Start of Part 2
STORAGE

• Concrete silos & steel bins
  • Most common types of commercial grain storage structures
    • Store large quantities of grain
    • Relatively low cost
  • Building life
    • Up to & more than 100 years
• Variety of sizes & configurations
  • Heights: 100 to 150 ft
  • Diameters: 20 to 100 ft
  • No such things as a “standard elevator”
    • Each client has different
      • Needs, requirements, opinions
STORAGE

- Number of grains
- Material movement through facility
- Dust
- Segregation
- Identify preservation
- Flexibility
RECLAIM SYSTEMS

• Purpose
  • Remove grain from storage locations and transfer to shipping system (loadout)

• Design considerations
  • Equipment must be sized to meet loadout requirements
    • Typically ≥ 50,000 bu/hr
  • Bin-bottom & discharge design
    • Hopper-bottom (auto-cleanout)
      • Side draw vs. eccentric discharge vs. central discharge
    • Flat floor
      • Multiple discharges + final cleanout
        • Bin sweep augers vs. skid-steer loaders
RECLAIM SYSTEMS

• Effective storage volume
  • Affected by silo bottom
    • Cylindrical flat floor
RECLAIM

• Effective storage volume
  • Affected by type of silo bottom
    • Flat floor
    • Central discharge vs. side draw
    • Conical
    • CAD solid modeling essential
RECLAIM SYSTEMS

40,000 BPH
LOADOUT SYSTEMS

• Purpose
  • Transfer grain to shipping containers
    • Typically rail cars (sometimes trucks)

• Design considerations
  • Equipment sized for speed and labor efficiency
    • Typically \( \geq \) reclaim rate (\( \geq 50,000 \) bu/hr) – prevent delays
    • 110-car unit trains loaded in <15 hr; < 24 hr (railroad regulations & incentives)
  • Typical equipment used
    • Overhead surge bins with support structures vs. mechanical fill
      • Can be system bottleneck
    • Bulk weigh scales
    • Spouting with sampler & diverter
    • 3 common options
LOADOUT SYSTEMS

• 3 common types
LOADOUT SYSTEMS

Gravity

Mechanical

Combination
**LOADOUT SYSTEMS**

- Unit train loading
  - Bulkweigher, spouting, reclaim/recycle from train
  - Size system to meet railroad requirements

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<th>Car Size (ft³)</th>
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ADDITIONAL THOUGHTS

• Maintenance
• Inspections
• Operational flexibility
• Cleaning
ADDITIONAL THOUGHTS
FACILITY DESIGN

• Dynamic process
  • 5 main stages
FINAL THOUGHTS

• Brief overview of design & operation considerations
  • Each commercial facility is unique
    • Many styles, layouts, and options
    • Many common features and equipment

• Ultimately, design and operation based on owner preferences
  • But, knowledge of processes is extremely useful
THANK YOU!

Any questions?