DEFENSE

INCREASING PRODUCTIVITY THROUGH CARBIDE BLANKS & PREFORMS

H.B. Carbide

hbcarbide.com

INDUSTRY-LEADING CAPABILITIES AND PERFORMANCE RELIABILITY

Whether it's military aircraft, ground defense, space exploration, shipbuilding, gun manufacturing or various defense systems designed to operate on land, sea or in the air, we are prepared to support you.

Our fully-integrated capabilities, extensive process knowledge and experienced specialists are committed to helping you in your decision making to achieve optimized solutions from powder production through finished ground blanks with inspection and verification built into each step of the process.

CAPABILITIES EXAMPLES INCLUDE, BUT ARE NOT LIMITED TO:

- Ammunition Die Blanks
- Casing & Bullet Die Blanks
- Preform Round Tool Blanks
- Custom, Standard, and Altered Design Blanks
- Drill & Reamer Blanks
- Gundrills Blanks
- Deep Hole Drills
- Draw Dies
- Punches
- Cartridge Drawing Die

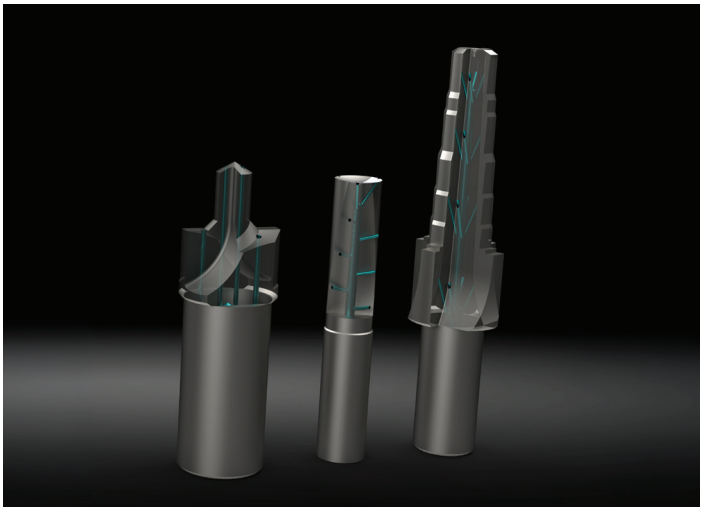
AMERICAN MADE AND AMERICAN OWNED.

H.B. Carbide, Lewiston, Mich., a global leader in the blank tooling industry, was established in 1983 with the mission to deliver a superior customer experience with industry-leading custom and altered standard carbide blanks that provide consistency, reliability and advanced capabilities for your most demanding applications.

- Manufactured in the USA from raw material to finished ground blank
- Providing consistent quality and reliable service for 40 years
- Comprehensive grade/capability offering specialized to provide solutions to all your business and application challenges

GRADE SELECTION
Defense

Ultrafine | Submicron | Medium | Coarse | Bimodal



METAL CUTTING

As a fully-integrated manufacturer, H.B. Carbide provides optimized cemented carbide grade selection, achieving the perfect balance of hardness and toughness for fracture resistance. Our company also provides improved edge wear reliability in cutting applications and superior adhesion in diamond coating applications and grades.

PREFORM AND ALTERED STANDARD BLANKS

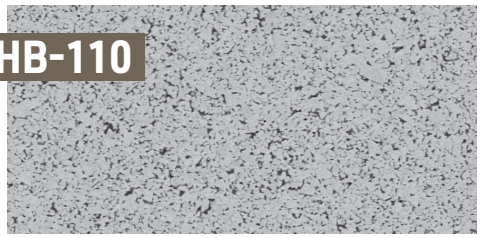
HB-710

Co	10%
WC	90%
Density	14.46 g/cm³
Hardness	92.0 HRA
Grain Structure	Submicron
TRS	625,000psi

