EQUIPMENT CONSIDERATIONS IN THE CRAFT MALTHOUSE

Presented by Christian Stanley
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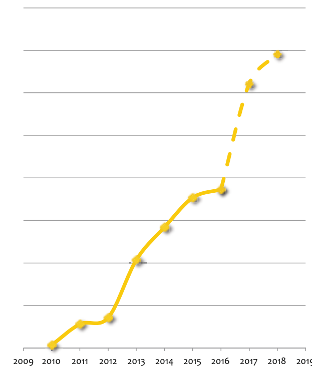
A Little Bit About Me

- Founded Valley Malt with Andrea in 2010
  - Initially 1 Ton "Unimalter"
  - 2012 Upgrade to 4 x 1 Ton Unimalters
  - 2014 Add 1 Ton Floor Malting Capacity
  - 2017 – 2Ton Batch, Separate Steep, Germ & Kiln
- Formerly worked as a Mechanical Engineer
  - Environmental Engineering
  - Fuel Cell / Hydrogen Generation R&D
  - Mechanical Engineering Consultant
- Full Time at Valley Malt in 2014



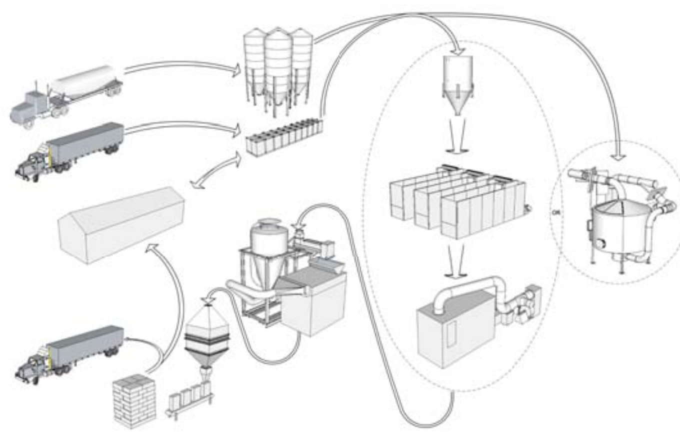
Malting – It's Easy, Right

Grain

Steep

Germinate

Kiln



Starting or Expanding a Malt House? You will need to think ahead

Topics to be covered

- General design considerations
- Grain Storage
- Steeping
- Germination
- Kilning
- Material Handling
- Grain Cleaning & Packaging
- Dust
- Facility Layout Considerations

What I would look for if I were choosing a system today.

What would I do now if I could

Design Considerations

Space / Location
- Ceiling Height: 15 to 20' Minimum
- Grain Storage

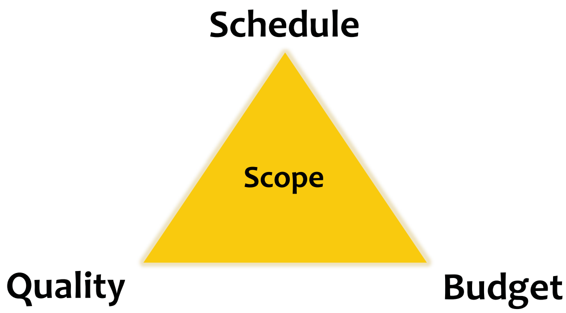
Power
- Electric:
  - (1P) - 1 KwH per lb of malt
  - (3P) - 0.7 KwH per lb of malt
  - Recommend 480 V 3 Phase Power
- Gas:
  - Usage will depend on kiln design, 75-85% of power needed is in the form of heat.
  - Natural Gas or Propane (250-300,000 BTU/hr per ton)
  - Could also use biofuel

Water
- Water: 1,000 gallons per Ton per Steep for unimalter – Most will be sent to the sewer, 500 gallons per ton if conical type steep tank
- 2 submersion steeps minimum, commonly 3, and occasionally 4
- Need a sewer connection or a solid plan to get rid of waste water.

