GRANIT
QUALITY PARTS

CONCAVE DISC
PRODUCT BENCHMARK

CUSTOMER INFORMATION

The following were compared:

The concave disc from GRANIT
with part number **1800178201966**
with comparable products from an original equipment manufacturer and three other competitors.

TEST REPORT NO. K 743-2021

IWS Institut für Werkstoffkunde und Schweisstechnik GmbH

Comparison of features

» Material analysis
» Hardness test
» Structure analysis

Figure 1: Concave disc for tillage machine/disc harrow

TEST RESULTS:

MATERIAL ANALYSIS

The material analysis determines whether the correct material has been used for the product's intended purpose. Selecting the right material is crucial to ensuring the service life and load capacity of the concave disc.

RESULTS OF THE MATERIAL ANALYSIS:

The following materials were analysed on the concave discs:

- GRANIT and Competitor 1 and 3 use a material with the designation 30MnB5
- The original equipment manufacturer uses a material with the designation 27MnCrB5-2
- Competitor 2 uses the material 39MnB5

Materials with the alloys manganese and boron (MnB) fall into the category boron-alloyed quenched and tempered steel. These materials are characterised by good hardenability and strength. This strength is achieved by manganese and by the proportion of boron in particular.

The material analysis shows that all the manufacturers compared use well-suited base materials for their concave discs.

HARDNESS TEST

The hardness test should indirectly provide information about the expected wear behaviour (abrasion). The aim is to increase the mechanical resistance, and thereby increase the service life of the concave disc.
The Vickers hardness test (HV10) was performed in accordance with DIN EN ISO 6507-1:2018. The hardness test was performed on three areas: on the cutting edges (S), the centre (M) and the mounting holes (B). The results were then converted to HRC (in accordance with EN ISO 18265).

Figure 2: Test area and samples taken from the concave discs to be tested.

RESULTS OF THE HARDNESS MEASUREMENTS

	Supplier	Average values from the areas S, M, B
1	GRANIT	50
2	Competitor 1	50
3	Original equipment manufacturer	51
4	Competitor 2	52
5	Competitor 3	51

All discs were sufficiently hardened at the cutting edge, in the centre and at the holes. These areas must have a certain toughness and strength. Even if the results differ slightly, the differences are only marginal and can be considered negligible. The hardness values are equally good for all the concave discs sampled.

STRUCTURE ANALYSIS

The concave discs are hardened and tempered using a special heat treatment. The heat must be applied evenly and completely to the component, after which the component is quenched (rapid cooling) and the metallic structure is changed in a targeted manner.
Improper execution can result in decarburisation on the material surface. Decarburisation on the cutting edges can result in higher wear.
In order to carry out a metallographic examination of the altered structure and the decarburisation, segments are cut out from the cutting edge (S), centre (M) and hole (B).
The samples taken are ground, polished and etched with nitric acid. The metal structure of the prepared samples is then examined under a microscope with up to 200x magnification.

RESULTS OF THE EXAMINATION UNDER MICROSCOPE

Supplier	Decarburisation at the cutting edge	Comment
GRANIT	None	-
Competitor 1	None	-
Original equipment manufacturer	0.08 mm	Decarburisation more pronounced at the edge, patchy heat influence
Competitor 2	0.05 mm	Decarburisation visible over the entire length, structure shows patchy heat influence
Competitor 3	0.2 mm	Decarburisation more pronounced at the edge

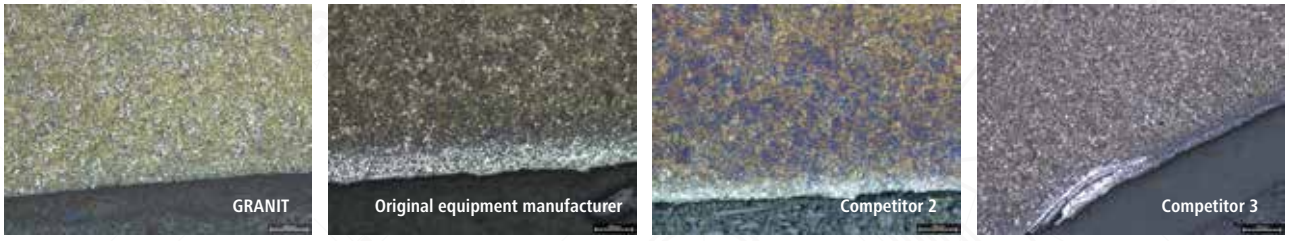

Figure 3: Prepared samples/metal structure. Decarburisation of the cutting edge shown in white.

There was no evidence of blemishes in the structure or decarburisation at the edge of the Granit concave disc. This significantly reduces the susceptibility to wear. This result reflects the optimum process reliability during production.
On the other hand, the discs from the other manufacturers all have blemishes in the structure or decarburisation at the edge. The degree of wear is higher on these concave discs.

CONCLUSION:

- GRANIT uses a material that is well suited for manufacturing concave discs.
- The hardness test shows that the concave discs from GRANIT boast hardness values equivalent to the OE standard.
- The concave discs from Granit rely on good manufacturing quality. This also indicates - among other things - that no decarburisation was found on the cutting edges.
- The Granit concave discs meet OEM quality standards.
- In terms of price and performance, GRANIT achieves an excellent result.
- The excellent features of the Granit concave discs guarantee optimum wear properties. Your customers will therefore benefit from the durability of the Granit products, and achieve the greatest possible cost effectiveness.