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Brush and Forest Residuals Baler
Modular Roundwood Bunks

Baling & Roundwood Hauling Fireline, Powerline, and WUI Woody Biomass:
Alternative to on-site Chipping

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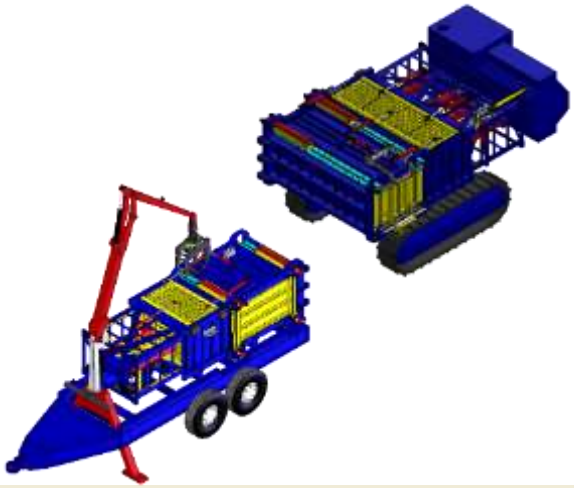
Why Bales and Roundwood?

- **Preserve opportunity for value-added end uses**
  - **in-field chipping/grinding greatly reduces number of markets & products**
- **Minimize labor, noise, dust, … at work sites**
- **Reduce transportation cost by using conventional flatbed trucks, trailers, rail, ...**



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

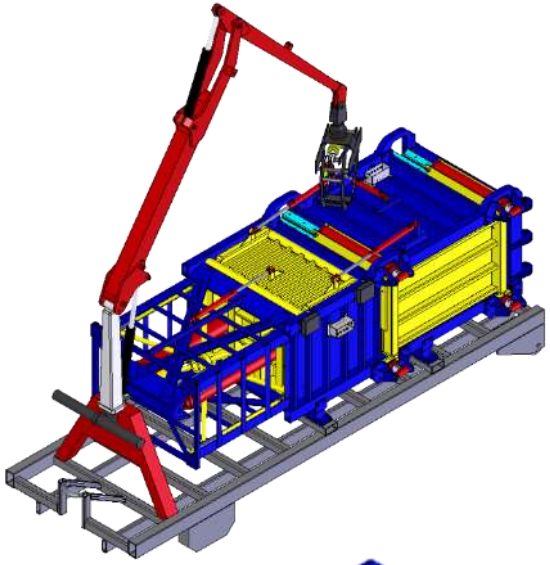
Problems with on-site chipping of wildfire protection and fuels reduction materials

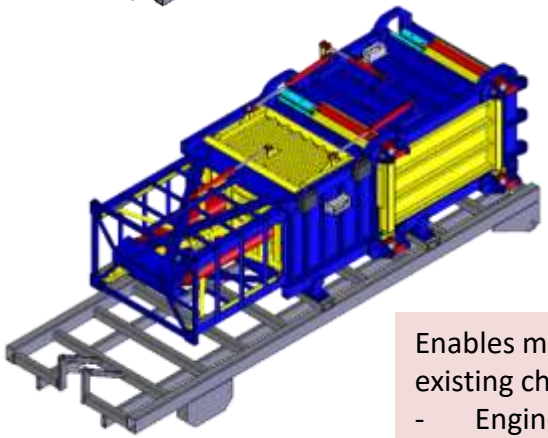
- Noise and dust
- Ties up skilled crews
- Precludes opportunity for beneficial use off-site

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

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.

Auburn

Cambria

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

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

- 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

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

Next Round of Development

Conduct a full-season, complete system field trial including operating contractor, hauler, processor, end user, AND university forest operations research team.

- Five – seven balers operating as a network, with supervisor/trainer/data collector/mechanic
- One hauler with self-loading truck
- Storage and processing site
- End user customer for processed biomass

Cost – Approximately $3 million

- Balers and support vehicles - $2,000,000
- Contractor/hauler/processor incl operators - $1,500,000
- Academic partner / MS Student - $350,000
- Sponsoring organization /staff and proj. mgmt. - $200,000
- Some cost may be offset by payments for work completed and biomass sold to end-user
- Option to transfer equipment to a NonProfit or Contactor at end of project

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Thank You

www.forestconcepts.com

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