

Reduced Geometry Probing

Southwest Test Conference

May 31-June 3, 1998

By: Mike Chrasteky, Central Sales Mgr.

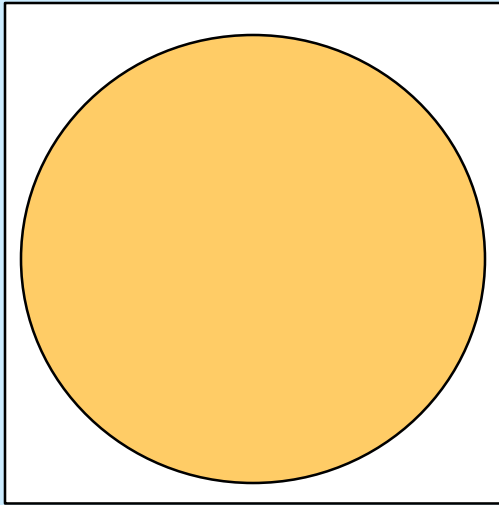
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Goal

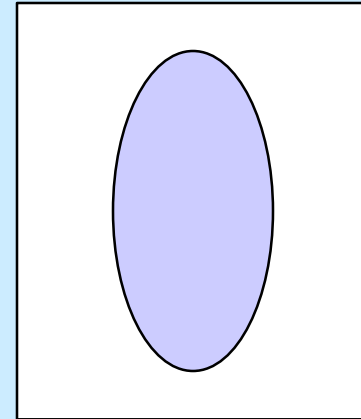
- To determine the performance window of reliable and consistent electro-mechanical performance for small pad probing.



Why?

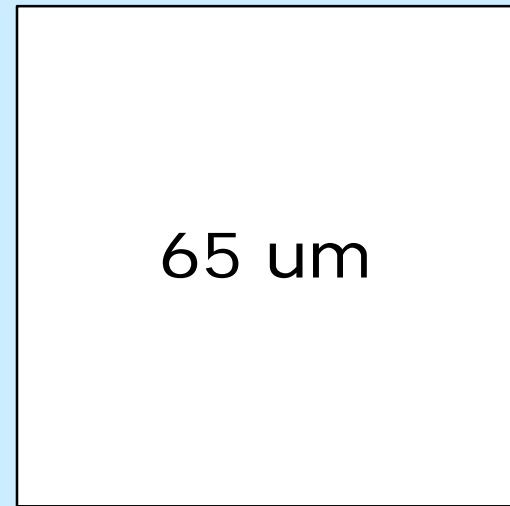
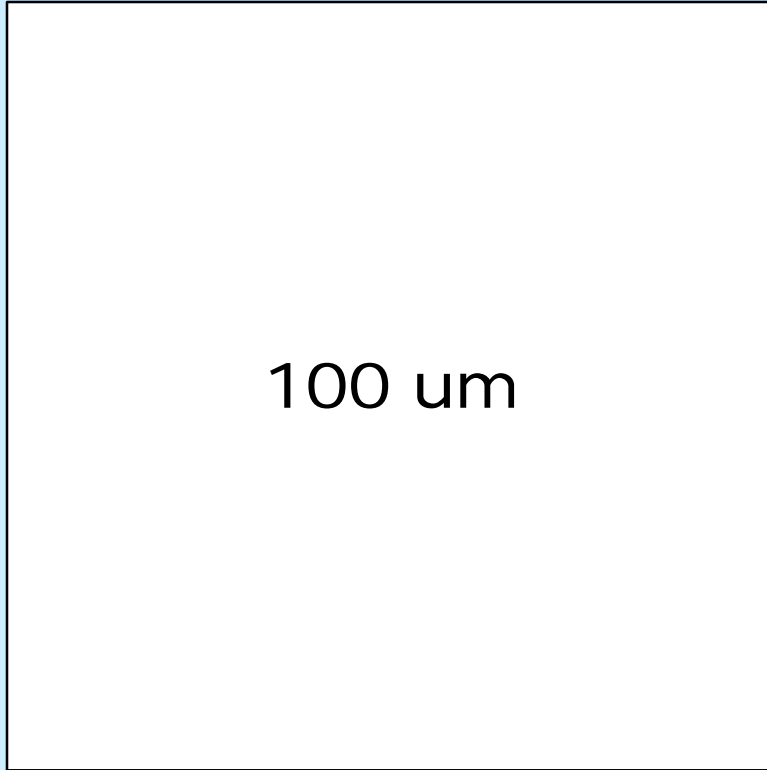


Thermo compression ball bonding at 70um pitch with 65um bond pad size.

