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**Brush and Forest Residuals Baler
Modular Roundwood Bunks**



***Baling & Roundwood Hauling for Fireline and
WUI Fuels Reduction Woody Biomass:
Alternative to on-site Chipping***

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Why Add Balers to Your Chipper Fleet?

- Quiet – reduce noise in sensitive areas
- Little/no dust where fugitive dust is an issue
- Aggregation – baled wood biomass material is similar to other baled recyclables
 - Easy to handle with forklifts & grapple loaders
 - Stacks on small footprint
- Second-mile/long haul transport
 - Use tarped flatbed trucks or vans like hay and other recyclables
- Grinding at destination to user specifications
- Reduced biomass supply chain carbon footprint
 - Lower fuel consumption compared to on-site chipping
 - Higher long-haul transport payload with back-haul efficiency
 - Grinding at point of use with efficient large grinders
 - Potential for all-electric balers to support hand crews

Problems with on-site chipping of fireline debris

- Labor intensive
- Ties up skilled crews
- Precludes opportunity for beneficial use off-site



Problems with on-site chipping of wildfire protection and fuels reduction materials

- Noise and dust
- Ties up skilled crews
- Precludes opportunity for beneficial use off-site



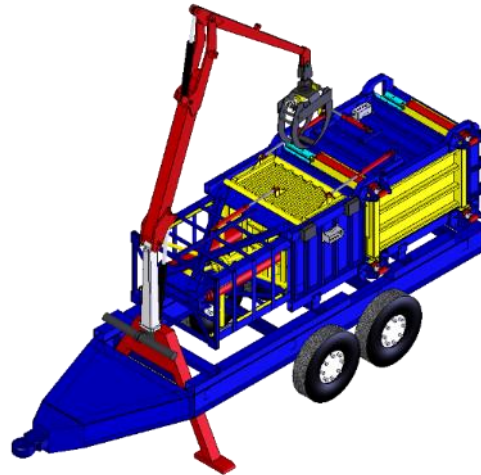
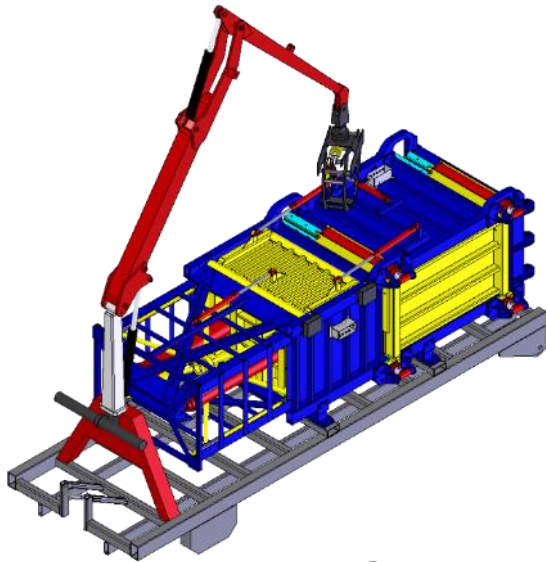
Alternatives to chipping



- Haul in bulk bins & trucks
- Lop and spread
- Burn when able
- Bale and haul like hay

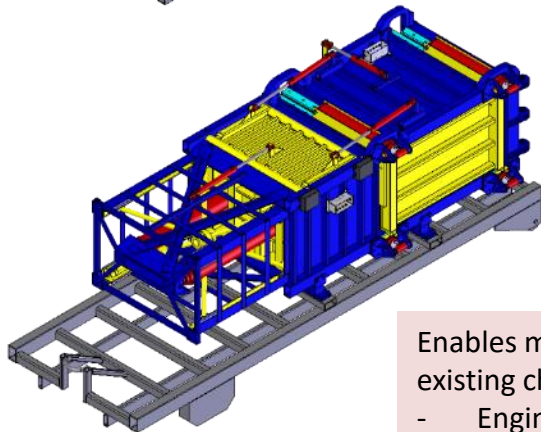


Woody biomass baler is a modular system



Module can be mounted on:

- Hook-lift skid
- Straight trailer
- 5th-wheel trailer
- Log forwarder chassis
- AWD truck chassis



Enables maximum use of common parts with your existing chipper fleet

- Engine & hydraulic system
- Axles & tires
- Loaders & grapples



Optional Equipment:

- Slashing saw
- Wire auto-tie
- Small log/brush grapple
- Hydraulic power unit
- Tele-operation via RF
- Chassis and running gear

Why Bale? Minimize size reduction at the source (roadside, landing, or forest)



Lake Tahoe



Cambria



Auburn



Winthrop

This is a big WUI fuels reduction pile, BUT...it is on a play field in the middle of a residential area. Onsite chipping or grinding are not options.

