

Effect of Tungsten Carbide Tipping on Tillage Tool Wear Rates

UNIVERSITY OF SOUTH AUSTRALIA



Agricultural Machinery
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AMRDC would like to thank farmers Robin Manley (Avon) and Donald Campbell (Yongala) for use for land for field trials.

Why Do Points Wear?

- Wear occurs because particles in soils are much harder than metals. These particles act like miniature cutting tools and literally machine metal off points.

Magnified surface of metal share, worn by hard soil particles.



AMRDC Field Tests

Abrasive soils can contain as much as 80% Quartz, which has a vickers hardness of 1100.

Typical Tillage Materials	Approximate Vickers Hardness
Steel (high carbon)	400-450
Cast Iron (Ni-Hard)	550
Tungsten Carbide	1500

Tungsten Carbide

- Tungsten carbide combines high hardness (wear resistance) with high toughness (impact resistance).
- Inserts are brazed with silver solder which helps absorb impact and stresses in the joint due to differences in expansion and contraction between the metal and the carbide.
- Excellent brazing is required for inserts to be successfully used on tillage tools. Testing has shown that inserts lost due to impact are likely not to have been brazed adequately.
- Other failures of inserts have been attributed to a lack of support behind the insert due to metal wearing away behind it.

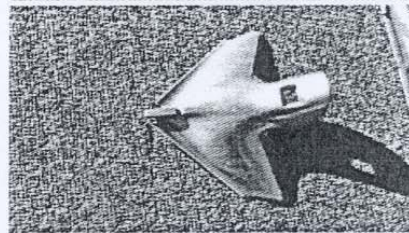
AMRDC has conducted full-life wear trials on tipped points in abrasive, stony soils to assess the wear and impact resistance of tungsten carbide.

- Pressed lucerne narrow points, Avon (1991)
- Prototype pressed steel, 150mm wide cultivator shares, Laura, Mangalo and Yongala (1995).
- 100mm wide cast cultivator shares, Yongala (1997)

AMRDC tractor and field dynamometer used for wear testing.



Prototype tipped cultivator share had kept its shape after travelling five times as far as a standard point in abrasive, stony conditions.



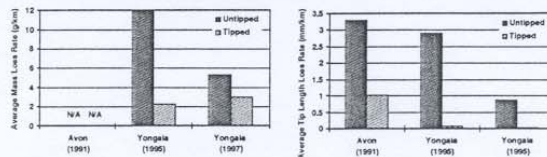
Results

Conclusion

Tungsten carbide possesses ideal properties for both wear and impact resistance.

Field tests have shown the wear life of tipped points to be up to five times that of standard points.

When correctly brazed and with adequate support, points tipped with tungsten carbide are suitable for stony conditions.



Operating Depth: 75mm Speed: 8.5 - 10.0 km/h
Tines Used: John Shearer '580' edge on.

Shares rotated around tine pattern to minimise differences in wear due to position or rank.