

CRAFTSMAN CRIBSHEET

ISO Material Groups: Hardened Materials

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Hardened materials are very difficult to machine. Hardness in materials means “resistance to penetration.” Finding tools that are harder than the material being machined becomes increasingly challenging as hardness levels increase. Coming from the older HSS perspective these are grind only hardnesses. The advent of new technologies has made hard machining more accessible

and increased its popularity. Hardened Materials are typically classified into four categories. These categories are then divided by the material hardness range. The same material can often be hardened (then tempered back) to multiple levels of hardness, allowing it to be placed in multiple categories on this list. ISO Material Groups is what we use for identification of material we are cutting with carbide inserts.

H	Hardened Materials	Hardness (HB)	Hardness (HRC)
H1	Hardened Materials - Machinability Range: 0-10% [^] Examples: A2, A6, O-1	415 – 456	44-48
H2	Hardened Materials - Machinability Range: 0-10% [^] Examples: A2, A6, O-1, D2, 420PH,	456 – 552	48-55
H3	Hardened Materials - Machinability Range: 0-10% [^] Examples: A2, A6, O-1, D2, S7	572 – 627	56-60
H4	Hardened Materials - Machinability Range: 0-10% [^] Examples: A2, A6, O-1, D2, T15, M2, S7	>627	<60

*Machinability is a percentage of 1212

Machinability is essentially meaningless for these categories of materials. There are tool geometries and grades of carbide that achieve high SFM in hard materials. It is all about cutting parameters. For instance, one company makes a milling cutter that can achieve 375 SFM at .0002” Feed Rate at a 5% of diameter (of the mill) Depth of Cut in materials 65-70 HRC. **P**