

DAIRY PLANT LAYOUT

- Plant layout is the arrangement of equipment/ machines/ facilities in a plant for the efficient functioning of the whole system with a view to maximize the profit.
- In a fruits and vegetables processing plant, the raw materials (raw fruits and vegetables) are transformed into finished product (processed fruits and vegetables) by a series of operations, whose sequence and numbers are specified for the input.

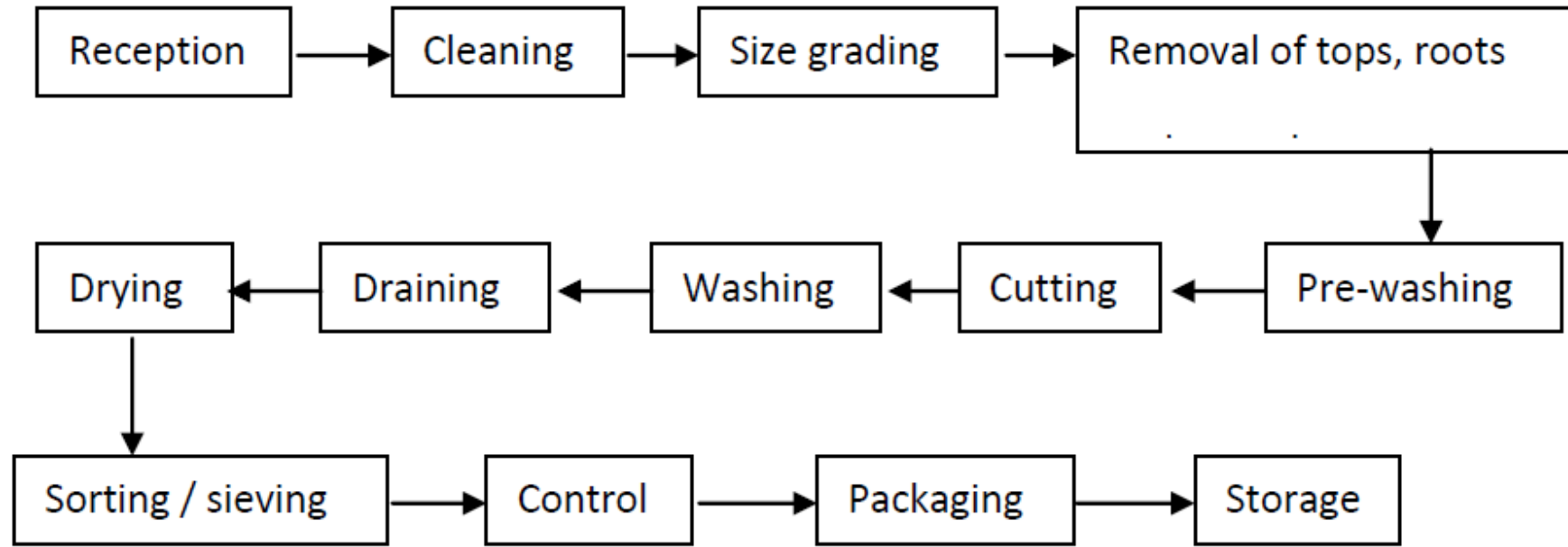


Fig. 3.12: Preparation of dehydrated onion

- ✓ We can not change the sequence of these operations as per our desire.
- ✓ In this case, after receiving, the dust and dirt sticking to the surface of the onion bulbs must be cleaned first.
- ✓ Then the bulbs should be graded for size, then the tops and roots be removed, and so on.
- ✓ Therefore, for efficient utilization of energy, labor (these are the other inputs than the raw materials), and of course money, the cleaning section should be kept adjacent to the receiving section followed by the grading section, and so on.
- ✓ Now, suppose we place the size grader between the receiving yard and the cleaning section or the drying section between the packaging section and storage section, what do you think will happen? It will unnecessarily increase the materials handling cost and time, and reduce overall performance.
- ✓ In addition, it will also cause collision between the workers and wastage of manpower and energy.
- ✓ Hence, we should arrange the work areas, equipment and auxiliary facilities judiciously in the processing plant such that the operation will be economical and the employees will feel safe and satisfying.

