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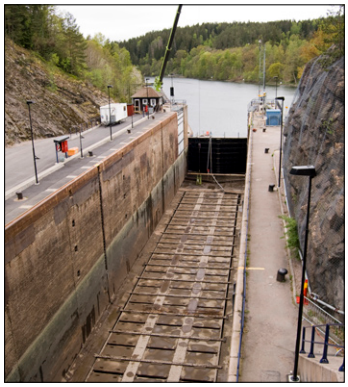
Case study:
How to drain 37 440 m³ of water in just 14 hours

Trollhätte canal, located in the Southwest part of Sweden, has a difference in altitude of 44 meters, handled by six locks. One single lockage demands 8000-12000 m³ of water. In May 2009, the lock system was closed down for maintenance and repair; this required four of the locks to be drained and kept dry for four days. Grindex pumps in the sizes Matador and Maxi were rented for the task. During 14 hours, a total of over 37 millions of litres of water were drained away.



Every lock chamber is 90 metres long, 13-18 m deep and 13 m wide.

A 200-year-old canal with 44 m of difference in altitude

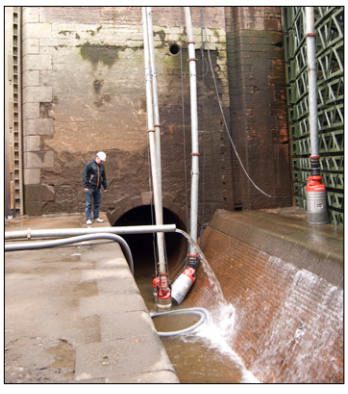
Trollhätte canal was opened for traffic for the first time back in the year 1800. This allowed sailing ships to pass through the river Göta älv all the way from Gothenburg up to Lake Vänern. The river has been widened several times since the opening. The canal is 82 km long; ten km of these are excavated while the rest is a natural part of the river. The difference in altitude is 44 metres and is managed with locks in three places: One lock in Lilla Edet is managing six metres and in Trollhättan are four locks with a total difference in altitude of 32 metres. The last lock is located in Brinkebergskulle and manages six metres.

At every lockage, 8000-12000 m³ water is demanded. Every lock normally contains 9360 m³ of water; this is equal to nine seconds of flow in the Göta Älv River. Despite their 200 years of age, the locks are modern with electric and mechanical operation of the locks. Double lock floors gives calmer movement of water during both filling and emptying of the locks. Ships up to 4000 metric tonnes can pass the locks; the limits are 89 metres of length, 13 metres width and 5.4 metres depth.

Repair of the upper lock floor in Lilla Edet, this is where the water enters the lock chamber during lockage.

Service and repair

With intervals of a few years, the locks are closed down for service and repair. In May 2009 four lock chambers were scheduled for an overhaul. From May 9 at 0600 to May 12 at 2000, they needed to be drained completely. And we are talking about big amounts of water here; as every lock chamber is 90 metres long, 13 metres wide and 8 metres deep you end up with a total of 37440 m³, or 37 million of litres with water. All this must be drained away in less than 24 hours.



Lilla Edet, two Matador pumps drains leaking water inside of a temporary lock gate. The two Maxi pumps were used during the draining of the lock chamber.

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Renting pumps from Grindex

The Swedish Maritime Administration is responsible for the locks. As they were planning the service and repair of the locks, they contacted the local supplier Sjuntorps Industrisupport, who helps them with pumps in other applications, with a pump rental request. As the time frame was narrow it was imperative that the whole operation went as scheduled. Staff from Grindex technical department assisted with the calculation of the pumps. Based on facts from earlier lock chamber drainage operations with Grindex pumps, a time between nine and 16 hours was estimated. For this the pump models Matador and Maxi were recommended for the task. At the pressure height of 6 metres, the pumps have a flow of 306 and 684 m^3 per hour. A total of 17 pumps were rented, including backup pumps.

A service deal between the Swedish Maritime Administration and Sjuntorps Industrisupport was also closed, guaranteeing service around the clock together with spare pumps if necessary. Everything was working as planned and the staff from the Maritime Administration could focus on their task without bothering about the pumps. The time frame for the draining of the lock chambers was set to 24 hours, after only 14 hours it was dried out and ready for work.

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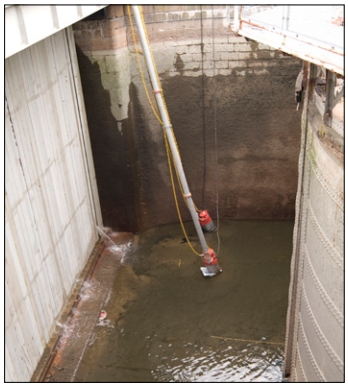
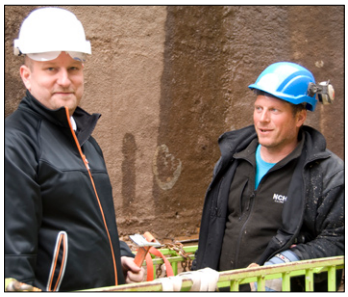
A Matador pump drains leaking water below the upper lock floor. The sludge pump Senator (laying down) is used for pumping away any fish that gets trapped in the lock.



Two Matador pumps drains leaking water inside of a temporary lock gate in Lilla Edet.



Håkan Ohrling from Sjuntorps Industrisupport AB and Stefan Häggström, manager at the Swedish Maritime Administration, are both happy that the draining of the locks went as smooth as expected.

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