

Seed processing plant design considerations

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1. PRELIMINARY FACTORS

- Crops produced for seed in the area and potential volume of production.
- Contamination weeds common to the area
- What capacity per hour of seed flow will be needed?
- Size and type of building needed for cleaning and storing seeds
- Will it be necessary to build seed drying facilities
- Source of adequate dependable power for running machinery
- Will seed be brought to the plant in bags, in bulk or both?
- Will seed be stored in bags, in bulk or both

2. Plot Plan

- Pilot plan shows how the buildings, parking lots and driveways fit on the lot. It also shows highways, utilities drains, electrical systems, and any other relevant information.
- Starting with the plot plan, add the main roads that border the property.
- Determine where access roads will enter the property
- Indicate the utilities on the plant
- Place the building so that the front faces a road; expansion will occur behind the building.
- Indicate where receiving and delivery will be, and connect this area to the main road.

3. Materials handling considerations

- Materials handling should be part of the planning from the start.
- Product movement costs money, and it must be kept to a minimum.
- The most efficient materials handling involves raw materials being received at one end of the plant with the final product emerging at the other and without backtracking or sidetracking.

- Planning should reduce the travel of product, people, and handling equipment. This will:
- -increase material flow
- -reduce bottlenecks and stoppages
- -reduce unsafe situations and practices
- -increase product quality

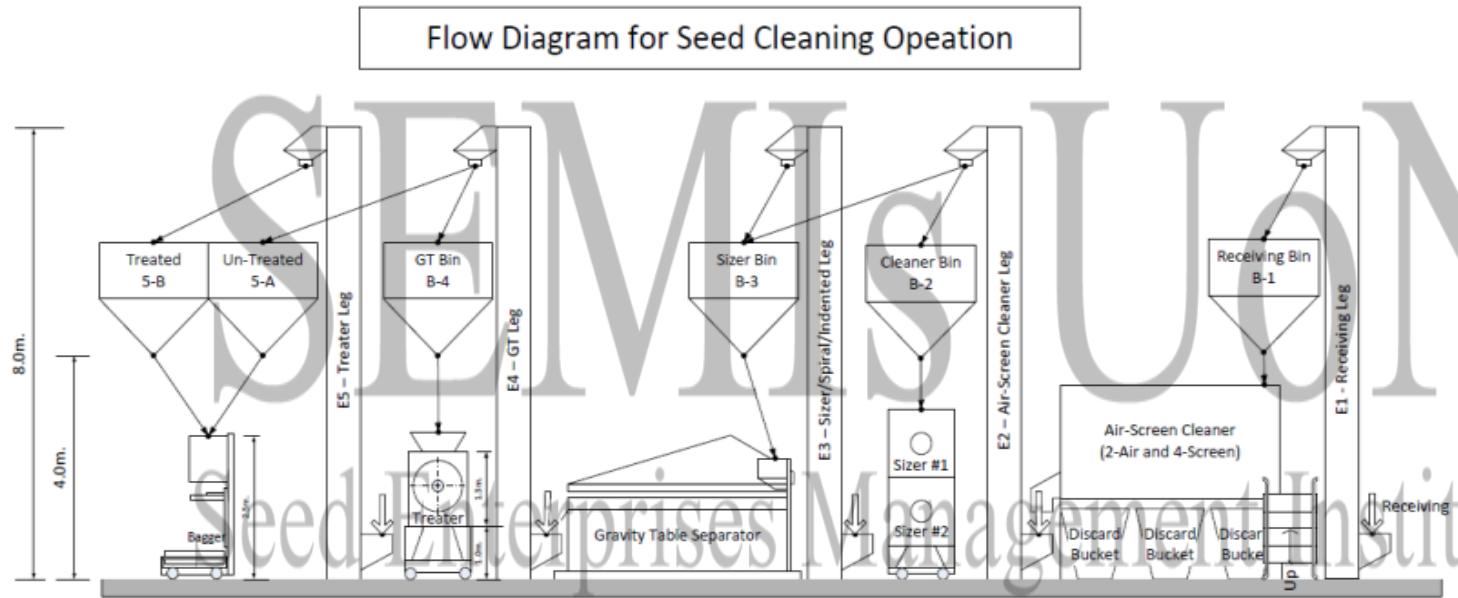
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- Consideration should also be given to the type of equipment to be used in materials handling,
- e.g. if forklift trucks are to be used, the passages should be wide enough for the truck to pass workers at a safe distance.
- These passages (aisles) must also be kept free of any obstacles or overhanging machinery and be well lit so that the truck operators can see limiting clearances easily.

4. Processing plant layout

- Three main types of processing plant layouts are multistory, single level and combination
- Multistory: Here seed is carried by elevators to the top floor and stored in large bins.
- Processing machines are arranged in a vertical series on the lower floors.
- Flow of seed from one machine down to the next is by gravity.

Seed Plant Design -Flow Diagram



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- **Single Level:** In this system, seed is moved from one machine to the next by elevators placed between the machines.
- This layout enables one person to supervise the processing line without running up and downstairs.
- Closer supervision of all operations can thus be maintained.

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- **Combined Designs:** These involve a compromise between the single and multistory system.
- Whatever the design, equipment should be arranged to provide:
 - 1. A sequence of cleaning and handling that is proper, efficient, complete, and as simple as possible.