Thus, the arrangement of the different facilities and equipment in a food processing plant plays an important role in the overall viability of the project.

This physical arrangement of the industrial facilities is known **as plant layout.**

Advantages of good plant layout

- Saving in floor space;
- Better utilization of machine and man power, and services;
- Reduced material handling, thus saving in labor and cost, less production delays;
- Increased output/ production per unit time, labor, money and energy; and
- Easier and better supervision

Factors in planning layouts

- ✓ Proper placement of equipment and conveying machines
- ✓ **Economic distribution of services**
- ✓ **Suitable use of floor and elevation space**
- ✓ **New site development or addition to a previously developed site**
- ✓ **Future expansion**
- ✓ **Waste disposal problems-**
- ✓ **Safety considerations**
- ✓ **Other factors** - The building code requirement, weather conditions like extreme high or low temperatures, maximum wind speed in the area, etc. are some other factors which need to be considered during planning the layout.

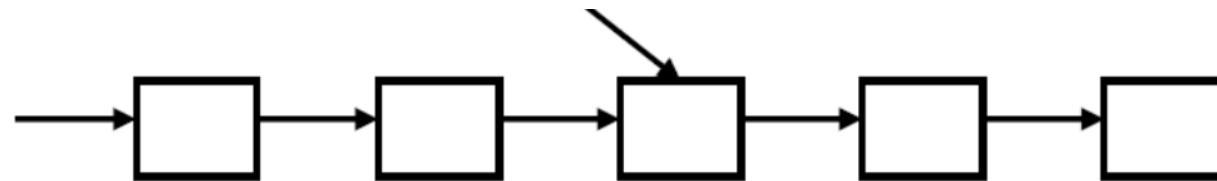
Types of layouts

There are generally two types of product flow in food processing industry

1. Line flow process
2. Intermittent flow process.

line flow process

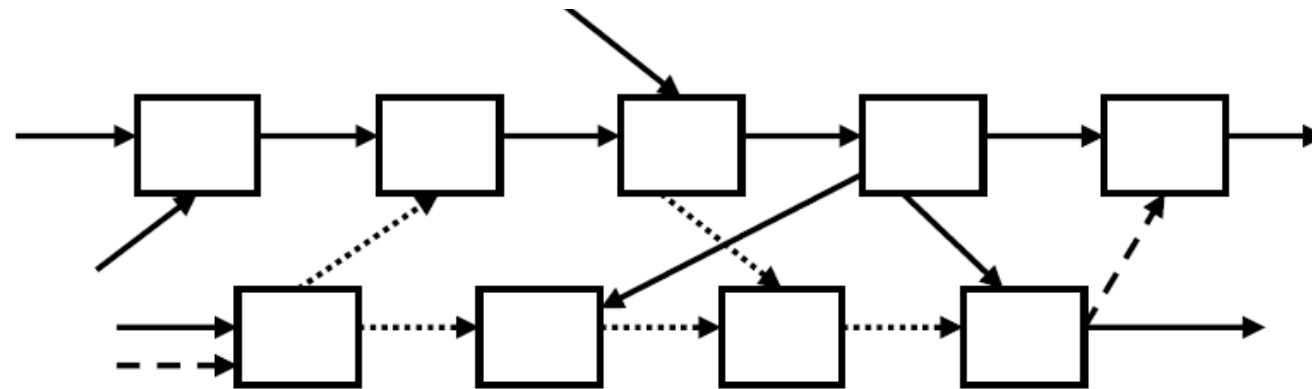
- The product flows from one operation to the next in a prescribed sequence as in the preparation of homogenized and pasteurised milk in an automatic dairy plant.
- The individual work tasks are closely coupled.
- There may be side flows, which impinge on this line, but they are integrated to achieve a smooth flow.
- line flow is also called a **product form of layout** because various process equipment, and labor skills are put into sequence according to the way the product is made.



