

Make Your Own Pellets

Most settings for my articles are in or near forested areas where woodland management takes place and the raw materials for a sawmill are close at hand. But around the tiny town of Larrabee, Iowa, corn is king, and the few trees that do grow provide shade around houses and barns. Mark Stief's woodworking shop occupies one such barn.



Mark Stief describes how he got into the business. "I started out in construction in 1993," he recalls. "In the winters off, I started building kitchen cabinets." When the cabinet business took off, he set up his shop to build them full-time, giving his knees a much-needed rest from shingling roofs. Following the general housing trend, however, the cabinet business declined. "So I went to driving a truck for a local door manufacturer for a year. I looked at the mouldings I was hauling for them, and I thought to myself—you dummy, you've got the stuff sitting in the shop, and you could be making moulding for them." Using his planer and a router, he made some sample pieces for the company, and in a few days got an order for 15,000

running feet of oak, maple, and poplar. "I never realized they did that volume," he exclaimed. "When I got a 25,000-foot order, I knew I needed a bigger machine. I found a 4-head Silver, and then upgraded to the 5-head I have now. I've got about 1,100 hours on it."

Stief estimates that he produces over a thousand pounds of shavings per day. Not one with a history of ignoring a potential source of income, Mark wanted to find a way to market his shavings as well. "I just got tired of giving it away," he recalled. "One fellow told me he would take my shavings for horse bedding—if I would deliver it at no charge. I wasn't about to do that!" Mark's solution was to get a wood pelletizer and market his waste shavings as fuel.

Make Your Own Pellets

After looking at several pelletizers, he settled on an 8-inch model built by the company Make Your Own Pellets. The pelletizer was a natural addition to his business. "The wood is already kiln dry," he pointed out. In fact, he has found that the machine produces better pellets when he adds a little moisture, plus a product called Pellet Bond, which acts as a binder to help hold the pellets together as well as a lubricant to help them slide through the pelletizer die. "I've tried a lot of things as binders, but I always come back to Pellet Bond," he concluded. Once he got his first pelletizer working, he bought a second one so that he could run pellets for an hour in the



Left: Mark checks the flow of wood flour into his mills. He salvaged the augers and 3-phase motors from a junkyard, and added a variable speed control so that he could control them independently.

Above and below: Checking the pellets. According to Mark, producing pellets is as much of an art as it is a science, and he is still learning how to control all the variables. All the pipes and tubes give Mark's pellet operation the appearance of an old-fashioned moonshine still. Mark is still experimenting with the mills to get consistent operation, but he is able to produce each mill's rated capacity of 250 lbs. per hour.



morning to use a day's production of shavings. "I can make about 250 pounds per hour with each pelletizer," he explained. "It is better to run several smaller units than one big one, because I can see what they're doing. Just last week, I had a problem with a shaft, so I took the chain off it, and just kept making pellets with the other unit."

The Process

The process of making wood pellets is much more involved than just throwing sawdust into one end of a machine and kicking pellets out the other. Before pelletizing, the wood shavings are ground into a powder and mixed with the Pellet Bond. An auger feeds this powder into a hopper where it is

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stored until Mark is ready to run a batch of pellets. Variable speed augers feed the powder into the two pelletizers. Mark controls the moisture of the wood pellets with steamers that feed directly into the pelletizers. The pelletizer itself is similar to a feed pelletizer. The Make Your Own Pellets unit uses a rotating steel die with a number of 3/16 inch holes in it. A pair of rollers crushes the powder through the dies to make the pellets. The compaction of the wood and friction with the die create the heat and pressure to make the lignin in the wood flow and hold the pellets



Mark adjusts a steam humidifier to get the desired moisture in the wood. His two pellet mills run off the PTO shaft (lower left in the photo) of his 150-hp Deutz tractor. The two angled pipes transfer the wood flour from the hopper to the pellet mills and the open auger transfers the pellets to a grain cleaner to remove the dust.

together. The pellets come out of the press about five times the density of the powder. The next step is to auger them into a rotating screen to cool them and separate out any remaining dust. After that, Mark can either auger the pellets into 40-pound bags or fill the back of a customer's pickup truck.

To achieve all this, Mark's pellet manufacturing room is an inventor's dream, with variable speed augers feeding his two pelletizers, steamers, and, of course, the pelletizers themselves, which are powered by the PTO of a tractor sitting just outside. The PTO shaft comes through the wall of the shop and turns a pair of sprockets that drive the chains that turn the gear reduction box on the pelletizers. Mark is clearly proud of his use of "scrap" material. "I got the feed motors and augers from a junkyard," he says. Mark did find that his 150-hp farm tractor was a little overpowered for his pellet mills, however. "On the first one, I broke the outer tooth and snapped a drive shaft. I had to get a machine shop to make a new shaft for me." He now uses a lighter drive chain and shear pin to avoid future shaft breaks. The pellet mills have been trouble-free. After running about 25 tons of pellets, he has had no mechanical problems with the mills themselves, and is still using the original dies.

"When I first started making pellets, I thought what have I gotten myself into?" Mark recalls. But, he says, the people at Make Your

Own Pellets have been very helpful. "Brian Dingman [company owner] and those guys have been great help. They're making pellets every day. They can give you pointers, but until you start making pellets on your own, there is no way set in stone for making pellets, because it will change every day." He finds making wood pellets as much of an art as it is a science, and that it often helps to let the wood powder sit overnight. "I compare it to making soup. It's good the first day, but it's always better the second day. I don't know whether it's that the moisture and binder get better distributed, but it works better. It's just one part I haven't figured out."

Present and Future Markets

Selling the pellets has not been a problem for Mark, and he is one of his own best customers. "I've got a pellet stove here in the shop, and I'm going to put a pellet stove in my wife's restaurant in Larrabee. We'll probably go through four or five tons ourselves." Last year, he pelletized about 13 tons, but with a second pelletizer on line, he predicts he will produce about 30 tons this year. "I'm not keeping up with the sawdust I'm making now. I might add a third pelletizer so that I can make pellets for an hour or two first thing in the morning, and work in the shop for the rest of the day." Just in case he ever does get caught up with his sawdust produc-

Left: The rollers force the wood through the holes in the dies. The friction of the wood against the dies heats the wood and causes the lignin in the wood to flow. This compresses the wood and binds it together into pellets.

tion, Mark is experimenting with other materials. "Last week I experimented with making corn-stalk pellets. And they worked!" Other possibilities he is considering include cardboard, dried grass clipping, leaves, and even dried horse manure.

Whether setting up his 5-head moulder/planer to make a perfect cut, or adjusting his pelletizers, Mark clearly enjoys experimenting and tinkering, and the independence of running his own shop. "For me, this is my life. I live this. I don't know how I could work for somebody else. I love working with wood. I'll do just about anything if it's made out of wood." But he is also realistic, and has seen the problems that come from being too specialized. His advice is simple: "You find a niche that works and you stick with it. But you can't just do one thing anymore. That just doesn't work. A lot of big cabinet companies are finding that out." ■

Dave Boyt has a BS degree in Forest Management and an MS in Wood Technology. He manages a tree farm (2006 Missouri Tree Farm of the Year), and operates a band saw sawmill.



Checking out the finished product. After the pellets have cooled and the dust removed, they are ready to sell. Mark sells them in 40 lb. bags and in bulk, but with a shop to heat as well as his wife's restaurant, he is his own best customer.

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