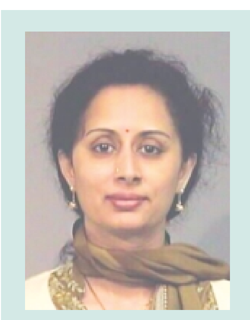
Is Your IC Design Passing Muster?

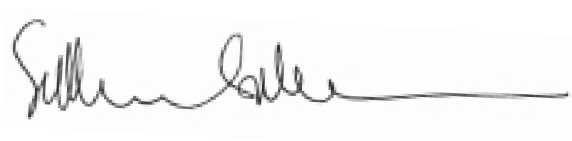
In 1962, then-U.S. President John Fitzgerald Kennedy captured the imagination of millions when he declared that, by the end of the decade, the U.S. would land a man on the moon. That speech, given at Rice University, exemplifies the power that the human imagination has in driving the technology innovations of tomorrow. The desire to reach beyond ourselves—to become greater than what we are—is irresistible. History has proven this time and again, and the semiconductor industry is no exception.

Take, for example, the evolution of the microprocessor. In 1971, Intel introduced what is widely recognized as the first single-chip, general-purpose microprocessor, which, at the time, contained 2300 transistors and boasted a clock speed of 108 kHz. Compare that to 30 years later, when the latest Intel microprocessors are more than 20,000 times faster with more than 20,000 times as many transistors capable of providing incredible computing power. Thriving on innovation, our industry has evolved beyond what many could not even imagine would be possible only a few decades ago. And today, predictions abound as to what the future holds in store for the semiconductor industry. Nanobots performing radical surgery non-invasively, flexible displays having the thickness of paper, even biochips that can perform more than 100 individual experiments. Is all this the stuff of fantasy? Or is this science in the making? If the past is any indication that imagination can truly become reality, than why should our perspective of the future be any different?

With speculation that silicon-based IC production will finally run out of steam within the next 20 years, the industry is already looking at what the next revolution in semiconductor technology has in store for us. But while we look ahead to the future, we still have to grapple with the present. Even now, with chipmakers and OEM equipment and materials suppliers gearing up to meet 90-nm process complexities, significant challenges still exist that prevent chipmakers from even achieving manufacturable yields at the 130-nm node. In fact, with the continued extension of 248-nm lithography tools to produce feature sizes at these design rules—using resolution enhancement techniques like optical proximity correction and phase shifting—lithography is literally being stretched to the limit. And, as a result, process problems that previously were minor or non-existent at 0.18-micron design rules are now wreaking havoc on yields at these smaller geometries.

"How can I get my IC design to meet my production performance requirements?" That was one of the overriding questions at the SPIE Microlithography Conference this past year. With process windows literally collapsing around us, significant process control improvements are needed in a whole host of areas—such as photoresist thickness uniformity, focus/exposure window stability and tighter reticle CD control, to name a few—in order to enable successful implementation of 130-nm IC designs into production. All this can be summed up in one simple need—greater process control in the lithography cell. That's the focus of the latest issue of our YMS Magazine. From accelerating device shrinks through improved pattern transfer control and establishing a cost-effective lithography defect monitoring strategy to managing your overlay budget and examining the microeconomics of advanced process window control, this issue takes an in-depth look at many of the challenges and solutions that are currently available to enable chip manufacturers to control their advanced lithography processes at 130 nm—and beyond.





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