

manufactured firelogs

by James E. Houck and Paul Tiegs

The future looks bright for wax-sawdust and densified firelogs.

CONVENIENCE FUELS

Manufactured logs have become very popular and are widely used. There are two fundamental types that often become confused with each other. These are wax-sawdust firelogs that are composed of a mixture of petroleum wax and sawdust, and densified firelogs that are made by compressing sawdust or wood shavings.

Wax-sawdust firelogs are for use exclusively with fireplaces. Compressed (densified) firelogs are for use primarily in wood stoves, but can be used in fireplaces as well. Most wax-sawdust firelogs are sold through mass merchandisers and grocery stores. Most compressed firelogs are sold through mass merchandisers and fuel dealers. The demand for both products is increasing. For densified firelogs, economical distribution and the availability of raw materials appear to be the biggest problems facing their manufacturers. For wax-sawdust firelog manufacturers, regulations limiting the installation and use of fireplaces are of considerable concern.

Wax-Sawdust Fireplace Logs

Wax-sawdust fireplace logs (firelogs)

are a convenient substitute for cordwood. Surveys have shown that wax-sawdust firelogs are used at least some of the time in about 30 percent of woodburning fireplaces that are in use in the U.S. This means that some 5.1 million households are familiar with the product.

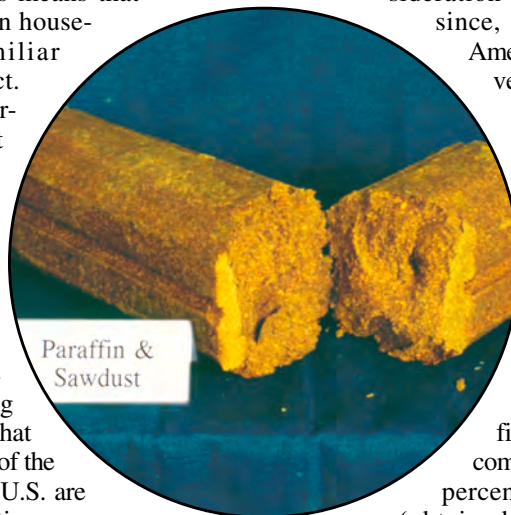
The same surveys show that wax-sawdust firelogs are used exclusively in 12 to 15 percent of these woodburning fireplaces. This widespread usage is not surprising when the fact that about 61 percent of the fireplaces in the U.S. are used for aesthetic purposes rather than primary or supplemental heating is taken into consideration.

These fireplaces are often only used on special occasions, perhaps several times per year. Convenience, such as offered by individually wrapped, easily started firelogs, not fuel cost or the absolute

amount of heat provided, is most important to the consumer at these times.

Even when fireplaces are used for supplemental heating, the convenience of firelogs is often an important consideration to the consumer since, according to the American Housing Survey data, the majority of fireplaces are in suburban or urban settings. In these settings, firelog retailers are generally close by and offer cleanly packaged boxes of fuel.

Wax-sawdust firelogs are typically composed of 40 to 50 percent petroleum wax (obtained from petroleum refineries) with the remaining being sawdust. Wax-sawdust firelogs are designed for one-at-a-time use in fireplaces and require no kindling to start.



ABOVE: Wax-sawdust firelog

RIGHT: Wax-sawdust firelog in use

They are individually wrapped and the fire is started by lighting the wrapper. They contain almost twice the heat content of cordwood (15,700 Btus per pound as compared to approximately 8,800 Btus per pound for most cordwood), and much less moisture (two percent moisture as compared to about 20 percent for typical cordwood).

There is a standard for performance and labeling of wax-sawdust firelogs (UL 2115). The performance standard covers aging, spontaneous heating and heat loss rate characteristics. The common log sizes are 6 lbs., 5 lbs., and small (2.5 to 3.5 lbs.) for four-hour, three-hour and two-hour burn durations, respectively. They burn best on grates with closely spaced bars (less than three-inch spacings between bars) rather than factory supplied grates typical of most fireplaces. They are generally sold individually or in six-packs with typical prices in the range of \$1 to \$3 per log.

