One-Of-A-Kind Shop Heater

Clair Wilson's new shop furnace is so different we decided to give you a glimpse of it as it's being built. Wilson farms with his brother Warren near Winchester, Ill.

The firebox is located at the southwest corner of his shop. The shop is built into a hillside so the firebox is dug into the ground. The 8 by 8 by 8-ft. firebox is designed with a hinged roof so it can be raised, allowing 7-ft. logs to be dropped into it by a tractor. The inside of the firebox will include rows of piping over the fire at the top that will be connected to piping under the shop floor. At the same time, heated air at the top will be pulled from the firebox and blown into the shop.

The huge firebox is double walled and is made from several salvaged large fuel storage tanks made from 1/4-in. thick steel. Wilson used some large metal brakes in his shop to bend the steel to make the top and sides.

The photo shows a door leaning against one wall that will enclose the near end of the heater.

Clair Wilson dug this 8-ft. high firebox into the ground next to his shop. It has a hinged roof that can be raised to drop 7-ft. logs inside with a loader tractor.

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Home-Built Outside Wood Boiler

Mike Schultz of Grand Marsh, Wis., wanted the convenience of an outdoor non-pressurized wood boiler, but he didn't want to burn the half a face cord of wood a day that many commercial units consume. Instead, the maintenance mechanic at an injection molding company used his experience to build his own stove and boiler system.

Schultz focused on specific features: an efficient way to burn the wood, a way to increase the surface area that transfers heat, and efficient heat storage.

"To get efficient combustion, you want fire to burn and combust as fully as possible before extracting heat from it," Schultz says. "I never have to dampen down my combustion. Because of the high heat, the stove puts out very little smoke once it gets going. I virtually have no creosote," Schultz says.

There's an Aquastat draft regulator attached to the front of the stove as a required safety measure. It monitors water temperature, closing the draft if the stove gets too hot.

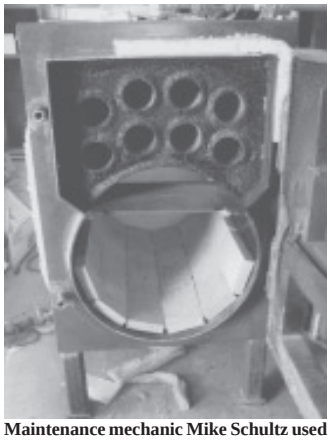
"You don't want it to boil," Schultz warns.

He built his stove from new and recycled materials. The firebox was made from a piece of a 20-in. dia., 1/4-in. thick steel pipe, and the outer jacket is a 24-in. dia. pipe, both purchased from a scrapyard. Schultz placed firebrick inside much of the firebox, which can hold half a dozen pieces of wood up to 22-in. long.

For other stove parts, he purchased square tubing and hot-rolled steel, which is made from recycled metal and less expensive than cold-rolled steel. To increase the heating surface, Schultz added smoke tubes made from 3-in. schedule 40 pipe above the firebox. Smoke goes through them from the front and into a smoke chamber in the back, which captures more heat.

Schultz shopped the internet for a good deal on two water lines of PEX (poly) tubing, which run underground from the stove to the heat storage tank in his house about 40 ft. away. He made his own insulated box for the tubing out of 2-in. high-density foam, by cutting blocking and strips out of the foam on his table saw. Cost for insulated tubing normally runs from $12 to $18/ft., Schultz says. His system cost just $2.50/ft.

In the basement of his farmhouse, 50 ft. of recycled copper pipe runs through a heat storage tank that holds 600 gallons of water. Thermostatic zone valves move the hot water over the plenum and turn on blower fans, sending heat into the home's ductwork.



Maintenance mechanic Mike Schultz used his work skills to build his own stove and boiler system.

"I can still get heat out of the system until the water is down to about 110 degrees," Schultz says. "The temperature is thermostat-controlled inside the house. It doesn't matter what the outside boiler is doing."

Another important part of the system is the expansion tank, which is positioned higher than the stove. The tank has room for the water level to expand when it heats. Schultz built his tank out of inexpensive cutoff scraps of steel.

Schultz notes that people considering making their own wood boilers should have good welding skills and an understanding of metal contraction and expansion.

"This is not your average do-it-yourself project," Schultz says.

He spent less than $600 on his stove, including the 30 to 40 lbs. of wire he used in his wire-feed welder. Overall, the system cost about $2,000.

With a drafty old farmhouse the first year, Schultz had to fill the stove about five times a day, but anticipates that will be reduced, since he has added insulation and installed new windows.

