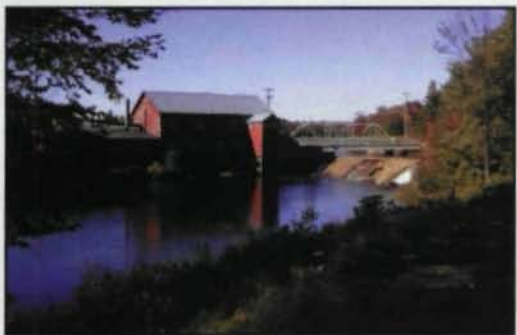


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Water Powered Machinery

Photo Essay by Robert E. Smith



In one of my many visits to northern New York state, which includes the St. Lawrence River (Thousand Islands Region) and the Adirondack Mountains, I visited Croghan, a village on the Beaver River, which is fed by the Stillwater Reservoir in the Adirondack Mountains. At the base of a dam within the village, I found the remnants of a water turbine and a bevel gear drive system. Having worked for The Gleason Works for many years, I was intrigued by the remains of the bevel gears, which appeared to have had wooden teeth at one time.

Several years later, someone told me there was still an operating water wheel and drive on the other end of the dam, so I had to return for another visit. I found a company called the Croghan Island Mill Lumber Co., Inc. It is currently owned by the Martin family, and I met Jim Martin.

The family has owned the business since 1969. Before that, Martin's father worked for the previous owner for 30 years. There has been a similar business on site for about 150 years, according to Martin's research. They do custom millwork for restorations—moldings, window frames and sashes, etc.

At one time, there was a sawmill on the other end of the dam, where I had seen the original remains of the turbine and bevel gear drive. The sawmill had used a water wheel called a Rodney Hunt wheel for power, but the mill burned down about 1950.

The Croghan Island Mill uses a James Leffel water wheel, made by a company that used to be in Springfield, Ohio. Someone bought the drawings and claims to have replacement parts available. The water drop is 9 feet. The turbine is about 5 feet in diameter and 2 feet high. According to Martin, it generates about 70 HP, enough to drive all their machines at one time. The current water wheel has been in use since about 1912.

The gear drive is a speed increasing pair of bevel gears, with a ratio of 1.5:1. The bevel drive gear, attached directly to the turbine shaft, is about 48 inches in diameter, with 66 teeth. The pinion is 32 inches in diameter and has 44 teeth. The pinion is metal, while the gear is a casting with slots in it. The teeth are hardwood, and they are held in the slots by wedges on the underside. The teeth have a tapered "involute-like" shape and were originally made by a company in Carthage, NY. The company probably no longer exists. Martin has one new tooth, which can be used as a pattern.

It seemed incredible to me that the wooden teeth on the large gear have been running at least since the Martin family took over the business 31 years ago. They have had no tooth failures in all that time, and they don't know how long the gears were running before the family bought the mill. The wooden teeth are worn considerably thin at the outer ends, so that they look more parallel today. The wear pattern indicates that the gears are not mounted properly, relative to each other, but as they wear, there is more face width of the teeth carrying the load. They occasionally apply some grease to the teeth, from a barrel that was on site when they took over the business. About once a year, they have to replace or adjust the wooden pillow block just above the turbine.

The drive shaft goes into the building and is belted down below the main floor. From there, the power is distributed to other drive shafts near the various machines. The machinery includes table and band saws, planers, joiners and sanders. All the machines are from the late 1800s to early 1900s and are still used daily.

During the winter, the water in the top of the tower freezes, especially on weekends, when the turbine is shut down. The next morning, they pour some rock salt around the turbine shaft at the surface. Ten minutes later, the shaft is free and can be started up. Sounds like a pretty reliable and inexpensive source of energy. ⚙



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