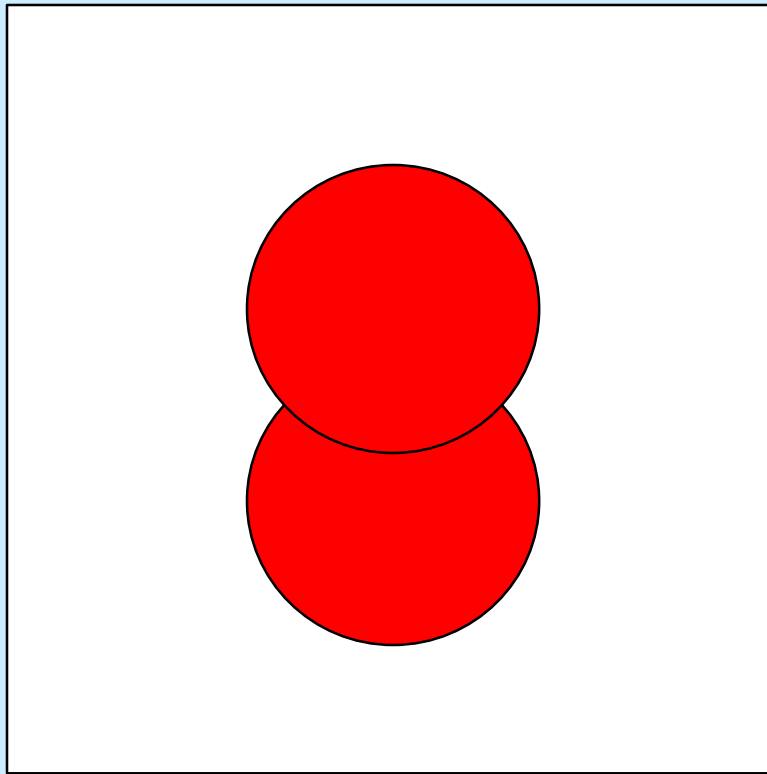


Ultrasonic wedge bonding at 60um pitch with 56X44um bond pad size.

