

Proper Use of Shims and Inserts - Application Note

Purpose:

The purpose of this application note is to explain the proper usage of the shims and poromeric inserts. Shims allow the user to have control and consistency of the wafer protrusion. Applying pressure on poromeric material over a period of time will result in compressing and reducing its overall thickness and wafer protrusion. Thus, using the shims will allow the user to adjust the wafer back to its ideal protrusion level.

ZeroMicron templates are designed to allow user to replace the shims or poromeric inserts after they are worn from usage. The competitors' templates have their poromeric material bonded to the frame. Since the poromeric material has a much lower life span than the frame, the frame ends up being tossed away as well when the poromeric material has reached its end of life. With ZeroMicron templates, just replace the worn out shims or poromeric inserts and it can continue to be used again saving template replacements.

Below is a series of diagrams that graphically display the compression and protrusion issues.

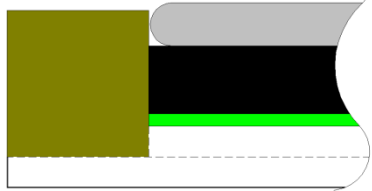

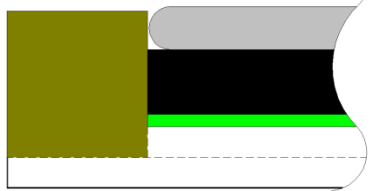

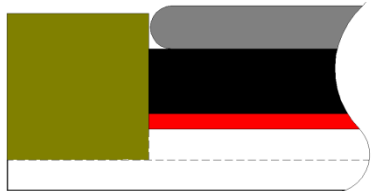

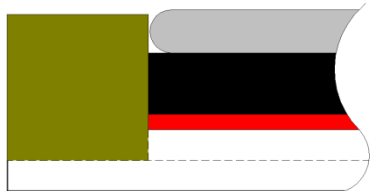
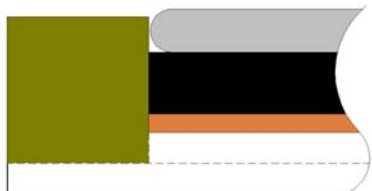
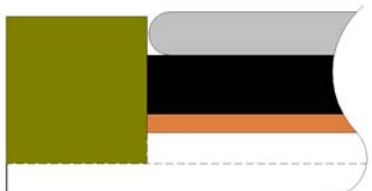
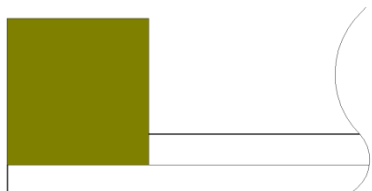
Advantages:








There are four failure modes; (1) blowout, (2) template separation, (3) backside staining and (4) worn out pockets. From client reports, we can state that ZeroMicron templates report a 75 to 80% reduction in blowouts. With other templates, a blowout requires replacement of the template. As for the ZeroMicron template, normally only requires replacement of the poromeric insert resulting in a large time and expense savings.

Other manufacturers' templates bond the poromeric material, a porous structure, to the FR-4 frame creating a weak bond between the two. Further, the FR-4 material is rather thin and flexible. If the wafer starts to wear at the glue layer, the template will delaminate. The ZeroMicron template, by comparison uses a very thick and rigid frame of G-10 or on special request, G-11 material. And, the ZeroMicron template construction keeps the wafer away from the glue layers.

Backside staining occurs when the poromeric material becomes contaminated with a buildup of slurry. This is normally addressed by scrubbing the material and rinsing. With other templates, vigorous scrubbing can lead to early delamination and it is difficult to get into the edges of the pocket. With the ZeroMicron design, the poromeric inserts can be removed and scrubbed or replaced, further extending the life of the template.

Template / Shim / Poromeric Insert Replacement Chart

ZeroMicron (ZM)	Protrusion / Compression	"Competition"
	<p>New templates</p> <p>◀ 20% protrusion 30% protrusion ▶</p>	
	<p>20% ZM recommended compression</p> <p>◀ 10% protrusion 20% protrusion ▶</p>	
	<p>40% ZM recommended compression</p> <p>◀ install new shim ◀ 20% protrusion 10% protrusion ▶</p>	
	<p>60% ZM recommended compression</p> <p>◀ 10% protrusion 0% protrusion ▶ Need new template ▶</p>	
	<p>80% ZM recommended compression</p> <p>◀ install new shim ◀ 20% protrusion</p>	
	<p>100% ZM recommended compression</p> <p>◀ 10% protrusion</p>	
	<p>Replace poromeric insert and original shim, ◀ NOT the template.</p>	<p>OOPS, Need <i>yet</i> another new template here.</p>

 Wafer	 Poromeric Insert	 FR-4/G-10	 4 mil Shim	 5 mil Shim	 6 mil Shim	 Clear PET
---	--	---	--	--	--	---

The last failure mode is when the wafer pocket wears out. Over many runs, the edge of the pocket will start to wear. As this wear continues, it will round the edge of the pocket off and the wafer will slip out of the pocket. Other manufacturers try to run their wafers at a 30% protrusion. This puts the apex of the wafer edge very close to the upper edge of the FR-4 material. This is done to obtain the maximum life from the template as the poromeric material is compressed. With the ZeroMicron template, this is not a concern as the depth can be adjusted for the poromeric compression. We strongly recommend a 20% protrusion. This means that the wafer edge apex is located deeper in the pocket and takes substantially longer to wear sufficiently to require replacement.

Instructions for shims and inserts

1. Three different thicknesses of shims are used. The thicknesses are in consecutive order, e.g., 3 mil, 4mil, and 5 mil, or 4 mil, 5 mil, and 6 mil, etc.
2. Use the thinnest shim of the three with a new or uncompressed poromeric insert. Be very careful to only use one shim. They tend to stick together, especially when wet so care must be taken to insure that only one shim is used.
3. When the poromeric insert is compressed by 25 microns and the wafer protrusion is reduced, change the shims to the next thicker size. This will be dependent on your material, pressure and process time.
4. When the poromeric insert is compressed by another 25 microns and the wafer protrusion is reduced again, change the shims to the next thicker size.
5. When the poromeric insert is compressed again by yet another 25 microns, replace the poromeric inserts and go back to using the thinnest shim of the three.

NOTE: Do not use the shim if it becomes opaque as this is a sign that it is at the end of its service life. If deep scratches occur, the shim should be replaced. Deep scratches are typically a sign of contamination in the template pocket.

For additional information or assistance, please contact ZeroMicron Inc. directly.

ZeroMicron Inc.
2330 South Tenth Street
San Jose, CA 95112
Tel: (408) 441-4600
Fax: (408) 441-4602
Sales@ZeroMicron.com
www.ZeroMicron.com