SOUTHERN MACHINERY

Equipment Throughput Calculation

- **Simplistic Throughput Calculation**
  - Deduct a basic rule of thumb percentage from the maximum machine cycle rate.
  - The accuracy of this method is highly questionable.
- **Effective Throughput Calculation**
  - Machine de-rate calculated using statistical data based on actual run data and component counts.
  - Also considers PPM, Product Changeover, Board Load/Unload Time, and Downtime.

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First Pass Yield

$$\left(\frac{\text{Total Components Run - Defects}}{\text{Total Components Run}} \right) \text{X } 100$$

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Intrinsic Availability

$$\left[\frac{\text{Productive Time}}{\text{Productive Time + Repair Time}} \right] \text{X } 100$$

Intrinsic Availability is the percentage the machine operates based on down time attributed to ***relevant*** interrupts and active repair or recovery time only.

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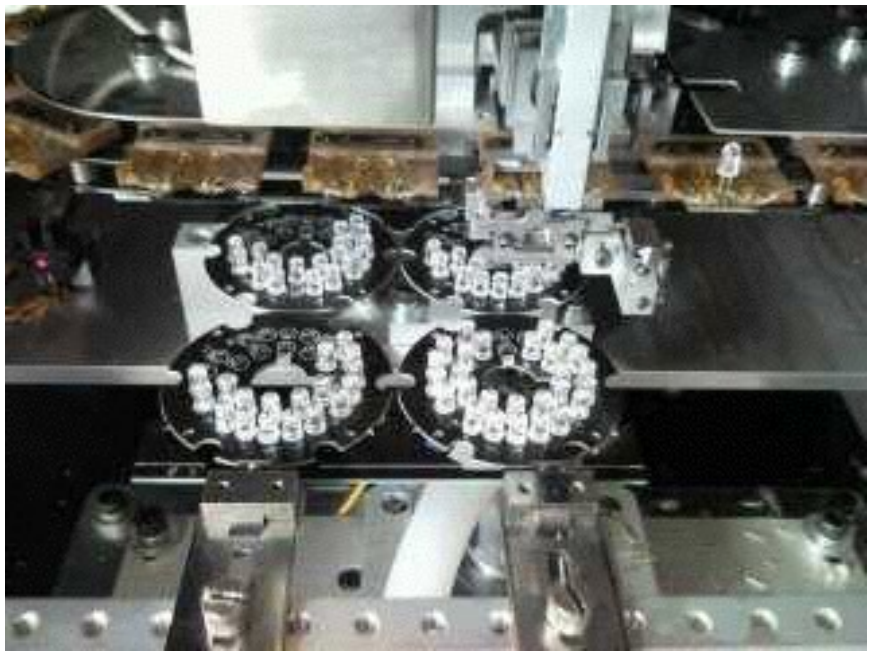
Insertion/Placement Reliability

$$\left(\frac{\text{Total Components Run - Insert Errors}}{\text{Total Components Run}} \right) \text{X } 100$$



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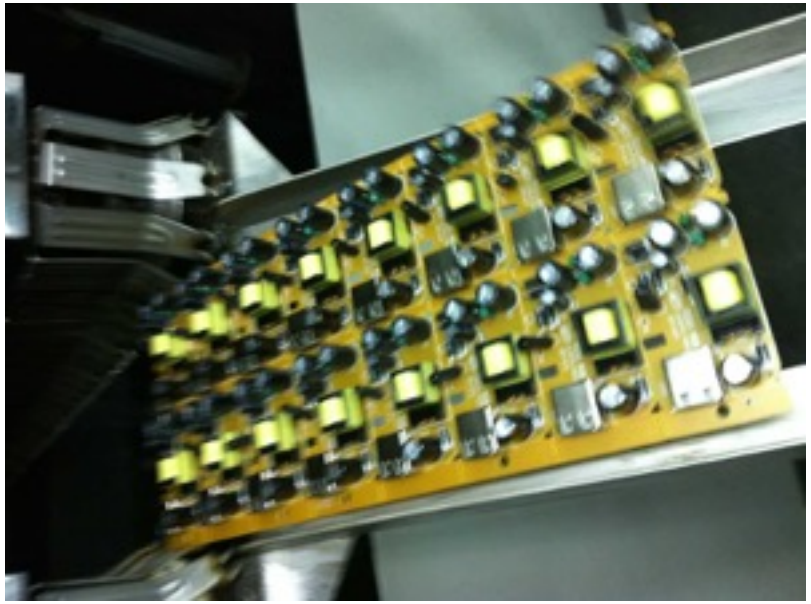
Placement Error/Repeatability

- Placement error is based purely on attribute data.
- No meaningful variables data has ever been defined for through-hole processes.
- Placement Repeatability for through-hole is not measurable.