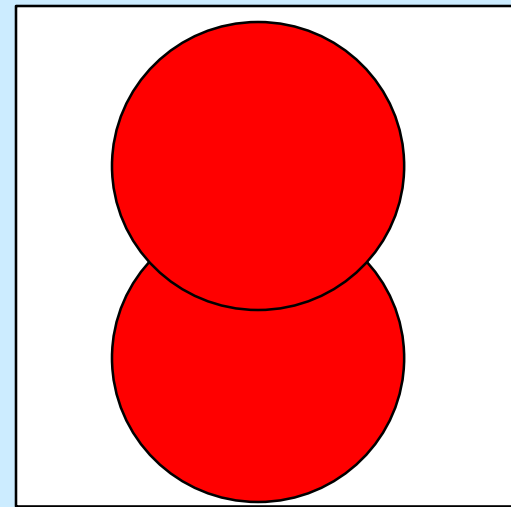
33% shrink



1.5mil tip @ 3mils OD

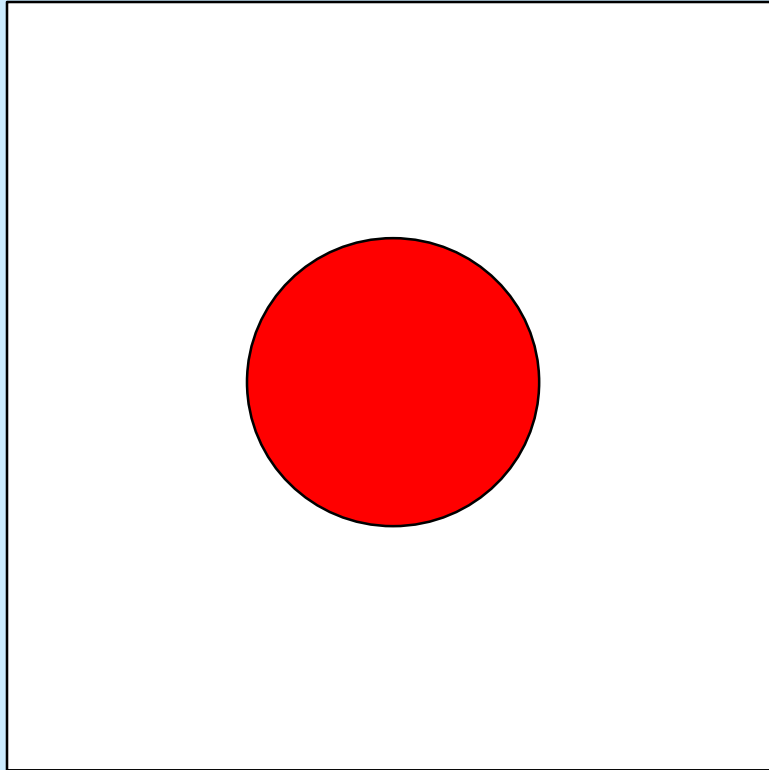


100 um

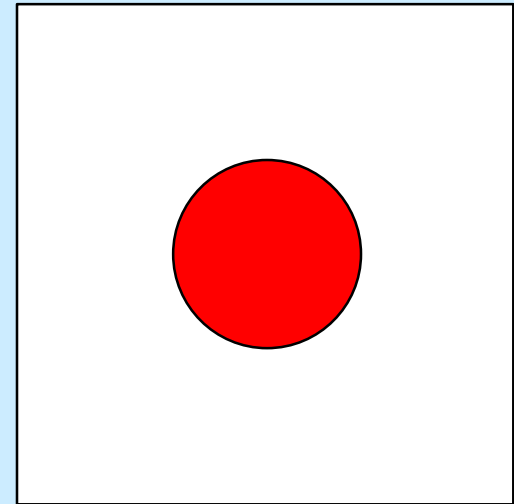


65 um

33% shrink

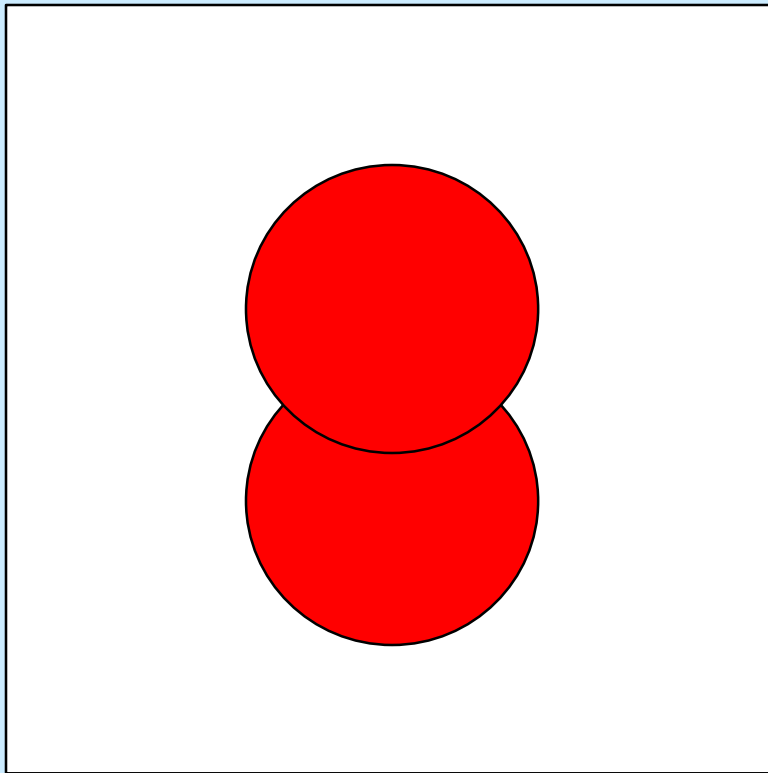


100 μm



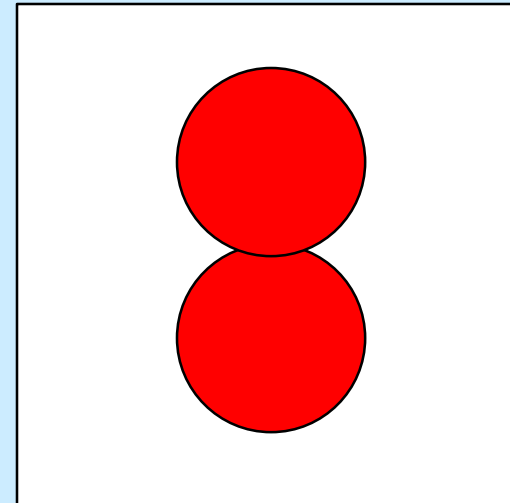
65 μm

1.5 mil tip diameter with 1 of scrub utilizes 2.5 mils of y axis dimension with 17um passivation to tip spacing.



100 um

1.0 mil tip diameter with 1 mil scrub utilizes 2 mils of y axis dimension with 7um passivation to tip spacing.

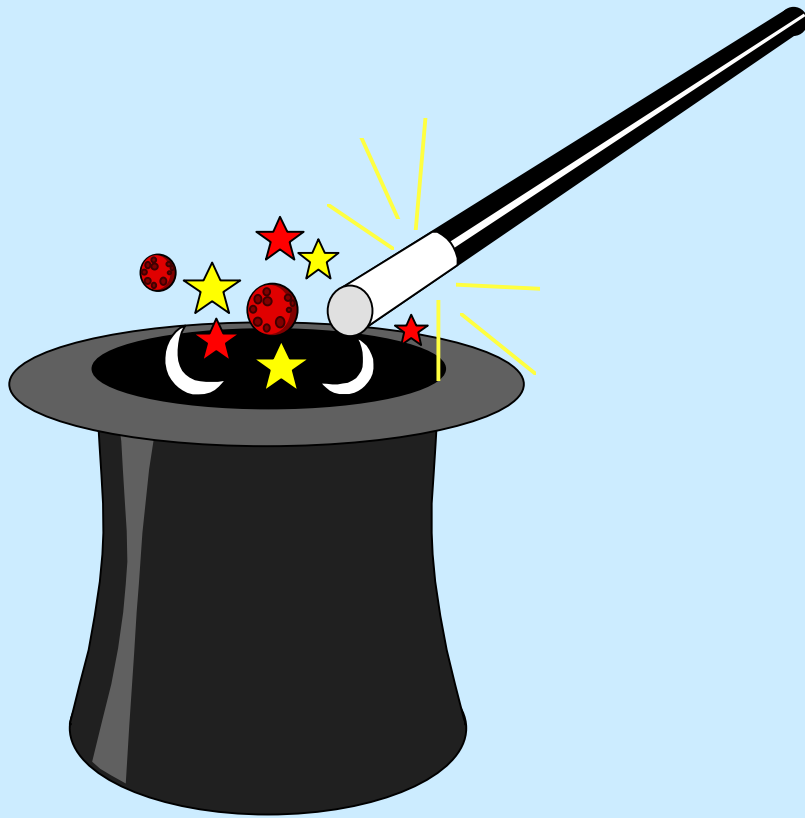


65 um

Here's the problem...

