



STEELS FOR HYDROPOWER

The pumped-storage power plant at Vianden

MORE DILLINGER HYDROPOWER KNOW-HOW

A problem faced since the very start by the power generation industry is the question of how do you store electrical energy - particularly in bulk? The expansion of the use of renewable energy sources results in significant fluctuations in power generation, since the wind, for example, never blows steadily all the time, and since the sun, of course, shines only during the day. The solution takes the form of so-called pumped-storage power plants. When there is surplus energy in the electrical grid, water is pumped through pipes up into the storage reservoir. When electricity is needed in the grid, on the other hand, the water flows down again, driving turbines and their generators. This is, in fact, the only storage technology which has been in use for decades and has been repeatedly further developed.

Total commitment for maximum output

The pumped-storage power plant operated by RWE at Vianden, Luxembourg, has one of Europe's highest outputs. And even that had to rise: between 2010 and 2013, an eleventh turbine was installed, increasing capacity by 200 MW to a total of 1.3 GW. Now, 78 m³ of water per second flow through the 4.5 m diameter pipes when the plant is operating at full load. Remarkable outputs can thus be achieved, even at the relatively small „head“ (height difference) of 280 m. The new system was commissioned in 2014.

Dillinger supplied all the steel needed for this project's new penstock (pressure pipeline), totalling 2,000 t of pipe-shell sections in plate thicknesses from 16 to 50 mm. We simply love the big challenges!



Dillinger Heavy Fabrication shop

The steel of choice

It was firstly necessary to select the right steel for production of the penstock. The essential criteria, in addition to cost-efficiency, were safety and reliability, above all. Our thermomechanically rolled TM steel was the ideal solution for this application. This modern material contains significantly less carbon and alloying elements than regular structural steels. Thanks to its large reserves of toughness with simultaneously high mechanical strength, it also possesses excellent workability and, in particular, weldability. It was thus possible to make safe and reliable welds that meet high toughness standards even under critical ambient conditions. Our TM steel and its special materials properties naturally also offer enormous potentials for a large range of other applications.



Longitudinally and circumferentially welded components

Service that bonds

The selection and production of the steel was far from being the end of our work for the Vianden pumped-storage power plant, however. Another special service available to our customers is integrated fabrication of plates into larger system components. This reduces the working operations necessary on site - a great benefit for many applications, including hydropower engineering. A lot of know-how and a high level of technical equipment are necessary for this, however. Dillinger has both. This makes us not only a reliable partner in supplying high-quality plate, but also for ready-fabricated components.

Effort halved

For Vianden, we firstly fabricated 178 pipe sections from TM steel. Forming was followed by longitudinal welding. Pairs of sections were then welded together to create a single component of 6 m in length - all in the Dillinger Heavy Fabrication shop. After further inspection, the eighty-nine pipe segments thus produced were shipped to Vianden for installation ... and our readers have already heard about the impressive result!



On-site installation of the fabricated components

Vianden pumped-storage power plant: Facts and figures

Plant-expansion

End user:	Société Electrique de l'Our (SEO)
Capacity increase:	+ 200 MW to 1.3 GW
Type:	Pump-turbine
Increase in maximum head:	1 m
Increase in volumetric capacity:	+ 500,000 m ³ to 7.34 millions m ³
Construction period:	2010 – 2013
Commissioning:	2014

Penstock

Height of vertical penstock:	280 m
Length of horizontal penstock:	180 m
Diameter of penstock:	4.50 m
Number of bends:	Two (one vertical, one horizontal)
Bend radius:	15 m
Weight of completed penstock:	2,000 t

Dillinger scope of supply:

2,000 t of pipe-shell sections consisting of steel S460 ML, in plate thicknesses from 16 to 50 mm, supplied to DSD Noell.



Contact

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