Cobra Probe Head Interface Standardization

Mike Egloff – AMD, Austin, Tx.

Mike Harris – TI, Dallas, Tx.

Jack Courtney – IBM, Burlington, Vt.

INTERNATIONAL SEMATECH MANUFACTURING INITIATIVE

- New venture (established in 2004) to broaden industry participation in developing manufacturing technologies
- Programs focused on manufacturing infrastructure and manufacturing effectiveness
  - E-Manufacturing, fab modeling, standards
  - Equipment productivity, fab productivity
  - Metrology
  - Environment, Safety, and Health
- Unique focus on improving manufacturing productivity
  - Today’s installed base
  - Factories of the future

Council Projects – General Principles

Objective **Provide a forum for ISMT members to share best practices in MM&P**

Approach

- Benchmark Metrics
- Identify Best-in-Class
- Share Best Practices
- Site Visits (Fab Tours)
- Networking
- Validate Industry Roadmap Direction
- Communicate Consensus Requirements to Suppliers
- Sub-teams/Focus Groups on Specific Topics of Interest
- Organize and Sponsor Workshops

Deliverables/Milestones

- Two to four council meetings/year
- Benchmarking Surveys

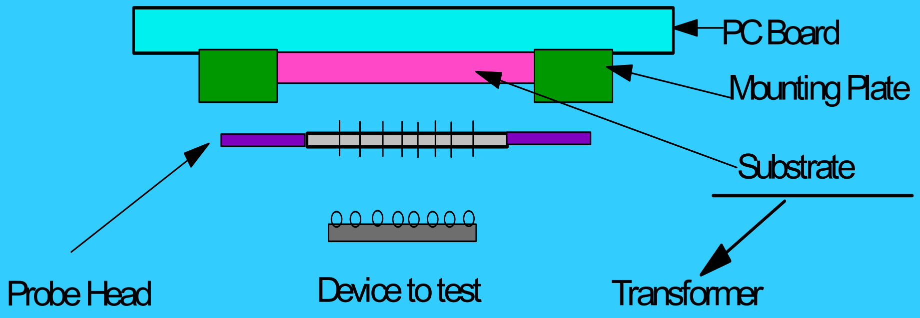
MC Benefit/ Comp. Adv.

- Participants see best-in-class performance levels and ways to achieve them
- Accelerated productivity improvement
- Faster problem solving through easy information exchange via various electronic forums

Project Plans for 2005
ISMI Probe Council

- Review Update probe card supplier survey
  - Review with key suppliers at SWTW
  - and Update ITRS chapter on probing
- Probe head standards presentation
- Detailed internal discussions on
  - Probe card standards
  - High Current Specs for probes
  - Documented guidelines
- Probe card metrics survey
- RFID practices for probe card tracking

Cobra Probe Terminology



PC Board

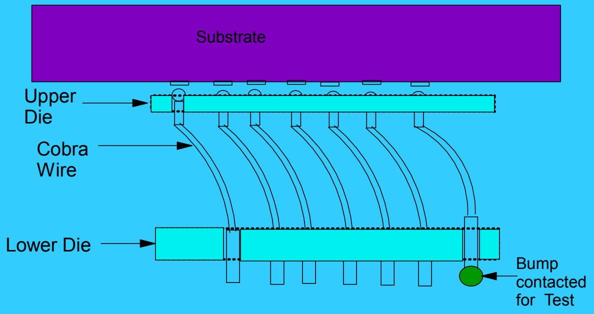
Mounting Plate

Substrate

Probe Head

Device to test

Transformer



Substrate

Upper Die

Cobra Wire

Lower Die

Bump contacted for Test

Head InCompatibility

- Typical transformer requires unique head
  - Heads from Vendor A won’t fit on transformer from Vendor B
  - Mix of transformers requires mix of heads, spares, spare parts, wires, etc.
- Hidden costs of unique heads
  - Higher inventory
  - Training and support
  - Competitive bid opportunity reduced
  - Constrained capacity

