

The Value of Laser-Driven Gas Analysis



Laser-driven gas analysis for molecular process control spurred a relatively new technological trend that has had a major effect on the manufacturing industry, particularly semiconductor fabrication, industrial gas production, and high-brightness LEDs. Ease of implementation, low cost of ownership, and the technology's level of cleanliness have made it a very attractive option for these manufacturers. Lisa Bergson, CEO of Tiger Optics LLC, a company that designs and manufactures laser-based analyzers, recently spoke with Manufacturing Business Technology about the technology and its benefits. Fred Conroy, the Global Director of Sales for the Semiconductor, LED, and Solar Division of Tiger Optics, also took part in the interview.

Could you offer an overview of Tiger Optics' state-of-the-art gas analysis technology and what it brings to the manufacturing industry?

Bergson: Our proprietary technology is at the cutting edge of a growing trend toward the use of laser-based technology in molecular process control. The powerful and precise laser-based techniques have only been available in this century and truly mark a paradigm shift in the way gas and environmental measurements are made. The performance that people derive from these analyzers is really transformative; you gain magnitudes in terms of speed of response, dynamic range, and accuracy, with no trade off when it comes to sustainability, ease of use and cost-of-ownership. That's why over 65% of our sales are to repeat customers.

Have you seen a decent response from a lot of these industries, in terms

of being willing to adopt this technology, or at least look into it as a potential option?

Bergson: In the early days, from 2002 through 2005, it was really tough. We'd be lucky if we sold one analyzer a month. It was all missionary work, convincing people to try the technology – it was so different from what they knew. But it's at the point now where we're experiencing better than exponential growth, and that is very exciting and gratifying. In fact, the recession actually helped us because a lot of our customers used the time to do cost-of-ownership analysis. With this technology there are no moving parts; there are no consumables; and they don't have to use the fossil fuel-based gas standards other technologies require just to make sure they're calibrated and running properly. Plus, it's really plug-and-play, so they save on manpower. That frees up people to do more productive and interesting work too. In sum, the reduced cost over time more than compensates for the investment up front.

Conroy: The chemicals and gases that our customers use to form the layers that make up the semiconductor chip have to be really pure. If you look at medical gases, they may be looking at parts per million-type purity. Where in the semiconductor market, it may be parts per trillion-type purity, which is equivalent to tracking down three people in the entire global population. That's where Tiger Optics can fit in. A lot of people think that it's the medical industry where the highest purity reigns, but it's really on the electronics front.

How smooth is the transition in terms to trying to adopt this kind of technology?

Bergson: With some of the older technologies, like mass spectrometry, they actually have to bring in PhDs for weeks to help them balance and calibrate the system for use. By contrast, our customers have been amazed, because our instruments really are what you'd call "plug-and-play". We ship it, they turn it on, and the analyzer just runs. So, from the user's perspective, the transition brings delight.

This technology was introduced around the turn of the decade. What about the technology has changed since then, and where is it headed in the future?

Bergson: The devices have become smaller, easier to use, more affordable, and a lot more versatile. For example, our first product measured only trace moisture, and was very large and over-engineered, weighing in at 100 pounds. Our UK representative threw out his back trying to live it out of the trunk of his car. I had warned him not to lift it on his own, but he went ahead and suffered terribly. By contrast, our new instruments weigh less than a third of that and are literally the size of a shoebox, they're much more intelligent, and they can be used to measure a wide array of gas and atmospheric contaminants. You name it, we'll find it

Going forward, we will continue to widen the number of analytes that we can detect, moving into broadband measurement with our new Prismatic analyzer. We want to

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add more and more value at a lower cost. Plus, we are rapidly expanding into new markets and applications, such as environmental monitoring, photovoltaics, and aeronautics.

What are some of the specific benefits manufacturers can see from this gas analysis technology?

Bergson: In the beginning, back in 2001 and 2002, I kind of had my fingers crossed that our expectations for the technology were actually realized. But now, customers are coming to us and just lauding the equipment. In fact, over 65% of our sales are from repeat customers. What they love about our equipment is not so much the razzle-dazzle stuff, like accuracy and speed of response or the wide dynamic range – over four orders of magnitude. It has a lot more to do with no hassles, the way it makes people lives easier because it's easy to use and basically maintenance free, with no consumables, if used properly. It's good to live with. Plus, our customers get points with their bosses for improved throughput and quality, which is great too.

Conroy: Our technology is an absolute technology. You don't need other calibration gases in order to make it work. We're just looking at the time it takes for a measurement to take place, we're not actually looking at the intensity of the laser, as some other laser-based technologies do. With others, they have to focus on how bright the laser light is, and how accurate that is. With ours, we fill a cavity with the sample and then we shut the laser off. Then we just measure the time it takes for the light to dissipate. (The speed of light is pretty fast.) And that provides you with data on the level of purity in your process. The fact that it's an absolute technology is just a huge factor for the end-user.

Bergson: They get the performance they need with a very low cost of ownership. The technology, first of all, is very clean for us to manufacture. But more importantly, it promotes clean manufacturing at the user site. That's something not too many people talk about, but it's really nice for our customers who want to do the right thing, better performance combined with clean technology. For once, there's no trade-off.

For more information, please visit www.tigeroptics.com [1].

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