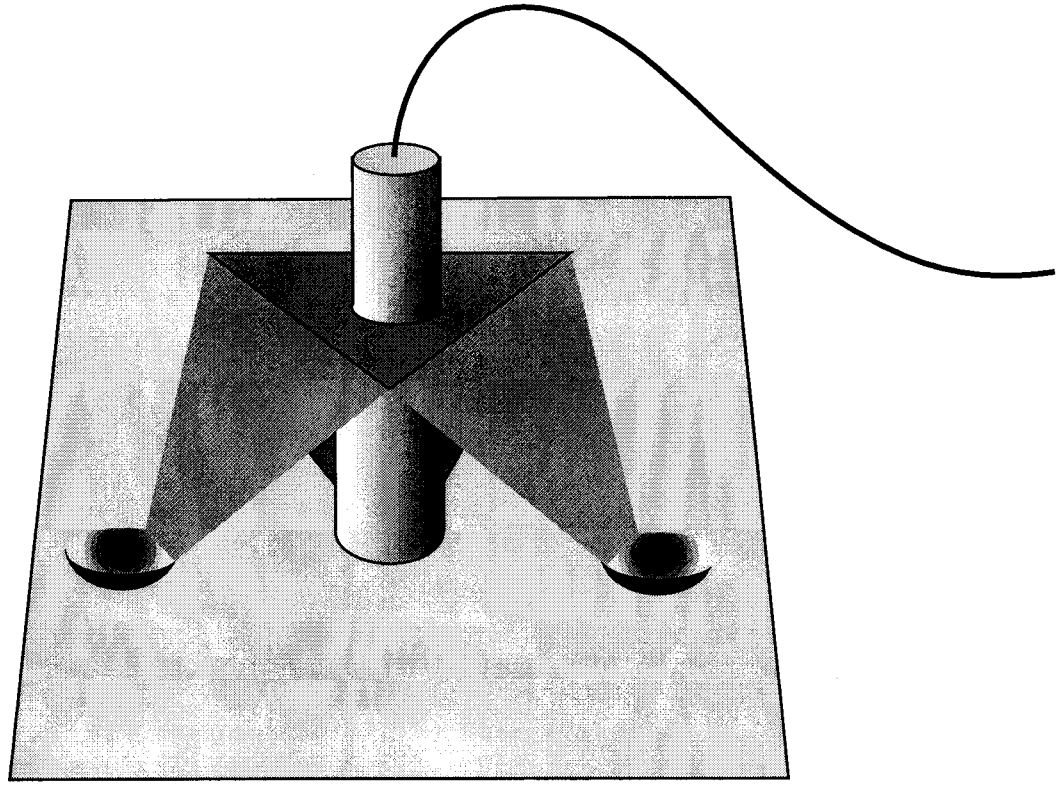
TRIPOD POSITIONING AND LASER WELDING



VERTICALLY MOUNTED COMPONENT

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CONCLUSION

- Presently used photonic packaging methods are labor intensive and often unreliable
- Studies have shown laser welding to be the superior fastening technology but it must be used in combination with a compatible positioning technology
- The right combination of positioning technology and fastening technology which will result in low cost, reliable photonic assemblies is yet to be developed