DNP

DNP Aseptic

Asahi Nagoya Factory

HIGH PRODUCTIVITY, HIGH QUALITY AND SUSTAINABLE ASEPTIC FILLING SYSTEM

FOR ASAHI'S NAGOYA FACTORY

In April 2021, Dai Nippon Printing (DNP)'s aseptic PET bottle filling system went into operation at the Nagoya factory of Asahi Breweries. The system has three key features

- It can produce carbonated and non-carbonated beverages
- Changeover time of aseptic system is less than two hours
- The maximum capacity is 54,000 bottle per hour (bph)

In short, this system is a highly productive, aseptic filling system for a wide variety of products, maintaining the high aseptic quality of Japan and enabling a reduction in environmental impact.

A High Productivity Line for Three Major Asahi Brands

Asahi Soft Drinks has three big brands with a history of more than 100 years. These are the carbonated drinks 'Mitsuya Cider' and 'Wilkinson', and the lactic beverage 'Calpis (Calpico)'. These production volumes have grown steadily that a new production line has been set up in Aichi Prefecture, in the centre of Japan.
To be able to produce all three big brands, an aseptic filling system capable of producing both carbonated and non-carbonated beverages was required.

Additionally, to maximise productivity, the flow rate of the UHT steriliser was designed to be 30 m³/h to achieve a high productivity line of 54,000 bph for small PET bottles of 500 ml or less and 20,000 bph for 1.5 litre PET bottles.

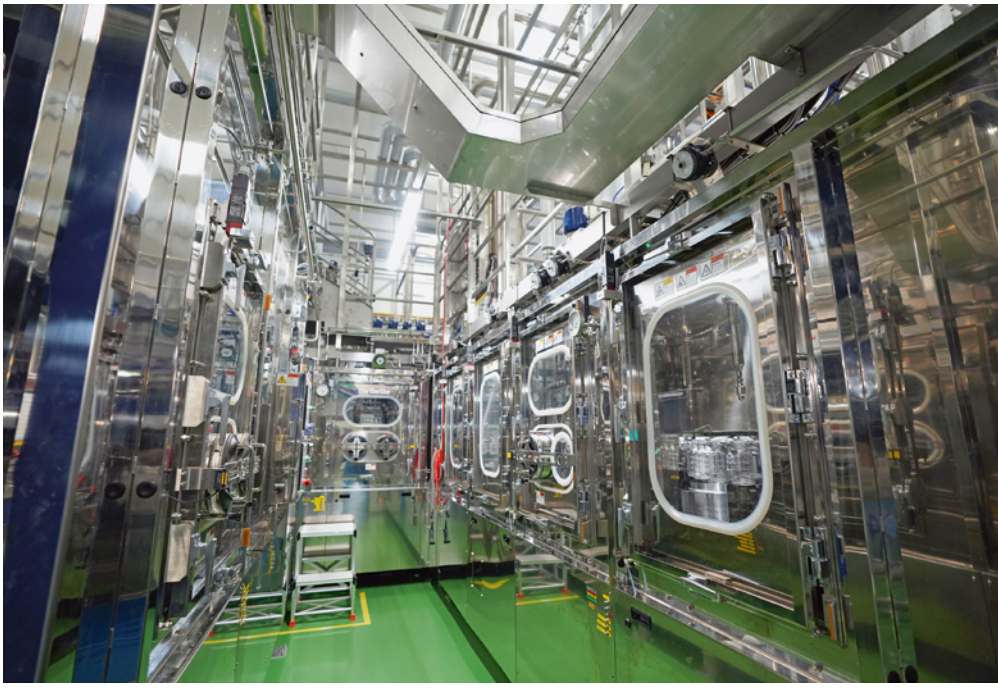
This system consists of the energy-saving blow moulder connected to the aseptic filler. The reason for this is not just a smaller footprint. The major advantages for the customer are secure and reliable bottle sterilisation with H_2O_2 gas. More specifically, the bottle temperature after blow-moulding is around 50°C, which is extremely effective for H_2O_2 gas decontamination. This reduces the amount of H_2O_2 used for bottle sterilisation by approximately 40% compared to conventional systems.

