Aseptic Processing and Packaging of Foods

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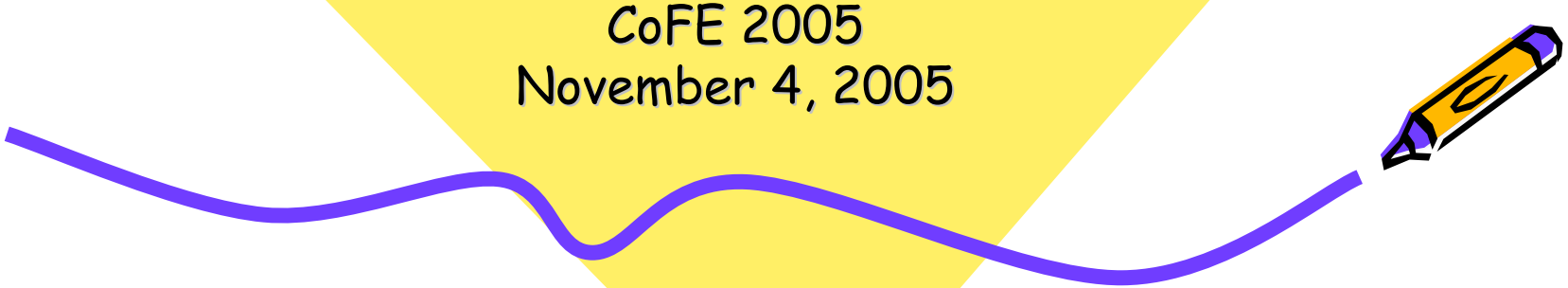


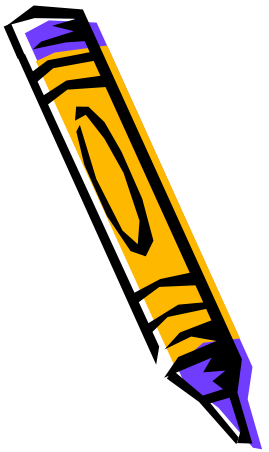
Introduction

- Aseptic processing & packaging has a long and significant history
- Numerous developments and applications have contributed to the current status
- Many food products are available to consumers as a result of these developments
- Convenience and quality are significant factors in successful products

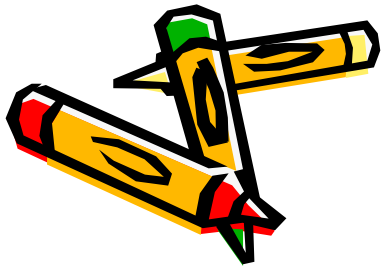
Objectives

- To define and describe the process, with emphasis on current applications
- To review the history and evolution of the process
- To present and discuss a specific case study dealing with application of the process
- To review factors contributing to the success and failure of applications

