MEMBER NEWS

LSI NAMED ONE OF THE WORLD'S TOP INNOVATORS

LSI Corporation has announced that it has been named a Thomson Reuters 2012 Top 100 Global Innovator, recognizing its achievements as one of the world's most innovative companies. The program honors corporations and institutions worldwide that are at the heart of innovation as measured by patent-related metrics. The Thomson Reuters 2012 Top 100 Global Innovator methodology is based on four principal criteria: overall patent volume, patent grant success rate, global reach of the portfolio and patent influence as evidenced by citations. The Thomson Reuters 2012 Top 100 Global Innovator award recognizes companies for significant, ongoing innovation, evaluated on patent metrics including the number of successful patent filings, the global reach of the inventions and impact on the industry.
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DISCO CORP. TO STRENGTHEN ITS SECONDHAND EQUIPMENT BUSINESS

DISCO Corporation has announced plans to strengthen and develop its secondhand equipment business, which involves buying back and refurbishing used DISCO equipment. There is growing demand for secondhand equipment in order to reduce the financial burden of capital investment to improve production capabilities and for early ▸▸

SonoSimulator Takes the Mystery Out of Stacked Die

Sonoscan, in Collaboration with T.U. Dresden, has Developed a Software Program that Creates a Virtual Model of the Echo Returns of the Die Stack

STACKING DIE PERMITS designers to pack a great deal of capacity and increase processing speed in a much smaller volume. In the process the die stack also creates many internal interfaces where critical defects, such as voids and delaminations, can lurk.

Makers of die stacks are very interested in using non-destructive acoustic microscopy, such as C-SAM®, to locate and image these critical defects, but until recently the die stacks have been far more difficult to image clearly than other IC devices.

The problem is that when ultrasound is pulsed into a die stack, the numerous internal interfaces create multiple return echoes in the A-Scan.

To speed up and simplify the task of assigning each echo to its proper interface within stacked die, Sonoscan® has developed over the last several years, in collaboration with T.U. Dresden, a software program called SonoSimulator™ that creates a virtual model of the echo returns of the die stack. The user of the program enters data about the dimensions and materials of the stack and then the software creates the virtual model for simulation of the A-Scan.

To simulate defects for imaging, the operator uses the SonoSimulator software to insert virtual defects at interfaces of interest. The virtual defects simulate air gaps (example from SonoSimulator in Figure 1) so that the interface between virtual die 5 and 6, for example, can be identified by its position from left to right, position #5 in this case. The oscilloscope waveform at the top of Figure 1 (known as the A-Scan) is so realistic that the virtual

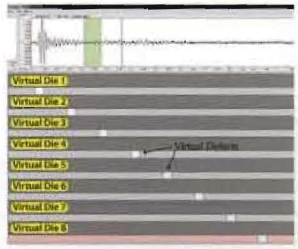

Figure 1

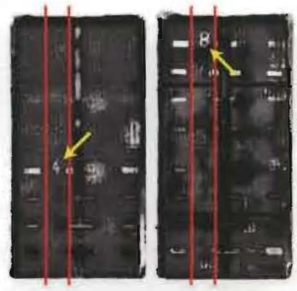
Figure 2

defects act like real gap-type defects, reflecting >99.99% of the ultrasound energy.

The user interacts with the SonoSimulator to perform simulated imaging of the virtual die stack at the levels of interest by adjusting gates (precise depths from which echoes are used to make an image; one gate is green in Figure 1) within the simulated A-Scan. When the user is satisfied with an image of the defect at a specific level, they now know the precise position and width of that gate. The imaging (gating) recipe is then transferred to a Sonoscan Gen6™ C-SAM (C-Mode Scanning Acoustic Microscope) system to scan and image a real die stack sample. In a production environment, a test die stack will likely have a "known defect" planted between two die to help identify a specific level. When the "known defect", which is an intentional reflective gap, is in focus any other unintended gap-type defects or features at that interface will also be in focus.

The stacked die manufacturing process or materials may evolve over time, which may then require adjusted parameters to properly image the stacked die levels. The SonoSimulator process can be repeated to refine the image(s) by adjusting the gate and recipe parameters on a revised virtual sample, and then moving the improved parameters back to the C-SAM system to analyze the evolved sample.

Figure 2 is the SonoSimulator derived C-SAM image of a test stack sample having 8 die with acoustically reflective numerals and bars etched on each die. In this image, the SonoSimulator provided the scan parameters to isolate and image the "known defect" specific to die 4 on the left and die 8 on the right.

SonoSimulator was originally designed to help obtain C-SAM images for stacked die, but other thin, multi-layer sample analysis can be done, too. In any sample with multiple, closely spaced interfaces the ultrasound echoes may be hard to distinguish or separate for each interface, and/or may interfere with each other. With this integrated software, a model of the sample can be built to simulate the echo patterns with known defects at each layer of interest. Using a reference waveform, a model of the A-Scan is generated, which can be captured and compared for each layer of interest. Transducer frequency, focus level and gate positions can then be established, tested and refined prior to transferring the imaging recipe settings to the Gen6 for all future parts of the same construction.

For more information visit www.sonoscan.com. ◆