- 2. Economical distribution and maintenance of space
- 3. Orderly and continuous flow of seed and waste products with a minimum cost
- 4. Flexibility to handle different seed that require different processing.
- 5. Possibility of orderly expansion as capacity needs increase.
- 6. Maximum safety and comfort of operating personnel
- 7. Effective and economical means of handling waste products

5. SELECTION OF EQUIPMENT

Factors influencing the kinds of equipment needed for processing and handling seed.

i) Cleaning Machines

- a) Kinds of crop seed to be cleaned affect equipment selection. Different crop seed requires different screen sizes, cut adjustments and different kinds of separating machines.
- b) Kinds of weed common in the area must be considered , since they also determines kinds of equipment needed
- c) Volume of seed to be handled will determine size and number of machines needed.

Seed Plant Design –List of Equip

Crop Description	Seed Processing Operation													
	Drying	Shelling or Threshing	Pre-clean (air)	Pre-clean (scalp)	Debeard or Brush	Air Screen Cleaner	Spiral or Belt	Indent or Disc (I)	Sizing (w/t)	Polisher	Destoner	Gravity Separator	Color Sorter	Seed Treater
Corn (Maize)		Urgent	Urgent	Optional		Urgent		Urgent				Urgent	Optional	Urgent
Beans		Urgent		Optional		Urgent			Optional		Urgent	Urgent	Optional	Urgent
Groundnut		Urgent		Optional		Urgent			Optional		Urgent	Urgent	Optional	Urgent
Cow Peas		Urgent		Optional		Urgent					Urgent	Urgent	Optional	Urgent
Millet		Urgent		Optional	Optional	Urgent					Urgent	Urgent	Optional	Urgent
Grain Sorghum		Urgent		Optional		Urgent		Optional			Urgent	Urgent	Optional	Urgent
Wheat		Urgent		Optional		Urgent		Optional			Urgent	Urgent	Optional	Urgent
Sunflower		Urgent		Optional		Urgent		Optional			Urgent	Urgent	Optional	Urgent
Spider Plant						Urgent		Optional						Optional
Solanum (African nightshade)						Urgent		Optional						Optional
Crotalaria						Urgent		Optional						Optional
amaranthus						Urgent		Optional						Optional
Urgent Need:		Urgent												
Optional / Future:		Optional												
Food Grade Only:		Food Grade												

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ii). Elevators and conveyors

- a) Elevator and conveyor capacity must be matched to machine capacity
- b) There must be sufficient numbers of elevators and conveyors to move seed from machine to machine , or machine to bin.
- c) Easily damaged seed cannot be handled in some elevators.
- d) Ease of cleaning equipment when changing varieties is an important factor.
- e) The type of plant layout will also influence the selection of elevators and conveyors

iii). BINS

- a) Storage bins are needed . Holding bins must be used over each cleaning machine, over the treater and over the bagger.
- b) Bins must be self-cleaning
- c) Surge bins (over each machine) must be large enough to permit continuous feeding of the machines without constant attention .
- d) Sufficient bin capacity should be available to permit bulk holding of lots until cleaning is completed.

6. SEED MOVING EQUIPMENT

- These are equipment needed for receiving, conveying and elevating seed. They include elevators, mechanical conveyors and pneumatic conveyors. Choice of equipment depends on the type of seed handled, the capacity desired, and the distance seed must be moved horizontally and vertically. Ease of cleaning and low seed damage are important considerations,

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SEED PROCESSING PLANT MANAGEMENT

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BASIC MANAGEMENT OBJECTIVE

Attainment of quality seed where quality is defined as good vigour, high purity percent and high germination percent.

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KEY TECHNICAL MANAGEMENT FACTORS

1. Complete Cleaning

Complete efficient separation of all undesirable material from the crop seed and at a high capacity. Appropriate machines of the right capacity used in the proper sequence.

2. Mixture Prevention

Avoiding contamination of the crop seed during processing and handling operations. Self-cleaning equipment ; adequate cleaning equipment

COMPLETE IDENTITY

- Maintaining positive and separate identity of each lot and bag during handling, cleaning, bagging and storage. Proper record system, modern warehousing systems and techniques

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EVALUATION AND IMPROVEMENT

- A means of constantly evaluating the processing operations to pinpoint bottlenecks and inefficient operations so that operating efficiency and seed quality can be constantly improved.
- A thorough sampling and analysis program is required

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THE MANAGEMENT PROCESS

- The management process consists of planning , organisation, motivation control and innovation

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PLANNING

- Estimate of crop size well before the processing season.
- Cost
- Length of time to accomplish job
- Size of crew
- Equipment need.
- Contingencies.

Organization

- A manager ought to know the people in the crew and how to best deploy them, each person should be deployed to do what they are best suited to do.

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MOTIVATION

- Motivation is some inner drive, impulse, intention that causes a person to do something or act in a certain way, incentive, goal.
- “The ability to get a person to do what you want him to do when you want it done, in a way you want it done, because he wants to do it” (Dwight Eisenhower). This is the core of seed processing plant management.

CONTROL

- The manager needs to check on the crew's work
- He/She may chose to do this constantly, or this can be done by establishing checks at various points in the process.

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INNOVATION

- Innovation must be an ongoing process, there is no single best method of cleaning seed. Each seed lot is slightly different.
- The size, weight and shape of seed differs not only between lots but also within lots, new ideas often come from crew.

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