References

Water supply in very demanding terrain in Norway

Uponor involvement

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Project Facts:

Location	Completion
Glomfjord, Norway	2016
Building Type	Product systems
Municipal	Potable water
Project Type	
Renovation	

Partners

Contractor: Bernhardsen Entreprenør
Specialist contractor and pipe
supplier: Uponor Infra Project
Services

Construction of Yara's new pipe-line in Glomfjord proceeded in two stages and the work was completed in August 2016. The project was implemented as a partnership between local contractor Bernhardsen Entreprenør and Uponor Infra's own specialist unit, Project Services, from Vaasa in Finland. This is a specialist service that Uponor makes available for large and technically demanding projects of this type. ''Uponor provides services for a number of major projects that involve large dimension pipes. These include onshore and offshore pipelines, water intakes and outfalls for local authorities, municipalities, industry and mining. These are special projects and in our experience the results are most successful and effective when we are involved in their planning and implementation. This is normally done together with a local partner,'' says Kari Karjalainen from Project Services.

Unpredictable

The construction of pipelines for hydropower and water supplies in the mountains often involves difficult terrain with limited accessibility for machines and vehicles. Completing projects like this demands the relevant experience and technical expertise. ''As well as the difficult terrain, we must also take account of unpredictable conditions, such as the weather bringing snow or flooding,'' explains Karjalainen.

One example of this occurred during the work, when there was a minor landslide of loose material as a result of the altered drain-age routes for water caused by the new trench for the PE pipeline. ''Parts of the route have a slope of more than 40%, which is very steep; even the earthworks and laying gravel in the trench is a demanding job on such a gradient. On several occasions the rain created a flood that washed away the gravel, so it had to be filled again. If this had happened when the pipe was lying on the gravel, and the gravel had washed away, it would have been very tricky to get new gravel under the pipe again,'' says Karjalainen. "We also had to give proper consideration to the landscape, making the least possible environmental impact."

Inaccessible

The combination of steep and rugged terrain and local buildings down in the valley created special requirements for the safe transport of the sections of pipe, which where 18 metres long and weigh 5 tonnes per piece.
''It was also important to take account of the alpine ski centre, which is one of the biggest in Nordland, and the skiing slopes under which we buried part of the pipeline.'' ''The sections of pipe were transported on steep and winding roads using two special vehicles. Safety is a basic consideration here. Just imagine a scenario in which a pipe came loose, went out of control and began to slide down into the valley. This could injure people and damage buildings; we need to be 100% sure that this won't happen,'' says Karjalainen. Specialist expertise is therefore important for both consultants and contractors on site, who must understand the potential consequences of working in steep and challenging terrain.

Long curves

Getting the pipes into place in the most rugged spots means using mountain winches and several excavators in combination,

with tandem lifts in the steepest parts. “When anchoring the pipes into position, we take account of both the weight and pressure class of the pipe, as well as the water hammer effect. This means large, reinforced concrete reaction blocks, which have been cast on-site, for all sharper bends and T-pieces,“ says Karjalainen. “Welding and jointing was done strategically. Normally, the pipes were welded in the pipe trench, but to get around the sharper trench bends we had to weld the pipes across the service road and above the trees located further downhill. This was necessary in order to obtain the leverage needed by the excavators to force the pipeline, which was stiff due to its 100mm-thick walls, around the bend,” explains Karjalainen.

Forward looking

For Yara, the water supply is of great importance for future industrial operations. This means that the pipeline is a long-term investment that will ensure access to a vital re-source. This is a collaborative project between Yara Norway and Statkraft Energi. Yara has signed agreements to share the water supply with other businesses in the industrial area. As well as the pipe, 15 parallel cable ducts are also being laid, which will be used for high-voltage cables and signal cables to carry electricity from the power station to the plant. Yara owns the pipeline and Statkraft owns the cable ducts.

Water supply in very demanding terrain in Norway