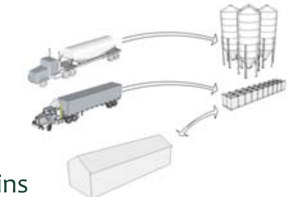
Environmental
- Dust
- Noise
- Waste water
- Smells
- Dry Waste Grain
- Wet Waste Grain and Chaff

Conflicting Processes
- Operations requiring Heat
- Operations requiring cooling
- Dusty operations
- Need for clean, Fresh Air

The Project Triangle



Grain Storage



Totes

- Offers flexibility of malting a wide variety of grains
- Movable with a forklift
- Pests can easily get into bags
- Can be suspended above tanks for unloading; eliminating conveyors.
- Can be ripped, torn and toppled over.
- Even with racking, requires larger footprint for storage.
- Can use aerators to keep air flowing through the grain, but tough to dry grain in a tote.

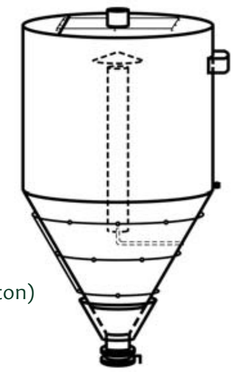
Bins

- Enables 25 ton Truck Deliveries
- Require concrete footings
- Requires conveyors to get grain in and out.
- Highly resistant to rodents, but subject to insects if improperly maintained.
- Small bins – air flow not required necessarily
- Large bins – air flow required to maintain grain quality





Steeping

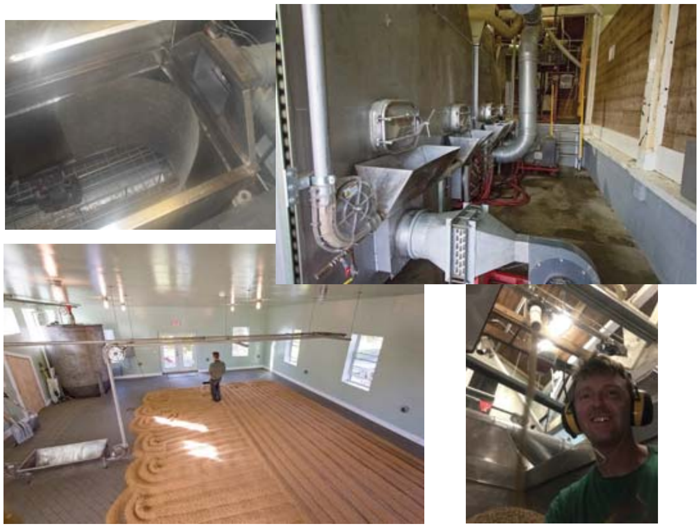


- Materials of Construction
  - Stainless Steel
  - Copper
  - Concrete
  - Plastic
- Aeration vs. Rousing
- Overflow
- Spray Steeping
- CO_2 Extraction (30 to 200 SCFM per ton)
- Cone at a 60° angle
- Unloading: Wet vs Dry
  - Wet – Pump or Gravity
  - Dry – Gravity, Flex Auger, Auger, Belt or Drag Conveyor




Germination

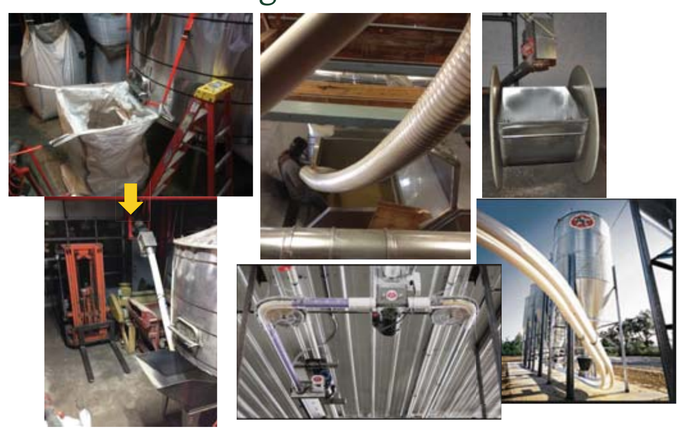
- Materials of Construction
  - Stainless Steel
  - Concrete
  - Tile
  - Galvanized Steel: Ductwork
- Possible To Combine with Steeping and/or Kilning
- Stirring
- Cleaning is important!
  - Is it easy to clean under the false bottom?
  - CIP is good but where does the waste go?
- Where is it located relative to kilning vessels, grain cleaning equipment, and air handling systems.
- CO2 removal and safety