Benefits of Head Compatibility

- Reduced inventory
  - 10% Reduction

- Streamlined repair and production
  - 20% Spare parts reduction
  - 10% improved productivity at repair
  - Improved productivity in production

- Competitive pricing
  - 10% savings

- Total Impact for single part number – 10 system load
  - >100k$

Standard Interface Requirements

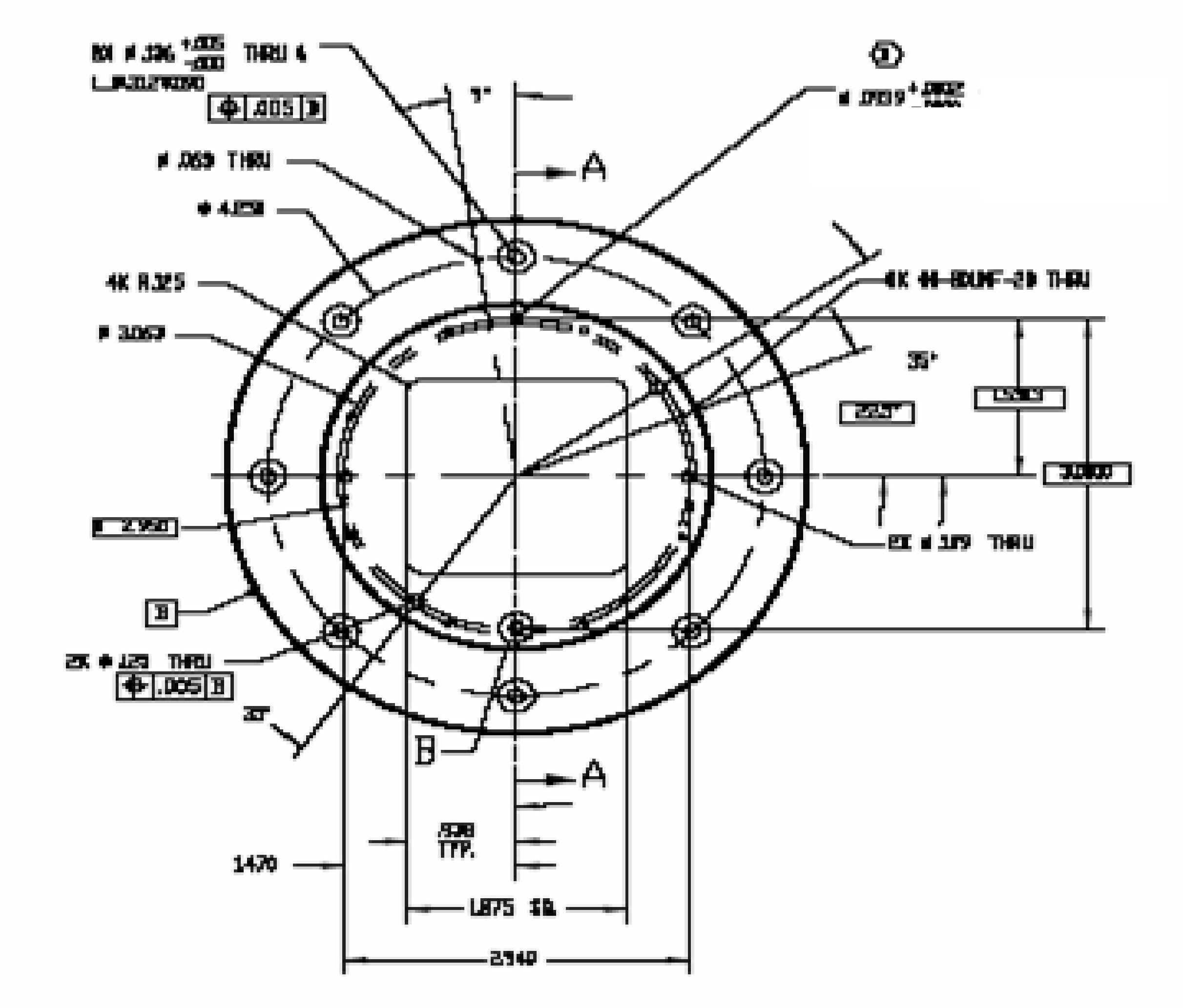
- Elements
  - Mounting holes
  - Alignment features
  - Image location
  - Flexibility in Z stack
- Capture all the above on the mounting plate

