

All aboard!

Mt. Washington Cog Railway introduces its first diesel locomotive to its historical steam-engine operation

Since the mid-1800s, coal-fired steam engines on the Mt. Washington Cog Railway have dutifully pushed passenger coaches on a 4.8-kilometer (3 mi.) journey skyward to the top of New England's highest mountain peak.

At the top of Mt. Washington, towering 1,917 meters (6,288 ft.) above sea level, passengers peer above the clouds



The cog gears beneath the locomotive travel up the tooth-racked rail system.

overlooking the White Mountain range. On a clear day, it's a breathtaking panoramic view encompassing the Atlantic Ocean and Canada, as well as several New England states.

The Mt. Washington Cog Railway in New Hampshire is the world's first mountain-climbing cog railway. Established by Sylvester Marsh in 1869, it was a marvel of its time, with its tooth-racked rail system and an oddly shaped steam locomotive. Today, 30 cog railways exist in the world. The Mt. Washington Cog Railway, with its 37.4 percent grade, ranks as the second steepest among them.

As many as 80,000 visitors ride the cog each year. Today's operations are reminiscent of those that began 138 years ago. Yet, its current owners Wayne Presby and Joel Bedor are striving to restore and upgrade the operation, without changing the truly unique cog experience.



Al LaPrade, the Cog Railway's mechanical engineer, rides the coach pushed by the Cog Railway's new John Deere-powered locomotive.

Eco-friendly engine. Their biggest accomplishment, which debuts during a July 3rd ribbon-cutting ceremony, is the development of an environmentally friendly biodiesel locomotive powered by a John Deere diesel engine. The locomotive was built "from the wheels up" by the Cog railway's shop crew, following a century-old tradition of building all of their locomotives and coaches onsite by their own personnel.

The new diesel locomotive offers visitors a clean, cost-effective way to travel to the summit of Mt. Washington.





The PowerTech 6125H engine, supplied by Bell Power Systems, features a hospital-grade muffler system to reduce noise. The electronically controlled engine and Funk pump drive power a series of hydraulic components encompassing the powertrain.

The new diesel locomotive joins a fleet of seven coal-fired locomotives that will continue to operate on the rail. “We don’t have plans to eliminate steam,” assures Al LaPrade, the Cog Railway’s mechanical engineer. Rather, the new diesel locomotive is more likely to aid in the preservation of the current steam engines by offsetting the rising cost to operate them. Each trip up the Cog Railway requires over a ton of soft-grade bituminous coal. “Coal prices are rising in excess of \$225 (U.S.) per ton, and we predict that cost to double or triple this year,” says Al. By comparison, the cost to run the diesel locomotive is about \$60, which could amount to a savings of several hundred dollars per trip.

This efficiency is obtained using a well-engineered powertrain introduced to the railway by Ron Ruel, sales engineer for the Leen Company. The Leen Company is a division of the Hope Group, which is a value-added distributor featuring Parker Hannifin fluid power and electrical components. Ron and Al then refined the concept to the current “as built” design that is on the locomotive today.

The powertrain. To run the hydrostatic system, the PowerTech 6125H is paired with a John Deere-manufactured Funk Series 56000 pump drive. Because the powertrain was initially designed around a competitive engine rated at 2400 rpm, the Funk pump drive offered the engineering flexibility to set the gear ratio at .882:1, making it possible to drive the hydraulic system with a 2100-rpm John Deere engine without a major redesign.

Behind the drive, two Parker Dennison hydrostatic transmissions drive two Parker Volvo piston hydraulic motors. These motors drive two Eskridge planetary gearboxes that power the cog gears under the locomotive.

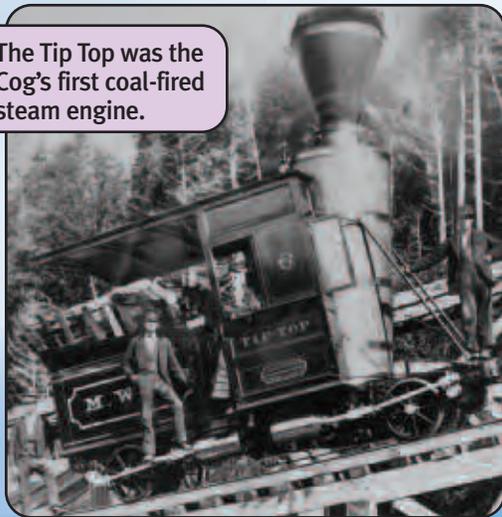
Ron says the electronically governed PowerTech 6125H was a crucial component in the powertrain. “We wanted a modern-day engine that was compatible with an SAE J1939 technology,” explains Ron. “This enables us to integrate a Parker IQAN MDL module to control and monitor the hydrostatic powertrain system.”

The computer package will ultimately provide an opportunity to monitor the position of the diesel locomotive on the cog rail within four inches. When the locomotive goes through the lower switch, it breaks through a laser light beam. At that point, a counter in the Parker IQAN MDL begins to count the teeth on the cog rail, making it possible to better coordinate trip schedules and the timing of trains passing through switches, explains Ron.

Bringing 21st century technology to the historic Cog Railway isn’t necessarily philosophically easy for everyone to accept. But both Al and Ron say the new locomotive aims to complement the Cog Railway experience, offering some visitors a cleaner and more cost-effective way to travel to the summit of Mt. Washington. Future plans include the addition of at least another diesel locomotive powered by a Tier 3/Stage III A PowerTech Plus 6135H diesel engine.

So, welcome aboard. Whether you relish the trip aboard one of the venerable coal-fired steam engines or a clean-burning diesel locomotive, the journey on the Mt. Washington’s “railway to the moon” holds the key to an awe-inspiring, unforgettable experience into yesteryear for everyone.

The Tip Top was the Cog’s first coal-fired steam engine.



Funk Pump Drive Model	28000
Number of Pads	2
Max input power	268 kW (360 hp)
Max input torque	1017 Nm (750 lb-ft)
Input configuration	Direct driven

Emissions Cert.	Tier 2/Stage II	Tier 3/Stage III A
Engine Model	PowerTech 6125HF070	PowerTech Plus 6135HF485
Displacement	12.5L	13.5L
Rated Power	448 kW (600 hp) @ 2100 rpm	448 kW (600 hp) @ 2100 rpm
Cylinders	6	6
Aspiration	Air-to-air aftercooled	Air-to-air aftercooled
Distributor	Bell Power Systems, Inc., Essex, Connecticut (860) 767-7502, www.bellpower.com	