Kilning

- Materials of Construction
  - Stainless Steel
  - Concrete
  - Galvanized Steel: Ductwork
- Possible To Combine with Germination
- Cleaning is important!
  - Is it easy to clean under the false bottom?
  - CIP is good but where does the waste go?
  - What happens to the water when you are kilning?
- Disadvantages of Germ-Kilns
  - Bed Depth – takes less time to kiln equivalent batch size in dedicated kiln
  - Sprayers Clog – Any water left in sprayers will evaporate leaving minerals behind that will clog misting nozzles.
- Air for kilning has to come from somewhere.
- Fan HP is something to look at and evaluate
- Capturing waste heat possible but also problematic

Material Handling



Material Handling Recommendations

- Dry Grain:
  - Drag Conveyor
  - Chain Disk
  - Traditional Auger if nothing else
  - Pneumatic Conveying – but not on malt
- Wet Grain (& Dry Grain)
  - Belt Conveyor
  - Flex Auger
  - Traditional Auger if nothing else

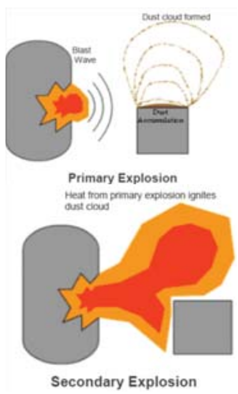
Cleaning

Packaging

Shipping & Receiving

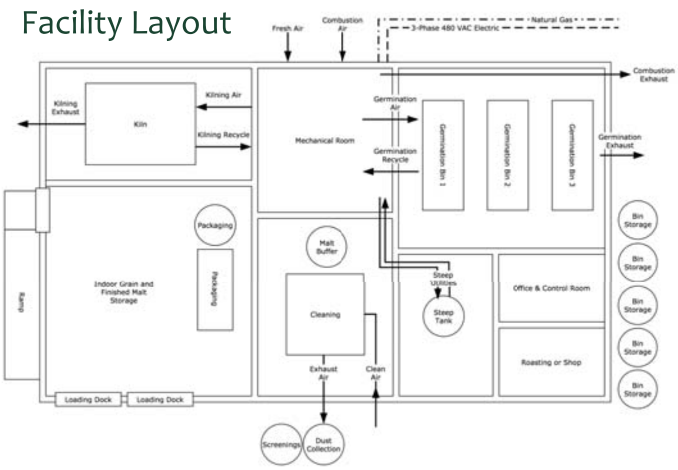
Malt Dust Is an Explosive Dust Hazard

- Given the growth in the industry, this is a hazard to be aware of.
- Accumulation of dust over time, can lead to an extremely hazardous condition.
- OSHA Recommends
  - Housekeeping to control dust accumulations;
  - Ventilation system design;
  - Maintenance of ovens; and,
  - Equipment safety devices.
- Keep the malthouse clean, especially places high up where dust can be unseen & accumulate over time.
- Avoid having open gas flames in areas that have malt dust – possible source of ignition.



Malt Dust Also Clogs

Facility Layout



My Recommendations

- Getting Your Feet Wet
  - Unimalter – Load the grain in, don't have to touch it until the malt comes out. Eliminates the need for conveying between processes.
  - Avoid looking at having multiple unimalters in one space, unless process equipment is elsewhere
- Maximizing Quality & Production
  - Three separate batch processes
    - Conical Steep
      - Aeration and Rousing
      - CO_2 Extraction
    - Pneumatic Germination – Either drum or Saladin style
      - Up to 48" bed depth
    - Separate Kiln
      - 24" bed depth maximum
- Automate as much as possible

If I Could I would…

- Add grain cleaning capability to the conveyor which is used to load the steep tank.
- Have not bought certain equipment. I spent too much on equipment purchased online that went direct to the bone yard
- Add dust collection to our grain cleaning.
- Add a weigher bagger to our cleaning / packaging operation

- Know your strengths and weaknesses.

Don't forget….

- Books
  - "Malts and Malting", Dennis Briggs
    - "The Bible"
  - "Craft Maltsters Handbook", Dave Thomas
  - "Malt", John Mallet
- If you are a craft maltster or an aspiring craft maltster Join the Craft Maltsters Guild – www.craftmalting.com