LINE FLOW- PRODUCT FORM OF LAYOUT

Intermittent flow process

- ✓ The production is carried out in batches at intermittent intervals. In this case, we can organize the equipment and labor into different work centers by similar types of skill or equipment.
- ✓ The product can be sent to any of the work centers as per requirement.
- ✓ The intermittent process is also known as a **process form of layout** as similar equipment and processing operations are grouped together. It is also known as 'layout by function'



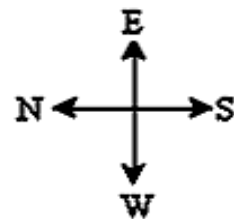
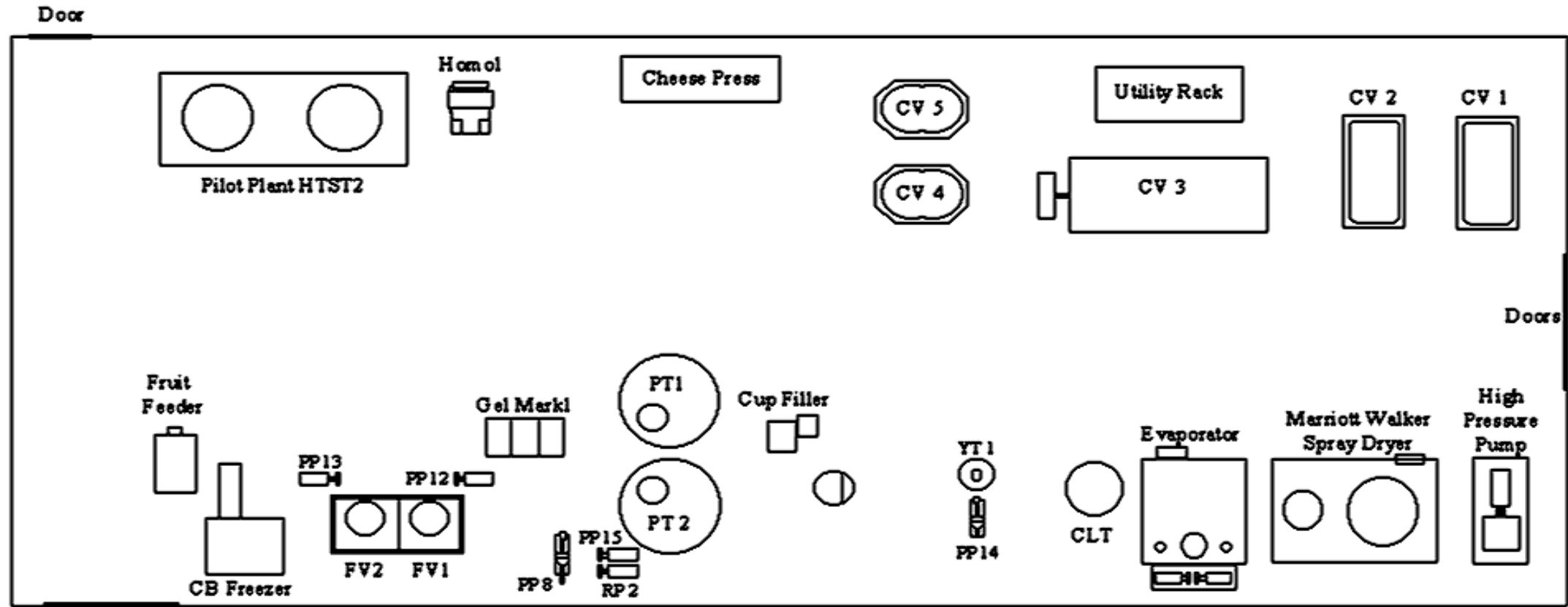
INTERMITTENT FLOW-PROCESS FORM OF LAYOUT