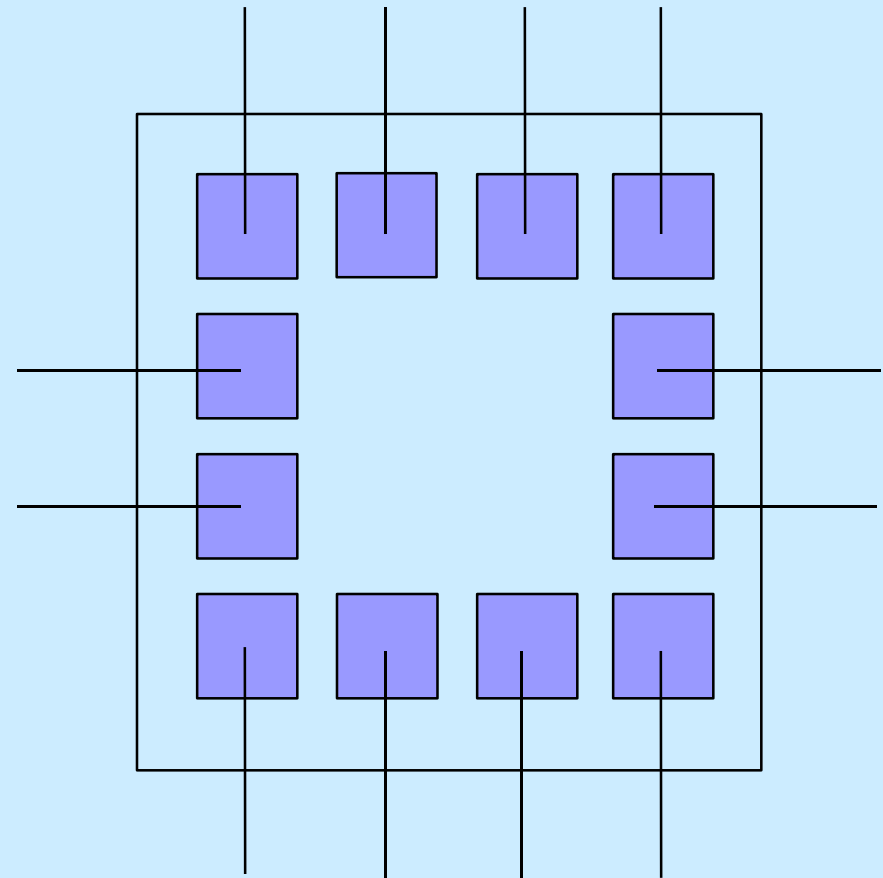
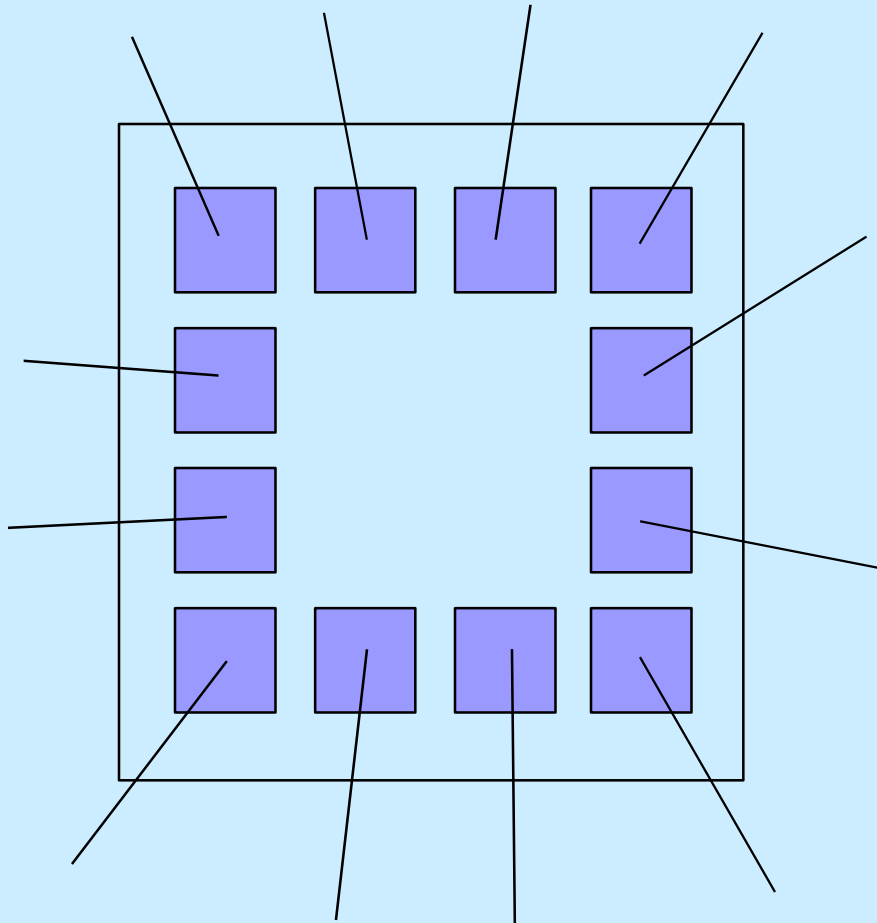
- Conventional alignment and planarity specifications coupled with today's manual alignment capabilities are currently limited to .0002 to .00025 from true position.
- (That's 5 to 7um)

Here's what we tried...

