

Christoph Hammerschmidt

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MUNICH, Germany — Although the worldwide semiconductor industry is anticipating growth over the next two years, the capacity utilization of fabs, the silicon supply outlook, and uncertainties in the backend could give chip companies some unpleasant surprises during that time, according to SEMI Europe. And of these, the back-end could be the most shocking. Many test and assembly contractors are being so starved of adequate returns on their existing investments that they cannot afford to upgrade for the future, according to Otto Kosgalwies, STMicroelectronics General Manager Supply Chain, who was a guest speaker at a SEMI event held here. As the semiconductor industry now contracts out a major portion of the test and the assembly of its chips, the supply chain could simply fail in a catastrophic domino effect.

The chip market is projected to grow 6.0 percent growth in 2006, and 2007 is expected to be even better, with market analysts' forecasts ranging from 5.1 percent (Gartner) to 19.8 percent (Semico Research). According to the SEMI Europe, most forecasts set the growth figure at over 10 percent. However, none of these forecasts take into account the possible limited supply of testing and assembly services or chipmaking equipment.

Figures released by SEMI Europe in Munich on Friday (Dec. 16), indicate that the semiconductor industry has learned how to deal with its cyclical ups and downs, at least partly. For example, the oscillations in the book to bill ratio has been substantially damped in recent time. In addition, wafer providers don't reach frantically for their price cutting knives every time the market slumps, with the result that price decreases in the industry have stabilized to some degree.

And the volume of manufactured wafers in terms of silicon surface area continues to climb steadily. Industry analysts expect manufactured wafer surface area to reach 6.38 million square inches for the current year, rise to 6.82 million square inches for the coming year, and to reach 8.2 million square inches in 2008 — that is if the silicon wafer providers cooperate.

But according to SEMI Europe president Heinz Kundert, rapid growth in the photovoltaic equipment industry has left silicon wafer providers with a supply shortfall. "The [wafer] supply shortage will be with us for another two to three years," Kundert said.

Meanwhile fab capacity utilization has increased steadily over the past two years and has now reached 92 percent or more. Facilities with the newest generations of technology are the most overburdened. This is good news for chip makers who are striving for maximum capital efficiency but also suggests a reluctance to buy new equipment. "When new fabs were planned in the past, the envisaged threshold was 80 percent. But this is no longer the case," said Kundert. "Today the facilities are operated at their maximum nominal capacity."

Nonetheless, semiconductor equipment providers are anticipating 9.1 percent market growth for the coming year, to nearly \$36 billion worldwide.

According to Kosgalwies, the semiconductor industry has successfully made a "soft landing" this year. Although sales declined 1.5 percent in the first half of the year, there was a large sales increase in the second half of the year, amounting to 8.5 percent, resulting in a quite respectable showing of 6.5 percent growth for the year.

Although manufacturers have switched to 300-mm diameter wafers more rapidly than anticipated, the 200-mm production lines have proven to be anything but superannuated, and production at these facilities has been going great guns. "The 200 millimeter wafers will be with us for quite some time to come," said Kosgalwies. However, silicon availability is a key limiting factor in this regard." According to Kosgalwies, 200-mm wafer users are feeling the supply pinch more than their 300-mm counterparts.

Semiconductor vendors are tending to invest in new plants far less than was the case in the past. Capital investment is currently far below the long-term index of 23 percent of semiconductor sales and Kosgalwies said he suspected this number could easily slip to 18 percent in the near term, since chip vendors nowadays use their equipment longer, owing to Asian price pressures.

The backend situation could also pose a serious problem. Many vendors have outsourced their testing and packaging activities. These contract manufacturers are now subject to such acute price pressures that they simply lack the capital reserves to make necessary and substantial investments. "Some subcontractors are running debts that are as high their annual sales," said Kosgalwies. "The backend arena may well become the limiting factor for the industry before long."

This cost structure streamlining, the thinning out of inventories, and the tendency to squeeze the maximum out of existing machinery have combined to increase the industry's vulnerability to production breakdowns. "If one segment in the supply chain fails, it isn't long before you get a catastrophic domino effect," said Kosgalwies.

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