Why Bale? Enable cost-effective transportation, storage, and processing



Ten years in development

- USDA NIFA SBIR – Small business innovation research program
- USDA CAP NARA – Oregon State U.
- DOE BETO BRDI – Humboldt State U.
- USDA National Fire Plan – Deschutes NF
- Yakama Nation Forestry – Baling alternative to pile burning
- Deschutes County Forestry, OR – Fuels reduction thinning
- City of Auburn, WA – Vegetation Mgmt. > Green Energy
- Jones Tree Service, TX – Pipeline corridor Maint.
- Asplundh Tree Service, WA – Powerline Maint.
- Rainier Wood Recyclers, WA – Woody biomass fuels
- Eco-Options Energy Co-op, BC – Woody bioenergy feedstocks

Woody Biomass Baler Test

Wildland Urban Interface – Deschutes County, OR



Deschutes NF field demo with
Forest Resources Association,
Friends of the Metolius
City of Bend,
USFS R6 Staff

Yakama Forestry burn piles

After two years of waiting for a burn window, these piles needed to be hauled off-site.

Baling greatly reduced the cost.



City of Auburn Parks and Roads

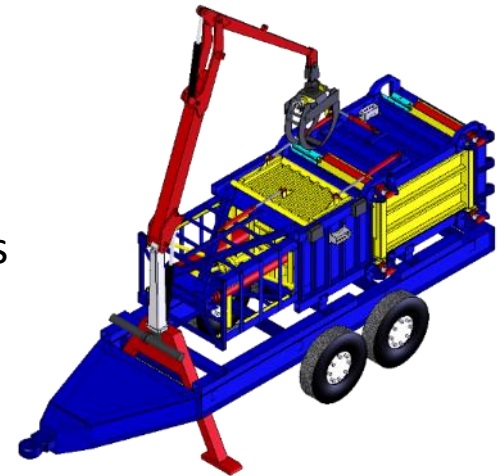


Forest biomass utility baler

- Modular baler unit that can be mounted to:
 - On-road or off-road trailer
 - Log forwarder
 - Tracked undercarriage
 - Truck chassis or flatbed truck
 - Hook-lift skid
- Bale size and weight optimized for:
 - Skid-steer loader handling
 - Smaller horizontal grinders
- Primary uses:
 - Baling roadside windrows and supporting thinning crews
 - Baling fireline and fuels reduction biomass
 - Baling slash from keyhole and stranded landings
 - Recovering dispersed slash



Baling roadside slash from forest thinning
Snoqualmie National Forest (Aug 2015)



What about the roundwood?

- Preserve length as much as practical
 - Firewood-lengths are impractical to chip or grind
 - 4-5 ft. lengths enable uses + chipping or grinding
 - 9-18 ft. lengths enable production of lumber



Davis Harper Photo / PG&E site



Forest Concepts Roundwood Bunks

Winner of 2004 AE50 Award for Innovation



AE50 OUTSTANDING

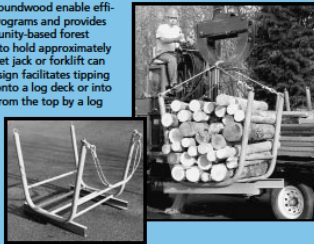


INNOVATIONS 2004

Bunks boost efficiency of wood handling and transport

Multi-Modal Wood Bunks for Small Diameter Roundwood enable efficient transport of wood from forest thinning programs and provides labor-efficient handling of smallwood at community-based forest product firms. The all-steel bunks are designed to hold approximately 1.5 cubic meters (1/2 ton) of roundwood. A pallet jack or forklift can move the bunks at a production facility. The design facilitates tipping by automated equipment to feed roundwood onto a log deck or into a processing line. The bunks also can be lifted from the top by a log loader for easy stacking, placing, or loading in the forest. The bunks can be hauled on a self-loading flatbed trailer, conventional flatbed truck, and small trailers. The bunks are designed to nest when empty so they may be efficiently stored or transported back to the forest from town.

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www.elwdsystems.com



June/July 2004

AE50¹¹



Next Steps

- Contact us to discuss your projects and needs
- Arrange a time for a personal webinar
 - More in-depth discussion in your context
 - Videos of field trials and baler use
- Arrange for live demonstration or site visit
- Develop detailed specifications for a baler system optimized for your operations



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Thank You

www.forestconcepts.com



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Field trials and demos were supported by USDA Forest Service and other cooperators/sponsors.

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