

### Overview of bulk materials handling

#### Australian and different global operations

- What is bulk material handling?
- Typical materials
- Ranges of capacities
- Trends and production efficiencies

#### Bulk material flow properties and application to equipment design

- Key properties of bulk solids needed for equipment design
- Coefficient of sliding friction for hopper and chute design
- Cohesive strength for selecting hopper outlet size and stockpiles
- Bulk density and permeability for calculating hopper outlet size
- Particle size and shape
- Discussion of influences of moisture and fines content

#### Activity 1:

Workshop/quiz for flow properties measurement

#### Material throughput considerations and sizing of equipment

- What does "nominal" throughput mean?
  - Annual vs instantaneous throughput rates
  - Throughput in tonnes compared to throughput in cubic metres
  - Minimum and maximum
  - Surge
- How should we design to achieve this?
  - Interpreting equipment capacity
  - Current limitations on some technologies
  - Buffering flows

#### Layouts and designs

- Typical design challenges
- Safe and environmentally sensitive bulk materials handling systems
- Topography
- Climate
- Real estate limitations

#### Bulk material sizing, screening, and conveying equipment

- Review of main equipment types and key components
  - Crushers
  - Screeners
  - Conveying systems
  - Stackers/reclaimers
  - Loading/unloading systems for ships, rail cars

- Mobile machines

#### Bulk material storage, feeding, and handling systems

- Review of common flow problems
- Types of storage
  - Silos, bins, hoppers and their flow patterns
  - Stockpiles
  - Stockyards
- Feeders (e.g. screws, belts, aprons, vibratory, rotary valve)
- Transfer chutes

#### Activity 2:

Workshop/quiz for bulk storage systems

#### Managing equipment operational issues

- Typical issues (e.g. plugging, wear, spillage, failure, high power consumption)
- Methods to address and minimise maintenance costs