In order to always be one step ahead of the competition, Symrise AG relies on innovative product concepts combined with strategies that take a long term view. By automating and miniaturizing a key process, the Germany based global player has succeeded in increasing the productivity of its flavors and fragrances development in a sustainable manner, reducing the use of costly ingredients.

By Guido Deussing

When management spurs an organization on to question standard procedures and to try new approaches in order to improve products and processes, an innovation drive can be set in motion that releases a lot of creative energy within a short period of time. This is what happened in the German company Symrise AG. The Symrise company group was formed in 2003 by a merger between the German companies Haarmann & Reimer and Dragoco. Today, Symrise is among the top three companies in the global flavors and fragrances market. It is the stated intention of the company to continue growing faster than the market.

The key to success

Creating conditions for growth is easier said than done, but a company that can afford to take a long-term view on investment while continually working on process improvement is off to a promising start. Key parameters in working towards continual improvements and success are productivity, flexibility and sustainability, the latter meaning reducing the amount of energy and other resources spent at all levels. This is the approach taken by the Analytical Department of Symrise, which has a key role in the development of flavors and fragrances for different applications and markets such as the food and consumer goods industries. When they create new flavors and fragrances, the flavorists rely on a large number of very different raw materials and ingredients, each of which can consist of a multitude of compound mixtures. The ingredient concentrations, depending on their flavor intensity, can range from a few ppm to as much as 90 percent in the final mixture. Accurately producing a new flavor or fragrance with such a wide concentration range of components requires technical know-how and the right equipment in addition to the flavorist’s creativity.

Miniaturization improves flexibility and reduces cost

Blending new flavors for sensory evaluation is typically a time consuming and labor intensive task that requires a significant amount of expensive ingredients. Speeding up flavor development requires automation. If automation can be combined with miniaturization of the blending process, significant savings can be achieved. If the automated system is capable of running 24/7, good efficiency and productivity is also ensured.

Automated blending devices used in flavor and fragrance development are obviously capable of reducing the
many of these ingredients can degrade when exposed to heat, it was decided that Peltier cooled tray stacks were the best option for ingredient storage. Three stacks with the capacity to hold 6 trays per stack were used in the final configuration. These were vented in order to eliminate the possibility of flavor and fragrance emissions and possible cross contamination. This provided the MPS Dual Head WorkStation with a capacity of 204 to 918 ingredients depending on the vials and trays used. For example, VT12 trays hold up to twelve 2 mL vials; VT54 trays offer 54 positions for 2 mL vials. If only VT12 trays are used, a maximum of 204 ingredients can be stored in the system that was configured in cooperation with Symrise; if only VT54 trays are used up to 918 positions are available. The remaining 18th tray is used for diluents and solvents. Through careful optimization, the flavor experts at Symrise and their GERSTEL project partners succeeded in accommodating all essential raw products normally needed for flavor development work using a single MPS WorkStation.

To assist in the technical implementation of the blending process on the MPS Dual Head WorkStation, Symrise developed a database tool, which stores and takes into account specific product data including relevant ingredient specifications such as specific density and viscosity. In addition, the Symrise database keeps track of ingredient usage and stock levels in the MPS WorkStation. An integrated export function directly transfers the “recipe” of ingredients and their associated quantities for a particular fragrance blend directly to a MAESTRO Software Prep Sequence for automated blending.

In the development project, a strict and indispensable condition laid out was the ability to identify raw products by unique product numbers as well as to pinpoint their specifications.
exact vial and tray position. The overall implementation and integration of the database with the MAESTRO control software required multiple project steps in which the impact of the parameters chosen on the wider software project always had to be considered carefully. “The system alerts the user when ingredient stock is low and should be replenished or if an ingredient is missing altogether and should be added”, Uwe Schaefer and Lars Grohmann report.

Successful cooperation

The flavor experts from Symrise and the application and software experts from GERSTEL were able to draw on each other’s expertise, pooling their knowledge to produce an impressive solution. The task was among other things to expand the possibilities of the MAESTRO software and to enable the desired features such as stock management, data transfer, weighing, data tracking – and, last but not least, miniaturization. “Instead of dispensing milliliters or larger volumes by hand, the MPS performs the job dispensing only a few μL of an ingredient in order to create a new fragrance”, Uwe Schaefer and Lars Grohmann report: “The automation and miniaturization of the process using the MPS WorkStation resulted in savings in raw product usage of up to 80–90 %”.

According to the flavor experts, the MPS WorkStation works day and night, eight days a week when needed. That means the MPS is working overtime and the flavor experts have more time to challenge conventional wisdom in the operation and to try out new things. In short: More time for creative work – the most important thing in the flavor and fragrance business.

GERSTEL MPS with SID 1D/2D Barcode Reader

The new Sample ID (SID) 1D/2D Barcode reader for the GERSTEL MultiPurpose Sampler (MPS) uses a dual camera setup and image analysis for positive identification of samples. SID can be connected to a PC or via LAN using USB connectivity. Fully implemented into the MAESTRO software, SID enables independent sample logging or fully integrated sample ID transfer to the data file with multiple user-defined options for sample verification and the handling of deviations.

GERSTEL quickMix

The quickMix is an option for the GERSTEL MPS family of samplers. It enables extremely fast and efficient mixing and extraction of a sample as part of the automated sample preparation process. The mixing power is comparable to that of vortex mixing. The sample is agitated in a special tray on the module, depending on the vial size holding up to 6 samples at a time. The tray can be exchanged to operate with 2 mL, 4 mL, 10 mL and 20 mL vials. If needed, quickMix can be configured with a heated tray. All sample preparation steps are set up by mouseclick in the MAESTRO software in stand-alone operation, fully integrated with Agilent MassHunter or ChemStation, or coupled with software from SCIEX™ or Thermo Scientific™.