Since all bottles are conveyed from the blow moulder to the aseptic filler by gripping the neck ring, high operation rates can be maintained even if the bottle types change frequently. In fact, operation rate verification tests at commissioning were carried out on five different bottles over a period of more than eight hours of production. As a result, all were passed with a high operation rate of more than 95%.

Ultimate Changeover Time Reduction

Generally, in the case of aseptic filling systems, production of a large number of varieties reduces productivity. This is because Sterilisation-In-Place (SIP) process is required after Cleaning-In-Place (CIP) process. DNP developed a technology that allows SIP to be carried out at the same time as CIP, and SIP to be skipped once CIP is finished. Patented, this technology that performs CIP and SIP simultaneously is called "CSIP".

At the Asahi Nagoya factory, CSIP was installed in the UHT steriliser, aseptic tanks and the filler. As a result, these could be cleaned and sterilised within two hours, resulting in a significant reduction in production intervals. Needless to say, shorter changeover times, high operation rates and high-speed machines directly lead to lower TCO.



Aseptic filling system

Why Aseptic Carbonation is Sustainable

The Calpis brand of lactic beverages has a long-running popular product called 'Calpis (Calpico) Soda' since 1973. Carbonated beverages requiring sterilisation, such as Calpis Soda, have previously had to be filled at low temperature and then the product sterilised in a pasteuriser at 65°C or higher for at least 10 minutes to comply with the Japanese Food Sanitation Law. The higher temperature of the carbonated beverage, the higher the pressure inside the PET bottle, making it difficult to ensure the sealing of the cap. Therefore it was necessary to use special pressure and heat resistant PET bottles with crystallised mouth parts.

The aseptic PET bottle filling system for carbonated drinks developed by DNP in 2008 has eliminated these problems. Specifically, the system allows aseptic carbonated liquids to be filled with an aseptic carbonation filler, which can be produced in a normal pressure-resistant PET bottle that does not require crystallisation of the mouth.

Additionally the elimination of the need for a pasteuriser has not only reduced the footprint, but also has led to a significant reduction in steam and water consumption in the pasteuriser. In other words, the lighter PET bottles and energy savings have reduced CO_2 emissions and made production equipment more sustainable.

Another added benefit of the aseptic carbonation system is that the elimination of the pasteuriser enables the production of products with high gas volumes that require sterilisation, giving customers more freedom in product design.

Sterilisation Verification Tests of the Aseptic Carbonation System

DNP has been carrying out sterility verification by means of media filling tests during commissioning since 1994. At present, this verification method is spreading to China and South-East Asia. Adding CO_2 to the media lowers the pH and inhibits the growth of bacteria. To avoid this, the Asahi Nagoya factory switched from CO_2 to sterile air for media filling tests. A total of more than 30,000 units were filled and, after one week of incubation at 30˚C, zero spoilage was confirmed and initial production was started as scheduled. In Japan, after an annual overhaul, we conduct a media filling test of more than 10,000 units to ensure that the sterile condition is not compromised.

Production is only restarted once it has been confirmed that there is no spoilage. We believe this is necessary so that our customers can produce and serve safe and secure beverages for the long term.

