

# Technology partnering enables liquid chromatography innovation

**C**arlo Dessy is Managing Director of Testa Analytical Solutions eK, a respected international OEM developer and supplier of instruments, innovative detectors and software for liquid flow applications. Here I am sharing an interesting interaction with Carlo Dessy.

**Microbioz India: Please tell us about TESTA Analytical and your expertise in HPLC and GPC/SEC?**

**Carlo Dessy:** My interest in chromatography goes back 35 years ago to when I was first employed by a leading manufacturer of HPLC and GPC / SEC equipment in Germany. The unlimited possibilities of their separation science technologies fascinated me immediately, and I was given the chance to work on several new product development projects leading an experienced team of engineers and scientists. My career has focused on liquid chromatography since then, digging deeper and deeper into it and focusing mainly on the creation of innovative new detectors. TESTA Analytical was founded in 2014 with the declared aim to supply scientists with the best possible tools for analysis and characterization of macromolecules, both natural and synthetic. We have maintained a steady stream of innovative new product introductions for chromatographic applications. Over the last 9 years this has included a high performance differential refractive index detector, a highly stable viscometer, several unique combination detectors and most recently a range of real-time, non-invasive flow monitoring devices the assessing and validating the performance of liquid chromatography systems.

**Microbioz India:** Why should Asian liquid chromatograph manufacturers consider TESTA Analytical as a detector development partner?

**Carlo Dessy:** We are a truly globally focused company – we make no difference in regard to the origin of our clients - everybody is welcome and supported equally! We have found that Asian manufacturers have demanding requirements for product reliability, ease of service and regulatory compliance is increasingly important. TESTA Analytical is very familiar with these requirements and understands the need for robustness accompanied by high performance and fulfillment of compliance with regulatory issues.

As such, we are very well equipped to serve Asian manufacturers with the creation of solutions tailored to their particular needs for our common advantage and benefit.



**Carlo Dessy**-Managing Director of Testa Analytical Solutions eK

**Microbioz India: How does a specialist HPLC or GPC/SEC detector development project work?**

**Carlo Dessy:** It is hard to explain a product development process in just a few sentences. For more information I would like to refer to our publication ‘Specialty chromatography detectors: Make or Buy?’ (<https://www.custom-chromatography.com/articles.html>) where we go deeper into exactly this topic.

However, in short, detector development work is a process which includes analysis of technological requirements, market needs, scope and goal of the development and consideration of readily available solutions which might be the basis for the final instrument.

## Interview

The term “process” is the key here; it is a necessary dialogue and cooperation between the involved parties with the goal of covering all relevant aspects, technology, market, finance, desired outcome, liabilities. Well planned and designed, our well proven product development process leads to great results and happy customers.

**Microbioz India: Why should HPLC instrument manufacturers and users be interested in your Differential Refractive Index (DRI) detector technology?**



**Carlo Dessy:** Differential Refractive Index (DRI) detectors have been used in liquid chromatography systems for some time and consequently you might think real improvements would be difficult to achieve. The latest generation of our DRI technology demonstrates the opposite. Through optimization of a number of different (often underestimated) factors we have been able to create a DRI with unique features. Some of these features target the day-to-day performance and reliability, for instance an extended operating temperature range up to 80 °C or an automatic safety shut off in case of blockage of tubing safeguarding the DRI flow cell. Additional service focused design innovations have eliminated the need to re-align the DRI detector if the flow cell is replaced, and the ability to replace single tubing's without a complete rebuild of the optical assembly.

The combination of all those small details makes our DRI detector not only easy to use and service but also offers performance surpassing any other refractive index detectors on the market. It is rarely ONE detail change to make a market leading instrument, usually several smaller developments are involved. This is real progress.

**Microbioz India: What advantages do your unique combination technologies offer over standard GPC/SEC detectors?**



**Carlo Dessy:** Molar mass sensitive liquid chromatography detectors such as Multi Angle Light Scattering (MALS) and viscometers, require concentration information about the sample under investigation. The key here is the definition of “concentration”. Molar mass sensitive devices require the concentration of the sample segment currently detected. This is what we define as “corresponding concentration”. The difficulty with conventional single detectors, is that they are simply daisy-chained, and this means that the detected concentration is not the “corresponding concentration” but is a value affected by the volumetric delay between the molar mass sensitive detector and the concentration detector. This volumetric delay, which cannot be completely numerically corrected, leads to degradation of some information which can be extracted by GPC/SEC chromatography. This is not molar mass, as many might think, but valuable information such as branching and structure of the macromolecule under investigation. Our unique combination GPC/SEC detector technology reduces the delay volume down to zero. This is achieved by making the flow cell of the DRI detector in our COMBO ONE Viscometer - Refractometer combination detector an integral part of the viscometer bridge.

As such, we really achieve detection of viscosity and concentration at the very same time and on the very same sample segment, thus achieving the highest possible accuracy and resolution which enables precise determination of valuable structural information.

# Interview



This led to the development of our LC Flowmeter, a small device capable of non-invasively monitoring the flow rate of any liquid chromatography system in real time. Since introduction of our first flowmeter, we expanded the measurable range

**Microbioz India:** Can you tell our readers about any of the new product technologies you are working on?

**Carlo Dessy:** Typically, new product developments we undertake on behalf of instrument manufacturers are subject to non-disclosure agreements and consequently we cannot discuss them. However, TESTA Analytical also has an active research and development program creating, testing, and bringing to market innovative new products to serve the liquid chromatography market. Recently, we investigated the possibility of introducing advanced sensor technology to the most common and underestimated parameter in liquid chromatography – flow rate. All operations performed in HPLC, UPLC, Ion Chromatography and GPC/SEC can be directly related to the flow rate delivered by the system pump. All calculations performed by your liquid chromatograph are fully dependent on flow rate. For instance, let's consider – peak integrations. The area of a peak is the product of detector signal and of elution volume (sometimes expressed as elution time as flow rate is assumed to be constant). This assumption shows the importance of solid knowledge of the actual flow rate of any liquid chromatography system.

of flow rates with a  $\mu$ Flowmeter, which targets UHPLC and LC-MS applications. Just last month we introduced an advanced software driver which allows direct interfacing of all our flowmeters with the Chromatography Data Systems (CDS) of several major suppliers.

This latest development enables separation scientists to undertake continuous total quality assessment by coupling each chromatogram with the corresponding flow rate data. Based on these experiences, we are now working on expanding the measurable flow range to higher levels, targeting preparative applications which might be considered even more flow rate sensitive. Our aim is in 2024 to be able to serve the market with some very exciting flowmeter products for semi-prep and preparative liquid chromatography.

## About the interviewee:

Carlo Dessy is Managing Director of Testa Analytical Solutions eK, a respected OEM developer of liquid chromatographic instruments, related detectors, and software. Carlo may be contacted on [cdessy@testa-analytical.com](mailto:cdessy@testa-analytical.com)

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