PROCESS FORM OF LAYOUT

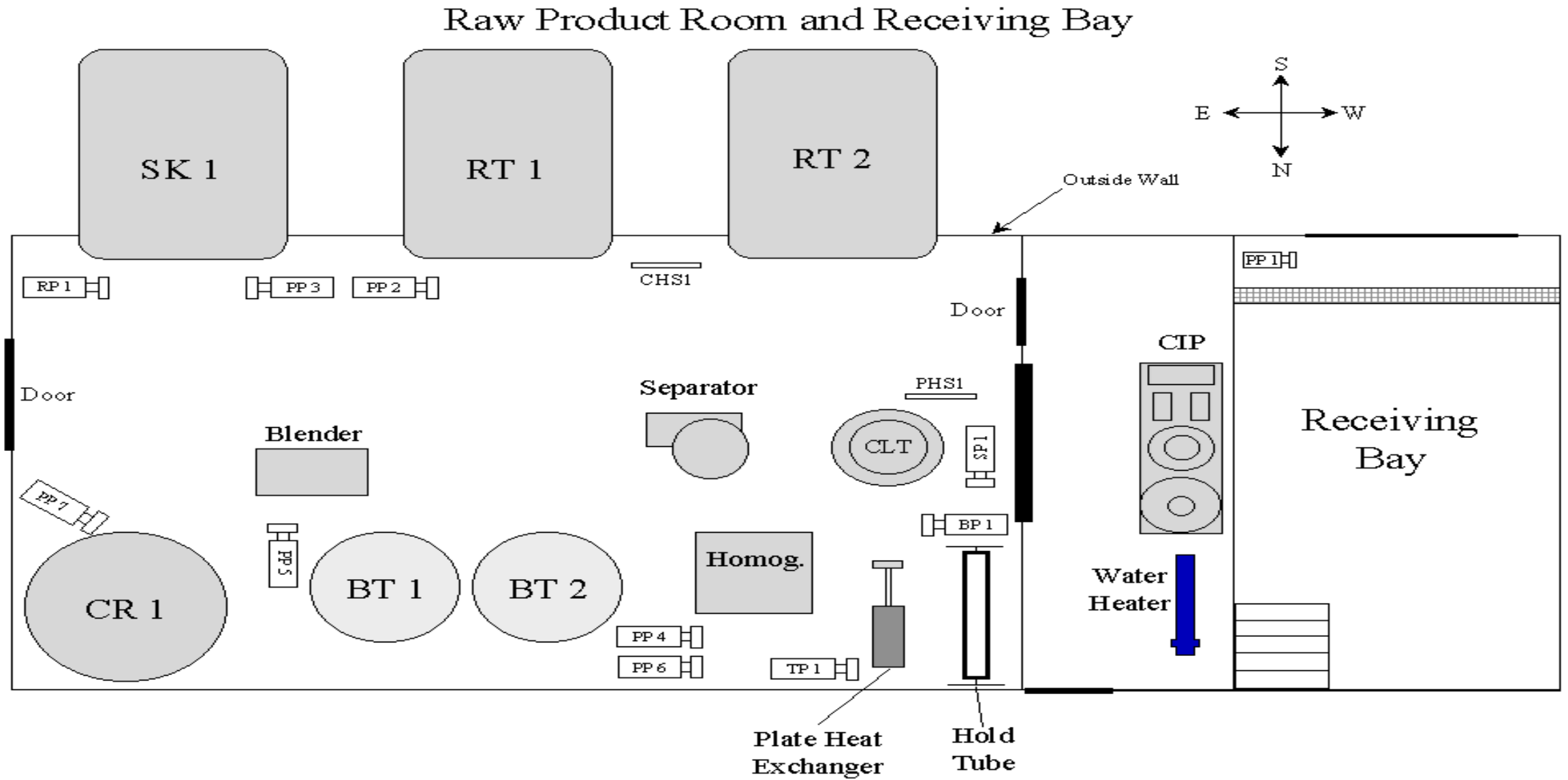
- ✓ A hybrid layout is one, where some portions may be layout by process and some portions by product.
- ✓ Generally the small food processing plants have process form of layout, whereas bigger industries have hybrid layouts.
- ✓ Another type of classification of layout is single level, multi-storey or combined layout.