In addition to the standard firelogs, several types of specialty logs have been produced. These include logs that crackle, replicating the sound of real cordwood burning. The crackling is accomplished by the addition of various seeds (analogous to popcorn in concept), or mineral products or byproducts with trapped gas pockets which pop when heated.

Other specialty products have included logs which produce colored flames by the addition of salts, logs with fragrances added such as used with scented candles, and logs with chimney creosote removal additives.

Since both the wax and the sawdust used in the manufacture of the firelogs are byproduct materials, there is a fundamental and obvious environmental merit in using wax-sawdust firelogs. Beyond this fundamental environmental plus, air quality emissions also have been demonstrated to be lowered by the use of wax-sawdust firelogs in lieu of cordwood.

OMNI Environmental Services (OMNI) has conducted air quality studies for the Department of Energy, the former Firelog Manufacturers Association, and Duraflame. The results of these studies have been published in the proceedings of Air and Waste Management Association, U.S. Environmental Protection Agency (EPA) and

U.S. Department of Energy-sponsored conferences. The results also have been filed with the EPA for use in their national emission inventories.



These studies, along with earlier work done by Shelton Research and the Canadian Combustion and Carbonization Research Laboratory, have shown that the emission of the key air pollutants of particles and carbon monoxide are reduced by the use of wax-sawdust firelogs in lieu of cordwood. The more recent studies conducted by OMNI also have shown that the important air toxic compounds of formaldehyde, benzene and polycyclic aromatic hydrocarbons (PAH) are also reduced through the use of wax-sawdust firelogs.

There has been considerable consolidation among companies manufacturing wax-sawdust firelogs. Currently the overwhelming majority of wax-sawdust firelogs are manufactured by only two companies – Duraflame and Conros Corporation. Duraflame is based in Stockton, California, with plants in Stockton, Vancouver, Toronto, and in Kentucky. Conros Corporation is based in Scarborough, Ontario with plants in Toronto, California and Texas.

Besides logs manufactured under its own label, Duraflame produces the brand names of Hearthfire and Flame-Glo, as well as various private label logs. Conros sells logs with the brand names of Northland, Hearthlog and Pine Mountain, and private label logs as well.

Surveys have shown that approxi-

mately 253,000 tons of firelogs are sold annually in the U.S. Most are sold in the West and South. Due to the fact that firelogs contain more heat per pound than cordwood, less moisture than cordwood, and are designed for one-at-a-time usage, the 253,000 tons sold annually in the U.S. corresponds to over one million cords of wood that are replaced through their use.

Densified Logs

Densified firelogs are fundamentally unlike wax-sawdust firelogs in manufacture, use and distribution. Far fewer densified firelogs are produced annually than wax-sawdust firelogs. It is estimated that only 52,000 tons of densified firelogs are produced annually as compared to 253,000 tons of wax-sawdust firelogs. Densified firelogs are a western phenomenon, with all operating plants located in the Northwest (Oregon, Washington, Idaho, Montana and British Columbia) and virtually all sales in the West. Historically, there have been numerous players that have gone in and out of the business. Currently, there are eight companies that the authors were able to identify that manufacture the logs.

Densified firelogs are composed of compressed sawdust or wood shavings, generally without any binder added. There are two types of technologies used to make them – piston and screw machines. The original logs were developed in the early 1930s by Potlatch Corporation in Lewiston, Idaho. During their early development the name “Pres-to-Logs” was coined. It is currently the name brand of logs produced by Lignetics but, like the use of the brand name “Coke” to generically apply to cola soft drinks, the term “Pres-to-Logs” is often used in the same way to apply to densified firelogs in general.

