Closed Water Loop Dewatering System

Sand Screw Feed (from sizing screens)

Possible Coagulant Feed Points

- 200 mesh (75 micron) solids

Possible Flocculant Feed Points

- 400 mesh (38 micron) solids

Product

Product

Feed

Thickener

Belt Filter Press

Possible Coagulant Feed Points

Belt Wash Water

Dilution Water

Filtrate

Cake

Water for Reuse

Provided by Tramfloc, Inc.
**Chemicals**

**Coagulant**
- Usually Tramfloc dadmacs
  - 600 & 700 series
- Usage in Thickener
  - Only if overflow is too turbid for reuse in wash plant
  - Dosage ≈ 1 – 5 ppm
  - May improve settling
- Usage in Dewatering
  - Usually precedes anionic flocculant
  - Overdose “kills” floc strength
  - Dosage ≈ 0.01 – 0.12 lb/ton

**Flocculant**
- Usually Tramfloc anionics
  - Use 100 series
  - Standard or special emulsion
- Usage in Thickener
  - Required! Settling and overflow quality demand it.
  - Dosage ≈ 2 – 8 ppm
  - HMWs will give better settling, but may hurt settled solids %
- Usage in Dewatering
  - HMWs may have narrow range and may blind the belt fabric
  - Dosage ≈ 0.10 – 0.50 lb/ton
Process Variations

Dry Processing – including sizing screens

- “Manufactured Sand” is rock that mined then crushed
- Dredged sand may have sticky clays
  - “Log Washer” or other equipment may be used to get clay off
  - Clays will often make use of polyDADMACs necessary in clarification
- Wide variety of screen techniques and equipment
  - Our concern is the amount and consistency of the ultra-fine solids – the material that does not settle well
Process Variations

• **Fine Sand Washing**
  
  – The main use for sand (aggregate in concrete) requires very low amounts of silt – particles smaller than 200 mesh (75 microns) – to maintain good engineering properties in the concrete.
  
  – This is the part of the plant that removes silt as a waste material.
Fine Sand Washing (Wet Processing)

- Diagram shows Screw, Classifier and Hydrocyclones
  - Many operations will not use all of these
  - Selection of unit processes is made based on characteristics of raw materials and needs for finished product grades

- Wet processing has two main functions:
  1. Remove the unwanted silts
  2. Separate the fine solids into desired grades
  - Function #1 is where our silty slurries come from
Process Variations

• **Clarification**
  - The diagram shows a high-rate circular thickener
    - Very compact
    - Excellent performance
      - Both water and underflow solids
    - Low maintenance cost
  - More plants actually use settling ponds
    - Some ponds need no chemical treatment
    - Maintenance (including labor) is high – dredging ponds and hauling mud
  - Some plants use simple rectangular settling tanks
    - Capital cost is lower than a high-rate thickener
    - Performance – especially in settled solids concentration – is not as good as a thickener
Process Variations

- **Dewatering**
  - The diagram shows a belt filter press supplied by Tramfloc
    - Very compact with polymer feeder and cake conveyor
    - Excellent performance
      - Cake can be conveyed and hauled easily as a dry material
    - Low maintenance cost
    - Significant chemical cost (low per ton, but many tons!)
  - Some plants use draining/drying areas instead
    - Mud is pumped from thickener or dragged out of rectangular tank
    - Multiple areas are used
      - One is filled while a second is emptied and a third is draining and drying
    - No chemicals
    - High maintenance cost (including labor)
Chemical Selections

• **Dadmacs**
  – Tramfloc 620, 630, 720 and 730 series are available
  – Feeding is simpler for dadmacs than emulsions
  – Molecular weight seems to be less important for thickeners than for settling ponds
  – Ponds may only need a dadmac
  – On belt presses a dadmac fed after the Tramfloc 100’s can help improve dewatering efficiency
    • Drier cake
    • Better capture
    • Higher throughput
Chemical Selections

• **Anionic PAM**
  
  – Dry vs. Emulsion:
    • Economics and local preference will typically decide
    • Dewatering performance can be hurt by excessive molecular weight (MW); Tramfloc has a broader selection of molecular weights among the drys than emulsions
  
  – Molecular weight
    • Clarification is benefited by higher m.w.
    • Dewatering can be hindered (see above)
    • Settling tanks often have very short retention time, so very high MW can be a real help!. Consider Tramfloc special emulsions.
  
  – Charge, amount of anionicity, expressed as mole%
    • 10 to 50 – perhaps higher