

Hardox® 450 in concrete mixer drums enables a saving of one in six loads

Concrete mixer drums operate in a very tough environment with hard and wet concrete that continuously exposes the drums to extreme wear. In addition, increasing regulation applying to the maximum allowed weight for heavy goods vehicles around the world creates challenges.

Besides being very tough, concrete mixer trucks must also be very light. Lower tare weight enables higher payloads and thus increases productivity while also reducing fuel consumption and environmental impact.

SSAB's high-strength steels make it possible to build significantly lighter applications. One steel that meets the demanding market requirements is SSAB's wear-resistant steel, Hardox 450.

During the last years SSAB has made significant development when it comes to thin Hardox. New, pioneering quenching technics introduced in the strip mill are especially favorable for producing thin wear resistant steels. "Good combination of bending properties and through-thickness hardness together with excellent surfaces characterize thin Hardox", says **Joachim Larsson**, Head of Product Development.

A concrete mixer drum made of Hardox 450 can be made very light without compromising on service life and gives the customer a:

- durable mixer drum with good resistance to wear and denting
- significantly lighter mixer drum
- possibility to increase payload, which in many cases enables a saving of one in six loads*

**Results from customer experiences when changing from standard steel to Hardox wear plate.*

Developing a new wear test to find the optimal solution

"A project in line with SSAB's innovative work has been to develop a conceptual model of a concrete mixer drum using Hardox 450 wear-resistant steel," explains **Mikael Jungedal**, Wear Specialist at SSAB. "The aim was to achieve a combination of strong design, low weight and long service life," Mikael continues.

To better understand the tough abrasive and corrosive environment present inside a mixer drum, SSAB started to develop a new wear test in order to find the optimal steel grade for this application. The wear test developed could evaluate the wear resistance under both sliding wear (during the mixing cycle) and impact wear (during the unloading cycle) for up to 34 samples in every test.

SSAB's Drum Wear Test consists of an Ø800x100mm steel drum where up to 34 samples are placed in a holder, assembled along the inside of the drum and tested under the same conditions. Different types of abrasives can be used together with water, depending on what is handled in the field application. Both sliding wear and mild impact wear can be tested. Wear is measured by weighing the sample before and after testing. A typical test runs for 90 h, with two changes of abrasive material every 23-h cycle.

For the specific project, a number of steel samples were tested under both sliding and mild impact wear. The abrasive material used was 16-25 mm granite rocks together with water in order to simulate an aggressive case of concrete. The test revealed SSAB's wear-resistant steel grade Hardox 450 performed positively, with over 4 times higher wear resistance than mild steel S235.

A major part of the project focused on investigating the possibilities and limitations when designing a concrete mixer drum in Hardox 450, with thinner gauges from 3 - 4 mm. Both particle flow simulation, FE-simulation and field measurements were done to better understand the critical wear and load scenarios that occur during the lifecycle of a drum.

Key finding: Up to 50% weight reduction possible with Hardox 450

Studies showed that it is possible to manufacture an extremely light and strong concrete mixer drum in Hardox 450, without reducing service life. The conceptual model was built using 3 mm Hardox 450 in both the shell of the drum and the spirals, resulting in a weight reduction of up to 50% compared to conventional mixer drums on the market. This reduction in weight means higher payload, lower fuel consumption and less environmental impact.

Market demand for concrete mixer drums is shifting

The concrete mixer drum market is shifting, with heavy drums being replaced by lighter and more durable drums. Hardox 450 is an excellent choice to combine the best in terms of wear resistance and toughness, on the market.

Many SSAB customers have already realized the full benefits of Hardox steel and are producing light concrete mixer trucks in wear-resistant Hardox steel. For example, Intermix, a German concrete mixer manufacturer, has been using Hardox 450 successfully in its concrete mixers for several years. Using Hardox wear resistant steel, they were able to reduce the weight of the mixer by 18%, while maintaining the same service life.

Comprehensive offering for concrete segment

In addition to Hardox 450 wear-resistant steel for concrete mixer drums, SSAB can offer a wide range of other solutions to combat the challenges of the industry. Strenx 700 MPa high-strength structural steel enables the design of a lighter structure for the pedestal and subframe. Hardox 500 Tubes have been tested in the field with excellent results. A concrete pumping tube is an excellent case example of an application where tube needs to resist extreme internal and external wear.

SSAB SHAPE* offers tailored solutions to fully explore the benefits of using Hardox in concrete-making equipment. A wide range of services in design, product development and processing supports equipment manufacturers all the way from the drawing board to ready-to-weld kits, giving possibilities to increase productivity and enhance product performance.

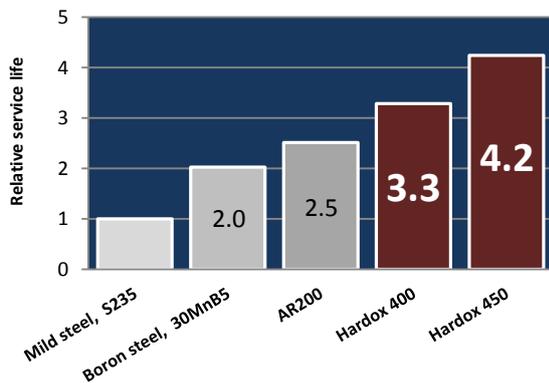
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HARDOX[®]
WEAR PLATE

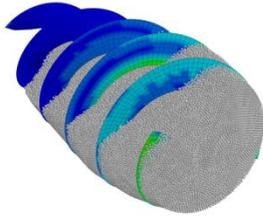
STRENX[®]
PERFORMANCE STEEL



Our comprehensive offering to concrete equipment manufacturers includes Hardox wear plates, sheets and tubes, Strenx high-strength structural steels, as well as tailored solutions on design, product development and processing support available from SSAB SHAPE.



Results from SSAB's Drum Wear Test show that Hardox 450 wear plate enables 4.2 times longer relative service life compared to mild steel S235.



Particle flow simulation is used to analyze wear pattern and stress distribution. The simulation showed higher wear in the green areas of the spiral fins which could also be confirmed by field measurements.



SSAB's Drum Wear Test consists of an $\varnothing 800 \times 100$ mm steel drum, where up to 34 samples are placed in a holder, assembled along the inside of the drum and tested under the same conditions.