Environmental benefits

Environmental benefits of high strength steel in a spiral dewaterer

Did you know that...

- Through upgrading the steel in a spiral dewaterer to high strength steel and modifying its design the weight could be reduced by 26 % while the greenhouse gas emissions are cut by about 2 tonnes CO_{2e}.
- The costs of production and installation of the spiral dewaterer are reduced through upgrading by 40 %.

The world needs Swedish steel

Steel is the world's most used metallic construction material thanks to the material's strength in relation to its weight and price. During 2013 almost 1.6 billion tonnes of steel were produced globally.[1] Sweden's steel industry makes up about half a per cent of the world production. However, Swedish steel companies are highly specialised. In many cases they are world leaders within their respective niches.[2]

Steel forms part of an eco-cycle and can be recycled endlessly as raw material for new steel without any deterioration in quality. This makes it unique amongst modern materials.

New advanced steel grades are being developed all the time. Many of the steel grades that Swedish steel companies produce today were not even on the market five years ago.[2]

High strength steel is stronger than conventional steel and makes it possible to produce lighter steel designs. A doubling in the strength delivers a weight reduction of about 30 % in the upgraded structural components.[3] Upgrading means replacing with a steel of higher yield strength. Lighter structures lead to lower environmental impact through reduced emissions, more energy-efficient products and the sustainable use of natural resources.

Case study

To use high strength steel in structures can improve the design and reduce the weight. Lighter structures mean that less material needs to be produced and transported which reduces the structure's environmental impact.

In a case study[3], an investigation was carried out into the environmental benefit of upgrading the steel in a spiral dewaterer used in mining operations from conventional steel to high strength steel. The older model of the spiral dewaterer has many external stiffeners to enable the structure to resist high water pressure. Through upgrading the steel to high strength steel the spiral dewaterer is able to resist the water pressure without external

[1] *World Steel Association*
[2] *Jernkontoret, Steel shapes a better future*
[3] *The Steel Eco-Cycle, Environmental research Programme D 853.*

STEEL SHAPES A BETTER FUTURE

The yield strength of the steel and the number of construction parts in the spiral dewaterer before and after the upgrading.

	Yield strength (MPa)	Number of parts
Before upgrading	220	230
After upgrading	650	80

Weight reduction, reduced emissions of greenhouse gases and reduced energy use for the upgraded spiral dewaterer.

Weight reduction (tonnes)	Weight reduction (%)	Reduced greenhouse gas emissions (kg CO_{2e})	Reduced energy use (kWh)
6	26	1 970	7 880

stiffeners and the number of construction parts can thereby be reduced.

The results of the upgrading in the form of reduced environmental impact have been quantified through life cycle assessments. The assessments include the environmental impact from the steel production, transportation of the steel, manufacture of the spiral dewaterer and recycling of the steel.

Results

Through upgrading the steel in the spiral dewaterer and modifying its design the weight is reduced by 26 %, from 23 tonnes to 17 tonnes. Emissions of greenhouse gases are thereby cut by a total of 1 970 kg during the lifetime of the spiral dewaterer.

The reduction in emissions is mainly due to the need to produce smaller quantities of steel for manufacturing the lighter spiral dewaterer of high strength steel, compared with the older design in conventional steel. The smaller amounts of steel that need to be transported and the lesser environmental impact arising from the installation of the spiral dewaterer account for a minor share of the decrease in emissions.

Besides a decrease in environmental impact, the upgrade also results in cost savings. Through using bolted flange joints instead of welding, the production time is cut by 310 hours, from 880 hours to 570 hours. The time for installation on site is also reduced, from 240 hours to 48 hours. This leads to a cost saving of about SEK 300 000 which is equivalent to a cost reduction of 40 %.

Conclusion

High strength steel in structures can improve the design of the structure and, in this way, reduce the structure's weight and streamline production and installation. This leads to reduced environmental impact and lower costs. Such is the case with high strength steel in a spiral dewaterer.

Swedish steel and the companies' knowledge of its applications create possibilities for producing more resource efficient structures.

The properties of steel in terms of high strength, long operating life and recyclability make the material a significant component of sustainable development.

Do you wish to know more? Please contact us at Jernkontoret.

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