

THE ACID TEST

TO ENSURE UNINTERRUPTED OPERATION OF AGRICULTURAL MACHINERY, RESISTANCE TO CORROSION CAUSED BY FERTILIZERS, RAIN AND FROST IS VITAL. SO WHO DOES HORSCH MASCHINEN TRUST TO PRODUCE ITS HYDRAULIC TUBE COUPLINGS?



▶ Agriculture is subject to tremendous price pressure: farms have to achieve a high level of productivity while meeting EU environmental regulations that demand resource-efficient rural development. As a result, farmers must place their trust in sustainable technologies so as to combine time-efficient production, high productivity and efficient environmental protection.

Horsch Maschinen GmbH is one of the leading manufacturers of machinery and advanced components for soil cultivation, seeding technology and crop protection that meet these needs. Horsch first put its name on the agricultural engineering map with machines for plowless tillage. In 2013, this advancement was honored with a prestigious Meilensteine der Landtechnik (Milestone of Agricultural Engineering) award. The owner-run company has its headquarters in the Bavarian town of Schwandorf and operates its own agricultural holdings in Germany and the Czech Republic. The agricultural

engineering expert puts its many years of practical experience to good use in the production and continuous enhancement of its products.

In the past few years, the company has experienced an increasing demand for fertilizing machinery – and the corrosion protection requirements for the components installed in these machines are particularly high. “Resistance against corrosion caused by liquid fertilizers and fertilizer dust is extremely important for our customers,” emphasizes Thomas Prüll of Horsch’s R&D department. “They expect machines to work reliably and to look good – even after many years of operation. So we play safe in terms of quality by using Voss Fluid hydraulic coupling technology.”

Before Horsch started fitting Voss Fluid hydraulic couplings, it used tube couplings from various manufacturers and these varied greatly in the type of zinc-coated surface, visual appearance and quality. White rust

MAIN: In order to realistically simulate field conditions, Horsch assembled threaded hydraulic tube couplings from various suppliers, fixed them to a frame and exposed them to natural weathering

INSET: On average, Horsch buys 40,000 tube couplings directly from Voss Fluid

formed on the zinc surfaces after only a short period of use, which is far from ideal when trying to install reliable components for long-term leak-proof operation. Some surfaces also soon showed signs of corrosion in the places where the tool and the material had contact with each other.

Therefore, in order to ensure a sustained and consistently high standard of fluid technology for its customers, Horsch chose Voss Fluid GmbH as its standard supplier for hydraulic coupling technology. Thomas Prüll explains the reasoning for choosing the company: “We were highly impressed by Voss Fluid zinc-nickel coating because it

offers the highest-possible corrosion protection available on the market. What's more, the company is highly competent in applying this technology."

High-performance surface technology

There were several key arguments brought forward by Horsch: the Voss coat is even better than K5 – the highest corrosion protection class as defined by the German Engineering Association's standard sheet (Einheitsblatt 24576, Verband Deutscher Maschinen- und Anlagenbau, VDMA), which stipulates that surfaces must be resistant to red rust for at least 720 hours. In addition, Voss surfaces differ from their purely zinc counterparts in that they form only a slight, barely visible gray fog, rather than large amounts of white rust.

To ensure lasting, efficient application, Voss Fluid constantly endeavors to improve this coating in its in-house experimental electroplating plant – and not without some success. In the salt spray test, for example, loose parts with a Voss coat have proven to offer corrosion resistance for more than 2,000 hours.

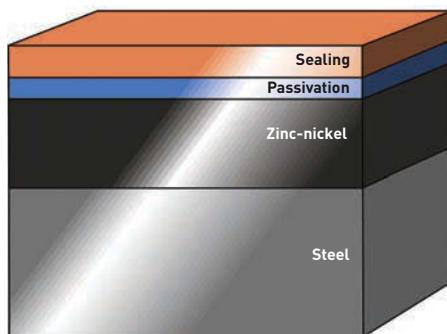
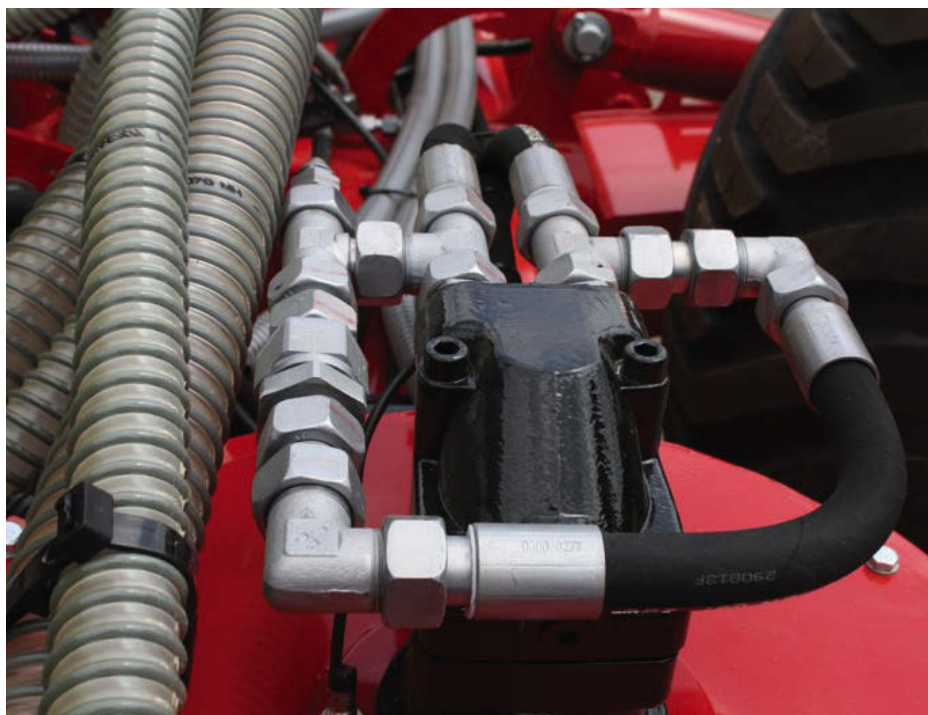
But the surface has also proven its high resistance in field tests under realistic conditions. Random sample products taken from ongoing production were subjected to typical work routines such as transportation, storage and assembly using standard tools. Although the products had been exposed to mechanical stress, the base metal of the coupling elements showed no signs of corrosion even after 1,000 hours.