Cutting & Wear Resistance — Impact & Toughness

- High temperature, Heat resistant nickel-base alloys
- 718 Inconel
- Stainless steel alloys
- Titanium Alloys
- ***Exceptional consistency and repeatable performance in heat resistant alloys and titanium.***
- ***Special advantages where high strength and sharp edge profiles are required.***

HB-110

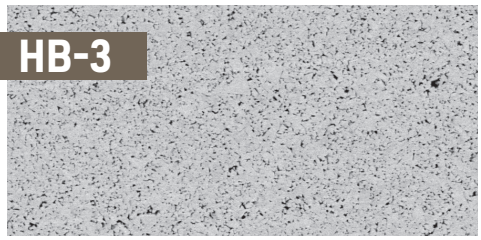


Co	10%
WC	90%
Density	14.5 g/cm³
Hardness	91.7 HRA
Grain Structure	Submicron
TRS	550,000psi

Cutting & Wear Resistance — Impact & Toughness

- Excellent performance when machining a wide range of materials
- Titanium alloys
- Alloyed and non-alloyed steels
- Machining of steel and cast iron as well as non-ferrous metals
- Optimized brazability for PCD tool bodies

HB-3

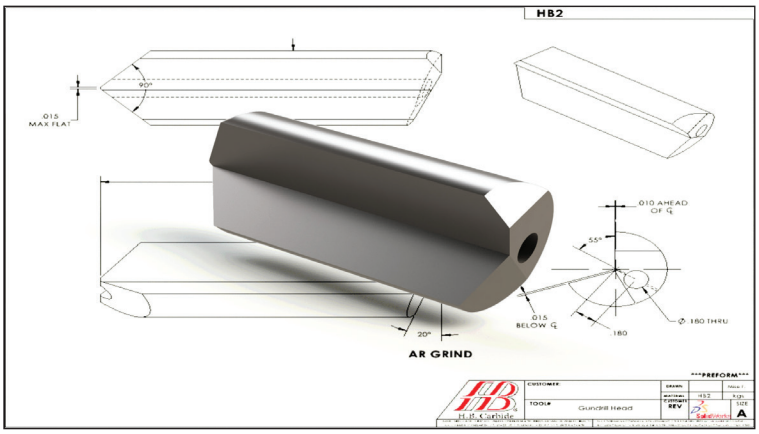


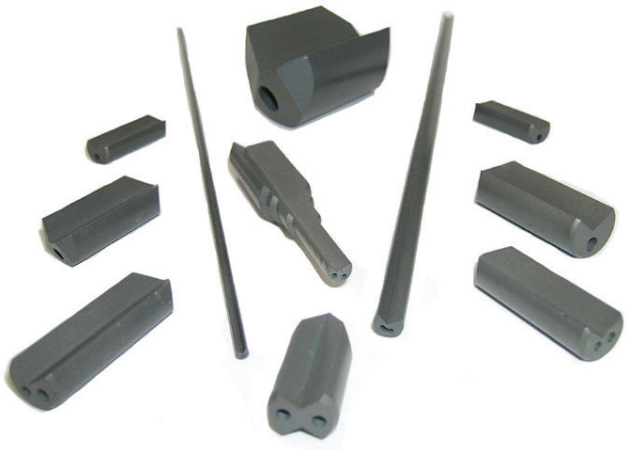
Co	6%
WC	94%
Density	14.9 g/cm³
Hardness	93 HRA
Grain Structure	Submicron
TRS	520,000psi

Cutting & Wear Resistance — Impact & Toughness

- Aluminum alloys
- Diamond-coated carbide tools
- Fiber-reinforced plastics (CFRP, GFRP)
- Composite materials
- Wear applications, flow control

