

Transferring Methods to Compact and Portable HPLC

The Axcend Focus LC® enables laboratories to optimize space without compromising quality.

Space is an invaluable resource in the laboratory, so recent trends have led to the miniaturization of instruments to optimize that space. Smaller high-performance liquid chromatography (HPLC) instrumentation, for example, has the same benefits as analytical-scale equipment, but additionally offers a smaller footprint, more affordability, and portability. To learn more, LCGC sat down with Greg Ward (CEO of Axcend) to discuss the advantages of the Focus LC.



Greg Ward
CEO
Axcend

LCGC: Liquid chromatography has been around for decades. Can you explain Axcend's mission and how it differs from the "big box" chromatography vendors?

WARD: Today's chromatography systems are here to stay, but Axcend's mission and vision is to provide advantages to our customers who are trying to dramatically reduce the time, cost, and complexity of their analytical research. The Focus LC from Axcend was the brainchild of Dr. Milton Lee from Brigham Young University, who is well known in the field of analytical chemistry and separation science. The Focus LC is the smallest and lightest system on the market. As a result, it can fit in a fume hood, can be used in a mobile lab, and can go in a BSL space. The same qualities that make the Focus LC applicable for niche areas also make it work well for pharma and industry. It uses very small amounts of solvent, takes up minimal space, and runs on the well-known software platforms or CDS systems that pharma labs are required to use.

LCGC: What are some of the specific benefits of the Focus LC that enable users?

WARD: Let's talk about five benefits that are essentially our value propositions. First, the Focus LC is compact. That's the ability to put the tool where you need it because it doesn't take up much space. Second, it's portable, which means it can be moved around within a lab or from lab to lab. For one customer, that lab-to-lab movement was from North Carolina to Utah, and they could easily bring the instrument with them and test a contract manufacturer's product that they were making. It also could be an oil platform in the North Sea or in the field. There are several applications for portability beyond a small footprint. The third benefit is ease of use. I mentioned we work with existing CDS systems that are required in areas like pharma, where there are high regulations, but there are also instances in pharma where labs just want fast data. We have developed our own software that is simple to use and allows people to get the data they want quickly. It can be used in academic settings with brand new users who have never seen CDS before and don't want a high learning curve. We also have made a version of this that we call the Axcend Analyzer LC, where we put it in the hands of non-chromatographers. For example, we delivered some instruments to the US Air Force and, in that case, an 18-year-old airman was running it. These were certainly not chromatographers; they just needed a go-no-go tester, and we were able to do that. Next, the total cost of ownership is a benefit. This doesn't just include acquisition costs, but also what it costs to run the instrument. I mentioned that the maintenance contracts are less; the consumables are divided by a thousand in acquisition and disposable. We simply stretch a customer's budget by making the cost of ownership much lower. The last benefit is that the instrument is eco-friendly. Environmental, social, and governance (ESG) goals have been talked about in corporations for at least a decade, but it's getting to the point where they're becoming actionable. I read an article from Ernst and Young recently that said these goals are here to stay, not a fad.¹ Companies and employees are beginning to be measured on what they're doing to reach their ESG goals, and that could be achieved with green chemistry. The Focus LC helps customers and corporations reach those ESG goals.

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"[ESG is] not a fad, but an imperative."

– Ernst and Young



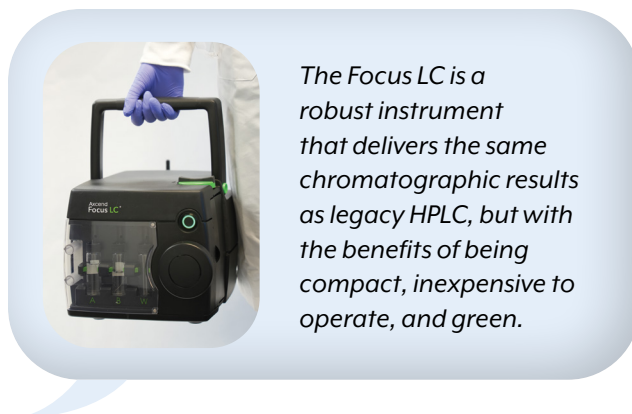
LCGC: (Bio)pharma is definitely a significant portion of the LC market and highly invested in those large LC companies that we discussed earlier. Where does the Focus LC fit in with Pharma today, and where do you see it going tomorrow?

