WE MADE A CAKE NOW WHAT?
MWEA 94TH ANNUAL CONFERENCE
2019
WHY GENERATE A CAKE?

- Chiefly to Haul to a Landfill
- Reduce Storage Costs, Cake Storage Less than Liquid Storage
- Production of a Class A Material
- Incineration
OPTIONS FOR CAKE PRODUCTION

- Belt Press
- Centrifuge
OPTIONS FOR CAKE PRODUCTION

- Screw Press
- Volute Press
- Rotary Fan Press
“Before the methods or methods of cake transport for a given application can be selected, specific requirement of the solids process train, site on building constraints, reliability, O&M and life-cycle costs should be analyzed.”
DESIGN CONSIDERATIONS FOR CAKE TRANSPORTATION

- Start at the end – Disposal & Storage
- Landfill
  - How do we want material delivered?
    - Dump trucks – Who is hauling
    - Dumpsters
  - Do they have daily limits?
  - What are their operational hours?
DESIGN CONSIDERATIONS FOR CAKE TRANSPORTATION

- Start at the end – Disposal & Storage
  - Land Applications
    - Covered
  - Size – Simple Volume of Storage
    - Discharge Locations
      - Inside/Outside
      - Odors
DESIGN CONSIDERATIONS FOR CAKE TRANSPORTATION

- Class A
  - Single Location – Multiple
  - Batch Process
  - Feed Rates
- Incinerator/Dryer
CAKE TRANSPORTATION OPTIONS

- Direct Deposit
- Belt Conveyors
- Screw Conveyors
- Progressive Cavity Pumps
- Cake Pumps
WHAT DO I NEED TO KNOW FOR ALL ALTERNATIVES

- Maximum Feed Rate
  lbs/hr – wet or dry
- Minimum & Maximum % Solids
- Basic Layout
DUMPSTER-VEYOR

Dumpster-Veyor AutoFILL
Automated filling and indexing of containers
BELT CONVEYORS

- Two Main Types
  - Troughed Belt
  - Serpentix
TROUGHEDED BELT CONVEYOR COMPONENTS

- Belts
- Rollers
- Skirts
- Frame
- Drive
SERPENTIX CONVEYOR COMPONENTS

- Belt Pan
- Track
- Guides
- Drive Chain
- Drive
CONVEYORS - DISCUSSION

Belt
- Simple
- Supports Multiple Discharge Points
- Limited Directional Ability
- Can be Messy
- Limited Outdoors
- Difficult to Control Odors

Serpentix
- Unique
- Single Discharge Point – Optional Flex End
- Directional Flexibility
- Can be Messy
- Limited Outdoors
- Difficult to Control Odors
- More Costly then a Belt
CONVEYOR DESIGN CONSIDERATIONS

- Automated or Manual Plows
- Materials of Construction
  - Costs
- Safety
  - Emergency Stop Controls
  - Cages/Belt Guards
SCREW CONVEYORS TYPES

- Shafted
- Shaftless - Spiral
MAIN COMPONENTS

Shafted

Shaftless
SCREW CONVEYORS DISCUSSION

**Shafted**
- Achieve Longer Lengths
- Need Hanger Bearings
- Lower Fill Rates
- Slightly Greater Costs

**Shaftless**
- Can be limited in Length – 125 feet
- Higher Fill Rates
- Requires Liner – More Maintenance
- Can go Vertical
- Slightly Less Cost
SCREW CONVEYORS DESIGN CONSIDERATIONS

- Feed & Discharge
  - Multiple Discharge Locations – Open at End
  - Automatic or Manual Discharge Gates
  - Distances & Vertical may Change Sludge Consistency
PROGRESSIVE CAVITY PUMPS

- SEEPEX, MOYNO, NETSCH
- All have Moved into this Market over the Past Ten Years
- Allows Flexibility
  - Less Space
  - Cleaner
  - Odors Contained
PROGRESSIVE CAVITY PUMPS

- Need to Feed the Material into the Pump Cavity – Rotor/Stator Area
- No Restrictions in the Pump to Increase Backpressure
PROGRESSIVE CAVITY PUMPS SYSTEM COMPONENTS
PROGRESSIVE CAVITY PUMPS DISCUSSION

- Design – More Technical
- Pressure Limitations
  - Injection Rings
- Frequency of Use
  - Cleanout Required
PROGRESSIVE CAVITY PUMPS DESIGN CONSIDERATIONS

- Distance – Pipe Sizing
  - 1 psi/Ft – Large Pipe Less Pressure
  - How do I calculate?

- Material Consistency

- Control of Feed Hopper
  - Level
  - Weight

- Frequency of Use
CAKE PUMPS

- Origins in Concrete Industry
- Available in Multiple Orientations
- Operate Under Hydraulic Pressure so Require Hydraulic Power Pack and Hoses
- Can Create Pressures up to 2,000 psi at Flows up to 300 gpm
CAKE PUMPS OPERATION

- Cake Dumps into Hopper
  - Hopper Typically Covered to Mitigate Odors
- Hopper Screws Feed Cake into Transition Chamber
- Pump has two Hydraulic Pistons to Achieve Smoother Flow
- Pistons Connect Between Transition Chamber and Discharge
- Pistons Operate in Opposite Directions
- Retracting Piston Draws Cake out of Transition Chamber, Extending Piston Pushes Cake into Pump Discharge
CAKE PUMP DIFFERENCES

- Two Main Cake Pump Suppliers in US: Putzmeister and Schwing
- Main Difference is Method of Changing over Connection to Discharge Pipe for Extending Piston
- Schwing System has Four Open/Close Valves, One on Each Retracting and Each Extending Piston
- Putzmeister has S-Tube Swinging between Pump Discharge and Each Extending Piston
CAKE PUMPS DESIGN CONSIDERATION

- Injection Ring Lubrication System – A Must!
- High Pressure Hydraulic Fluid Lines Require Support
- Require High Pressure Pipe, Fittings and Valve Actuators. Actuators can be Electric or Hydraulic
BATTLE CREEK, MICHIGAN

- Combination of Solutions
  - Short Screw Conveyors to Feed Cake Pumps
BATTLE CREEK, MICHIGAN

- Cake Pumps
BATTLE CREEK, MICHIGAN
DISCHARGE SCREWS TO TRUCKS