



18585 Samuels Road | Zachary, LA 70791 | 225.658.6166 | thompsonpipegroup.com

CASE STUDY:

A PENSTOCK FOR THE AGES

BACKGROUND

As part of the Franquelin River Hydroelectric Project in Quebec, Canada, Owner/Engineer/Contractor Axor Group needed 1,370 LF of penstock pipe for their 9.9-MW power station.

PROBLEM: CONVENTIONAL STEEL OR FRP?

Axor's original design of the project specified 110-inch-diameter steel pipe. However, with the introduction of an FRP pipe supplier capable of producing pipe that could meet the pressure requirements for the application, they looked into the option of using filament-wound FRP pipe instead. With its superior hydraulic efficiencies and inherent corrosion resistance, large-diameter FRP appeared to be the right solution over steel pipe.



SOLUTION: FLOWTITE® FRP PIPE

Thompson Pipe Group–Flowtite® was able to offer 96-inch-diameter Flowtite® filament-wound FRP pipe, with lower frictional losses than that of steel. The operational pressure for the system was 85 psi, with possible surge pressures of an additional 43 psi. This meant that the maximum pressure that the pipe material would be exposed to was 128 psi. Flowtite® FRP pipe is designed to accommodate a surge allowance of 40% above the pressure class of the pipe. Axor chose a pressure-class of 150 psi Flowtite® FRP pipe, which is allowed to operate at 150 psi and can handle system surge pressures of 210 psi. The true advantages of this FRP pipe solution included several factors, the first being that FRP is much lighter than steel. FRP's hydraulic efficiencies also meant that Axor could use a smaller diameter pipe

than steel, which resulted in lower material costs and easier transport and installation. In addition, the long-term benefits would be lower maintenance costs. With all of these considerations, FRP was clearly the right solution for Axor.



OUTCOME: SAVINGS FOR NOW AND THE FUTURE

With the penstock in place, the actual cost-savings could finally be realized. The material costs for the 96-inch-diameter Flowtite® FRP pipe was more than 30% lower than the steel pipe alternative. The advantages of the Flowtite® joining system and the fact that the pipe was 40% lighter in weight than the steel alternative were realized in 30% lower installation costs. Flowtite® FRP pipe is essentially maintenance-free, so the cost that steel pipe would have incurred for cathodic protection, liners or other corrosion-prevention measures was also saved. These maintenance costs over an estimated 20-year product lifecycle can be conservatively estimated to be more than \$140,000.



Further savings would come during the future operation of the system by minimizing revenue loss due to friction. Over an estimated 20-year product lifecycle, the hydraulic efficiencies of Flowtite® FRP pipe would result in estimated cost-savings of almost 20%.

The overall savings for the penstock as a result of selecting Flowtite® FRP pipe makes for a very convincing case over steel for almost any hydropower penstock application.