These test results convinced Horsch of the high standard of corrosion protection. In order to make sure that the couplings also met agricultural technology requirements on a long-term basis, Horsch examined the Voss coat more closely.

"The results of the salt spray test have only limited significance for us," explains Prüll, "as the actual effects of assembly, fertilizers, temperature and humidity on the corrosion resistance only become apparent when the machine is put into real operation."

Conditions in the field put even highly efficient corrosion protection to the test: the contact of exposed parts with mineral or nitrate fertilizers may result in an increased level of corrosion. For this reason, since November 2013 Horsch engineers have been testing the performance of a range of threaded hydraulic tube couplings from various manufacturers and with different surfaces in an internal long-term weathering test. The aim of this test is to guarantee that the components sold to customers are both of high quality and economical.

To realistically simulate the conditions in the field, Horsch assembled the threaded hydraulic tube couplings, fixed them to a frame and then exposed them to natural



TOP: Voss Fluid's tube couplings are installed in the hydraulic system of the Maestro single grain seed drill

MIDDLE: Thomas Prüll, R&D system engineer at Horsch Maschinen, and Werner Thorwarth, key account manager for mobile applications at Voss Fluid, inspect the hydraulic systems of a seed drill

ABOVE: The Voss coated surface ensures long-term corrosion protection

weathering. Over the course of two months, the engineers sprayed the components every workday with a common fluid fertilizer solution that is known to have a corrosive effect. Components with an A3C-coating and a zinc-nickel surface as well as stainless steel coupling elements were compared. After only a short while, the zinc-coated, yellow chromated surface and the customary zinc-nickel coatings displayed red rust over their entire surface.

By contrast, the Voss Fluid couplings showed only marginal signs of corrosion six months after testing began. This shows that in a direct comparison with other zinc-nickel surfaces, the Voss coat is the best coating available – indicating that high corrosion resistance cannot be attributed to the coating alone. In other words, the test results show that Voss tube couplings are durable under realistic conditions while providing a cost-efficient alternative to stainless steel.

Know-how in production and practice

The excellent corrosion protection of the threaded hydraulic tube couplings is largely due to the durable surface technology specially developed by Voss Fluid and to its many years of experience in the production and application of tube couplings.

At first sight, the composition of the Voss coat layers appears comparable to customary zinc-nickel coatings. It consists of a zinc-nickel base layer that is subsequently passivated and sealed. The mechanical stress resistance is mainly due to nickel, an extremely hard element.

The main difference lies in the design of the coating processes, which undergo continuous optimization by the Wipperfurth-based manufacturer. The process requires a



ABOVE: In the field, the hydraulic couplings of agricultural machines are in permanent contact with corrosive fertilizers and moisture

proprietary electroplating plant that is used exclusively to coat threaded tube couplings.

The company's practical and production skills are not just a coincidence. Compared with other companies involved in zinc-nickel electroplating, Voss Fluid processes great numbers of tube couplings in its electroplating plant and was the first provider on the threaded hydraulic tube

coupling market to introduce this surface protection as a standard feature in its products. In its proprietary electroplating plant, the expert for coupling technology has specialized in creating the efficient and resource-saving repeatability of each of its approximately 16,000 products – more than one hundred million parts are processed in the electroplating plant every year.

Due to the individual process parameters stored for each product, Voss achieves premium-quality results with regard to uniform layer thickness, visual appearance and friction coefficients. Training courses on leakage-free installation additionally ensure that the couplings are installed in Horsch's hydraulic systems using a reliable process.

And, vitally, complaints about threaded hydraulic tube couplings are a thing of the past since Horsch started to use Voss Fluid products. By achieving top results with regard to long-term corrosion protection and cost efficiency even under field conditions, these threaded hydraulic tube couplings verifiably prevent leakages and idle times in agricultural machines. Customers who buy high-tech Horsch machinery have invested in hydraulic systems that remain leakage-free and machines that are in operation for many years. They will also reap the benefits of environmentally friendly and economically sound cultivation of their land. **ivt**

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