Densified firelogs are, as the name implies, more dense than wood. In fact, they are so dense, they sink in water. Because they are made up of wood alone, their heat content per pound is the same as cordwood (on a dry basis). However, they are a superior fuel as their heat content per volume is much greater, and they contain considerably less moisture than typical cordwood (densified firelogs generally contain about seven percent moisture as compared to 20 percent for typical cordwood).

There are three sizes currently man-

Densified Log Manufacturers

Bear Mountain Forest Products

Cascade Locks, OR
(541) 378-8844

Dellen Wood Logs

Spokane, WA
(509) 928-1397

Eureka Pellet Mills

Missoula, MT
(406) 543-0812

Home Fire Prest Logs, Ltd.

Surrey, BC
(604) 530-8078

Lignetics

Sandpoint, ID
(208) 263-0564

North Idaho Energy Logs

Moyie Springs, ID
(208) 267-5311

Sawtooth Forest Industries

Melba, ID
(208) 495-1200

West Oregon Wood Products

Columbia City, OR
(503) 397-6707

Wax-Sawdust Log Manufacturers

Conros Corporation

Scarborough, ON
(416) 751-4343

Duraflame

Stockton, CA
(209) 461-6600

ufactured – 8, 5 and 3.1 pounds. The larger-sized logs are serious fuel and are almost exclusively used in wood stoves. The smaller-sized logs are more amenable for use in fireplaces but, as with the larger-sized logs, they are also more commonly used in wood stoves. Due to their density, they are more difficult to start than either cordwood or wax-sawdust firelogs. To mitigate this problem, Lignetics includes a waxed “mini-log” fireplace starter with bundles of their product.

The densified firelogs are generally sold in mass merchandise stores in small bundles of three or six logs, and by the pallet (about one ton) via fuel dealers. The cost per five-pound log in the small bundles is around 50 cents per log. The cost per pallet (ton) is in the \$150 to \$175 range. Like wax-sawdust firelogs, densified firelogs offer convenience. They are clean and, because of their uniform dimensions, easy to store.

OMNI has conducted research, sponsored by the Department of Energy, on air quality emissions from the use of densified firelogs. Two studies were conducted. One was conducted on both certified and noncertified wood stoves in use in homes. The other was conducted with wood stoves and fireplaces tested in the laboratory. The results of both studies showed significant reductions in emissions of particles and carbon monoxide through the use of densified firelogs as compared to cordwood. It is believed that these reductions are due in part to their higher density, lower moisture and uniform shape, and in part because they are made with clean sawdust or wood shavings without bark or debris.

Research Formulations

Over the last decade there have been a number of attempts to make artificial logs from a variety of biomass and related materials. OMNI alone has been involved in the performance and environmental testing of logs containing grass seed straw, rice straw, junk mail, cardboard, waxed cardboard, coal dust, olive pits, hazel nut husks, almond shells, palm boughs, peat, molasses, seaweed, palm oil, and polyethylene plastic. Many of these components are used as “extenders” for the traditional ingredients in densified or wax-sawdust firelogs. Some of the formulations have been commercialized on a limited basis. Either way, the use of biomass wastes or by-products for fuel offers an attractive

and obvious environmental benefit.

Packaged Firewood

Packaged firewood (bundled or boxed), while not a manufactured fuel, appeals to the same consumers for the same reasons as manufactured firelogs, and is also sold at mass merchandiser outlets and grocery stores. Quality firewood supplied by reputable dealers should produce lower air emissions than typical cordwood since it is generally better-seasoned, i.e., has lower moisture (10 to 12 percent as compared to around 20 percent for typical cordwood), contains no bark and is clean of debris. Proponents of its use point out that the smell and crackle of natural firewood are aesthetically more pleasing than that produced by manufactured fuels and that, importantly, the heat provided per unit cost (Btu/\$) for firewood is higher than for manufactured fuels.

While variable, the average package of firewood weighs around 24 pounds with a cost in the \$4 to \$6 range. Not surprisingly, unlike manufactured fuels which require capital intensive equipment, there are many small entrepreneurs in the business since all that is really required is a wood source, a truck and cutting/splitting equipment. To provide a sense of scale, in California alone there are at least six major dealers and innumerable “mom and pop” operations which combine to provide an estimated 70 thousand tons of packaged firewood annually.

