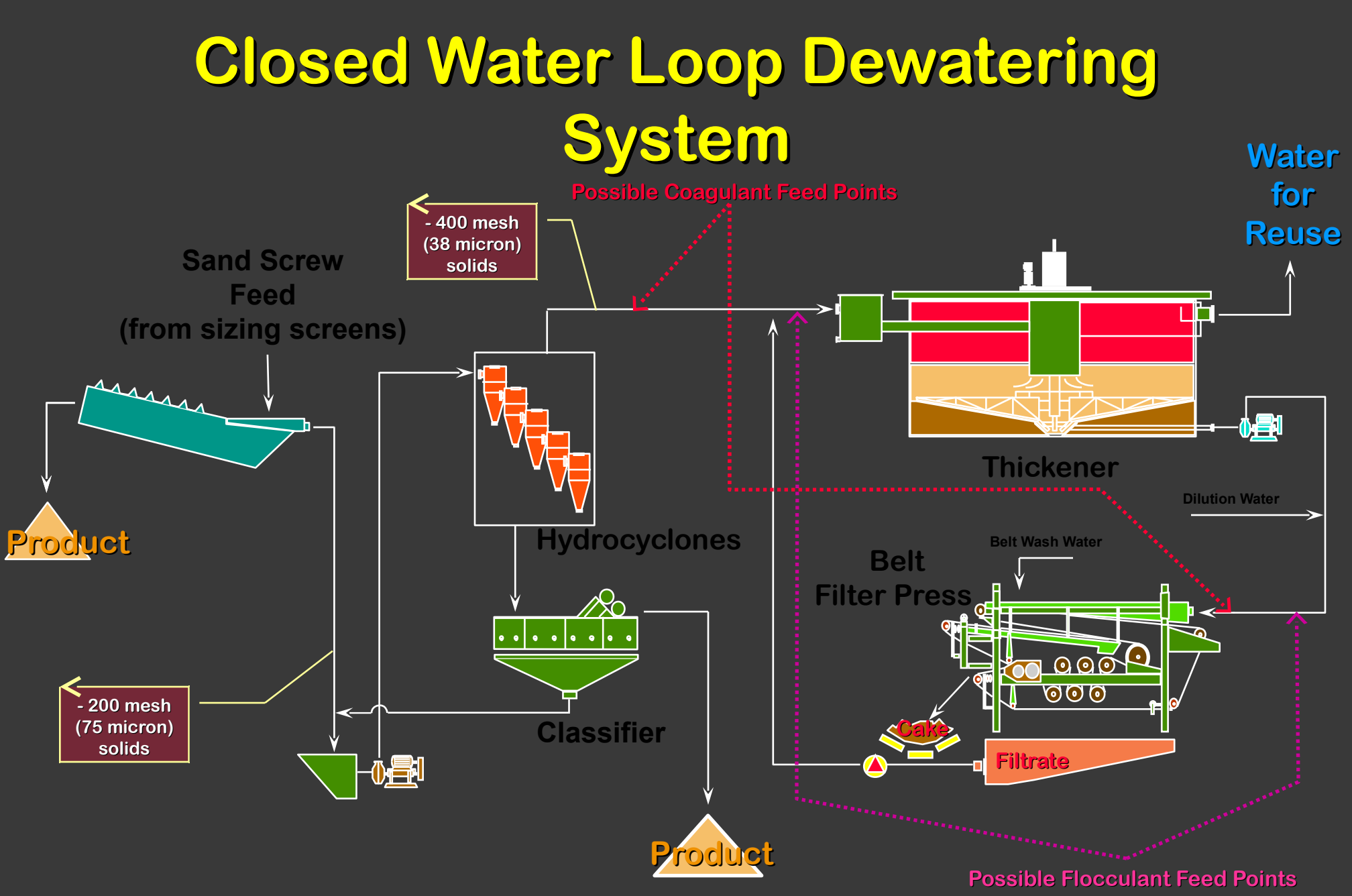
Closed Water Loop Dewatering System



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

Process Variations

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