



# THE NEXT GENERATION SUSTAINABLE ASEPTIC FILLING SYSTEM FOR KIRIN'S SHONAN FACTORY UTILISING TWO-STEP STERILISATION

DAI NIPPON PRINTING (DNP) HAVE SET THEMSELVES A GOAL.  
TO CHALLENGE THE DEVELOPMENT OF SUSTAINABLE ASEPTIC PET BOTTLE  
FILLING SYSTEMS WITH NO SACRIFICE OF QUALITY OR PRODUCTIVITY.

DNP's subsidiary, Aseptic Systems (APS), oversees aseptic development and have developed a new Aseptic PET Bottle Filling System with Two-Step

Sterilisation. This system was installed in the Shonan factory of Kirin Beverages and started operation in 2022 and 2023, with a capacity of 54,000bph for low acid

products. These new technologies reduce environmental impact while retaining high productivity and high aseptic quality demanded by producers and consumers.





### Two-Step Sterilisation Achieves a Reduction in H<sub>2</sub>O<sub>2</sub> Consumption

Conventional aseptic filling system sterilise a PET bottle with H<sub>2</sub>O<sub>2</sub>. With high-speed filling systems there is not only high production



costs but also a lot of H<sub>2</sub>O<sub>2</sub> consumption to keep high aseptic quality, which is not eco-friendly. APS resolved this issue by developing Two-Step Sterilisation, which is called 'Vapor System'. This system sterilises preforms and blown PET bottles.

Because a PET bottle volume is larger than a preform, it requires more H<sub>2</sub>O<sub>2</sub> to maintain high aseptic quality, whereas preform sterilisation needs less H<sub>2</sub>O<sub>2</sub> and still maintains high aseptic quality. After preform sterilisation, the PET bottle derived from the blowmoulder is sterilised with less H<sub>2</sub>O<sub>2</sub> and has the same aseptic quality level compared with conventional PET bottle sterilisation. As a result, Vapor System delivers a reduction of 25% of total H<sub>2</sub>O<sub>2</sub> consumption and 50% of H<sub>2</sub>O<sub>2</sub> evaporator for bottles, yet still retaining high aseptic quality.

Vapor System also enables the operator to choose the aseptic quality level by changing H<sub>2</sub>O<sub>2</sub> evaporator for bottles

quantity. Required sterilisation levels are different between carbonated and non-carbonated drinks, and by using preform H<sub>2</sub>O<sub>2</sub> sterilisation for carbonated production, the same level of aseptic quality is achieved. In short, Vapor System's flexibility and variable sterilisation levels help to decrease running costs.



### Inverted Air Rinsing System Significantly Decreases Water Consumption

Generally, sterilised PET bottles by H<sub>2</sub>O<sub>2</sub> are washed by sterilised water to eliminate any residual H<sub>2</sub>O<sub>2</sub>. Water rinsing systems tend to require more installation space and consume a lot of sterilised water. Furthermore, sterilised water production requires a lot of steam – the more sterilised water produced, the more CO<sub>2</sub> is produced, affecting the environment. APS developed and installed an Inverted Air Rinsing System instead of traditional water rinsing system at Kirin's Shonan factory. Over time, this system will significantly decrease both water consumption and CO<sub>2</sub> emissions. Water consumption annually will be reduced by around 90%, which equates to 0.13 million m<sup>3</sup>, in other words, 65 million times 2L bottles compared to conventional systems. Additionally, this system helps to simplify filling systems and reduces the footprint of machine size by 35% – saving much needed factory space. Residual H<sub>2</sub>O<sub>2</sub> and dust elimination is equally as efficient as water rinsing.



## DNP's Aseptic Filling System can be Adapted for a Variety of Products with High Productivity

Kirin Beverage has a mission to expand its health science business by pushing healthy soft drinks. To achieve this mission, they required an adaptable line capable of filling small 100ml PET bottles and larger 555ml PET bottles, without compromising quality or speed. In fact, a conventional filling valve could not assure the accuracy of volume when filling 100ml bottles. This is a material problem because Japan government established a strict weights and measures law to protect consumers. Deviation of products must be treated as disposal, therefore filling accuracy is a critical factor to help reduce wastage and to conform to laws.

A sub-valve was installed in the main valve which, when combined with the feed-forward control system, enables flow velocity to be adjusted. This synergy assures high accuracy within 0.2-0.3ml and retains high levels of productivity when 100ml bottles are produced. By disabling the sub-valve and feed-forward control system, 555ml bottles could be produced without affecting filling accuracy.

The feed-forward control system contributes to accuracy by; ❶ comparing actual filling volume and required volume,

❷ adjusting the next estimated filling volume, ❸ repeating steps 1 and 2 during operation maintaining the required volume. As a result, this system assures high accuracy.

## Creating New Technology for Aseptic Filling Systems for a Challenging Environment

DNP started to develop aseptic filling systems in 1972. Since then, aseptic filling systems have evolved and developed one after another to meet the needs of customers and society. DNP established a high-speed bottle transferring system combined with coupling the PET bottle blowing machine on to the aseptic filling machine, which is called Synchronised System. We also launched instant PET bottle sterilisation method by H<sub>2</sub>O<sub>2</sub>. Those technologies were once the most advanced technology and provided much needed cost-savings for producers. Going forward, DNP and its subsidiaries will continue to research, develop and bring to market aseptic technologies to help solve social issues and contribute to the realisation of a sustainable society.

**For further information contact:**

**DNP Europa GmbH**

🌐 <https://www.dnp.co.jp/eng/group/aseptic-systems/>