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Cost Per Insertion

- CPI Calculation

  Equipment Depreciation Expense

  Replacement Parts Cost

  Operator Labor Cost

  Maintenance Labor Cost

  Sum

  Divided By

  Number of Components to Be Inserted

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Process Issues

- Sequence of insertion
  - Interconnect (Eyelet, Pins, Terminals)
  - DIP
  - Axial
  - Radial

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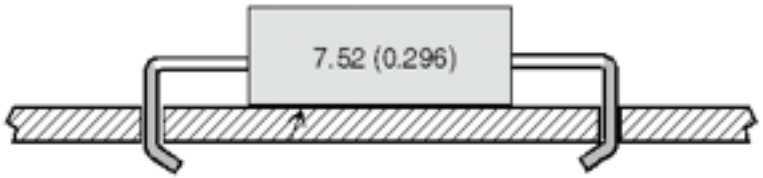
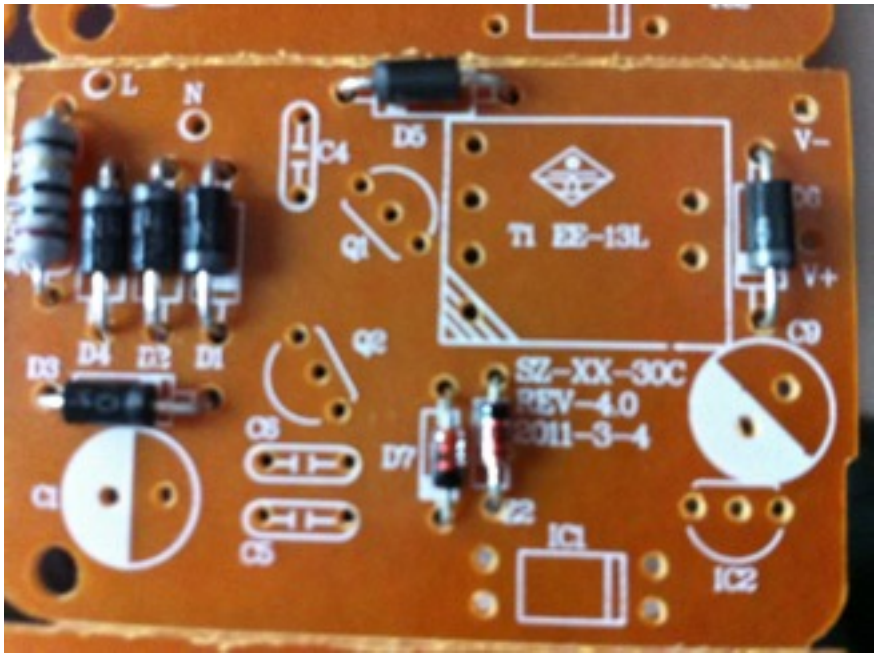
Process Issues

Axial Lead Length, Direction and Angle





- **Lead Angle Adjustable from 45-90 Degrees**
- **Lead Length Adjustable from 1.28 - 1.80mm**