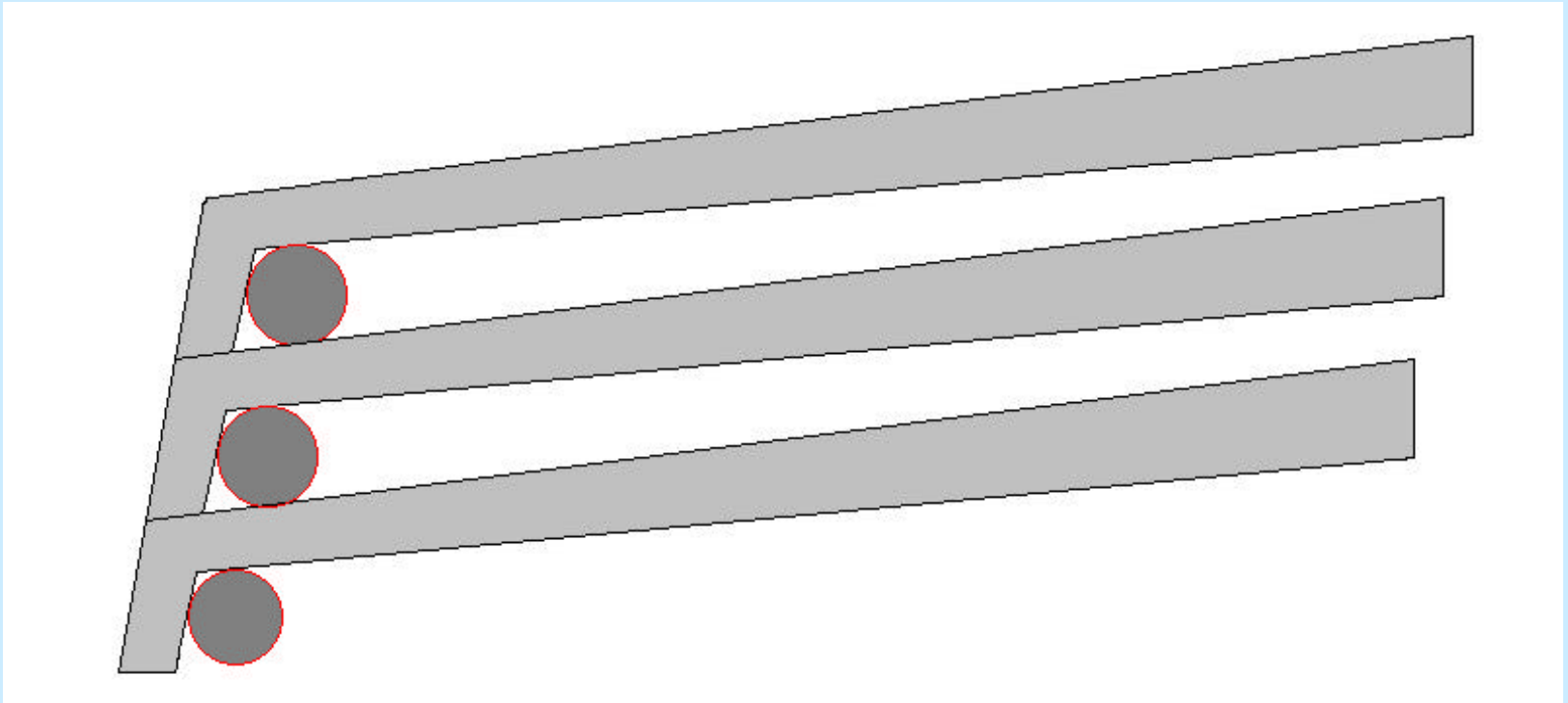


- 1. Design in directional control of probe to pad scrub.

