

An Interview with Fraser McLeod

Trevor Hopkins, Chromatography Today Editor met with Fraser McLeod, VP and General Manager for HPLC at Thermo Fisher Scientific in Germering, Germany for the launch of the new Vanquish Ultra High Pressure Liquid Chromatography (UHPLC) instrument on Friday July 11th, 2014.

Trevor interviewed Mr McLeod and asked him about high performance liquid chromatography (HPLC) at Thermo Fisher, and his personal development path to the separation sciences.



How did you get into chromatography?

I studied chemistry and analytical chemistry at the University of Strathclyde, where I was first introduced to HPLC and GC. For my first job out of university, I was an organic synthetic chemist and HPLC was my number one tool for helping me understand what I had synthesized (especially the by-products) and how efficient my synthesis had been.

What has your career path looked like?

After working in organic synthetic chemistry, I moved to an analytical laboratory in a contract research organization, where I led a team. We bought a software package called Chromeleon to help run the diverse set of LCs & GCs in the lab and quickly found that Chromeleon gave us a major productivity boost, helping us turn raw data into results in a remarkably short time. After about three years in that role, Dionex offered me a chance to join them as a Chromeleon specialist and that's when I made the transition to industry. At Dionex, I worked in various marketing roles. After the acquisition by Thermo Fisher Scientific, I became the vice president for chromatography software, and after that the vice president and general manager for HPLC, my current role. When you add it all up, it comes to more than 20 years working with chromatography instruments and software.

When was the decision made to develop a new UHPLC platform and why?

In 2009, we started looking at some options in the UHPLC market. This resulted in our UHPLC+ product range, released in 2010. Our customers told us that they were well served by this product range, but they began telling us that they could benefit from an additional offering that would allow them to perform even better separations, run at even higher throughput, and have even more sensitivity. When we sat down to look at how to achieve this, we quickly realized this would require the invention of a whole host of different technologies and that's when we made the decision to develop a new UHPLC platform. At the time, we reached out to the LC columns team to make sure that we could also develop a column that could fully complement the extreme power and performance we were planning for the system.

Who was/were the brains behind the specifications for the new instrument?

The initial inspiration came from our customers. They gave great guidance on what they expected from a new instrument. On the Thermo Fisher side, we had four main teams focused on the Vanquish system:

- Our R&D team, which came up with great ideas about ways to improve each module in the LC system;
- The marketing team that contributed to usability improvements and overall technical performance needs;
- The service team who gave guidance on how to improve serviceability and;
- The software team that looked at ways to better interface with Chromeleon software.

Finally, I would like to point out that the whole team realized early on that the system needed to be built around the column and the user, and we received great input on how to translate that into tangible specifications from the LC columns team and our customer-facing teams.

Where was the instrument developed and where will it be manufactured?

The system was predominantly developed in our Center of Excellence for HPLC in Germering, Germany, which is also the manufacturing site. The plate feeder was developed in cooperation with the Thermo Fisher Scientific Lab Automation team based in Burlington, Canada and Langenselbold, Germany. The Accucore Vanquish column that comes with the system was developed in Runcorn, UK and is manufactured in Bellefonte, Pennsylvania. I see the successful development of the Vanquish system as an excellent example of the benefits of being part of a large, diverse company with a global footprint.

In the development process were you able to use commonly available parts. If not why not?

This system was designed from the ground up and we did use commonly available parts as much as possible, which aids with serviceability. However, we invented some parts in order to provide the level of system performance we needed. A good example of that is the new injection valve. We needed a valve that could support the pressure range of 1,500 bar, be biocompatible, and offer extremely high robustness. We developed our own valve to meet these requirements and the results have been outstanding.

What type of users are you targeting with this instrument?

The Vanquish UHPLC system is for users who want the highest possible performance. Given this, it is aimed predominantly at R&D scientists in the pharma/biopharma, chemical, academic, and food and beverage industries.

What features uniquely differentiates the new Vanquish UHPLC system from the competition?

Every module of Vanquish was designed to give leading performance. Examples include:

- The pump supports pressures up to 1500 bar at flow rates up to 5 mL/min.
- The autosampler supports four trays and comes with a self-developed injection valve, which also supports pressures up to 1,500 bar and is biocompatible.
- The column compartment has a temperature range from 5-120°C and supports two different heating modes.
- The diode array detector combines a high dynamic range (linear up to 3,000 mAU) with low noise ($\pm 3 \mu\text{AU}$).

On top of this, the whole system is fully biocompatible, comes with a new 1.5 μm solid core column for high resolution separations, offers an extremely high level of usability and serviceability, and has exceptional integration into the Thermo Scientific Chromeleon Chromatography Data System. Finally, the system can be used with

a wide range of Thermo Scientific mass spectrometers, significantly extending the number of workflows it supports.

What benefits do these features provide for the end user?

All the features translate into great benefits to our users. They can separate more analytes, see lower levels of analytes and have higher throughput than before. In short, the system enables our end users to generate higher quality data in less time than ever before.

What Beta testing did you perform and what were the outcomes?

We ran several internal beta tests with key stakeholders and many tests with external customers. In some cases, we would send systems to customer sites to see how they performed in a typical lab environment. In other cases, we brought customers to our site for short, focused testing sessions. A key benefit of having the customers on site was that they could provide direct input to the R&D team. For example, customers gave us input on how to improve the usability of the system. So for us, the outcome was that the system performed exactly as planned, delivering the kind of exceptional performance the customers were looking for.

When will the Vanquish UHPLC system be available for sale and delivery?

The system is ready for sale and delivery now.