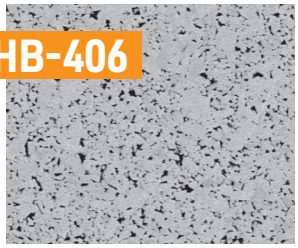
GRADE SELECTION
Defense





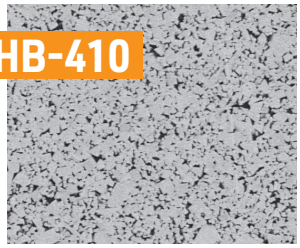
GUNDRILL BLANKS

- Single Flute, Two-Flute Two-Hole, Double Crimp, Rifle Buttons/Push & Pull Reamers, Double Jet



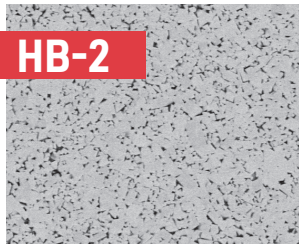
Co	6%
WC	94%
Density	14.9 g/cm³
Hardness	92.3 HRA
Grain Structure	Bimodal
TRS	334,000psi

Cutting & Wear Resistance — Impact & Toughness



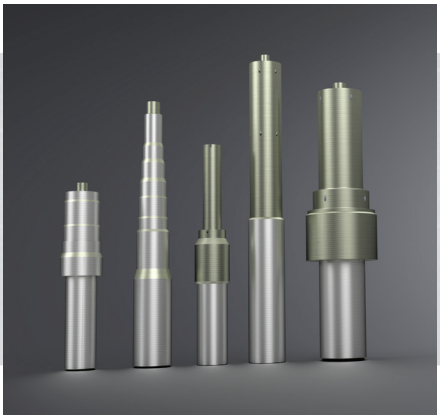
Co	10%
WC	90.0%
Density	14.5 g/cm³
Hardness	91 HRA
Grain Structure	Bimodal
TRS	553,000 psi

Cutting & Wear Resistance — Impact & Toughness



Co	6%
WC	94%
Density	14.9 g/cm³
Hardness	92.2 HRA
Grain Structure	Medium
TRS	530,000psi

Cutting & Wear Resistance — Impact & Toughness



BETWEEN CENTERS AND CENTERLESS GRINDING

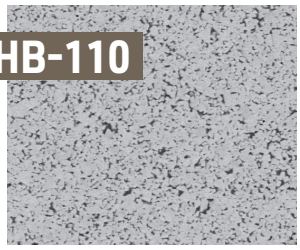
As a value-added service to our customers, H.B. Carbide can offer centerless and between center OD grinding on all blanks.

- h5 and h6 diameter tolerances
- Multi-diameter grinding
- Lapped centers

METAL CUTTING

BLANKS FOR PCD DIAMOND TOOLS

HB-110

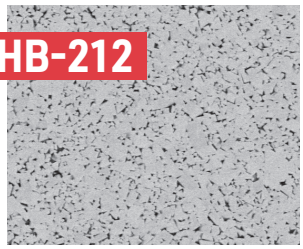


Co	10%
WC	90%
Density	14.5 g/cm³
Hardness	91.7 HRA
Grain Structure	Submicron
TRS	550,000psi

