

Salt and pepper bring new insights for optimisation

As a manufacturer of soil cultivation tools, we have been producing our own carbide-coated tools for many years. With our “eXtreme Carbide Line” range, we constantly work on optimising the tool geometries made from carbide and eXtreme cast. Our test system provides us with important insights in a short time.



The two cultivator shares move in a circle at a depth of 30 cm in a steel tub. This tub has a diameter of six metres and is filled with abrasive granite grit in a special grain size. In the construction industry, this grain mixture is known as “salt and pepper”. The system has a capacity of 25 cubic metres and the tools can work at a depth of up to 50 cm. A crossbar is mounted on the electric motor in the centre and the soil cultivation tools are fixed on the ends in an adjustable parallelogram. It revolves continuously at speeds of up to 20 km/h day in, day out and an integrated sprinkler system sprays the granite mixture when it becomes too dusty. A hydraulic pump is used to manually raise the steel arm. This allows the shares to be lifted clear of the granite grit for examination by the team at the test centre. The eXtreme Cast cultivator share with a carbide plate on the tip shows the first signs of wear. This is after twelve hours of handling granite grit.

“Just how good is the tool's geometry? Is the carbide coating optimally adapted to the shape of the tool?” The development team are the best people to answer these questions. Industriehof Scherenbostel started producing this series of tools with soldered carbide in 2014. As our practical experience has shown us, soldering tungsten carbide can significantly increase the service life of a tool in comparison to a standard cultivator share. This is due to the tungsten carbide's high carbide content, which makes it far more resistant to wear than any hardened steel or cast iron.



There is still no simulation programme for wear

Long-term tests in agricultural practice have shown that there is some potential for improvement in this area. The aim is to make the tools even easier to operate and more stable. As there is still no simulation programme that would allow us to replicate the earth currents and their effects on the carbide and carrier material in a computer, we can only carry out tests in the field. Luckily, we usually have the support of dedicated agricultural businesses that have large areas of land and the time to carry out these tests. To obtain the results faster and more easily on site, the Industriebhof development team designed and built the test system described above as a supplement to these extensive field trials.

The roughly € 150,000 investment, which was almost entirely built in the company's metalworking shop, has been successfully in operation for some time now and is continuously used to test the tools that we produce.

“Our system replicates the agricultural tests almost exactly”, says Fritz Brockmüller (Carbide Project Manager), who compares parts subjected to long-term tests carried out by farmers with those tested in our system.

We have already made significant findings. For example, parts of the tools that have been subjected to extreme stress remove less material. As a result, the material strength and weight of the tool can be optimised in these parts to improve the tool's service life.

We consider the eXtreme Cast tool and the tungsten carbide plates as one unit, the design of which we can still optimise in terms of price and durability. These live tests help us enormously in this regard.

Even tools for the leading OEM in the soil cultivation technology sector go through the system, making it possible to continuously improve the geometry of the parts. We already have over one hundred carbide-coated tools in our “Industriebhof eXtreme” range.

Through the joint venture with a Chinese foundry, Industriebhof only processes the eXtreme Cast series developed for its needs for this parts portfolio. The special thing about this material, which is an austempered ductile iron (ADI), is that its structure changes when it is subjected to pressure and abrasion. With a high notch impact strength and a self-hardening surface, which can achieve a hardness value of over 60 HRC, it can be used to replace boron steel and Hardox in many applications. In addition, when the carbide plate is soldered onto the eXtreme Cast tools at temperatures of over 700 °C, the tools retain their physical properties and do not need to be hardened again.

In recent years, the demand for Industriebhof's carbide-coated tools has significantly increased. In order to meet this demand, we procured an even more powerful soldering unit. Carbide-coated parts are a worthwhile investment for farmers. The longer service life, together with the consistently good quality of soil cultivation over a longer period of time and, above all, the savings made in labour costs for changing tools and fasteners, means that demand from farms is growing steadily.

As such, we also expect the “Industriebhof eXtreme” range to grow steadily. By using this salt and pepper granite mix, we are able to speed up the development process.