Plant layout

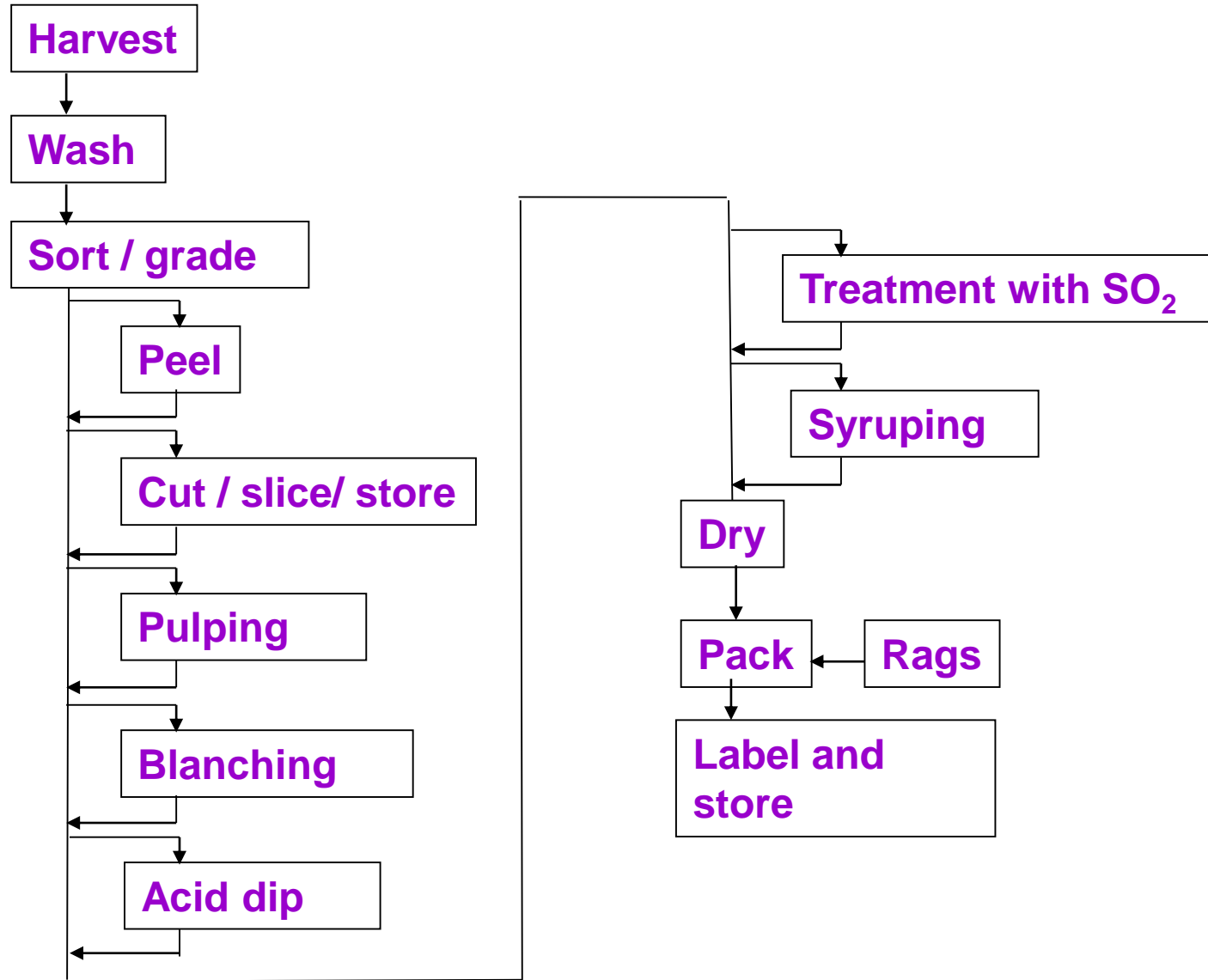
Process Room



Plant layout



Flow chart for vegetable dehydration



Equipment

- Wash tanks or special washers
- Knives, peelers, small peeling machines
- Fruit and vegetable choppers, cutters, slicing and dicing machines
- Pulpers, liquidisers, steamers, or at a large scale, pulper-finishers
- Boiling pan, heat source, wire basket or steamer
- Weighing scales or scoops, sulfuring cabinet or food grade plastic tank
- Weighing scales or scoops, boiling pan, heater, food-grade tank, muslin cloth filter
- Sun-drying, solar dryer, any type of suitable dryer
- Electric heat sealer for plastic bags

Thank You