

Fast Cars, Slow Change

By Lisa Bergson

“Fast Cars, Slow Change” could be the motto of many automakers. At least that’s Tiger Optics LLC’s (tigeroptics.com) observation when it comes to engine emissions monitors. While other industries have rapidly embraced cleaner and more efficient methods for quality assurance and process control, the auto industry lags behind. Waiting in the wings are new, powerful laser-based analytical techniques. These devices have transformed the way gaseous contaminants are measured across a broad swath of industrial and scientific markets, from semiconductor fabrication to natural gas to petrochemicals, and more. The auto industry, however, generally has yet to adopt these devices even as they are propelled into an age of stricter emissions controls worldwide.

In automotive applications, the barriers to entry are steep, with the status quo upheld by the vehicle industry, instrument companies, and regulators alike. It could be another five to ten years before car and engine makers catch up, according to Christopher Laroo, who has served for a dozen years as Environmental Protection Specialist at the Environmental Protection Agency (EPA). Even though strict emissions standards are coming into effect, the EPA adheres to the instrumentation that the industry has relied upon for the past 20 years. “We generally take a well-worn path,” explains Laroo, adding, “We don’t actually look for new ways as long as what we’ve been using is working.”

One notable exception is measurement of nitrous oxide (N₂O), a new requirement stemming from concern over greenhouse gases and their impact on global warming. Ranked fourth in contribution to global warming, N₂O has approximately 300 times the impact per unit weight of CO₂; with a 120-year lifetime in the atmosphere, it packs a real wallop.

“When we wrote the regs, there weren’t any instruments available,” recalls Laroo. Instrument makers responded with an array of options, including new laser-based analyzers from Horiba International Corp. (offering an instrument from Cascade Technologies Inc.); Sensors Inc. (with a device from

France’s Ap2e); MAHA Group; and Los Gatos Research Inc. Their monitors employ powerful quantum cascade lasers (QCL) that offer a greatly expanded measurement range. “It was good to see the industry respond to the need for a new type of analyzer,” Laroo notes. Upon evaluation, the EPA validated the QCL option, specifically for N₂O.

Nonetheless, conventional methods prevail for the measurement of other pollutants, including carbon monoxide (CO), carbon dioxide (CO₂), and methane (CH₄), with no regulatory call for more advanced systems. Thus, it will be interesting to see if Tiger Optics LLC makes inroads with its new VROOM auto emissions monitor that is based on patented Continuous Wave Cavity Ring-Down Spectroscopy (CW-CRDS). Its novel multi-species mirror simultaneously tracks up to four pollutants with a single CRDS sensor, saving space and time. With a touch-screen display and built-in computer, the user-friendly VROOM enables fast, stable, and accurate parts-per-billion range measurements with ease. Notably, other Tiger analyzers are currently employed by NIST (National Institute of Standards and Technology) and gas protocol makers to develop Standard Reference Materials (SRMs) compliant with new EPA rules for continuous emissions. Used for both spot checks and continuous monitoring, Tiger analyzers are prized for their low maintenance, with no consumables or replacement parts, as well as their intrinsic self-validating properties, eliminating the need for calibration and span gases. By using such instruments, automakers could be on a par with the many other industries that have dramatically reduced costs by eliminating the use and maintenance of old, possibly even obsolete equipment that requires storage of hundreds of spare parts and a patchwork of protocols maintained by temporary workers.



That said, Big Auto poses a daunting obstacle course for new entrants. Change appears to be driven by regulation, rather than the considerations of quality, efficiency, waste reduction, and cost-of-ownership that are motivating other industries. Also, it has long relied upon a small cadre of suppliers, with Japan’s Horiba enjoying an 80 percent market share and Austria’s AVL much of the remainder. Those two companies provide highly automated measurement systems that pull data from multiple analyzers to give auto and engine-makers information exactly tailored to their needs. “Even if your analyzer is approved, it has to be integrated into the existing test benches,” states Laroo. In other words, auto-instrumentation wannabes had best forge partnerships with the industry’s established suppliers.

Yet at Tiger Optics, we believe the benefits of our CRDS technology are too compelling to resist. The performance is far superior to incumbent techniques, obviating such issues as interferences from CO, CO₂, H₂O, and CH₄, while measuring at levels well below the capabilities of older technologies. Better performance, significantly reduced cost-of-ownership, combined with the potential for cleaner air and a healthier planet—now that’s a formula to rev your engine. ■

Lisa Bergson is Chief Executive Officer of Tiger Optics LLC. She can be reached by email at lbergson@tigeroptics.com or by phone at (215) 343-6600, extension 130.