Schultz is willing to advise others interested in making their own outdoor boiler stoves.

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Multi-Fuel Stove Burns Clean

Changing from wood pellets to corn to other pelleted biomass fuels is as easy as pressing a button on this new pellet stove that doesn't need different fire pots for different fuels like other stoves.

Jaime Helgeson of Cumberland Stove Works says, "The controller takes the user through start up, temperature control and choosing the fuel you wish to burn. It makes it easy to troubleshoot stove operation, too."

With stoves equipped with electronic ignition, start up is easy. Once the fire has started, whether manually or automatically, the thermostat-controlled fans and the feed auger regulate the fire, shutting down when target temperature has been reached, turning back on when heat is needed and cycling back up to the desired temperature.

The stove is rated at 45,000 btu/hr. with a heating capacity of up to 1,200 sq. ft. The hopper holds up to 62 lbs., and the stove can burn for up to 36 hours without a refill.

The company suggests that the key to successful burning of multiple types of biomass is the shape of the fire pot. Its unique oval geometry converts 99 percent of solid fuel into heat.

"Because it burns so completely, it is easy to clean, too," says Helgeson. "You don't get black ash, but a white ash cookie that drops into the ash pan. The stove is designed so the ash pan slides out, and the user can vacuum straight through to the exhaust vent."

Cleaning the firepot is suggested after every 105 lbs. of corn or 400 lbs. of wood pellets and is accomplished by turning the cleaning rod at the front of the stove. The ash pan should be cleaned after 800 lbs. of corn and 2,400 lbs. of wood pellets.

Multi-fuel stove doesn't need different fire pots for different fuels like other stoves.

The company says the stove has three times as many heat tubes as most comparable stoves. Heat from the firepot moves straight up and across the horizontal heat exchange tubes at the top of the stove and then circulates down the side of the stove past vertical tubes before exiting out the exhaust vent at the bottom rear.

Efficiency and clean operation are also improved with an air filter at the rear of the stove. It prevents dust, pet hair and other materials from circulating through the stove, extending stove life and increasing the hot air movement.

The company's suggested retail price for the MF3500 with manual ignition is $2,499 or $3,099 with electronic ignition.

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Side-By-Side Stove Burns Wood And Corn

When the wood stove he built 25 years ago needed to be replaced, Al Wolter built a new one with two chambers. One burns wood, and the other burns corn.

"I figured if the corn burner didn't work out, I could use both sides for wood," says Wolter.

As it turned out, the corn stove works just fine. He welded a fire pot out of steel and feeds it from the bottom by auger from a 3-bu. hopper a few feet away. The hopper was made from a hog feeder. Wolter made a stand for it and uses a 2-in. auger in a straight pipe to move corn into the fire pot. A timer on the auger motor runs it for five seconds and then stops for about a minute.

Filling the fire pot from the bottom moves clinkers up and out of the fire pot each time it fills. Wolter acknowledges the fire pot may not last more than a few years, but it was easy to make.

A small squirrel cage fan in the chimney pipe draws air into the fire chamber. Heat is always moving up and away from the fire pot and the auger. The downside of the design is loss of heat up the chimney. Wolter is designing a heat exchanger to capture more of the heat before it escapes. He is also considering adding a thermostat to control the auger. This would allow him to use the corn stove 24 hours a day.

"The stove stack stays between 400 to 500 degrees, which is too high, but I'll fine tune that," he says of the one-year-old stove.

The stove, located in the basement, acts as a space heater for the house, with the rest of the basement acting as a heat reservoir. Floor grates around the sides of each floor of the house allow heat to move upward. A large open staircase in the center of the house acts as a cold air return for the second floor. A 2 1/2–ft. sq. grate in the center of the main floor completes the cycle as cool air moves down and over the stove again.

The one exception is a flexible coil pipe that extends upwards from the stove vicinity, carrying a stream of warm air to a single small grate.

"The grate at the end of the pipe is right under the chair my wife sits in when watching TV," says Wolter. "It keeps her a little warmer."

Wolter welded the stove out of 3/16-in. plate, angle iron and some steel tubing and strap. The stove chambers measure 2 ft. deep by 3 ft. high with each chamber 2 ft. wide. Legs and grips at either end for moving the 350-lb. stove are made from 2-in. channel iron. The legs raise the stove 1 1/2 ft. off the floor.

"I heat an old 1,100-sq. ft., three-story house with no problems," he says. He figures that isn't bad for a stove he built without plans in only two days. Now that it has made it through a winter, Wolter is offering to share plans with people interested in building one for themselves.

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