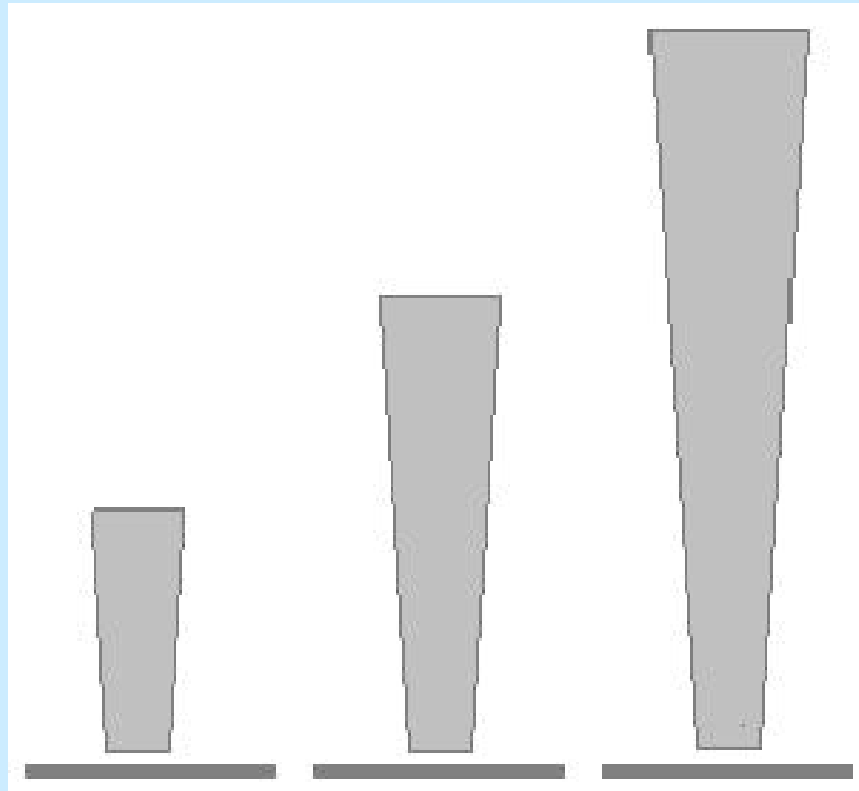
Straight Approach Design Model



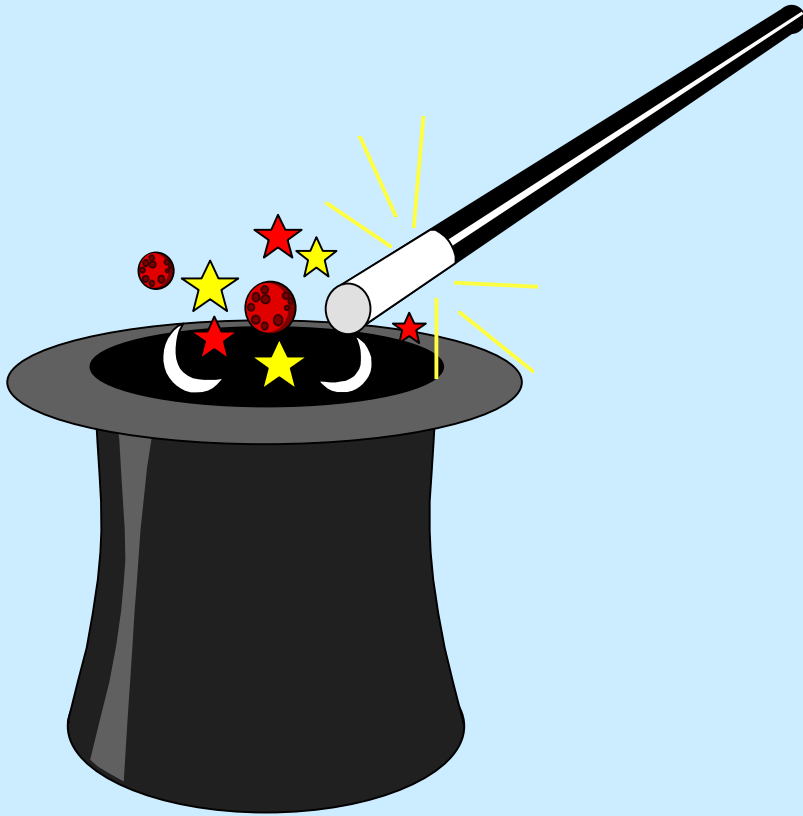
Stack Design Model



Stack Design Model

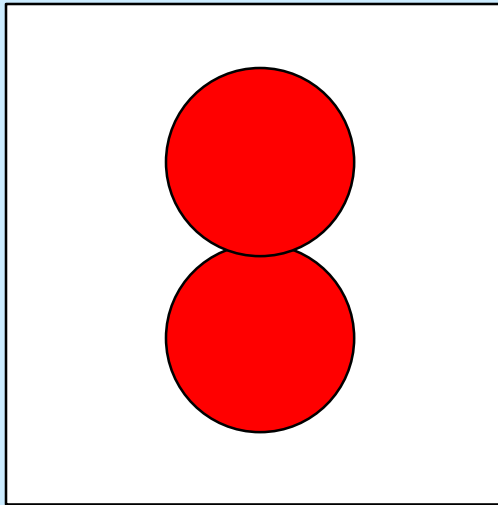


then...

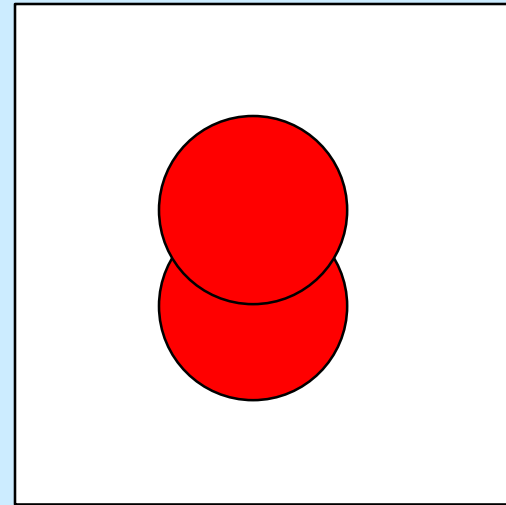


- 1. Overdrive was reduced to shorten scrub.

