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Case study Organics Management

Problem Being Solved

"Disk" shredders were utilised by the Majuro Atoll Waste Company to process organic materials for composting but were struggling to process the volume and type of material being received.

Due to the tough high fibrous nature of the vegetation in the Pacific and in atoll nations in particular, the disk shredders needed to be stopped regularly (approximately every 30 minutes) for the disk blades to be cleared, and to manage overheating.

Requiring a safer and more efficient solution to manage the organic material throughput, due diligence investigation was undertaken – with results indicating "drum shredders" to be an effective option for the Majuro Atoll Waste Company.

Current Situation at the Majuro Atoll Waste Company - Organic Materials Management:

- Input material of 7 tonnes per week (approximately 14m³):
 - 5 tonnes high fibrous vegetation including pandanus, coconut fronds, flax, and banana leaves
 - 2 tonne other organics such as hedge clippings, and food organics
- Operate a 7 Bay indoor composting facility



Challenges







1.5 hr drive to compost facility



2 x disk shredders overheating and requiring regular maintenance

Comparing Options



Drum Shredders feature a large horizontal drum with blades set at intervals. Suitable for handling heavy-duty larger loads and fibrous materials.



Disk Shredders use a vertical disk with inset blades that cut material at a 45-degree angle. Satisfactory for heavy-duty tasks, suitable for woody material.

Drum Shredder Suitability in the Pacific

Drum shredders provide the following benefits for managing organic material in the Pacific:



Power and Durability

Drum shredders are built with strong motors and durable components, making them suitable ideal for handling tougher materials. They are less prone to wear and tear, ensuring a longer lifespan and more reliable performance.



Safer Processing

Tough high fibrous material common in the pacific can get "caught up" in blades of a disk shredder. To clear the material often requires staff to interact closely with the blades – reaching inside and between the disks, posing a safety hazard.



Faster Processing

The rotary drum design allows for continuous and more efficient shredding, which leads to faster processing speeds.



Lower Maintenance

Due to their rugged design and fewer moving parts in comparison to disk shredders, drum shredders typically require less frequent maintenance, which can save on operational costs over time.



Processing Details

the Experience of Majuro

Drum Shredder operation achieving the following processing:

Throughput: Approximately 7m3 (3.5 tonnes) vegetation processed per hour

Materials: All materials, including pandanus, coconut fronds, flax, and banana leaves, up to about 12 inches – also including the odd coconut!

Size reduction: Size reduction of 1/3 was achieved, with 7m3 preshredded volume reducing to 2.3m3 after shredded

Chute swivels, allowing operators to choose to blow material onto the back of the dump truck, or onto property adjacent

Towable, allowing operators to tow around landfill and to undertake household collection

"Barriers"

Challenges / Limitations to Operation

Some limitations were experiences during the operation of the shredder:

- One quick stoppage to remove blockage from the chute after about 1.5 hrs of operation, could be done safely away from the blades
- Some of the green Flax type material does not get well shredded - comes out relatively whole still - but were probably "mulched" enough to go into the compost.
- There is not much of a safety barrier separating workers from the blades.



Design Details – Majuro Shredder

Specific features of the Majuro Drum Shredder:

Cummins Diesel Engine M500: 6BT5.9 – C130-11

102 hp

305 mm rotor dimension

75KW Rated power

3000 r/mins knife dish speed

2200 RPM

250 mm input diameter

6 blades

Swivel output shoot

4200x1900x2600 mm outside dimensions

Weight: 2200 Kilograms

Towable, mounted on a trailer certified for public roads

Other features / inclusions of shredder: Tail light, jack, tools, spare blades, belts and bearings, tool box

Opportunities

Improvements for Operation

Extra safety barriers or at a minimum paint/ signage could be employed to separate workers from the blades.