The Future

The future should be bright for biomass fuels in general and manufactured fuels in particular. The rising costs of fossil fuels for residential space heating will only increase the demand for densified firelogs for fuel. The concern over possible power shortages has had the understandable effect of manufactured fuel stockpiling by consumers. The increasing number of fireplaces due to new home construction should make for increased sales of wax-sawdust firelogs and, to some extent, densified firelogs as well.

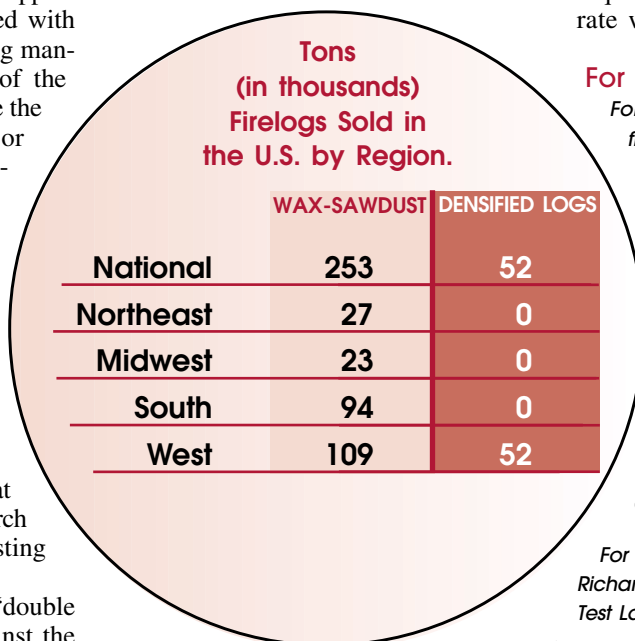
There are about 600,000 new fireplaces installed annually in the U.S. If the ratio of woodburning to gas fireplaces, and the fraction of woodburning fireplaces that use wax-sawdust firelogs are the same for new fireplaces as for existing ones, this corresponds to approximately 82,000 new fireplaces that will use wax-sawdust firelogs annually.

In terms of densified firelogs, the only limitation to sales in the West appears to be available fiber. Consumer product familiarity and economics appear to be the major issues associated with the expansion of densified firelog manufacture and sales to the rest of the country. Economic issues include the start-up costs for new plants or shipping from the West, as balanced against low-cost local cordwood. In addition, many of the same companies that manufacture or could manufacture densified firelogs also manufacture pellets, which compete for the same fiber resources. Raw material availability, while not yet limiting the manufacture of wax-sawdust firelogs, is also of continual concern to that industry, and much of their research and development activity is testing new raw materials.

Environmental issues are a “double edged sword.” Restrictions against the installation or use of woodburning stoves or fireplaces have the obvious effect of reducing the number of opportunities for home occupants to burn manufac-

tured fuels. Classic examples of this situation are Maricopa County, Arizona, and communities in and around the Bay

sions can provide an impetus for their use. Continued public education and interaction with regulators will be required to increase use commensurate with environmental benefits. 🏠



Area of California. On the other hand, the fact that manufactured fuels have been documented to produce lower emis-

For More Information

For more information on wax-sawdust firelogs, contact Chris Caron, vice president of marketing for Durafume - 209-461-6600.

For more information on densified firelogs, contact either Christopher Sharron, president of West Oregon Wood Products - 503-397-6707 or Ken Tucker, president of Lignetics - 208-263-0564.

For information regarding packaged firewood, contact Les Scott, CEO of California Hot Wood - 209-333-5480.

For information on safety testing, contact Richard Sparwasser, vice president of OMNI-Test Laboratories - 503-643-3788.

For information on firelog environmental or performance testing and product development, contact the authors Paul Tieggs or James Houck - 503-643-3788.