Definitions and Descriptions

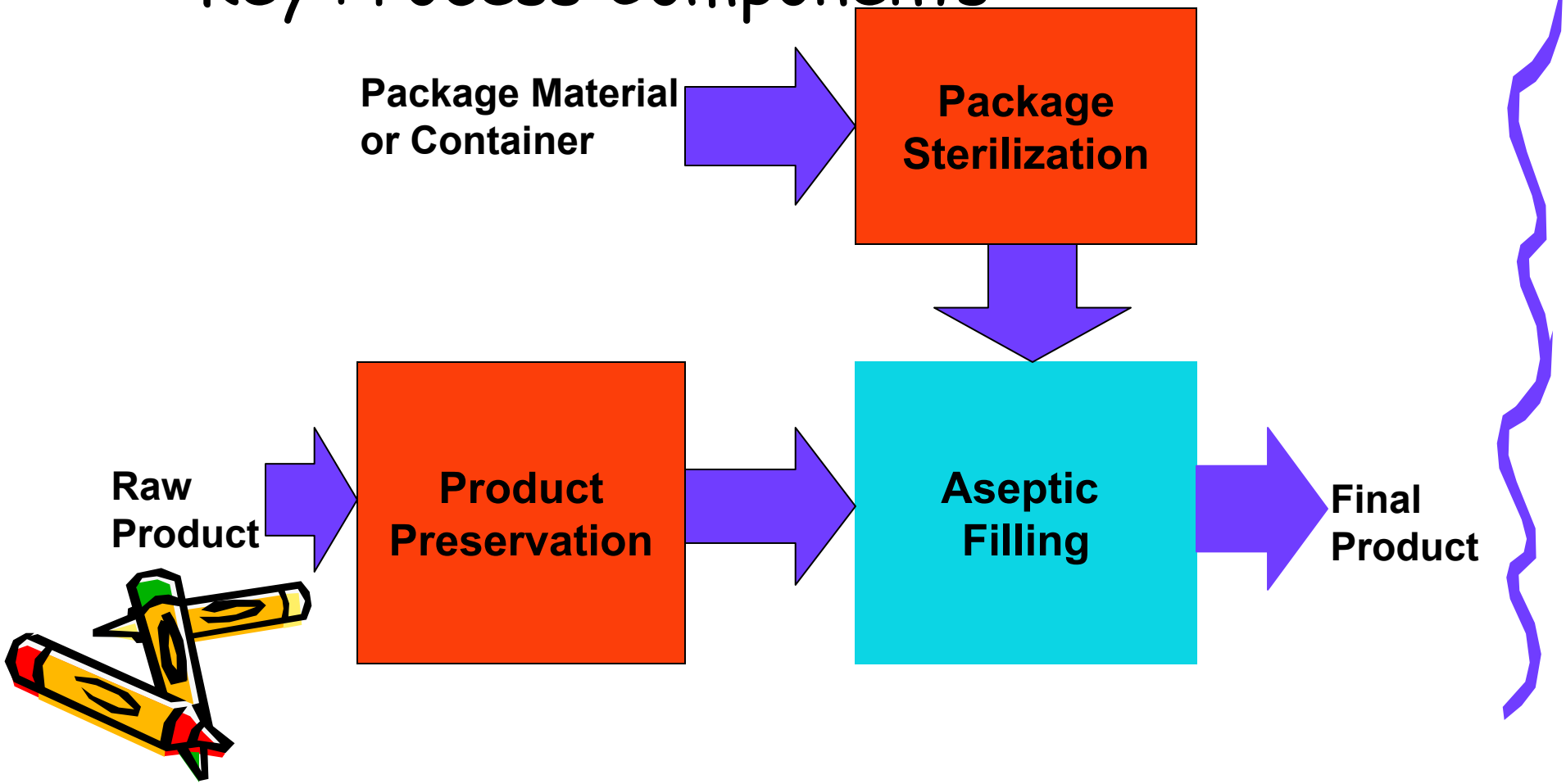


- Early definition – "a process involving the placement of a sterile product in a sterile package in a sterile environment"
- Components of the process:
  1. Sterilization of the product, usually a continuous process
  2. Sterilization of the package, usually just prior to filling
  3. Filling of product into package in a sterile environment



Process Description

- Key Process Components



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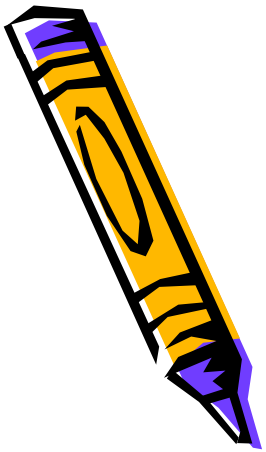
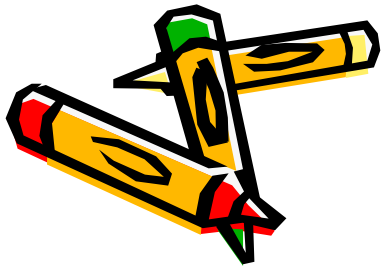


- Applications and developments have created significant variations from the original definition
- Current descriptions include:

  1. Preservation treatments with less than commercial sterilization
  2. Packaging with less than complete sterilization
  3. Filling environments that are "ultra-clean"

Early History

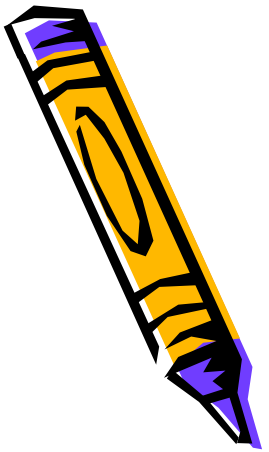
- 1914 – development of sterile filters for wine industry
- 1915 – patent granted for Pure-Pak carton; folded blank waxed cardboard package
- 1948 – first commercially-successful equipment – the Martin system
- 1950s – the Dole Aseptic Canning System; independent sterilization of product and can
- 1950s – the Avoset system; UHT processing of cream; filling into sterile glass bottles