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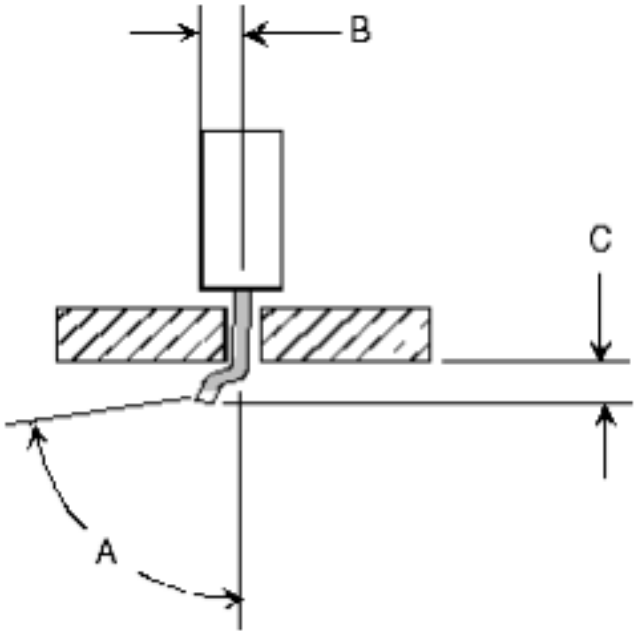
Process Issues

Radial Lead Length and Angle



Lead Length and Angle Hard Tooled (Refer to GS for Selections and Spec.)

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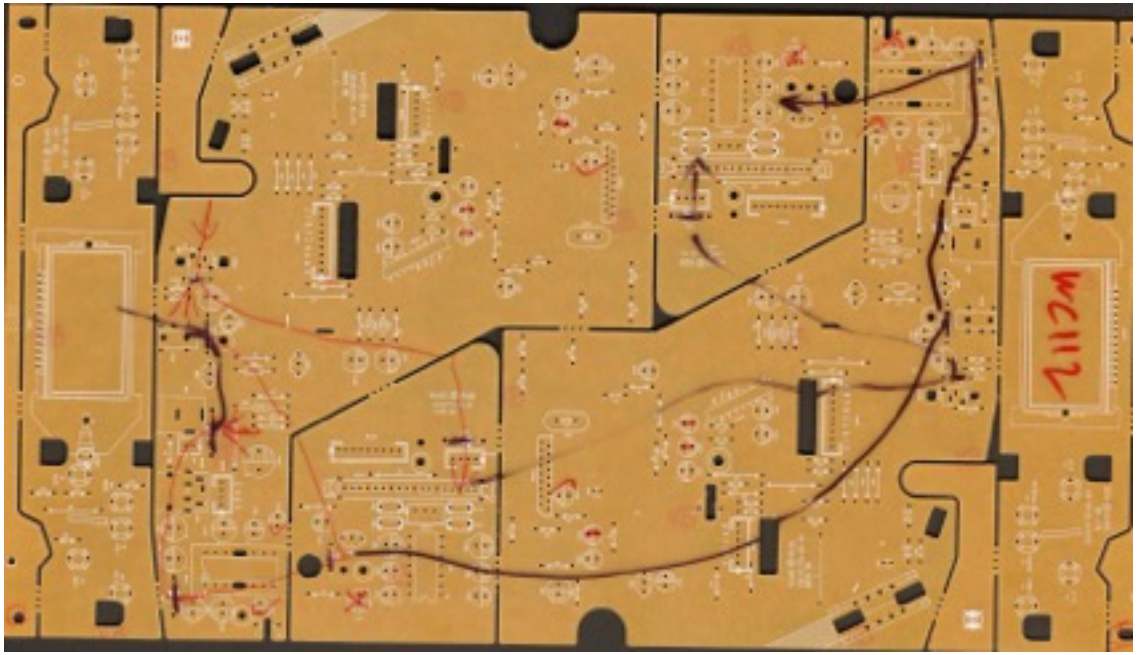
Process Issues

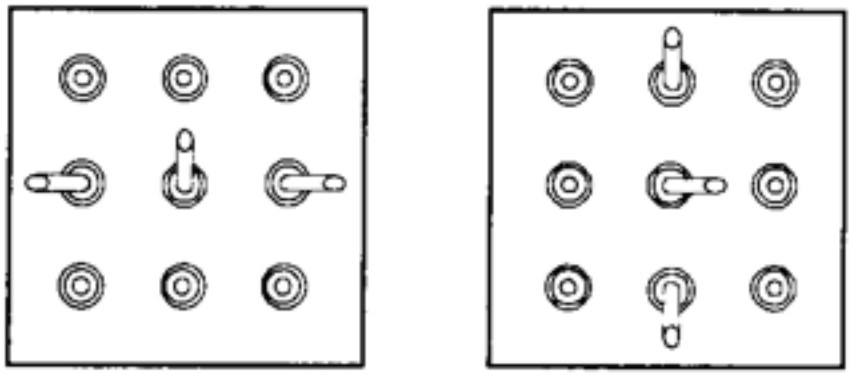
- Variables to Lead Length and Angle
  - Lead Material
  - Lead Diameter
  - Hole Diameter
  - Lead Hardness

