Long Distance Pipeline Transportation of Ore Slurry

with

GEHO®
Content of presentation

- A brief introduction to Weir Minerals Netherlands b.v.
- why slurry pipelines?
- product introduction
- GEHO piston diaphragm pumps
- experience
Weir Minerals Netherlands b.v.

GEHO®
PD Slurry Pumps
Weir Minerals Netherlands b.v.

- design, engineering and manufacture of axial-flow, piston and piston diaphragm pumps and hose-diaphragm pumps
- employs 400 people
- 12,000 m² manufacturing and 2700 m² facility
- turnover Euro 140 million approx
- 90% of the annual turnover is exported worldwide
- worldwide sales and service
- innovative research & development
- ISO 9001 certified
Pipeline transport

- Piston diaphragm pumps: an economic and reliable tool for slurry pipeline
Transportation scheme

Destination/Pellet Plant

Beneficiation Plant (Mine head)
Why slurry pipelines?

- **environmental considerations**
  - *no noise*
  - *no dust*
  - *no smells*
  - *invisible*

- **mineral processing requirements**
  - *crushing and grinding at minesite*

- **length of transportation**
  - *shorter routes*

- **terrain conditions**
  - *mountains*
  - *remote area*

- **weather/climate**
Economics

- Economics of slurry pipeline systems are influenced by:
  - initial investment costs for hardware and installations
    - Investment intensive items
      - Pipes
      - Pumps
  - annual operating costs
GEHO Piston diaphragm pump
GEHO product range

- GEHO PUMPS: specialized in high pressure slurry pumping
  - abrasive slurries (Miller numbers up to 650)
  - slurries ranging from pH 0,5-13
  - high density slurries (solids content up to 75+%)
  - high pressures (up to 250 bar in operation)
  - high temperatures (up to 205°C)
GEHO Pump Assembly (TZPM 2000)
Piston diaphragm pump features

- available in duplex double-acting and triplex single-acting

Sophisticated diaphragm stroke control system

- diaphragm separates sensitive pump parts from abrasive slurry
- only wear parts: valves
Cast power end: forged crankshaft

ZPM 900-1700
TZPM 180-2000
Advantages GEHO piston diaphragm pump

- Concept of large piston diameters and large stroke lengths - lower stroke rates => *lower wear*
- High availability (98%) => *suitable for continuous operation*
- Low stroke rates allow bigger valve sizes => *lower slurry velocity* in valves => *low wear* => *easy to maintain and lower spares requirement*
- *Very high efficiencies* (up to 96%) due to roller bearings and specially designed (low friction) piston seals => *savings on power requirement*
- Variable operation range (10% - 100%)
- Extensive after sales support through local representation world wide
Advantages GEHO piston diaphragm pump

- no piston flushing: *no slurry dilution*

- *sophisticated diaphragm control* system

- *reduced load on diaphragms*, using light weight components, special control systems, etc.

- *different valve concepts*, used for different applications
Pump efficiencies (depending on pump load)

Crankshaft driven piston diaphragm pumps
Compared to hydraulic piston pumps and centrifugal pumps

Pump types:
- Hydraulic piston
- Simplex double-acting
- Duplex double-acting
- Triplex single-acting
- Centrifugal

Efficiencies:
- Hydraulic piston: 78%
- Simplex double-acting: 85%
- Duplex double-acting: 96%
- Triplex single-acting: 96%
- Centrifugal: 65%
Conclusions: Piston Diaphragm pumps

- **piston diaphragm pumps** generally are the **most economical** pump type for long distance slurry pipelines

- **GEHO** offers state-of-the-art piston diaphragm pumps with **highest reliability** and **efficiency** and **lowest operating costs**
Mining industry

- mine desludging
- mine dewatering
- mine backfilling
- hydraulic ore hoisting
- tailings disposal
Pipeline transportation

- Ore, minerals and tailings
  - lead
  - zinc
  - phosphate
  - limestone
  - iron ore
  - copper
  - red mud
  - bauxite
  - kaolin
  - gold
  - sand and others
Typical references long distance pipelines

- MMX, Iron Ore Slurry Pipeline, Brasil, 550 kms
- Da Hong Shan, Iron Ore Slurry Pipeline, China, 171 kms
- Paragominas, Bauxite Slurry Pipeline, Brasil, 244 kms
- **Samarco, Iron Ore Slurry Pipeline, Brasil, 396 kms**
- Simplot, Phosphate Pipeline, USA, 100 kms
- New Zealand Steel, Ironsand Concentrate Pipeline, New Zealand, 18 km
- Los Pelambres, Copper Concentrate Pipeline, Chile, 120 km
- Minera Alumbrera, Copper Concentrate Pipeline, Argentina, 310 km
- **Jianshan, Iron Ore Slurry Pipeline, China, 100 km**
- Minera Dona Inés Collahuasi, Copper Concentrate Pipeline, Chile, 203 km
- Freeport, Grasberg Mine, Copper Concentrate Pipeline, Irian Jaya/Indonesia, 120 km
- Batu Hijau, Copper Concentrate Pipeline, Indonesia, 18 km
- **Hy-Grade Pellets, Iron Ore Slurry Pipeline, India, 268 km**
References slurry pipeline transport

- Slurry pipelines < 100 kms
- Slurry pipelines > 100 kms
GEHO EXPERIENCE

GEHO’s experience – WORLD WIDE

- Over 1000 pumps in operation
- Global presence
- Experience with nearly all major long-distance pipeline transportation application
GEHO EXPERIENCE

GEHO’s experience with Slurry Pipeline Transportation

Longest pipeline (550 km) : MMX (Brasil)

Highest Pipeline Pressure (240 bars) : Collahuasi (Chile)

Highest flow (540 m3/hr) : OEMK (Russia)

Total no. of Pumps : 130 plus

Total no. long distance of pipeline projects : 36 plus
Gains of Pipeline transportation

In conclusion, the gains of Pipeline transportation:

- Logistical problems eliminated
- Environment friendly
- Wastage eliminated
- Pipeline transportation is a economical solution.
- Approximate overall savings while in operation:
  - MMX, Brasil (Iron Ore pipeline) : 143 mio USD / year
  - Hygrade Pellets, India (Iron Ore pipeline) : 45 mio USD / year
Thank you!