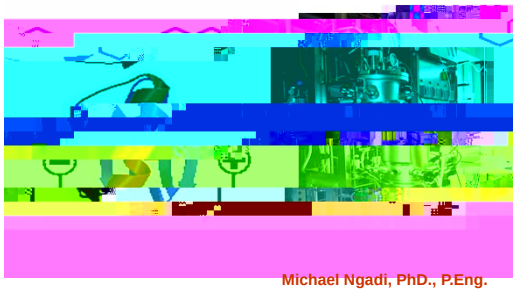
PROCESSING OF FOODS



Michael Ngadi, PhD., P.Eng.
Bioresource Engineering Department
McGill University

WHY PROCESS?

- to convert to edible products
- to preserve
- to extend availability and provide accessibility
- to provide variety and choice
- to provide convenience
- to add value

FOOD PRODUCTS

Products may be made by several processes. Interactions between product and processes differ.

Starch products
- a. Bread
- b. Cakes and biscuits
- c. Pasta
- d. Rice products
- e. Corn products

Oil products
- a. Margarine
- b. low fat spreads)

Meat products
- a. Products from cattle
- b. Products from pigs

Fish products

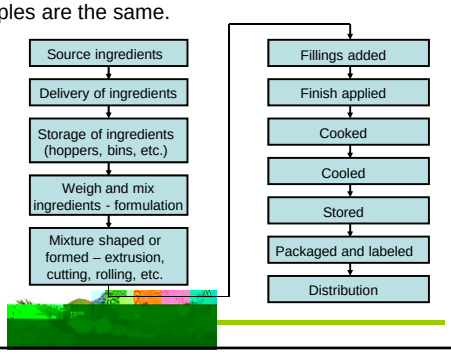
Milk products

Chocolate manufacture

Drinks

TYPICAL FOOD PROCESSES

Several steps are required to manufacture food products. The specific details of each may differ, but the basic principles are the same.



UNIT OPERATIONS

Unique steps or operations taken to prepare food products

These operations can stand alone

- Material Handling
- Cleaning
- Separating
- Size reduction
- Fluid Flow
- Mixing
- Heat transfer
- Concentration
- Drying
- Forming
- Packaging
- Controlling

TERMS

- **Process Design:** the design of food processes and manufacturing methods, including process flowsheets, design of processing and control equipment, and economic evaluation of the process.
- **Plant Design:** the design of whole processing plant, including the processing/control equipment, the utilities, the plant buildings, and the waste treatment units.

PROCESS FLOWSHEETS

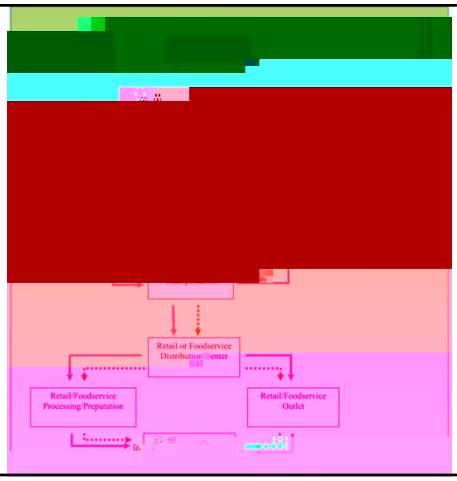
Process flowsheets are graphical representations of the layout and flow of equipment and materials in the plant.

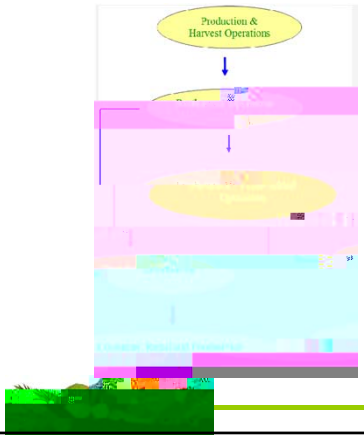
PBD: Process block diagram

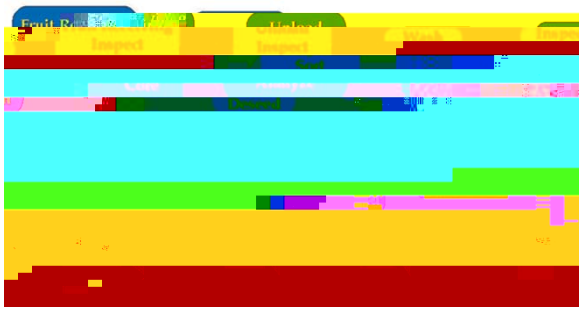
PFD: Process flowsheet diagram

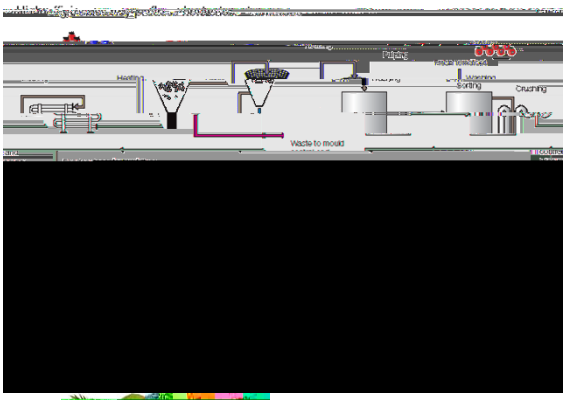
PCD: Process control diagram

PID: Piping and instrumentation diagram

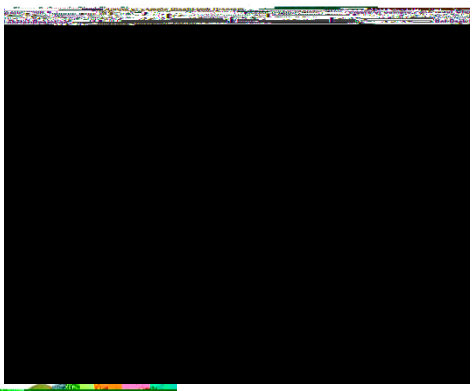








Energy accounting (process block) diagram of tomato paste manufacturing based on an 8 hour shift



GOOD MANUFACTURING PRACTICES (GMPs)

GMPs are a combination of manufacturing and management practices aimed at ensuring that food products are consistently produced to meet specifications and customer expectations.

GMPs requirements related to the design and layout of food plants include:

- Single-floor versus multistory buildings
- Land space for future expansion
- Waste disposal
- Building details (drainage, doors, lighting, ventilation, plumbing)

FOOD SAFETY PROGRAMS AND HACCP

Conduct a hazard analysis (biological, chemical, and physical)

Determine the Critical Control Points (CCPs)

Establish a critical limits for each CCP

Establish a system to monitor each CCP

Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control

Establish procedures for verification to confirm that the HACCP system is working effectively

Establish documentation concerning all procedures and record appropriate to these principles and their application