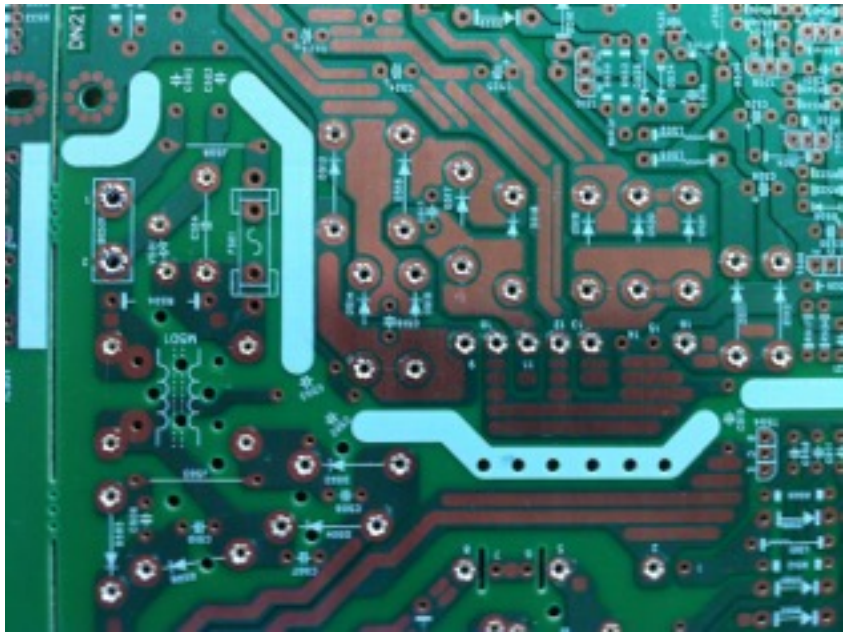


SOUTHERN MACHINERY

Process Issues

Radial Lead Direction “T” Style





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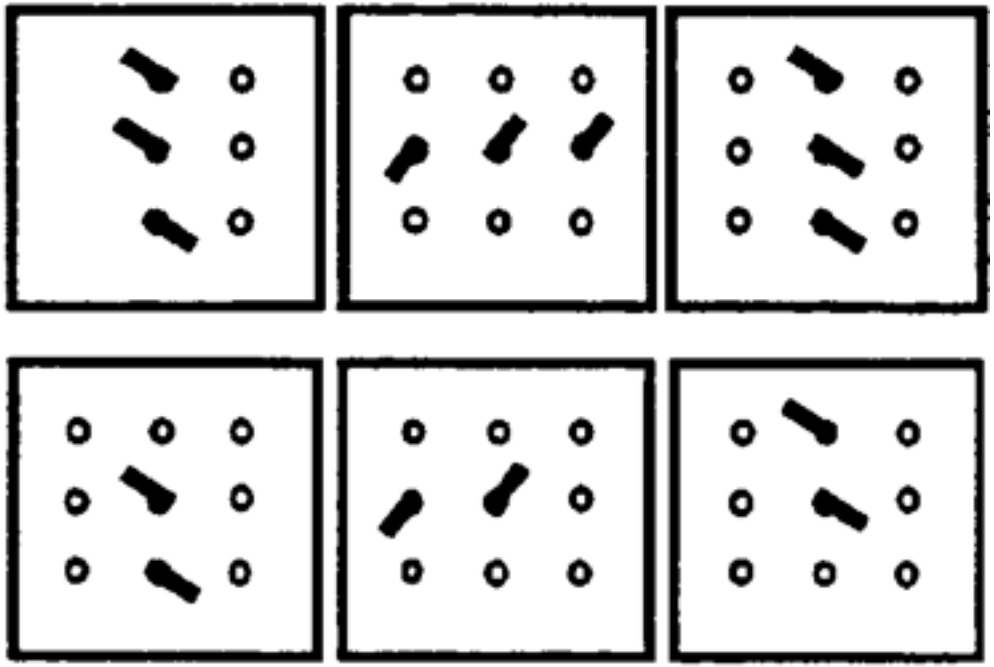
Process Issues

