

Aseptic filling

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Aseptic filling with electron beams

Electron beam sterilisation can be an effective alternative for most packaging formats, writes **Advanced Electron Beams** Product Manager Josh Epstein.



Josh Epstein

The growth of shelf stable, dairy based food and beverage products has been enabled by aseptic packaging technologies. Aseptic products, historically packaged primarily in cartonboard brick formats, are increasingly offered in a broad range of packages, including form fill seal cups, pouches, bottles and single serve formats. A key enabler of new aseptic package concepts has been the emergence of new sterilisation technologies.

Electron beam sterilisation increasingly is being adopted by brand owners in order to solve the unique challenges of high speed packaging material sterilisation.

Electron beams have been used for industrial sterilisation for decades. For instance, the pharmaceutical and medical device industries commonly use the technology for bulk sterilisation. The **FDA** supports the efficacy of electron beam sterilisation and the leading process authorities have experience with technology. Despite these steps, integration of the technology had been minimal due to the nature of the traditional electron beam systems, which were large, complex and difficult to integrate in line. Since aseptic packaging processes rely on the sterilisation of packaging material as it passes into an

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aseptic filling zone, electron beams were not widely utilised for food and beverage packaging.

Advanced Electron Beams (AEB) offers a compact, cost effective electron beam emitter product that can be easily integrated into a variety of industrial applications. This novel technology has created new opportunities for in line sterilisation. The company originally unveiled its plans for electron beam sterilisation products for aseptic packaging at Aseptipak 2006. Interest has grown rapidly – at Aseptipak 2008, real time research of conference attendees showed that 60% of attendees thought they would adopt the technology within the next three years.

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Though all aseptic dairy packaging requires the same degree of sterility, different packaging formats pose different sterilisation challenges. Electron beam sterilisation can be an effective alternative for most packaging formats, providing aseptic levels of sterilisation at production line speeds.

For bottles, a small electron beam is inserted through the bottle finish, sterilising the inside. For pouches, sterilising energy is delivered through the walls of the package into the interior surfaces. For caps and



closures, parts are conveyed through an electron beam system positioned to deliver sterilising energy on both sides. For cup formats – common for shelf stable dairy products – electron beams deliver energy to the interior surface from above. In addition to packaging material, electron beams can be used to disinfect the critical surfaces of the filling equipment (eg filling heads).

While the material handling and filling requirements for each product and packaging format are highly specific, it is generally most successful for a filling equipment company to partner with AEB when designing a complete solution. AEB's emitter technology is designed with a standard interface, which is shared with a growing group of equipment partners. Through close collaboration between AEB, filling equipment suppliers, end users and process authorities, electron beam technology has been successfully integrated into aseptic filling applications.

In-line electron beam sterilisation of packaging materials offers dramatic benefits over conventional chemical and heat based sterilisation methods. By eliminating the use of chemical sterilants, packagers are able to save on handling and disposal



costs, negate the risk of residual chemicals contaminating the product and eliminate the need for rinse water. In addition, electron beam sterilisation simplifies the process, making it possible to reduce the size of the filling equipment. Moreover, by removing heat from the process, it may be possible to use lighter weight packaging materials, saving on raw material costs. These benefits all translate to both lower operating costs and a more sustainable packaging operation. ■

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