In 2005, world-wide production of beer amounted to a volume of around 160 billion liters – or 1.6 billion hectoliters in brewery-lingo; more than half of this sea of beer was produced by the ten largest international brewing conglomerates.

Breweries up their R & D investments

Improving sales by focusing on quality and consistency

In first position, the Belgian InBev group produced around 20 billion liters of beer, almost 13 % of world-wide production. In second place was SABMiller of the UK with 17.6 billion liters, narrowly relegating the US-based brewing giant Anheuser-Busch (17.4 billion liters/year) to third position. In 13th position we find Asahi, Japan's largest and internationally most successful brewery.

Asahi was founded in 1887, launching their first lager beer five years later. In 2005, Asahi produced around 2.5 billion liters, equal to 1.5 % of world-wide production. The trend is clear: further growth!

Research Pays Off

Asahi's consistent success and solid growth over many decades is attributed in large measure to the company's constant commitment to research and development (R&D), which is always striving to produce the best possible product. The Asahi R&D Department has around 300 employees, a relatively large number. The picture that has emerged is, that in order to gain ground and stay among the leaders in international beer markets, breweries must be in a position to develop products that are attractive to a large number of different consumer markets, they must hit the right taste for these budding markets, and last but not least, deliver consistent quality.

Analysis Techniques

In the Asahi breweries and in their R&D facilities, even though a wide range of analytical techniques are used, chromatography is the technique most commonly used.

GC and LC systems help control all stages of production of the many Asahi beverages, ensuring product quality and consistency. These techniques are used for development purposes as well.

Chromatography is used "first when we develop the products, for example, analyzing hop flavors; secondly when we work to improve the quality of existing products; and thirdly, in our QC and food safety controls, for example, when we work to eliminate off-odors or variations in product taste or try to identify what causes these things", says Mr. Toru Kishimoto of the Asahi Brewing Research and Development Laboratory.

Choosing the Right Sample Preparation Technique

Extraction of target compounds from complicated beer or wort matrices is often a challenge. Conventional sample preparation techniques often are not up to the task, according to Mr. Kishimoto: "They require large volumes of solvent, lots of time, do not provide sufficient recovery or detection limits - and often they cannot be efficiently automated".

Consequently, Asahi has replaced many conventional sample preparation methods with Solid Phase Micro Extraction (SPME) and Stir Bar Sorptive Extraction (SBSE) using the GERSTEL Twister®. Toru Kishimoto: „These techniques are easy to perform. They require no solvent, provide low detection limits, they are fast so they ensure good sample throughput and are easily automated". SBSE is used by Asahi for the determination of hop flavor compounds as well as trans-2-nonenal, fatty acids or off-odors.

Asahi currently has a range of GERSTEL solutions in their laboratories: MultiPurpose Sampler (MPS)-GC/MS systems are used for automated SPME and SBSE analysis. Thermal Desorption (TDS)-GC/MS systems are used for automated thermal desorption of Tenax-filled desorption tubes, MPS/GC-GC/MS systems are used for Multi-Dimensional GC analysis and the GERSTEL Preparative Fraction Collector (PFC) is used for preparative GC. Finally, GC/MS systems fitted with GERSTEL Olfactory Detector Ports (ODP) provide simultaneous olfactory and mass spectrometric detection, using an integrated voice recognition software package to provide a detailed "olfactogram" that includes odor intensity, retention time and voice comments for compounds as they elute.

Mr. Toru Kishimoto talking to Mr. Hirooki Kanda. Mr. Kanda is Managing Director of GERSTEL K.K., a GERSTEL-subsidiary based in Tokyo, Japan.