



**PHILIPS**

# Today's Semiconductor Market Demands a Strategic Metrology Partner for Agile Manufacturing

In the past, semiconductor manufacturing was driven by technology and fabrication (fab) facilities that could make money by producing many similar chips over a long period of time. Fab managers had the time and resources to investigate and solve problems that arose in the chip production process. Metrology tools used by semiconductor manufacturers to help measure the accuracy of the chip manufacturing process from pilot to production, were relatively straightforward. Metrology solution providers would sell semiconductor companies equipment for each specific process or application, requiring a new unit every time there was a new process or application. In the past, “grand metrology problems” existed that were easily diagnosed and fixed and metrology suppliers could replicate a solution from customer to customer. Business was easy.

## ***Semiconductor Industry Shifts and Market Drivers Change***

Now, things are different. The semiconductor industry has matured and market drivers are changing. With the recent industry downturn, the focus of the semiconductor industry has shifted from technology innovation to productivity, efficiency and bottom-line profitability. Staffing resources have become scarce. Fabs are no longer seeing staff increases with the cyclical expansion of the industry; they must make do with existing staff from the “lean cycle.” Additionally, the market for chips has expanded into many devices ranging from networking to consumer and products are constantly being enhanced, requiring shorter runs of new chips. While fabrication facilities are still being driven to produce high yields, they are now doing it with fewer resources than ever before. Fab managers try to resolve immediate issues as they arise but don't have time to investigate what might be the deeper, on-going cause of the production or pre-production problems. Business is not so easy anymore.

## ***Metrology Market Fragmented***

This major semiconductor industry shift has had a rippling effect on the metrology market. Now, fabrication facilities don't want the capital expenditure of buying a new metrology machine every time they add a new application line. They want tools that are capable of expanding with them as their needs evolve. The luxury of replacement metrology tools as a solution for process or product changes is no longer viable. The

most prevalent strategy seems to be to try different solutions to problems in an “ad-hoc approach” based upon whatever previous tools or technologies they were comfortable with in the past. As a result, the metrology market itself has become fragmented. With so many new technologies, materials and structures being introduced, there is a huge difference between what the major semiconductor players are doing for process measurement and the technologies that they are using within their organization.

### ***Grand Metrology Problems No Longer Exist***

The big metrology challenges are gone, replaced by a whole set of small new metrology problems for each customer. More importantly, the problems are now more localized to each company. As a result, there are smaller individual sales of metrology equipment to each customer and replicating the sale has become difficult. Metrology problems are now more complex. They require more research and investigation and solutions need to be more strategic and long-term. There is not a traditional metrology product that is sufficient to solve all the needs of a semiconductor manufacturer; consequently, there are no “grand metrology problems” left.

### ***Metrology Tools for Agile Manufacturing Needed***

As foundries and semiconductor manufacturers build new facilities -- at costs that can sometimes escalate to \$3-4 billion dollars -- they need better ROI on their metrology capital equipment costs. This new reality demands a different approach to metrology equipment and necessitates a more integral partnership between semiconductor manufacturers and metrology solution providers. Clearly, the metrology business model needs to change from an “auto manufacturing mindset” of producing the same thing over and over with minor changes to the process to what is best characterized as “agile manufacturing.”

With an agile manufacturing approach, metrology vendors will have more flexibility to handle problems in software (versus hardware) which will increase applications reach and offer a much broader knowledge base of a wider set of problems that can be tailored to individual companies. For example, if a customer needs a new DT measurement capability (which is demanded by only a minority of the semiconductor companies) a metrology provider could quickly provide a working measurement algorithm and work cooperatively with customers to implement new requests such as software modifications and extensions.

### ***Choose a Metrology Partner Wisely***

So, the key question is – “Does your metrology vendor adapt to you or want you to adapt to them?” Measurement alone is not a solution anymore. Semiconductor companies must now realize that there is a great difference between doing a measurement and offering a metrology solution. Fabs need a tactical answer today but a strategic solution for long-term. Unfortunately, some metrology providers are still selling the “old way” and don’t take the time to determine the underlying problem. Without the right metrology solution provider, semiconductor manufacturers will have difficulty achieving the high yields they are looking for to stay competitive.

### ***Metrology Done Differently***

Philips Advanced Metrology Systems (Philips AMS) does business differently. Philips AMS sees the market change and is addressing metrology needs in a new way. Philips AMS brings its expertise and knowledge to help customers solve their problems, taking the time to investigate and truly understand the real issue or problem. Instead of offering single product designed for a single metrology problem, Philips AMS delivers a base tool that can be tailored to support multiple measurement applications. Unlike competitors, Philips AMS offers an extensible, scalable platform that maximizes ROI by supporting multiple applications and processes. With this innovative business model, Philips AMS can overcome the industry's long adoption curve for new technologies, the rapid pace of semiconductor advancement to smaller nodes and the industry need to increase yields.

### ***Strategic Partner with Customers***

Philips AMS offers advanced metrology capabilities that give customers fast and detailed results to characterize wafers, unique and comprehensive information on DT structures and thorough data analysis options. In addition, Philips AMS has expanded the scope and applications of its metrology to address the individual needs of each of its customers. By doing this, Philips AMS can take specific requirements into account as it develops a metrology solution.

An example of this approach can be seen in the partnership that Philips AMS has with Qimonda, the second largest DRAM company worldwide. Originally, Qimonda installed IR 3000 tools to monitor the "bottle" etch process used to produce trench capacitors. While working closely together, it became clear that there were metrology needs both before the "bottle" etch at the deep trench etch stage and after the etch for monitoring recess applications. To address this, Philips AMS rapidly developed new measurements and analysis methodologies which went far beyond the original requirements provided by Qimonda. In essence, Philips AMS metrology engineers were working as part of the Qimonda development.

### ***Taking Customer-centric Marketing to a New Level***

With Philips AMS, metrology is viewed as a strategic partnership in which Philips AMS becomes its customers' metrology process engineers, taking the concept of customer-centric marketing to a new level. As a fast, experienced and reliable partner, Philips AMS finds ways for its technology to solve and fix existing problems and tailor existing technology to meet new problems. Philips AMS' deep metrology knowledge base and efficiency of process helps resolve issues for customers quickly and ensures response time -- from request to delivery -- is short, saving valuable time and limited resources. As business and problems change, Philips AMS tailors its software to solve those particular problems. As part of its customer support, Philips AMS proactively works with its clients to identify metrology challenges and collaborates with them to bring new products and applications to market.

## **Philips Advanced Metrology Systems**

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