WARD: Pharma companies are trying to figure out how to bring their products to market faster. They're moving from what were large-batch reactions to micro-reactors where the reactor is being put inside a fume hood. The LC or other instrumentation is put directly in the fume hood next to that reactor as opposed to using tubes that go to the ceiling. The emerging technology consortium from the pharma community sent out a request for proposal for compact HPLC. We were able to win that bid and work directly with them, and they're using this in drug discovery and drug development. It doesn't have to just be used in pharma, but even small or large molecule discovery and development. We even had one customer who had a robotic platform where the chemistry was on the platform and the robot could draw sample, dilute, heat, stir, and then push the sample directly into the LC. In none of these cases could you put a legacy HPLC inside of a fume hood, but with the Focus LC you can. We're also finding that the Focus LC expands available bench space. Bench space is becoming increasingly expensive. Instead of building a new building, you can maximize the efficiency of your bench space, which is very attractive. The compact footprint allows labs to put more instruments per linear foot of bench space. Some of these pharma labs have multi-floor buildings, but they are restricted in the number of LCs they can put on floors two and three because of regulations on flammable materials. It would take more than 70 of our instruments to equal one legacy instrument in terms of the amount of solvent. With our 15-ml vials, you can now use floors two and three and expand the available bench space to pharmas without having to build new facilities.



LCGC: Looking outside of pharma, what markets and applications do you see the Focus LC addressing?

WARD: There are a few additional markets, and they keep expanding. Some that come to mind are industrial cleaning validation for kettle cleaning and industry, fuels, and different areas in oil and gas. We also have really good traction in academia because it's an easy-to-use tool. It's flexible, it's portable, and users like the minimal maintenance and service contracts we have. There are applications in government or military, like for explosives or biomarkers, which could be done with or without a small-footprint mass spectrometer. The instrument could be applied to point of care, drugs of abuse, or remote clinics. Basically, it can be applied to anything that is at line, online, or truly portable.



The Focus LC is a robust instrument that delivers the same chromatographic results as legacy HPLC, but with the benefits of being compact, inexpensive to operate, and green.

LCGC: You mentioned mass spectrometry. Can the Focus be used with mass spectrometers or other technologies? What else is important for our listeners to know about the Focus LC?

WARD: LCMS is state-of-the-art in the industry. Even if it's not all the time, many customers need it, especially when they have an unknown or when they have very low concentrations. We have been able to pair our instrument with a broad range of mass spectrometers from single quads, triple quads, ion traps, time of flight, and high-resolution mass spectrometers. Any mass spectrometer that has an appropriate source and works with the capillary flow rates will match well with the Focus LC. It comes down to the fluidic connection and the input-output (IO), and we have flexibility for that communication. On the electrical side, the IO and the plumbing are straightforward. We get data quickly with a broad range of LCMS or LCMS-MS. Recently, one of our customers had a peer-reviewed paper published in the *Journal of Separation Science*, and they demonstrated that they could get the same data from the Axcend Focus LC coupled with a range of mass spectrometers as they could with traditional legacy HPLC and mass spectrometers. This proved the tool works and that users can get what they need when they want a mass spectrometer, and they can get all the benefits of low solvents. Additionally, it is relatively well known in industry that capillary is an ideal flow rate in these single-digit $\mu\text{L}/\text{minute}$. With mass spec, you get higher efficiency out of that instrument in and of itself. Overall, the Focus LC is a robust instrument that delivers the same chromatographic results as legacy HPLC, but with the benefits of being compact, inexpensive to operate, and green.

Reference:

1. How C-suites and boards can seize the opportunity in their ESG risk strategy. EY. Accessed February 6, 2024. https://www.ey.com/en_us/consulting/esg-risk-strategy-for-c-suites-and-boards

Axcend manufactures portable HPLC systems that reduce the time, cost, and complexity of analytical testing. For more information, please visit www.axcendcorp.com.