Design and Construction of Packhouses

Henry Bonar, II
Bonar Engineering, Inc.
## Packinghouse Overview

<table>
<thead>
<tr>
<th>Old Method</th>
<th>New Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Harvest</td>
<td>• Harvest (and some Chilled)</td>
</tr>
<tr>
<td>• Transport</td>
<td>• Transport refrigerated</td>
</tr>
<tr>
<td>• Receive packinghouse</td>
<td>• Received (re)pack</td>
</tr>
<tr>
<td>• Transport</td>
<td>• Transport refrigerated</td>
</tr>
<tr>
<td>• Receive retail outlet</td>
<td>• Receive DC</td>
</tr>
<tr>
<td>• Transport</td>
<td>• Transport refrigerated</td>
</tr>
<tr>
<td>• Received, consumed</td>
<td>• Receive retail outlet</td>
</tr>
<tr>
<td></td>
<td>• Transport Bagged</td>
</tr>
<tr>
<td></td>
<td>• Received, consumed</td>
</tr>
</tbody>
</table>
Food Logistics Risk

1. Sanitation Field Heat
2. Temperature after Harvest
3. Time before Cooling
4. Packaging, Storage or Ripening Atmosphere
5. Time to Market
Field Heat

Common Methods

• Remote Refrigeration Trucks
• Vacuum Chamber Coolers
• Water Hydro coolers
• Chilling or Freezing at Process or Packinghouses
India

- 40%-60% loss of food from lack of refrigeration
Delhi Food Market
Food Market
Banana Truck
Ripening Bananas
Pineapples
India

- Frozen food development
Frozen Food Plant Under Construction
Bangalore Food Market
Fresher than Fresh
Nine Floor Freezer
Afghanistan Food Logistics

• Fresh foods
Afghanistan Food Market
Afghanistan Food Market
Outside Meeting
Meeting (With Book)
Afghan Coolers
Chill Reefers
Cooler Product
Bananas
Banana Box Foot Test
Afghanistan Food Logistics

- Frozen
Frozen Brazilian Chicken
Outside Freezer
Entrance to Freezer
Frozen Poultry
Air Channel
Jacksonville, Florida

• Current day banana storage and ripening
Banana Storage and Ripening Rooms
Banana Room
Tarp Being Placed
Tarp Down
## Banana Room Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Set Pt</th>
<th>Temp</th>
<th>Humid</th>
<th>Initial</th>
<th>Date</th>
<th>Time</th>
<th>Set Pt</th>
<th>Temp</th>
<th>Humid</th>
<th>Initial</th>
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</thead>
<tbody>
<tr>
<td>7/12</td>
<td>4:45</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>60</td>
<td>7/18</td>
<td>4:45</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>7/13</td>
<td>9:10</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>60</td>
<td>7/19</td>
<td>8:20</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>7/14</td>
<td>17:30</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>60</td>
<td>7/20</td>
<td>5:00</td>
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<td>100</td>
<td>60</td>
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<tr>
<td>7/15</td>
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<td>60</td>
<td>7/21</td>
<td>2:40</td>
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<td>7/16</td>
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<td>100</td>
<td>60</td>
<td>7/22</td>
<td>1:30</td>
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</tbody>
</table>

**GLOBAL COLD CHAIN ALLIANCE**
Ethylene Generator
Banana Color Guide

1. All Green
2. Green With Trace of Yellow
3. More Green Than Yellow
3.5. Half Green / Half Yellow
4. More Yellow Than Green
5. Yellow With Green Tips & Green Necks
6. All Yellow
7. All Yellow With Brown Flecks

Display Colors 5-6 For Maximum Sales Potential
Banana
Banana Temperature Monitor
Serbia

• Apple production and packing
Apple Packing Processing Facility
Sorting and Grading Equipment
Apple Sorting and Grading
Apple Boxing
Apple Storage Rooms
Apple Storage Room
Apple Storage Room
Loading Local Delivery Trucks
Refrigeration Compressors
Serbia

• Raspberry packing
Raspberry Packing Processing Facility
Raspberry Sorting and Packaging Lines
Raspberry Sorting and Grading Line
Raspberry Blast Freezer
Loading Tractor Trailers
Distribution Packing Process Facility

- Current day distribution operation
Potato and Onion Bins
55°F/12.78°C Potato Storage
Bean Hopper
Beans
Pineapples
Raspberries
Almonds
Product Ready to Ship to Retail Store
Miscellaneous Process Equipment

- Different equipment used for processing and in packaging operations
Sorting
IQF Raspberries
Vaccuum Cooler
Field Cooling
Freezing Peas
Corn Bins
Peas and Corn
Cranberries
above: Cabbage handling system
*Trimming and waste removal, Weight grading,
Automatic tray palletising.
(*also see 3 images below.*)
New Facilities

• Packing
• Storing
• Ripening
• Chilling
• Tempering
Produce Packing and Distribution Center

Operations and Process Flow Summary
Produce Repack Distribution
Tempering and Chill Areas
Floor Pouring
Steel going up
Port Fresh Logistics
IMP (Insulated Metal Panel) Ceilings
Proper Way to Install Roof Insulation
Recent surveys show that machine rooms with 6 or more combined reciprocating and screw compressors provide 4X the efficiency of refrigeration systems with only 2 to 3 screw compressors.
Long throw air units
Air Cargo

Roughly 45 percent of the airline's cargo into and out of Miami is perishable, with about 8 percent of it fruits and vegetables, Mr. Torre noted. "We use vacuum cooling for snow peas from Guatemala, baby bananas from Ecuador, asparagus from Peru, and pineapples from Honduras," he said.

"It is an integral part of our door-to-door perishable transport strategy. We bring the produce into our Miami cooling center, pre-cool it, move it into our jets and then ship it across the Atlantic to our Frankfurt perishable center, where it is picked up by refrigerated trucks and delivered to the consignee."

Each of Lufthansa's cargo aircraft sports five cooling zones in the hold so that different perishables can be cooled at an appropriate temperature. The airline sends three freighters a week to Europe with 90 tons capacity each, in addition to its daily combination passenger/cargo flights.

PRS has sold most of its vacuum cooling equipment to farmers, although it is currently discussing the sale of a system to a second airline, Challenge Air Cargo. The Miami-based airline confirmed it is planning to buy a system. "We're very interested and will likely go ahead with a sale in the next month or so," said Bill Spohrer, Challenge
Thank You!

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