Primary Crushing
Best Maintenance Practices
and Application

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Primary crusher

What types of crushers are used?

Things to know

• Understand your equipment
• Know and recognize your hazards
• Understand the process
• Identify your goal
• Maintain all your equipment
First thing to know

• Lock out tag out
• E-stops

Identify definitions - Jaws

• Jaw Crusher
  – A crusher that breaks material by squeezing it between two Jaw plates, one Moving and one stationary.
• Crushing chamber
  – Space between the stationary and the moving jaw.
• Gap
  – Top opening dimension of the jaw crusher from the stationary jaw to the pitman.
• Close side setting
  – Crusher setting when the discharge opening of the jaw crusher is at closest position referred to as CSS.
• Open side setting
  – Crusher setting when the discharge opening is at its furthest open position.
• Reduction ratio
  – Ratio relating to the top size of the feed to the CSS of the crusher.
Jaw Crusher

Crushing chamber

Space between the stationary and the moving jaw.

Moving Jaw Die

Stationary Jaw Die
Gap

- Top opening dimension of the jaw crusher from the stationary jaw to the pitman.

Open vs. Closed Side Setting

- **Closed Side Setting** is measured by subtracting the crushers throw from the at rest measurement
- **Open Side Setting** is measured while the crusher is at rest (Eccentric Down)
Open Side Setting, Jaw at Rest
Measure at lowest point of Movable Die, 90 Degrees to Stationary

Peak to Peak

Aluminum Foil Method
If Tape Measure is not Feasible
Reduction Ratio

- What is the typical reduction ratio for a:
  - Jaw - 6 to 1 or 8 to 1?
  - Cone - 6 to 1 or 8 to 1?
  - Impactor HSI - 12 to 1 or 18 to 1?
- What are the contributing factors?
Primary crushing goal

- Product reduction (first stage crushing)
- Maximizing plant thru put (tons per hour)
- Reducing your cost per ton (become profitable)

Best Maintenance Practices

- List your daily maintenance
- List wear parts
- Develop a program
Daily maintenance list

• Greasing
• Greasing intervals
• Checking fluid levels
• House keeping
• Walk around inspections

Document repairs

1. Plan your repairs
2. Document equipment history
3. Identify patterns
4. Provide tools needed
Use the correct lubricant

- Follow your manufactures recommendations
- Type, quantity and intervals

Grease example
Walk around the equipment

• Be alert to potential failures
• Look for loose or broken bolts, broken welds, etc.

Walk Around Inspections

House Keeping
Wear Parts

- Develop an inventory based on historical data
- Plan wear parts replacement
- Never over utilize wear parts

Over utilization
Note: Trying to over utilize jaw dies imposes unnecessary and excessive loads on the crusher! This creates an event called compaction. The loads can be multiplied 5 times the normal crushing forces as a result of worn dies. Damage to the crusher can and eventually will result.
The concaved wear shown creates compaction. Often referred to as “fish hooked”.

Over Utilized

Example: 4” Original Tooth Depth = 1”
Jaw Die Corrugation, Teeth

CHOKING POINT

- The choke point of the crushing cavity is a zone of minimum capacity. It is that point or zone in the chamber where the volume of material can approach a solid mass.
- The material can become compact, restricting progress down to the next crushing zone, drastically reducing capacity. This is known as the choke point.
- Choking will occur when there are enough fines present, either in the feed material or produced in the crushing process to eliminate most of the voids in the choke zone.
Desired Feed Level

Feed level should be kept at about 80%

**FEED**

- Too large or oversized feed material should not enter the feed system and should be set aside in the pit to be broke by a hammer.
- Oversized feed material can result in a premature failure of major crusher components.

Note: Trying to crush oversize material wastes time, reduces capacity and imposes unnecessary loads on the crusher components.
Improper Crusher Operation

BARREL PROTECTOR PLATE

- The Barrel protector plate, protects the pitman barrel from oversized feed material slamming against the pitman barrel
- Which will cause excessive wear on the pitman casting
- The upper Barrel protector plate is not a crushing area
Oversize material

Remove it here

Or remove it here

You choose

Whoops too big Huh?
Develop a program

- Educate your employees
- Encourage employee involvement
- Keep good equipment records
- Use a maintenance and repair guide
- Remain proactive
Educate

Recognize your employees as a value added asset

Employee Involvement

• Get and listen to employees input
• Develop improvement incentives
• Acknowledge achievements
Final points recap

- Understand your process
- Develop a good program and identify your goals
- Become proactive

QUESTIONS?

Thank You