- Mounting plates can still be unique to a company or application but have the standard interface elements

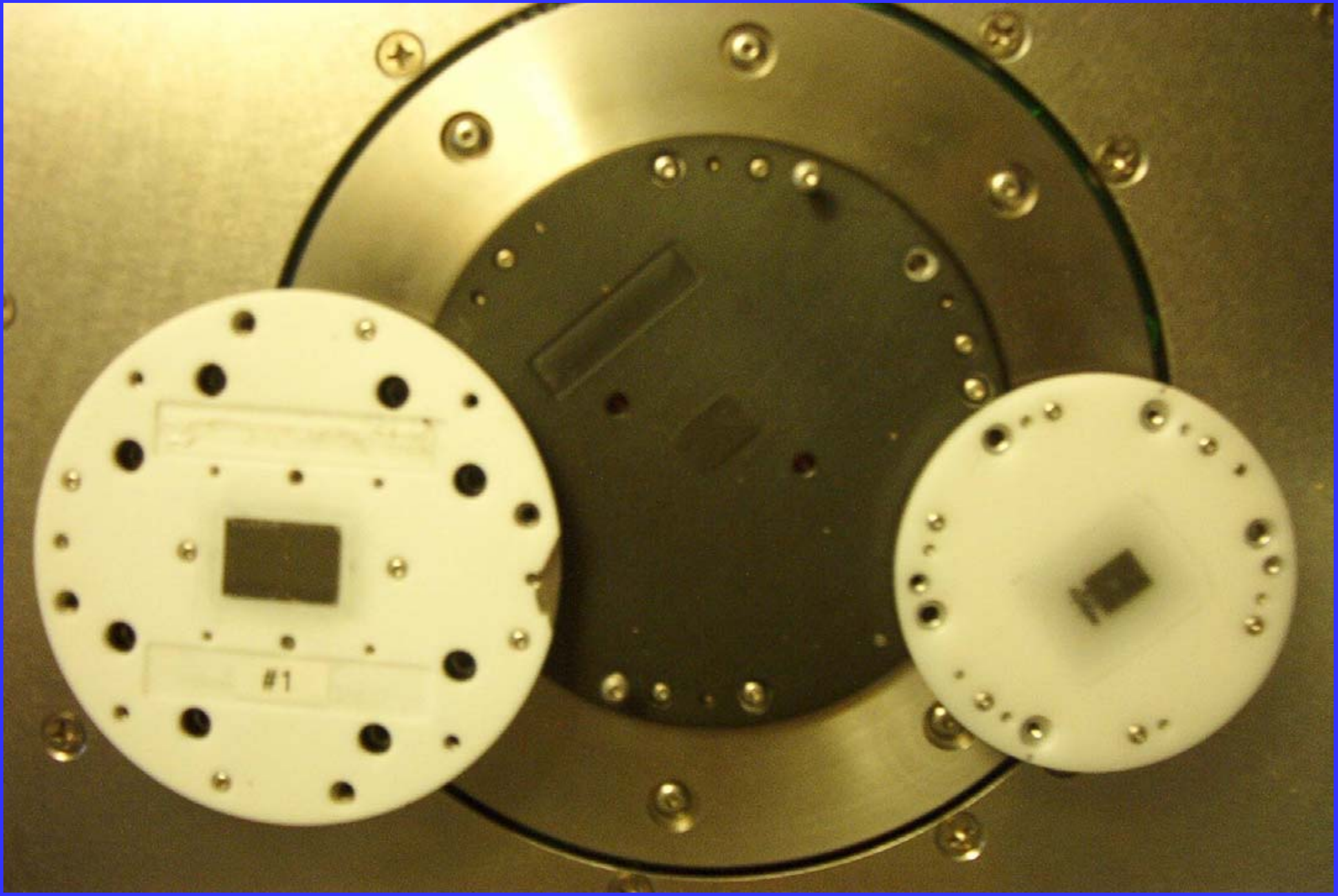
Degrees of Standardization

- Swap mounting plates and reassemble
  - Significant expertise required
- Common mounting plates but no constraints in Z or alignment
  - Some amount of assembly required
- Total plug/play compatibility regardless of head vendor

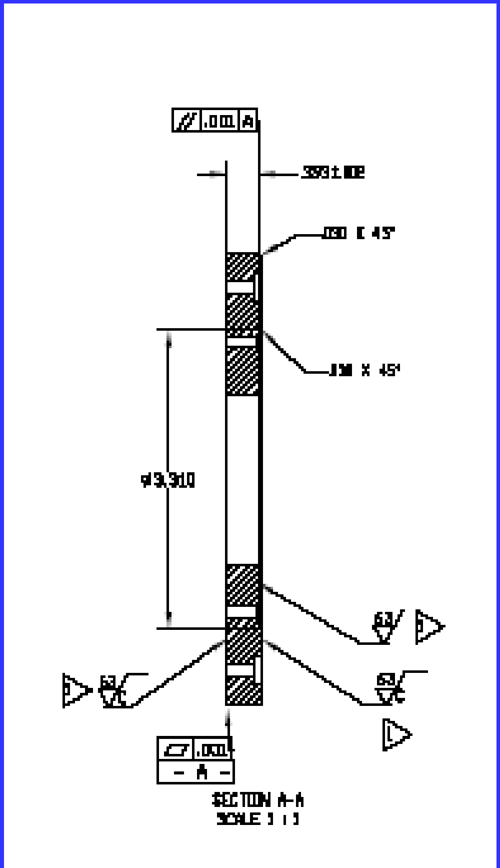
Mounting Plate

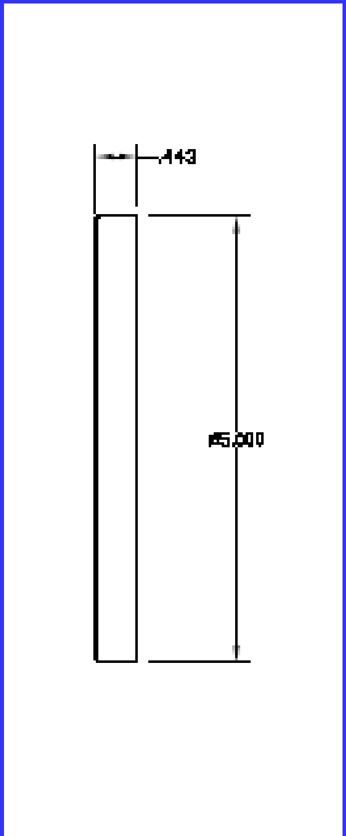


Photo’s



Vertical Variability





Status of the ISMI Standard

- Not finalized
  - More review and discussions with member companies
  - Trials at member companies
- Target for public document – 3Q05

Future Enhancements

- Compression mounting of substrates
  - Eliminate solder attach to allow exchange of substrates
- Other vertical probe designs
  - Membrane
  - Spring contacts
- Formal Standard

Thanks

- ISMI Probe council for inputs and reviews
- Probe engineering teams at AMD, TI and IBM for detailed analysis and engineering support
- Probe vendors for flexibility and open discussions
- Special thanks to Wentworth Labs for engineering discussions and inputs