



Best Practices in Wood Waste Recycling

Re-Chipping Equipment

Material: Wood Waste

Issue: *Some material produced from primary size-reduction equipment at a wood-waste processing facility is invariably larger than targeted feedstock specifications. Screening removes this oversized material from the acceptable material, which can then recycle through the primary size-reduction equipment. Also, the clean wood waste routed through a conventional chipper often contains a quantity of very small material (such as small trim ends) that is not effectively chipped. Further, the design of some processing facilities performs a two-stage size reduction in which the primary equipment produces large chunks of wood. After cleaning these chunks of contaminants they are then directed to secondary equipment for final size-reducing. Processing this smaller material through conventional size-reduction machinery produces an abundance of **fin**s (very small particles) and a poor yield of acceptable product. Thus, operators might consider using specialized size-reduction equipment for their small pieces of wood and oversized chips.*

Best Practice: This Best Practice recommends using re-chipping equipment to recover acceptable products from small pieces of wood waste and from the oversized material that primary size reduction produces. The design of re-chippers does not process large volumes of wood like conventional chippers, hogs, and shredders.

Re-Chipping Equipment. Re-chipping equipment is configured with either a disc and drum, with various knives, angles, and in-feed geometry to try aligning and holding the small chunks of wood as they enter the cutting zone. Disc re-chippers typically use a secondary spout above the primary spout, designed specifically to handle *overs* (oversized material). These chippers are usually used with closed-loop chipping, screening, re-chipping systems where screened overs automatically fall directly back into the small overs chute. Straight-knife drum re-chippers are generally considered advantageous because they have a much wider in-feed that can handle a range of feedstock sizes including broken ends, trim, and a substantial flow of overs. The drum chipper uses a bottom screen that, with appropriately selecting the opening size, can ensure a high level of acceptable chips on a single pass.

Another re-chipper is similar to the straight-knife drum chipper, except that it replaces the series of straight knives attached to the rotating drum with three-edged knives that cleanly slice chips from small pieces of wood waste. This knife design greatly reduces tearing and fracturing fiber and maximizes chip uniformity despite the varied shape and orientation of the incoming feedstock. To accommodate the unique knife design, the chipper anvil on this type of chipper is serrated to imitate the three edges of the knife.

Also, a new development is to use re-chippers for secondary size-reduction to follow a hog or other primary size-reduction equipment. Adjustments on the primary hog can produce coarse chunks of wood that can be cleaned of contaminants (especially metals) and then fed into re-chipper to produce a higher quality product with more consistent and better *chip* geometry than that from the primary hog alone.

Raw Material Types. The re-chipper design specifically processes small pieces of wood including oversize chips, slivers, and small trim ends. In secondary size-reduction, they chip coarse chunks from a primary

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hog. Like the chippers, the sensitive knife cutting edges on re-chippers demand feedstock that is free of hard contaminants such as rocks and metal.

End-Product Types. Re-chippers can yield a high-quality chip.

Implementation: Selection Considerations. The primary issues to consider when selecting size-reduction equipment are: operational issues (such as effectiveness, compatibility with other equipment, capability to handle production throughput, etc.), capital cost, maintenance issues, and safety issues.

Operational: With assistance from an equipment vendor, carefully size the equipment to handle a volume greater than the anticipated tonnage throughput of the plant. This sizing ensures that the equipment can handle the types and volumes of wood waste processed at a given facility. Operators should consider both raw material and end product issues to ensure that the machine performs satisfactorily. Critical concerns include the capability of the output product to meet feedstock specifications, consistency of output production, and equipment durability or reliability. Operators should consider running trials on several types and brands of size-reduction equipment using samples of the anticipated wood waste to verify the production of a satisfactory product.

Cost: Size-reduction equipment is among the most capital intensive equipment at a processing facility. In general, the equipment becomes more expensive with increases in throughput capacity and increases in product quality. As a result, it is critical to match the equipment size to targeted throughput and equipment style to the raw material and targeted end product.

Maintenance: Size-reduction equipment experiences wear from the abrasive properties of the wood itself and any non-wood contaminants present in the feedstock. In chipping equipment, the sensitive knives are designed for replacement and regular sharpening maintenance. The presence of unavoidable hard contaminants in incoming raw material restricts the use of chippers because of excessive wear and the resulting constant maintenance. Equip all size-reduction equipment with shearing pins on the impact surface to reduce damage if a large hard contaminant gets into the machine. A metal detection system protects chippers; if metal is present, the in-feed conveyor stops.

Safety: Most quality size-reduction equipment is adequately fitted with guards to avoid the ejecting flying debris. Proper training is essential to the safe operation of any size-reduction equipment. Management must clearly and continuously reinforce the danger and consequences of prohibited behaviors in operation. Some examples include the following: removing or disarming safety features; unjamming or repairing equipment without fully shutting down power and safety switches; or violating established danger zones or instructions of safety spotters.

Benefits: Re-chipping equipment will efficiently convert small sized wood waste into the highest value products attainable from the raw material.

Application Site: This Best Practice applies to wood-waste processing facilities.

Contact: For more information about this Best Practice, contact CWC (206) 443-7746, e-mail info@cwc.org.

References:

1. CPM Consultants; Vancouver, BC, Canada.
2. Nicholson, Scott. Equipment brochure. Nicholson Manufacturing Company; Seattle, WA.
3. Walsh, Dan. Northwest Wood and Fiber Recovery; Portland, OR.
4. Yeasting; John. Re-Sourcing Associates. Seattle, WA.

(See Appendix for an Equipment Manufacturer's List)

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