

# Wood Waste for Heat and Profit: The Superior Kilns Waste Wood Boiler

## CASE STUDY



BIOMASS



GEOTHERMAL



HYDROPOWER



SOLAR



WIND

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Established in 1982, Superior Kilns produces dimensional lumber at its manufacturing facility in Mellen, Wisconsin. Before 2004, the company used two gas-fired boilers and two wood-fired boilers to meet the process heating requirements of its 440 MBF (thousand board feet) lumber drying operation. In 2004, a fire destroyed the boiler room and kiln electrical control room. This unfortunate event gave Superior Kilns the opportunity to upgrade its boiler systems so the company could use the wood waste it generated as boiler fuel, while using new technology that would result in labor efficiencies, reduced emissions, and a safer environment.

Initially, Superior Kilns was concerned that a wood-fired system would cost more than a comparable natural gas system. After considering the energy requirements and other operating costs for the wood-fired boiler system, the company calculated the payback period to be approximately three years. Superior Kilns began exploring alternative funding sources to help defray some of the initial cost of the system. The company applied for and received a \$35,000 Implementation Grant from Focus on Energy in 2004. Additional project funding came from insurance and conventional bank financing.

Superior Kilns installed a 230 HP steel fire tube boiler that supplies low pressure steam (15 psi) to the kilns.



Mill waste is now replacing natural gas as the fuel used in Superior Kiln's production process.

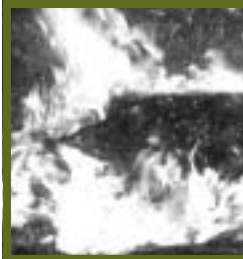


PHOTOS COURTESY OF JOHN KATERS

Superior Kilns' new wood waste boiler replaces two wood-burning boilers and two gas-fired boilers, increasing production and saving \$185,000 per year in fuel costs.

Wood waste initially enters a fuel pit. It is then metered by an electronically controlled feed auger, passed through an air lock into a twin boiler feed auger, and then enters the boiler. Electronic controls adjust the frequency drive to the augers based on the steam levels, firebox temperatures, boiler water levels and other control parameters. A dial-up router provides remote access to maintain or modify the system. The boiler has a built-in ash removal system and dust collector.

The Focus on Energy Implementation Grant assisted the company to save energy costs and expand its production capacity. Additionally, Superior Kilns has eliminated the operational problems created by periodic natural gas service disruptions that were a result of the company's interruptible service agreement with its utility. Overall, this project proceeded as planned and has provided a number of substantial economic and intangible benefits for Superior Kilns.



# Case Study Facts

## Superior Kilns Wood Boiler Date Completed: April 2005

### Personnel

**Owner:** Superior Kilns  
**System Contractor/Installer:** King Coal Furnace Corp., Bismarck, ND

### Building and Site

**Location:** Mellen, Wisconsin  
**Site description:** Superior Kilns produces dimensional lumber, with a capacity of 505 MBF. The company uses process heat to dry the lumber, and replaced two gas-fired boilers and two wood-fired boilers with a new wood-fired unit.  
Superior Kilns uses wood waste from its operation to fuel the boiler. Before installing the new unit, the natural gas boilers used a total of 220,000 therms a year, representing about half its energy use.

### Equipment

**SYSTEM COMPONENTS**

- 230 HP steel fire tube boiler, low pressure steam (15 psi)
- Electronically controlled feed auger
- Dial-up router provides remote controlled access
- Built-in ash removal system and dust collector

**MANUFACTURER**  
Burnham Boilers

### Equipment Costs and Benefits

**ECONOMIC COSTS AND BENEFITS**

- Total installed cost: \$449,000
- Grants, loans, tax benefits: \$35,000 grant from Focus on Energy
- Projected annual energy usage after installation: 540,000 therms. Capacity of wood energy provides the foundation to add 17 percent more drying capacity (to 505 MBF). Three FTE positions have been created and 17 more are anticipated.

**Natural gas savings:** 275,000 therms per year (including increased capacity), equaling approximately \$185,000 per year.

**Percentage of load offset:** Approximately 50 percent