PILOT PLANTS

UNIT OPERATIONS AVAILABLE
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
COMMINUTION

- 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
BENEFICIATION

- Thickening
- Rheology
- Pumpability
- Aging
- Salinity
- Upgrading
GRAVITY SEPARATION

- Significant expertise
  - Gold
  - Iron ore
  - Tin & Tantalum
  - PGE minerals
  - Mineral sands

- Equipment base
  - Wilfley table
  - Superpanner
  - Falcon and Knelson concentrators

- Bench and pilot scale
SPIRAL CONCENTRATORS

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

- **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)
MAGNETIC SEPARATION EQUIPMENT

- **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
VALUE OF INTEGRATED PILOT PLANTS

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)
VALUE OF INTEGRATED PILOT PLANTS

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

PRESSURE AND AMBIENT LEACHING
RHEOLOGY

- 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
SOLID / LIQUID SEPARATION

- Solution chemistry (redox, acidity)
- Temperature
- Settling/compression
- Aging effects
- Pumpability
VALUE OF INTEGRATED PILOT PLANTS

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

- Electrowinning
  - Impurities (organic, inorganic)
  - Cathode quality
  - Acid balance

- Intermediate Product
  - Hydroxide, sulfide grade, moisture Impurities