Cold Storage Design

Richard Dowdell
Design Phase

• The most important phase of facility design is the planning stage
• It is important to get design criteria correct as mistakes at this phase can become very costly
• The most important design information is your customer’s requirements
Design Phase

• Are the products for:
  – Local markets
  – Grocery stores, restaurants, hotels
  – Food processors
  – Export

• What are the requirements?

• The facility must be able to meet the customer’s requirements for quality, volume, and timeliness of delivery
Site Selection

- Important specific site selection factors include:
  - Electrical power availability (and reliability)
  - Good access roads
  - Good source of potable water
  - Close to farmers who supply fruit and vegetables (very important)
  - Proximity of local markets, food processors, grocery chains, food service companies, hotels, restaurants, or other possible customers
  - Is there room for expansion?
Floor Plan Design

• Small rooms are better for storage of fruits and vegetables for the following reasons:
  – Different products require different temperatures and humidity's
  – Some products are incompatible
  – Ethylene producing products need to be vented regularly (other than short term storage)
  – Fruit and vegetable storage rooms require periodic cleaning, small rooms offer more flexibility
  – Can be more energy efficient
Small Cold Storage Room
Truck Docks

• Good truck docks are critical for good operation
• Truck docks are one of the most neglected areas in cold storage facilities
• For good product quality control, truck docks should be refrigerated
• If the initial budget does not allow refrigerating the dock, it should be designed so insulated panel walls and refrigeration equipment can be added later
Refrigerated Dock
What is this?
Insulated Panels

• Use urethane insulated panels for cold storage facilities – if available – \( \frac{1}{2} \) thickness of expanded polystyrene panels

• Recommended thickness for urethane insulated wall panels are:
  - 6 cm    10 C and above
  - 8 mm    4 C to 10 C
  - 10 mm   -4 C to 4 C

Use an additional 2 cm for ceiling panels
Temperature and Relative Humidity

• Temperature is the **most important condition** for storage of fruits and vegetables.
• Produce should be cooled as soon as possible to protect quality and extend shelf life.
• Keeping fruits cool will slow down the ripening process.
• Relative humidity is the **second most important** condition for storage of fruits and vegetables.
Fruit and Vegetable Cold Storage

• How can cold storage affect storage life?
  – Avocados       3 weeks
  – Mangoes        7 weeks
  – Pineapples     4 weeks
  – Cabbage        3-4 months
  – Onions         4-8 months
  – Potatoes       12 months +

• Using proper temperature and relative humidity, the shelf life of fruits and vegetables can be extended
Compressor/Condenser
Compressor/Condenser
Air Conditioner with Koolbot
Humidifier
Generator

• A generator system should have the capacity to maintain critical temperatures within the cold storage facility

• If there is insufficient generator capacity to maintain all room temperatures, priority should be given to rooms storing products that are very sensitive to room temperature changes or high value products
Generator
Questions

• Any questions?