INTEGRATED TECHNOLOGY CORPORATION
1228 N. Stadem Drive Tempe, Arizona 85281 USA
TEL: (480) 968-3459 FAX: (480) 968-3099
Email: customerservice@inttechcorp.com

Shooting Holes in API's Claims On Optical Planarity

API has introduced their new probeWoRx system with optical planarity capability. Although there may be some reasons to use optical planarity in special cases, ITC is convinced that API's claims are not technically sound. In the case of Cobra type cards, it is of no use and may in fact lead the user to very bad conclusions. To illustrate this, we will refer to the presentation given at the 2003 Southwest Test Conference by Mr. Jeff Greenberg of Applied Precision Inc. entitled "Performance of a Next Generation High Speed, High Precision, Probe Card Analyzer" http://www.swtest.org/swtw_library/2003proc/PDF/S08_02_Greenberg.pdf

Starting with slide #23, Mr. Greenberg clearly shows the card bending that occurs when a large probe card is tested for planarity using the standard electrical method. This bending is also created by the wafer prober when the card is in use. In order to correlate with wafer prober results, it is critical that the probe card analyzer duplicate the card bending. Mr. Greenberg also correctly states that there is no card bending with the optical planarity method. The lack of equivalent bending makes the optical results essentially useless.

In slides #24 & #25, Mr. Greenberg tries to make a case for correlating electrical planarity to optical planarity by watching the highest probe and overdriving the card on their glass plate. The first problem with this approach is that there is no way to know which probe will be the highest using the standard electrical planarity test without actually running the test. Card bending and probe movement is not linear and depending on the probe array and stiffener configuration, probes will move in rather unpredictable ways. Cobra card probe float makes it completely impossible to predict the highest probe from a non-overdriven state.

In slide #25 Mr. Greenberg plots a chart that clearly shows the problem. Without detailed knowledge of the electrical planarity on the specific card being tested, there is no way to correlate the optical planarity to the real electrical planarity. If a complete electrical planarity test is performed and compared to the optical planarity, some correlation might be found on a particular card. The problem is that the planarity signature of each card is unique and the actual bending of the card depends on the planarity distribution. Since the electrical planarity must be measured in every case to perform the correlation, there is no purpose for the optical planarity.

In slide #26 Mr. Greenberg discusses using the optical method for Cobra card planarity. Most Cobra cards have some amount of float (difference between physical and electrical contact) in their probes. Furthermore, this float varies from probe to probe on a card and from card to card. Measuring the free hanging position of the Cobra probes tells the user **nothing** about the planarity of the card. The only true planarity is measured by the **electrical** contact. Even if we were to assume that API's correlation method from optical to electrical was valid, there would be no way to separate probe float from card bending.

In slide #27 Mr. Greenberg tries to make the case that the optical planarity can be compared to electrical planarity to measure the float of the probes. This is a totally false conclusion since it is impossible to determine the difference between the float and the card bending. In some cases, Cobra probes may be too short to make effective electrical contact at all within the acceptable planar window. This condition would never be found using the optical method. For all of these and other reasons ITC feels optical planarity is of no use for Cobra cards and of dubious value for many other technologies.

ITC has no specific information to know whether the API method works to measure the free hanging position of probes or not. Our position is that this method is not useful in the practical world of measuring planarity and correlating to wafer probers. Since this is API's main claim to higher speed for the probeWoRx system, we believe ITC's analyzers such as the Probilt ™ PB6500 and PB3500 will provide higher throughput on real tests than the probeWoRx system.