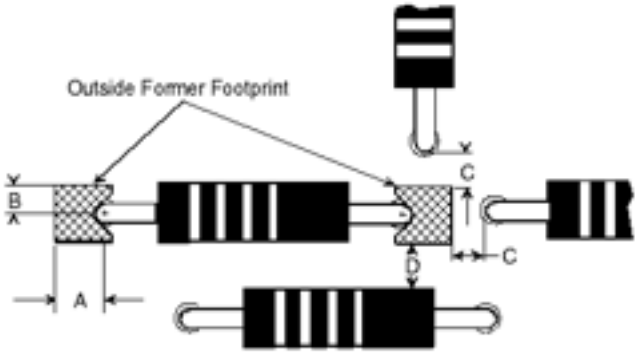
Radial Lead Direction “N” Style Clinch



SOUTHERN MACHINERY

Process Issues

Axial Head Tooling



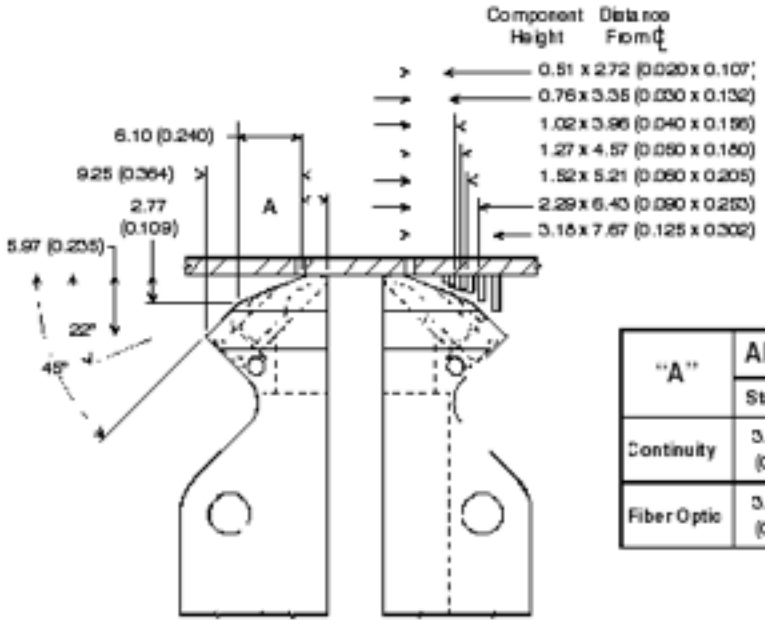
Dimensions are in millimeters; inch equivalents are bracketed.

	VCD AXIAL TOOLING FOOTPRINT						JUMPER WIRE TOOLING FOOTPRINT
	STANDARD		LARGE LEAD		5mmx5.5mm		CUT TOOLING
Lead Diameter	0.38 (0.015)	0.81 (0.032)	0.64 (0.025)	1.07 (0.042)	0.38 (0.015)	0.81 (0.032)	0.61 (0.024)
A	1.78 (0.070)	2.01 (0.079)	1.80 (0.071)	2.08 (0.082)	0.97 (0.038)	1.22 (0.048)	1.98 (0.078)
B	1.14 (0.045)		1.57 (0.062)		1.14 (0.045)		1.14 (0.045)
C	0.25 (0.010)						
D	0.76 (0.030)						

