The Global 450 Future

THE 450MM WAFER CONSORTIUM

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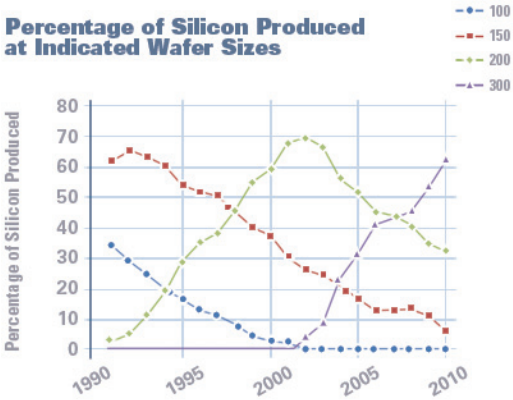
The steady drop in the cost of semiconductor performance has been as regular as a heartbeat. That beat has been accompanied by an equally steady increase in the size of the standard silicon wafer, as well as an increase in the price of equipment and facilities. As unit costs go down, wafer size and equipment costs go up.

Until now, tremendous demand has made it possible to drive down high-volume chip costs despite rising equipment costs. But the increased cost of machinery has had a serious impact on lower-volume activities like the development and testing of tooling itself. For the past few cycles, the industry has faced growing resistance to the expense involved in developing tools for the next wafer size. Now a first-of-its-kind alliance called the *Global 450 Consortium* has launched a $4.8 billion program in part to assist tooling suppliers to achieve the 450mm wafer.



The semiconductor industry's progress over the past decades has been marked by a relatively regular "heartbeat" of standard wafer size increases.

Figure 1 shows a 20 year snapshot of this "heartbeat" from a 100mm wafer to today's standard 300mm wafer. The industry as a whole has determined that it should migrate to a 450mm wafer sometime in the next five years.

Historically, as wafer size increases, the number of equipment manufacturers decreases. The 450mm cycle contraction may have already begun. For example, two of the largest and most successful industry suppliers, *Lam Research* and *Novellus*, have recently decided to merge. And, AMAT acquired another industry leader, *Varian Semiconductor Equipment Associates*, at the end of 2011.

The tremendous cost of developing the next generation of 450mm equipment has spurred the creation of The Global 450 Consortium. A partnership of Intel, IBM, TSMC, Global Foundries and Samsung, Global 450 is expected to dedicate $4.8 billion toward furthering industry needs, including supporting equipment suppliers, to achieve the 450mm wafer.

When 450mm becomes the standard, the cost of tooling will increase, as will the cost of fabricators. Currently, a state of the art fabricator costs between 5 and 10 billion dollars. Historical trends suggest the move to 450mm may drive fabricator costs to between 20 and 30 billion.

Continued industry consolidation seems inevitable when the cost of participation is so high.