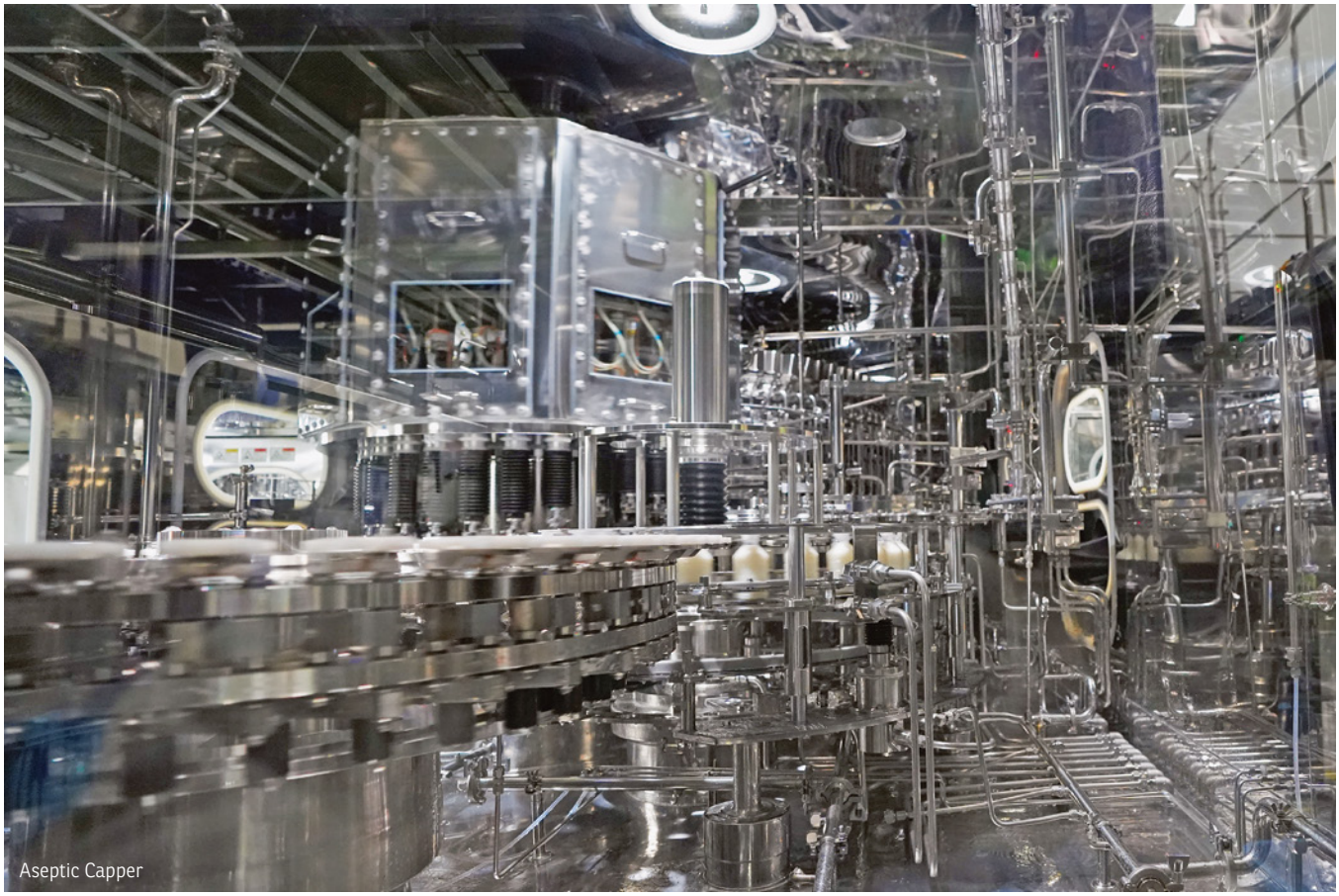
Advantages of 'High Acidity Aseptic'

We installed the first aseptic filling system for Calpis at Asahi's Gunma factory in 2008. Until then aseptic filling systems in Japan had been developed for the production of low-acid beverages such as tea and milk-filled drinks and were therefore over-specified for the production of high-acid beverages like Calpis. Because of this DNP developed an aseptic filling system specifically for Calpis, called 'High Acidity Aseptic'. As a result, this High Acidity Aseptic system successfully reduced SIP time by one-sixth compared to aseptic filling systems for low-acid beverages. Now, our aseptic filling systems have evolved into systems that can automatically select the equipment sterilisation mode for high-acid and low-acid beverages.

Creating Future Standards

DNP started the development of aseptic filling machines for UHT sterilised coffee creamer in 1972. Since then aseptic filling systems have evolved one after another to meet the needs of customers and society. As a result, aseptic filling systems for various packaging containers such as Bag-In-Box, Cups, Paper Cartons, Pouches and PET Bottles were launched. We will continue to research and develop aseptic technologies to solve social issues of the time and contribute to the realisation of a sustainable society.

www.dnp.co.jp/eng/group/aseptic-systems/



Aseptic Capper