Cutting & Wear Resistance — Impact & Toughness

- Optimized brazability for PCD tool bodies

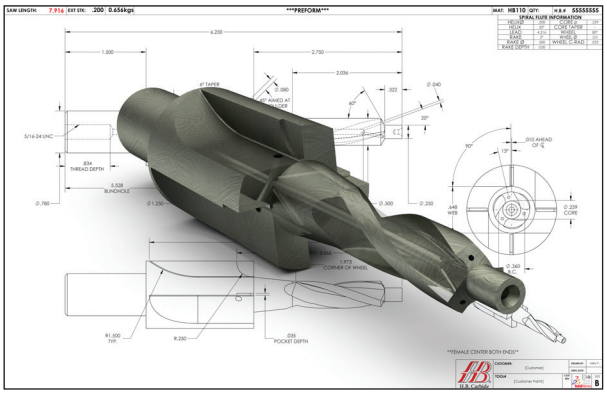
HB-212

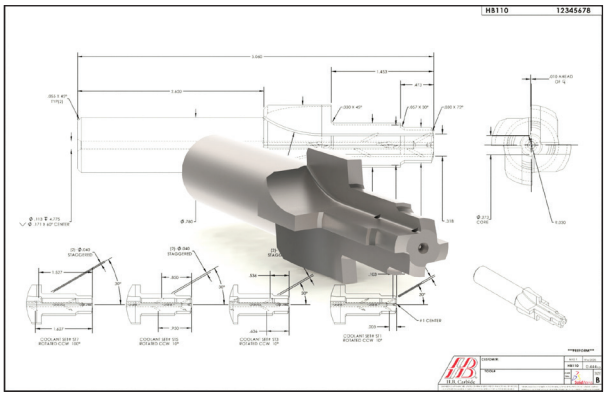


Co	12%
WC	88%
Density	14.28 g/cm³
Hardness	90.2 HRA
Grain Structure	Medium
TRS	377,000psi

Cutting & Wear Resistance — Impact & Toughness

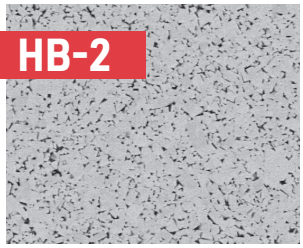
- Non-cutting grade
- Excellent thermal cycling properties





BLANKS FOR CVD DIAMOND COATED TOOLS

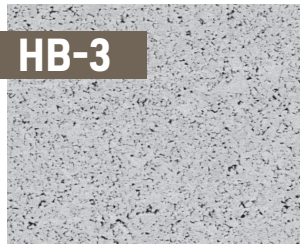
HB-2



Co	6%
WC	94%
Density	14.9 g/cm³
Hardness	92.2 HRA
Grain Structure	Medium
TRS	530,000psi

Cutting & Wear Resistance — Impact & Toughness

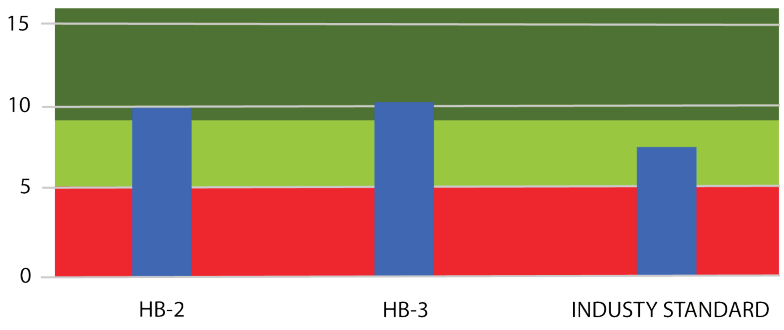
HB-3



Co	6%
WC	94%
Density	14.9 g/cm³
Hardness	93 HRA
Grain Structure	Submicron
TRS	520,000psi

Cutting & Wear Resistance — Impact & Toughness

Comparison of Adhesion with Other Carbide Grades



- excellent adhesion, highly recommended for diamond coating
- good adhesion, suitable for diamond coating
- low adhesion, not recommended for diamond coating

AMMUNITION DIES & PUNCHES

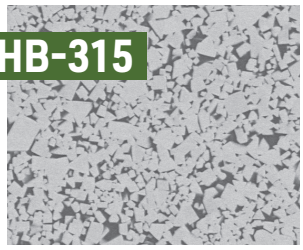
H.B. Carbide has advanced capabilities which allows supply and support for all ammunition calibers.