3 vs. 1.5mils OD

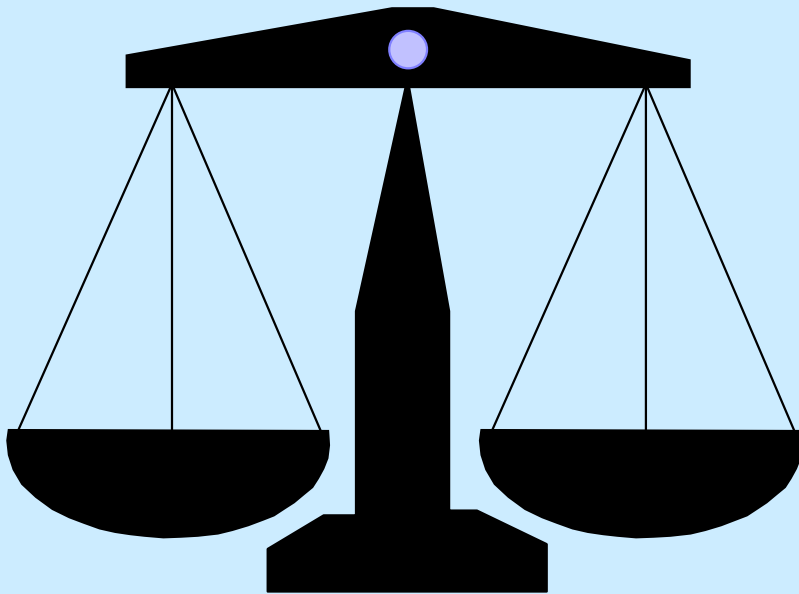


65 μm



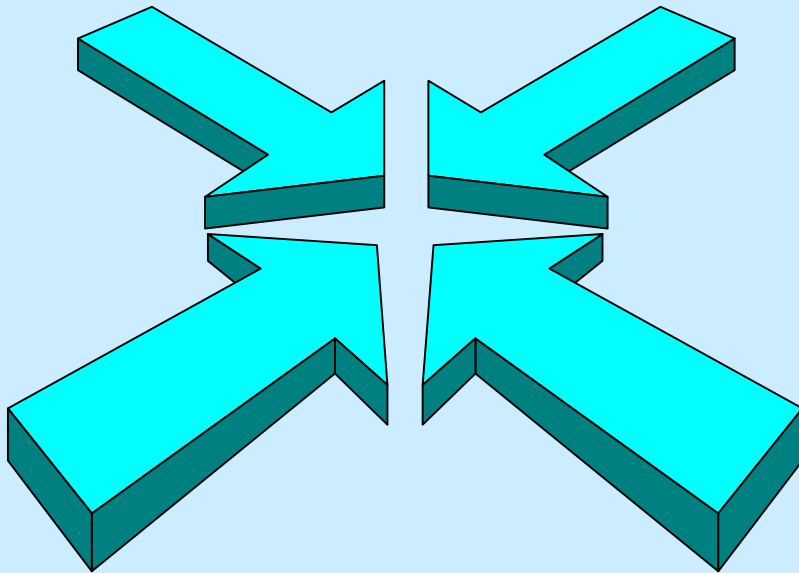
65 μm

and...



- Increase gram force by shortening beam length to compensate for loss of force due to a 1/2X OD.
- 2X, 4gms/mil vs. standard of 2gms/mil overdrive.

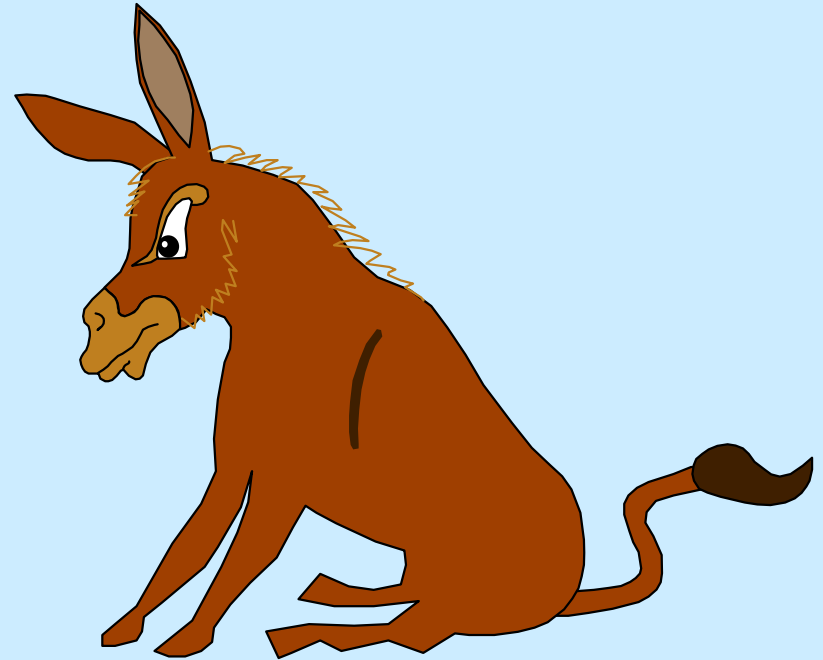
finally...