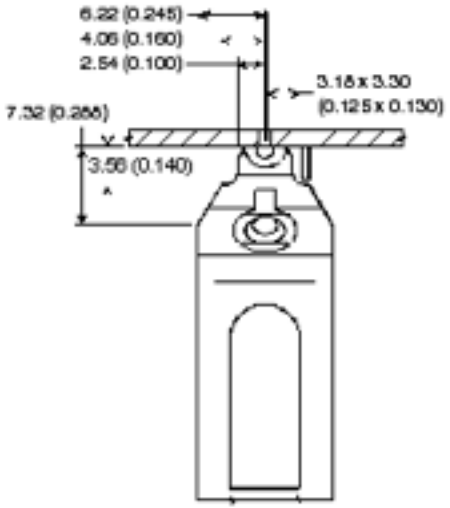
SOUTHERN MACHINERY

Process Issues

Axial Clinch Tooling



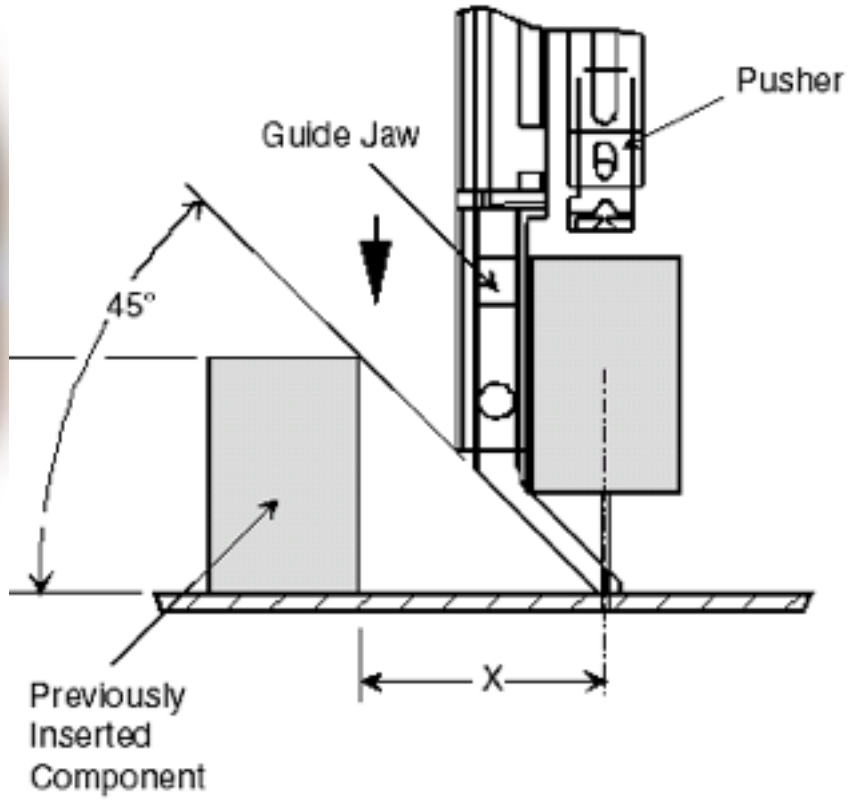
"A"	ANVIL STYLES	
	Standard	5.0mm
Continuity	3.37mm (0.133")	2.62mm (0.103")
Fiber Optic	3.12mm (0.123")	2.54mm (0.100")