HB-312

Co	12%
WC	88%
Density	14.33 g/cm^3
Hardness	88.7 HRA
Grain Structure	Coarse
TRS	490,000 psi

Cutting & Wear Resistance — Impact & Toughness

HB-315



Co	15%
WC	85%
Density	14.03 g/cm3
Hardness	87.4 HRA
Grain Structure	Coarse
TRS	470,000 psi

Cutting & Wear Resistance — Impact & Toughness

HB-320

Co	20%
WC	80%
Density	13.56 g/cm^3
Hardness	85.4 HRA
Grain Structure	Coarse
TRS	455,000 psi

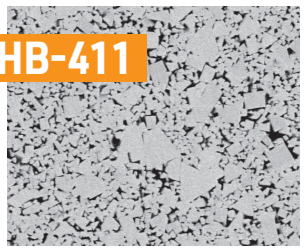
Cutting & Wear Resistance — Impact & Toughness

HB-325

Co	25%
WC	75%
Density	13.18 g/cm^3
Hardness	83.3 HRA
Grain Structure	Coarse
TRS	430,000 psi

Cutting & Wear Resistance — Impact & Toughness

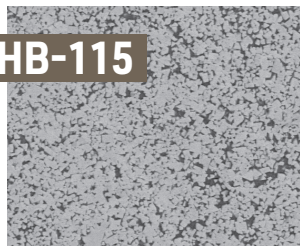
HB-411



Co	11.5%
WC	88.5%
Density	14.39 g/cm^3
Hardness	90 HRA
Grain Structure	Bimodal
TRS	530,000psi

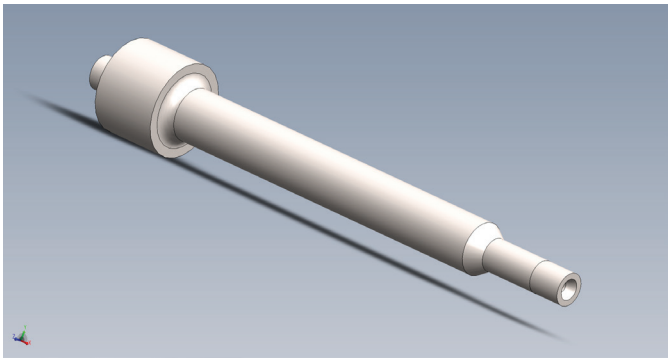
Cutting & Wear Resistance — Impact & Toughness

