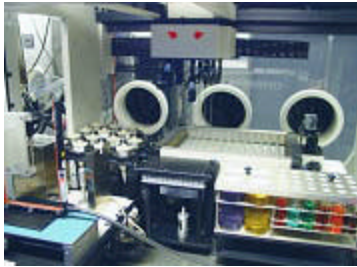


High-throughput experimentation: here to stay



Avantium is an R&D firm specialized in high-throughput experimentation. Some people think high-throughput experimentation is just another hype that will go away over time, while others see the potential benefits, but wonder if these new technologies will deliver on their promises.

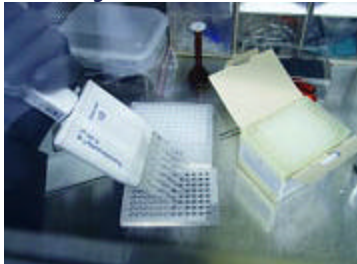
Industry examples

Companies are often pretty secretive about their R&D methods and inventions, since they do not want to disclose competitive advantages to their competitors. This makes it difficult to assess if high-throughput experimentation programs succeed in finding commercially attractive solutions. Only in recent history we are starting to see industry examples in the public domain of successful use of high-throughput techniques, such as:

- The Dow-Symyx collaboration for the development of new catalysts for specialty co-polymers
- Transform Pharmaceuticals' discovery of a novel salt form of Topiramate with a significantly improved solubility of this anti-epileptic drug of Johnson & Johnson
- UOP's development of the PI-242™ catalyst, selected by Big West Oil for the production of low sulfur, high octane gasoline
- Avantium and Pfizer collaboration on catalytic hydrogenations of nitro groups (see article in this Newsletter)

These examples are just the top of the iceberg but they demonstrate that high-throughput technology is starting to deliver results and faster than conventional methods.

History



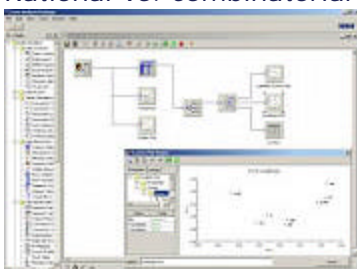
The concepts of high-throughput screening became well known in the 1990's in the area of drug discovery where millions of compounds are being tested for biological activity on a daily basis. About five years ago a limited number of companies started to implement high-throughput technologies in chemical process R&D.



Several of these early adopters are now drastically transforming their R&D organizations to maximize the benefits from these new technologies. This transformation entails much more than simply buying a couple of automated reactor stations;

it requires grasping new ways of designing experiments, new tools of handling data and radical new ways of visualizing and mining data. The early adaptors are followed by a much larger group of companies that have now begun to evaluate these technologies and slowly start to embrace the use of high-throughput experimentation technologies in order to maintain their competitive position.

Rational vs. combinatorial



Over the past five years Avantium has developed high-throughput technologies to address the needs of a wide range of industries. In doing so Avantium has gone through a tremendous learning curve to meet the diversity of chemistry presented by our customers. A classic problem with high-throughput experimentation is that scientists drown in massive amounts of data. Another well-recognized problem is the difficulty to repeat the most promising high-throughput experiments on a larger scale. Avantium is well aware of these issues and has developed software tools to help scientists with sorting and visualizing large amounts of data. To deal with scalability issues we have engineered our platforms by scaling down larger scale reactors. We call our approach the rational way, as we continue to develop systematic ways of running relevant experiments in equipment that has been designed to generate scaleable results. Therefore, this rational approach differs from combinatorial chemistry (running as many experiments as possible on a very small scale) in that it provides for ways to perform sets of systematically designed experiments and at the same time maximizes the knowledge return for our customers.