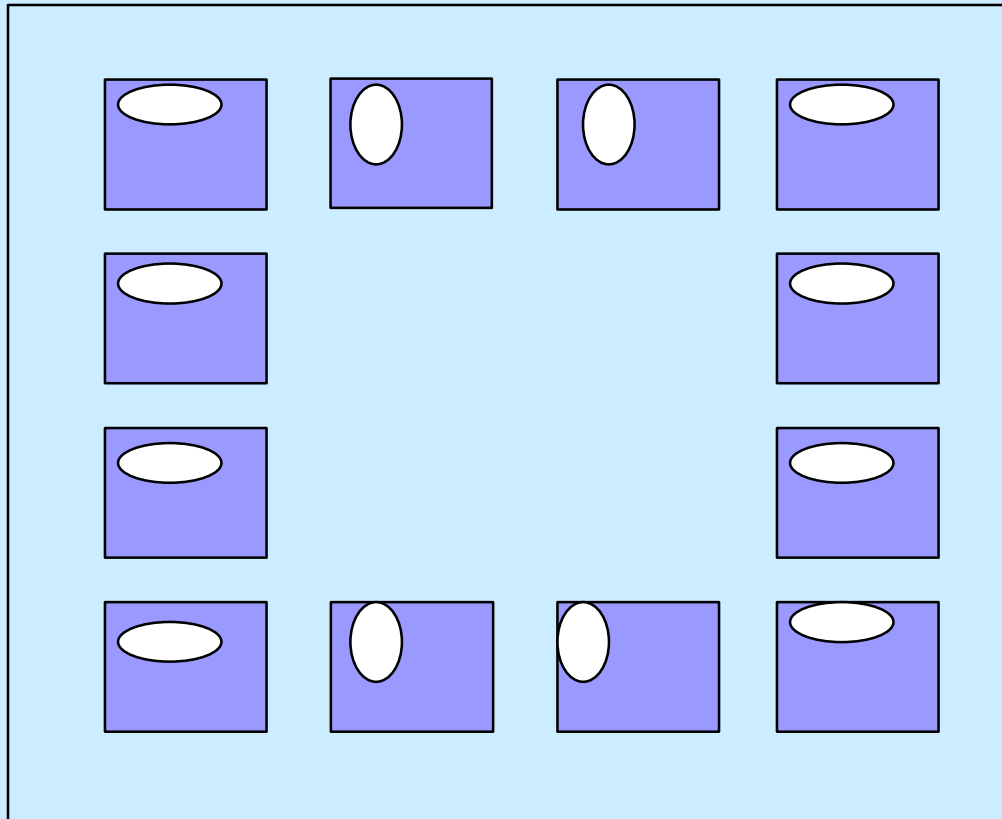
- P&A tolerance specifications were tightened.

We had problems...

- Auto Probe Align
- Contamination
- Continuity Degradation



Auto Prober Align



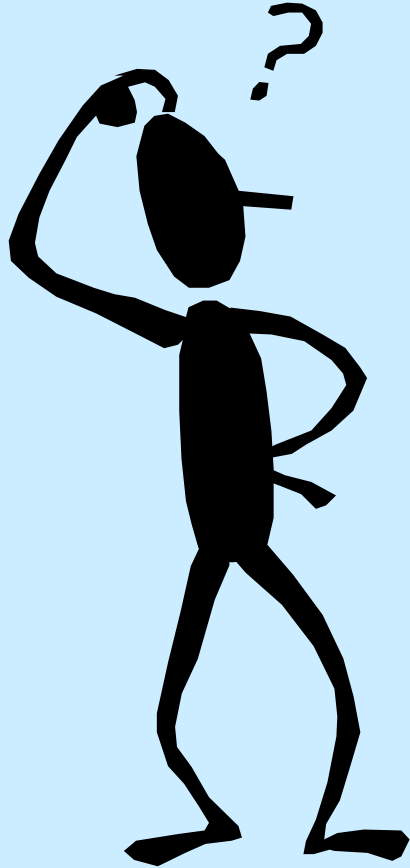
Contamination

- Aluminum flaking contamination due to the shaving of bond pad resulting from high gram force.

Continuity

- Resistance problems due to premature build up of non-conductive pad oxides due to excessive force and lack of scrub.

Where do we go now?



- New Designs
- Electro-Mechanical Characterization
- Experimental Matrix

Real Data Collection

Reduced Geometry Probing Experimental Matrix.

Card #

Pad Size:

Mechanics

Wire	Beam	Probe	Beam	Gram	Tip	Tip	Tip
Diameter	Length	Taper	Angle	Force	Angle	Length	Dia.
mils	mils	mils	deg	Per mil OD	deg	mils	mils
5	93	60	12 deg	2	103 deg	14	0.8

Performance

	1 mil	1.5 mils	2 mils	2.5 mils
Scrub Length (capture)	?	?	?	?
Scrub Length (pad)	?	?	?	?
Resistance	?	?	?	?

Goal

- To determine the performance window of reliable and consistent electro-mechanical performance for small pad probing.



Thanks

- Pete Dodd, Advanced Micro Devices
- Matt Lauderdale, Motorola
- Rey Rincon, Texas Instruments

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