SOUTHERN MACHINERY

Process Issues

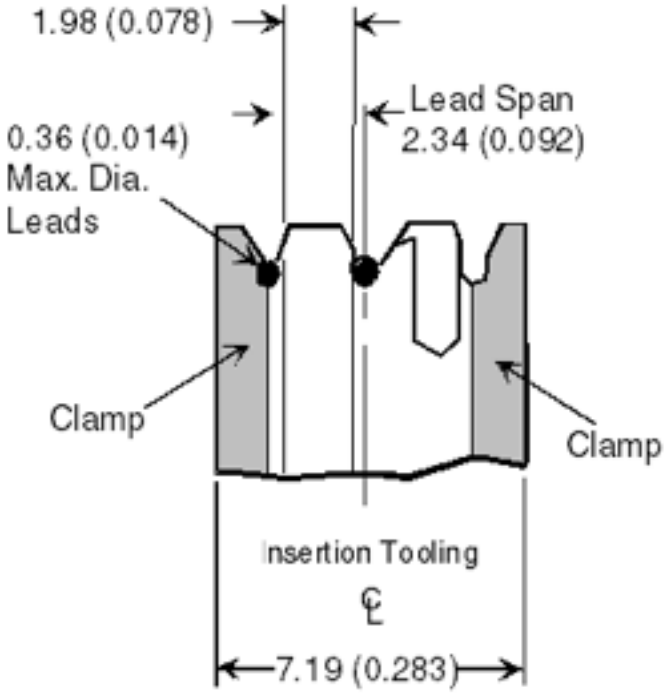
Radial Head Tooling

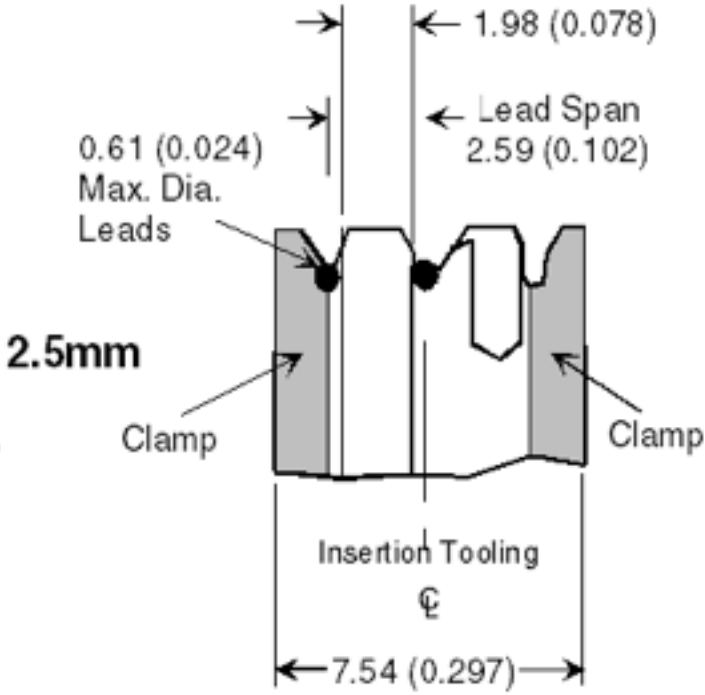


SOUTHERN MACHINERY

Process Issues

Radial Head Tooling

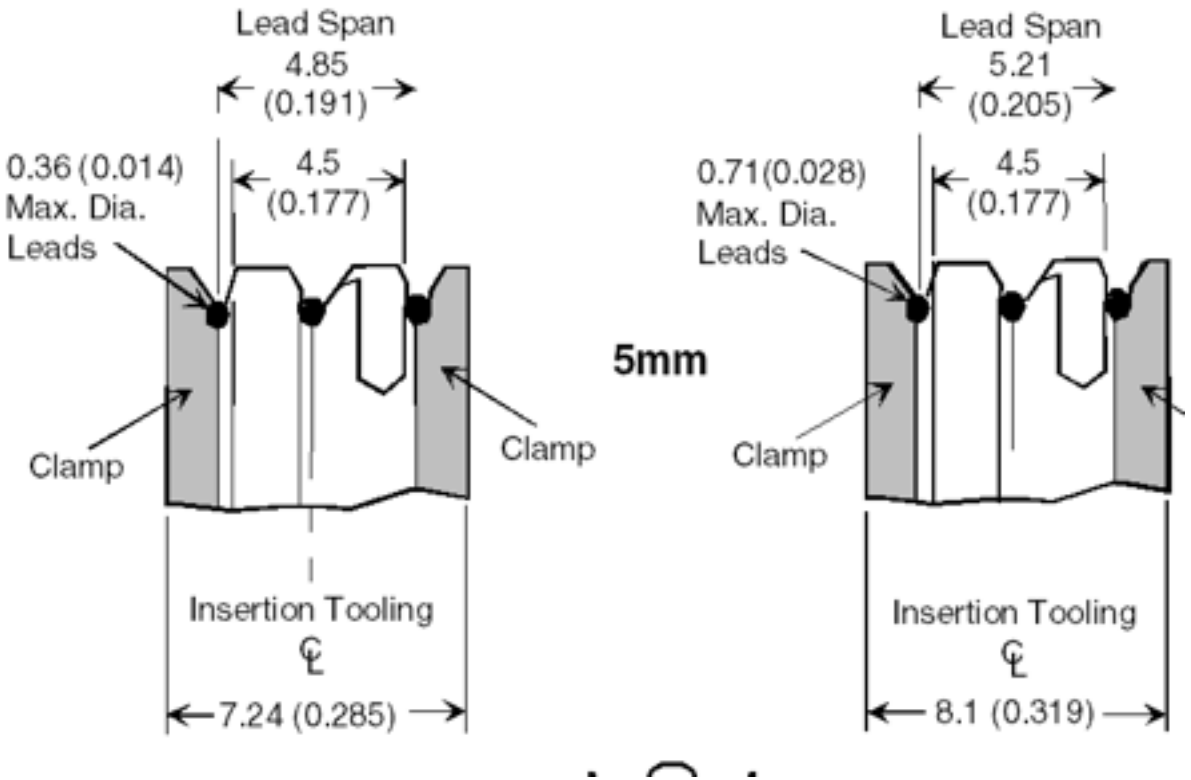




SOUTHERN MACHINERY

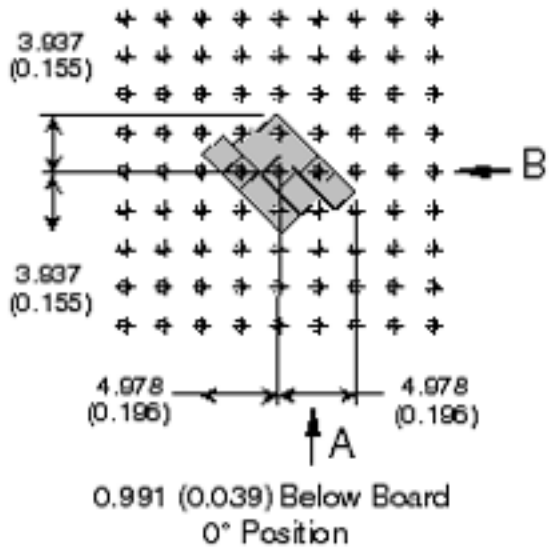
Process Issues

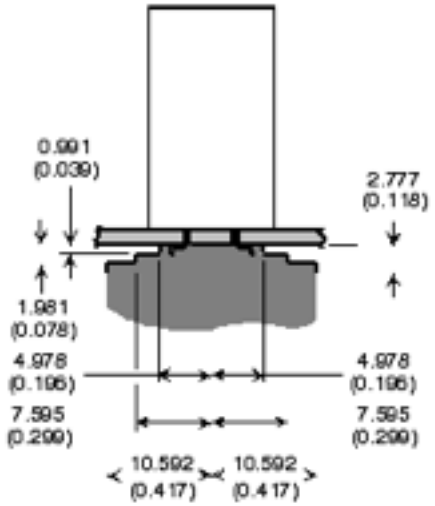
Radial Head Tooling



Process Issues

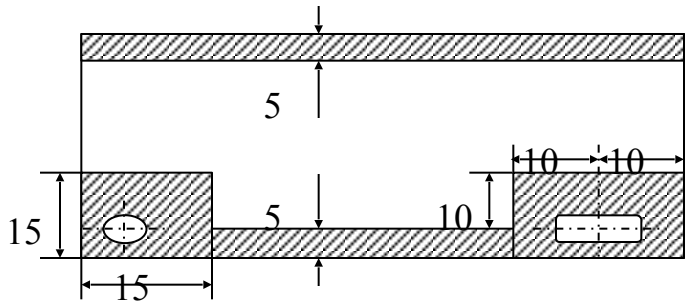
Radial Clinch





Process Issues

Printed Circuit Board Design Considerations



	HOLE DIAMETER TOLERANCE	HOLE POSITION TOLERANCE
E1 - E4 (Insertion Holes)	±0.07mm (0.003")	0.22mm (0.0085") Ⓜ A B Ⓢ C Ⓢ Note 4
D1 (Primary Datum Hole)	±0.05mm (0.002")	
D2 (Secondary Datum Hole)