

CASE STORY · WR-STEEL® · BORON STEEL · KVERNELAND GROUP

PLOWING INTO THE FUTURE

To run a profitable business, farmers need strong, reliable and lightweight plows. Using steel provided by Ovako and other suppliers, the Kverneland Group's factory in Klepp, Norway, is producing plows that meet farmers' demanding requirements.

With 5,000 plows manufactured annually, Kverneland is the world's number one plow producer. But the numbers only tell a part of the story. Kverneland has a reputation for producing quality plows based on a tradition of innovation and attention to the needs of professional farmers.

"A farmer's season is short – there aren't that many weeks that they can plow. So their plow has to work without fail during that time. It's about reliability, and our plows are the most reliable plows on the market," explains Odd Geir Aarre, Purchasing Manager, Kverneland Group Operations.

In close cooperation with Ovako, Kverneland has developed boron steel alloys that are both flexible and strong. This means that the alloys are so elastic that they can withstand prolonged wear. Each year, Kverneland buys large quantities of Ovako steel in many different forms, such as bars and tubes of various dimensions.

"Ovako offers a good range of dimensions," Aarre explains. "It covers a large part of what we need with both flat and round bars. Few other suppliers can do that in wide range."

Ovako's products are used in many plow parts, such as the tines of the chisel plow, the turning cylinder in the headstock and the landside, a long steel arm that stabilizes the moldboard as

it cuts through the soil. A large number of these items are delivered to exactly the right dimensions, such as the flat bars for the landside. This means the factory only needs to cut the bars to the right length – significantly less expensive than ordering steel sheets that would require laser cutting and generate a lot of scrap.

According to Kverneland's Production Director, John Karstein Tønnessen, the heart of the production facility is in the heat treatment, a process that changes the steel's molecular structure and makes it exactly the right combination of strength and toughness. "Here we forge, form and harden the steel, which makes it ideal for plows that are flexible, easy to pull and lift and highly wear resistant. It is very important that the steel is also suitable for welding," Tønnessen says.

Both Aarre and Tønnessen claim the real secret to the quality of the plow is due largely to the heat treatment – or, more precisely, the amount of time and temperature at which the boron alloys are subjected to the heat. The exact details of this heat treatment process are strictly confidential.



Kverneland's Production Director,
John Karstein Tønnessen

All products undergo a wide range of tests to ensure the plows deliver on their reputation for quality, from material checking of the suppliers' products and the hardening process in the production line, to fatigue tests on the components once they are produced. Damage analysis is also carried out if the company receives any complaints from customers.

"We use a shaking machine to simulate the effects of being pulled by a tractor since the highest stresses on agricultural equipment is during transport," says Dr. Fredrik Haakonsen, Senior Metallurgist/Laboratory Manager, R&D Department. "We make sure we get the same stress in the machine as we get in field tests."

But Kverneland's success is not only its technology and products. It's also about the relationships with its suppliers, according to Aarre.

"Ovako is easy to work with," Aarre says. "It is close to us geographically and its people speak a Scandinavian language. The benefit of this close working relationship is that they can do the theoretical tests and we do the practical tests. Then we compare the results and see what's the best solution. They are very open to making changes when necessary."

"It's one of many reasons why Kverneland make plows that last for many years," adds Tønnessen.

The process at the factory in Klepp:

Ovako products (bars and/or tubes) are delivered to the loading dock in Klepp, and then sorted according to the intended plough part. The product is:

- Cut to the length required for the final product.
- Heat treated in a high-temperature furnace (temperature levels and length of time in the furnace are confidential).
- Cooled in different quenching media that gives the optimum properties, such as hardness, in the steel.
- Ground and painted.

Advantages of WR-Steel:

- Tested extensively for excellent wear resistance
- Broad range of hardness intervals (350–650 HV)
- Correct properties after rolling or heat treating
- Cost-effective due to optimised alloy content for different end applications
- Wide range of steel grades in different dimensions

Ovako facts and figures:

- A leading producer of engineering steel for customers in the bearing, transportation and engineering industries
- Products: low-alloy steels and carbon steels in the form of bars, tubes, rings and pre-components
- Locations: Ovako has ten production sites and a number of sales companies in Europe, USA and Asia
- Net sales 2017: EUR 921 million
- Employees: 3,040
- Since June 2018, Ovako is part of the Japanese steel corporation Nippon Steel & Sumitomo Metal Corporation

Kverneland facts and figures:

- Founded in 1879 by Ole Gabriel Kverneland in his village smithy near Klepp, Norway
- Today, Kverneland is the world's leading plough manufacturer
- The factory in Klepp, Norway, produces about 5,000 plows a year
- Plows range from light 2-furrow plows to heavier 14-furrow reversible plows
- Kverneland has a dominant market share of plows in Europe and exports to more than 40 countries



Photo credit: Kverneland, Brian Owens