

# PILOT PLANTS

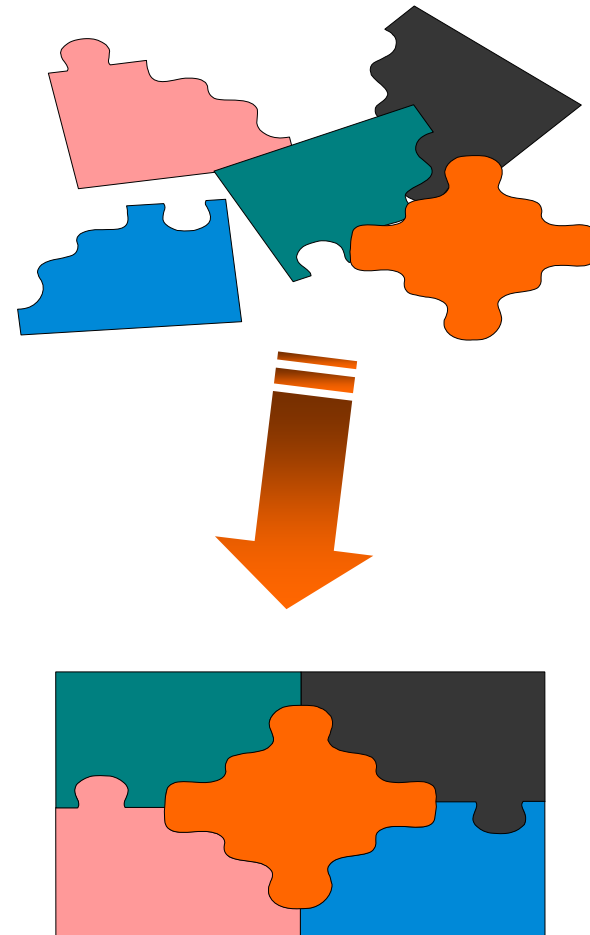
UNIT OPERATIONS AVAILABLE

WHEN YOU NEED TO BE SURE



## VALUE OF INTEGRATED PILOT PLANTS

- Demonstrate anticipated operations
- Integrate unit processes in real time
- Review impact of feed variability
- Assess recycle streams
- Identify potential problems  
(operating, automation, corrosion, maintenance)
- Prove product quality & generate market samples
- Mitigate environmental concerns
- Confirm energy needs, water balance and treatment, reagent consumption & equipment sizing



- Range of test capabilities
  - Bond Rod and Ball Grindability Test (Work Index)
  - SAG Power Index Test (SPI)
  - Static Pressure Test (SPT)
  - SMC Testing
  - JK Drop-Weight Test
  - MacPherson Autogenous Grindability Test
  - MacPherson 18" Mill Test
- Modeling & simulation using CEET
- Design, operate and audit efficient comminution circuits using both power and model-based methods



- Thickening
- Rheology
- Pumpability
- Aging
- Salinity
- Upgrading



- Significant expertise
  - Gold
  - Iron ore
  - Tin & Tantalum
  - PGE minerals
  - Mineral sands
- Equipment base
  - Wilfley table
  - Superpanner
  - Falcon and Knelson concentrators
- Bench and pilot scale



- Range equipment sizes
  - low
  - medium
  - high grade
  - fine
- Bench scale closed circuit
- Continuous pilot scale bulk operations



- Dry low intensity magnetic separation
  - Drum & roll separators (800, 1,000 and 2,000 gauss)
- Dry high intensity magnetic separation
  - Lurgi magnetic separator (to 19,000 gauss)
  - Carpco induced roll separator (to 9,600 gauss)
  - Inprosys High-Force laboratory separator (to 25,000 gauss)
  - Eriez induced roll magnetic separator (to 1,250 gauss)
  - Carpco induced-roll mag-lift separator (to 20,000 gauss)



- Wet low intensity magnetic separation
  - Davis tube
  - Drum separators (up to 1,400 gauss)
  - Dings-Crockett belt separators (up to 700 gauss)
  - Stearns and Sala drum magnetic separators (to 1200 gauss)
  
- Wet high intensity magnetic separation
  - Jones high intensity separator (up to 7,000 gauss)
  - Eriez Model L4-20 high intensity separator (to 20,000 gauss)
  - Dings (4,000 and 8,000 gauss) and Eriez Davis tubes





- Many metals- Cu, Pb, Zn, Ni, Co, Bi, Mo, Ta, W, P
- Flowsheet development & troubleshooting
- Reagent development & optimization
- Several bench tests available
  - MFT Test
  - Batch cleaner test
  - Rougher kinetics
  - Locked cycle test
- Pilot plant operation
- Process improvements (eg. high intensity conditioning)



- Blends
  - Acid consumption
  - Scale formation
  - Temperature, pressure
  - Residence time
  - Mixing characteristics
  - Materials testing
  - Water quality



- Impact of non-Newtonian flow on process dynamics & products (mixing, pumping, S/L sep)
  - Up to 200°C
  - Sample size 50 g
  - Robust data



**CCRV:**  
**Concentric**  
**Cylindrical**  
**Rotational**  
**Viscometer**

- Solution chemistry (redox, acidity)
- Temperature
- Settling/compression
- Aging effects
- Pumpability



- Process selection
- Choice of pH / redox modifiers
- Precipitate impurities
- Precipitation / rediss'n of products
- SX, IX



- Electrowinning
  - Impurities (organic, inorganic)
  - Cathode quality
  - Acid balance
- Intermediate Product
  - Hydroxide, sulfide grade, moisture Impurities



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