Effluent Desilting System

(Comparison between Belt Press and Dewatering Press)

Presented by,

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POME

- Palm oil mill effluent (POME) is the waste water discharged from the sterilization process (36%), crude oil clarification process (60%) and cracked mixture separation process (4%).
- Palm oil mill effluent is a thick brownish liquid that contains high solids, oil and grease, COD and BOD values.

POME characteristic

| Parameters | Raw POME | Discharge Limits |
|---------------------------|----------|------------------|
| BOD ₃ (mg/lit) | 25,000 | 20 |
| Total Solids (mg/lit) | 40,500 | 3000 |
| Suspended Solids (mg/lit) | 18,000 | 100 |
| Oil and Grease (mg/lit) | 4,000 | 25 |
| Ammonia-Nitrate (mg/lit) | 35 | 100 |
| Total Nitrogen (mg/lit) | 750 | 100 |
| рН | 4.7 | 7 – 9 |
| Temperature (°C) | 80 – 90 | 45 |

Conventional Desilting must be carried out when:

- Every 2 years (DOE's requirement) & apply for DOE approval at least 2 months before
- Result of BOD > 20mg/l at Final Discharge
- Effective volume at pond < 50%
- Pond fully silted up (100% sludge)

Conventional Desilting (Pump & transfer to holding pond)



Conventional Desilting (Excavation)



Continuous Desilting

- Belt Press System
- Multi Disc Dewatering System
- Geo-Bag Filtration
- Decanter System

No holding pond required (do not remove any trees)!!!

Continuous Desilting



Belt Press (Functional Principle)

- Use Rollers and Belts
- Solids are sandwiched between two tensioned belts and passed over rollers to squeeze out water
- Basic features: polymer conditioning zone, gravity drainage zones, low pressure squeezing zone, and high pressure squeezing zones.
- Continuous belt washing is required

Belt Press



Belt Press



Belt Press





Belt Press – Products





Dewatering Press



Dewatering Press (Functional Principle)

- Layers of spacers, fixed and moving rings
- Moving rings, which are slightly smaller than the outer diameter of the screw and slightly narrower than the spacers, are located between the fixed rings. Edge of the screw pushes these moving rings in continuous circular motion.
- The moving rings continuously clean sludge out of the gaps, prevents clogging and reduces the use of rinsing water.

Dewatering Press



Dewatering Press



Dewatering Press – Products



Comparisons

Chemical Usage, Power & Water Consumption

| | Belt Press | Dewatering Press |
|--------------------|--------------------------------|--------------------------|
| Chemical (Polymer) | 2 kg/ton solid | 1 kg/ton solid |
| Power | 50 kW | 32 kW |
| Clean Water | 10 m³/hr | 4 m³/hr |
| Manpower | 3 workers (include packing) | 1 worker (no packing) |

Comparisons

Capacity & Costs

- 1. Belt Press
 - Capacity: 0.625 ton solid / hour (2 units)
 - Chemicals: RM 30 / ton solid
 - Major Maintenance: Belts, Rollers, Pumps & Bearings
- 2. Dewatering Press
 - Capacity: 2.5 ton solid / hour
 - Chemicals: RM 18.50 / ton solid
 - Major Maintenance: Rotating Screws, Fixed & Moving Rings, Pumps & Bearings

Comparisons

Solids Produced

| | Belt Press | Dewatering Press |
|-----------------------|------------|-------------------------|
| Moisture content | 75 % | 80 % |
| Nitrogen content (N) | 6 % | |
| pH Value | 7.5 – 7.8 | |
| Potassium content (K) | < 3% | |

Application of POME Solids

- POME solids contain 6% of Nitrogen
- Organic Fertiliser
- Current practice is to apply at young crops to replace inorganic fertilizer (NPK)

Application of POME Solids

Packing



Application of POME Solids

Packing



Challenges & Future Improvements

- Any long term side effects by discharging effluent water that contains polymer into anaerobic pond?
- Is it good enough to replace conventional desilting?
- Fine-tuning to reduce cost/ton solid
- To completely replace conventional desilting one day