HB-115

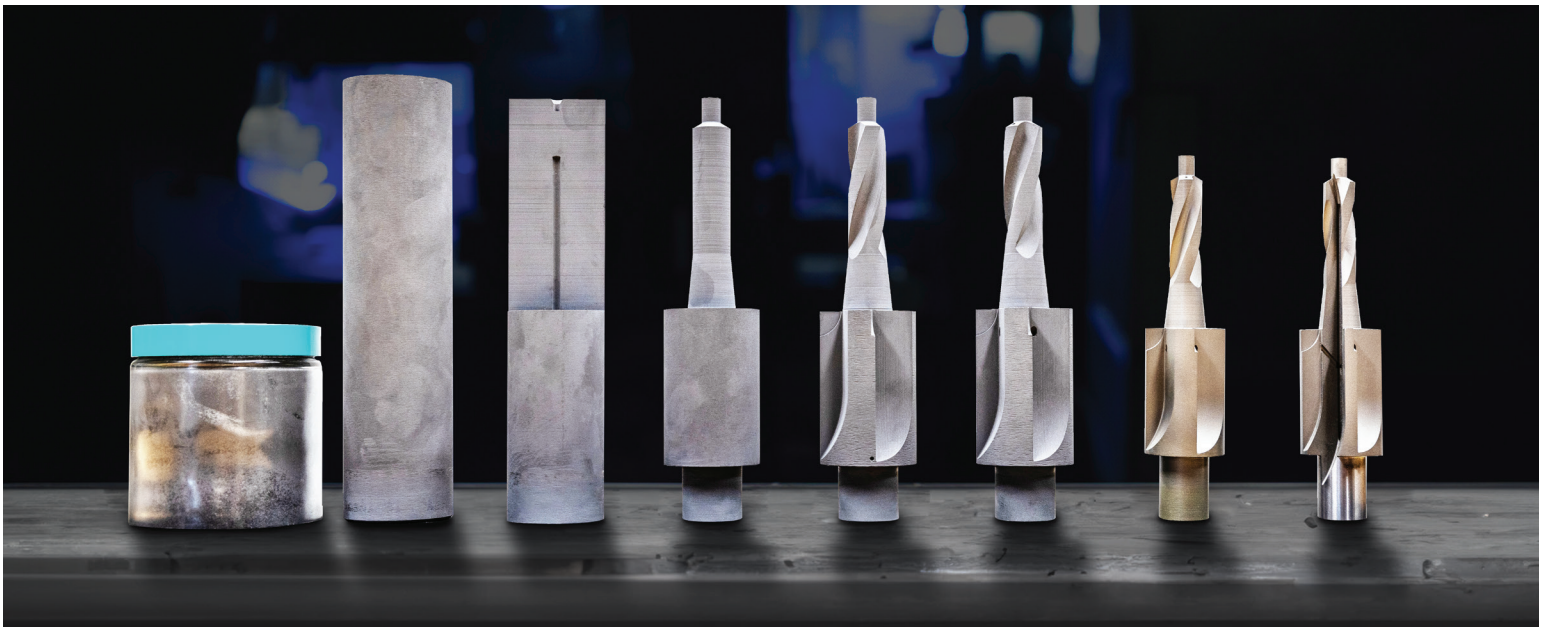


Co	15%
WC	85%
Density	14.0 g/cm^3
Hardness	90 HRA
Grain Structure	Submicron
TRS	610,000 psi

Cutting & Wear Resistance — Impact & Toughness



VERTICAL INTEGRATION – BETTER QUALITY CONTROL AND DELIVERY TIMES



H.B. Carbide is a vertically integrated company that handles every facet of carbide production starting from highest quality raw materials – procured from long-established, reliable suppliers – to the production of the final finished ground blanks. We keep a sharp eye on quality throughout the process while meeting aggressive delivery times.

POWDER PRODUCTION

Tungsten carbide powder, cobalt and carbon are milled to create a homogenous material mix.

POWDER APPROVAL

The carbide blend is evaluated for powder characteristics and hardness in our Test & Inspection Lab to ensure it meets the standards of each particular grade.

ISO-PRESSING

Used for the majority of the forms we produce, this approach is for diameters of 1" and larger. Powder is loaded into cans with rubber boots, sealed and then placed in an iso-static press using water pressure to push the powder together. The iso-press compacted bar is processed through a vacuum pre-sinter furnace cycle to semi-harden the material and allow it to be handled.

EXTRUSION

This approach is used to produce more near-net shapes from 0.050" – .75". It relies on a carbide powder binder system to create a pliable material, which is loaded into a press and pushed through a die to create various shapes that are then dried and pre-sintered.

PREFORMING

Blanks and preforms outer diameters are completed on both CNC and manual machines. Coolant holes and flutes are completed on CNC machines.

SINTER-HIPPING

The blanks and preforms are placed in a furnace that combines vacuum sintering and hot isostatic pressing to stabilize and densify the material. During this process, the forms shrink about 20% in size.

VALUE ADD SERVICES

For customers who need it, we can add centerless and between center grinding to the process.

FINAL INSPECTION

After sintering, forms and blanks run through non-destructive tests to determine indirect grain distribution assessment, cobalt content, density and powder flow ability, as well as destructive tests that evaluate micro-porosity and hardness. Plus, there is dimensional inspection of every component.

DISCOVER WHAT THE

H.B. CARBIDE ADVANTAGE

CAN DO FOR YOU

- **Responsible corporate citizen -** social, cultural and environmental responsibilities
- **Reliable partner** for global supply & support
- **Sustainability –** Environmentally focused, including recycling of carbide scraps
- **Focus on customer experience –** Service Supply & Technical Support
- **Material innovation –** Optimized application specific grade selection
- **Advanced production controls** and techniques ensuring quality and consistency

H.B. Carbide

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CERTIFIED ISO 9001:2015 COMPANY

MADE IN USA