

Study finds efficient way to burn wood

A wood combustion research project has uncovered more efficient ways to burn wood in industrial size wood and bark-fired boilers and reduce pollution at the same time.

The nation has about 1,700 industrial wood-fired boilers in operation now, most of them in the Northwest and South. Together the boilers use about 30 million dry tons of residue fuels annually.

"Sufficient additional wood and bark fuels are presently available at reasonable cost to expand this energy resource by three times," said David Junge of the Oregon State University Combustion Research Group.

The findings from the research in industrial wood combustion may play a significant role in promoting the expanded use of wood fuels in an environmentally acceptable manner, Junge added.

The group's information is already being used to improve the design and operation of industrial wood and bark boilers. The group hopes to improve the efficiency and reduce the air pollution of the burners with the project's information.

In the past five years, the wood combustion work has received a total of \$858,000 in funding from the U.S. Department of Energy and other groups including the Solar Energy Research Institute, Weyerhaeuser and the International Paper Company.

More than 200 tons of wood — more than enough to heat a home for 100 years — have been burned in tests at the group facility in Corvallis. As a part of the combustion tests, a carbon char burnup system has been developed to aid in the disposal of carbon char generated in industrial wood burning boilers.

More than 3,000 pages of technical publications have resulted from this research project.

Wood and bark fuels have different combustion characteristics and material handling characteristics. For example, ponderosa pine bark has a high cork content compared to other bark fuels and burns poorly, leaving a lot of unburned carbon char. The char is a potential air pollutant.

Redwood and cedar bark is so stringy and has such long fibers that they tend to plug up conveyors and other fuel handling equipment.

"But any wood that is available at a reasonable price is potentially useful as an industrial boiler fuel if proper combustion procedures are followed," Junge said.

Research has shown that it is best to carefully distribute the combustion air in industrial boilers. For spreader-stoker design boilers, slightly less than 50 percent of the combustion air should go through the grate. The remainder of the combustion air should be distributed over the top of the burning fuel as 'overfire air'.

By distributing air in that manner and controlling the level of excess air to 50 percent, the most complete combustion is achieved with the least amount of pollution.

The development of the overfire air distribution system was a major part of the boiler design improvement. "An air distributor system was needed which would provide uniform distribution of overfire combustion air in the boiler furnace," Junge noted. "We designed and demonstrated such a system and showed that a stable secondary flame front across the entire cross section of the boiler furnace could be maintained."

Many of the U.S. manufacturers of industrial boilers are using the research results to improve the designs for their boilers.

Now Junge and other researchers will study the use of boiler exhaust gases for drying wood and bark residue fuels. The project will be funded by a \$44,000 grant from the U.S. Department of Energy.

The purpose of the project is to develop a prediction model to determine the amount of fuel drying that can be accomplished using the exhaust gases from an industrial boiler.



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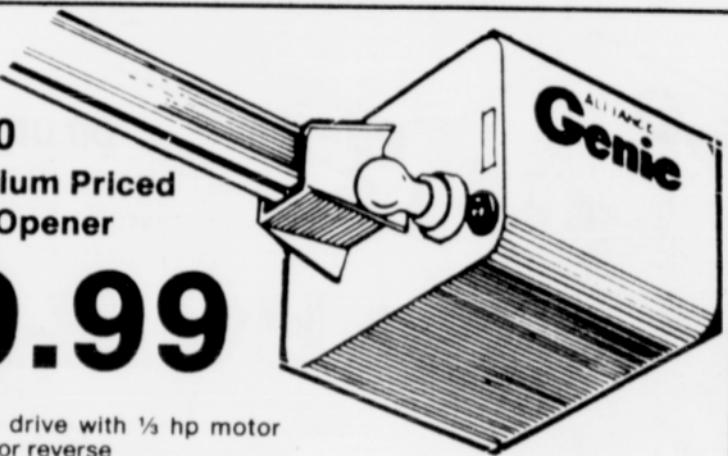


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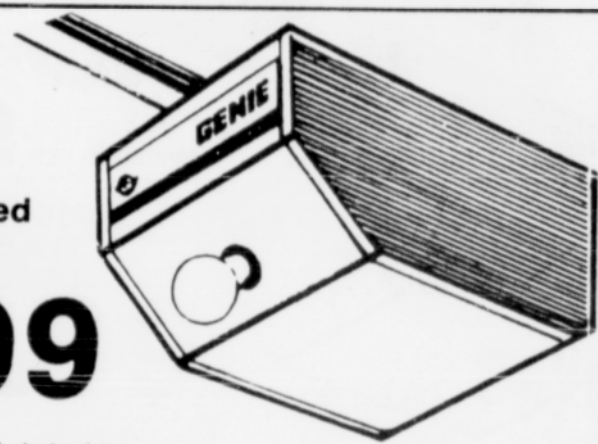


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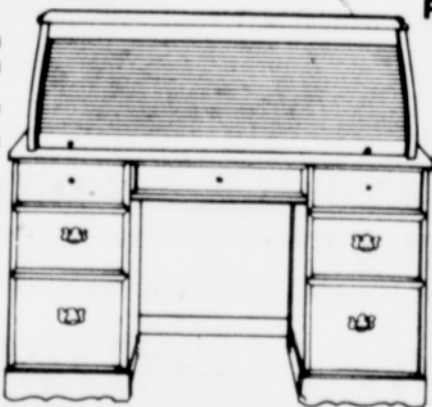
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