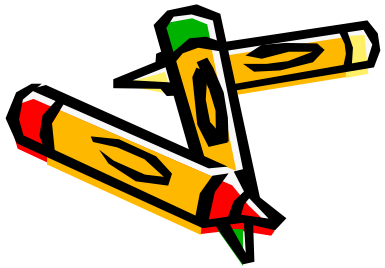
History of Aseptic Process

- 1950s – Tetra Pak introduced tetrahedron package; primarily for milk and liquid dairy products
- 1963 – Tetra Pak initiated use of rectangular carton; Tetra Brik
- 1981 – FDA approved hydrogen peroxide as sterilization agent for polyethylene in contact with a food product
- 1981 – Ocean Spray introduced "juice boxes" to market

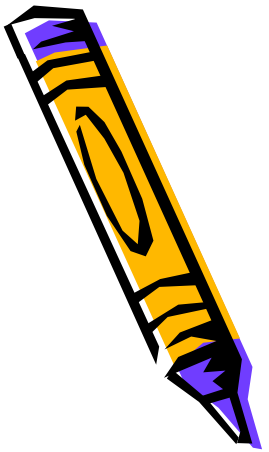
History of Aseptic Process



- 1985 – Ocean Spray began packaging juice drinks in PET plastic bottles
- Late 1980s – introduction of pudding in plastic cups
- Late 1980s – marketing of liquid whole eggs in paperboard cartons
- 1990s – advances in higher speed filling equipment and HDPE/PET packaging
- 2003 – aseptic filling of non-carbonated beverages in cans in France

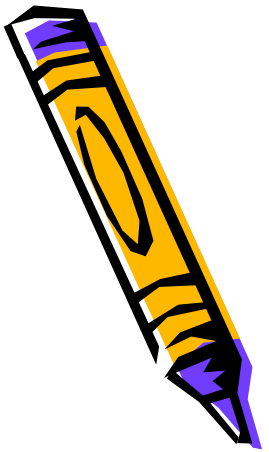


Case Study



- Campbell Soup Company in the 1980s
- CEO sets goal of replacing metal cans with plastic containers
- Company had history of research in metal cans and in can manufacturing
- Company makes commitment to research and manufacture in plastic packaging and containers

Case Study (continued)

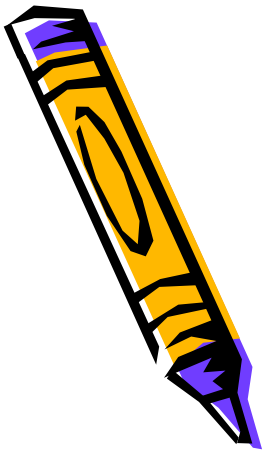


- Initial Steps:
  1. Created pilot plant with state-of-the-art preservation and filling equipment
  2. Began product formulations for liquid and low viscosity soup products
  3. Initiated development of HDPE and PET cans for soup products
  4. Conducted preliminary consumer tests to evaluate concept

Case Study (continued)

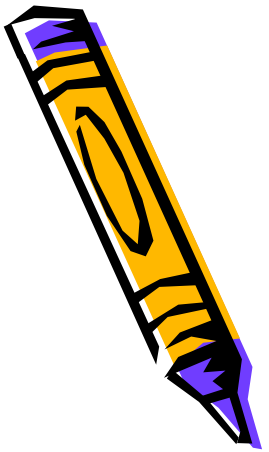
- Preliminary results:
  1. Internal evaluation of products were generally positive; superior quality attributes when compared to same product in metal can
  2. Processing and filling equipment met expectations
  3. Plastic cans and packages were acceptable

Case Study (continued)



- Challenges and limitations:
  1. Regulatory system was a significant challenge
  2. Processes for products containing particles (many soups) became major hurdle
  3. Filling systems for high viscosity liquids and products containing particles were not readily available

Case Study (continued)



- Final Analysis:
  1. Consumer viewed aseptic product as "new"; not as replacement of traditional product
  2. Aseptic product attributes (flavor and texture) were not viewed as improvement as compared to product from metal can
  3. Consumer was very comfortable with metal can: security, quality, shelf-life

Success and Failure

- Milk – in U.S., could not overcome flavor associated with UHT product
- Juice products – convenience associated with aseptic packages has been primary success factor
- Liquid egg products – provided safe delivery system for perishable product
- Soups – limited success with niche products

Success Factors

- Extended shelf life of products, not replacement of traditional shelf-stable products
- Lower distribution costs, primarily associated with reduced package weight
- Flexibility in package design; convenience for consumer
- Presentation of information on label