

SOLUTIONS

Surface Drilling and Tunneling Components



Wear Solutions for Drilling and Tunneling Applications

Kennametal is a global provider of solutions for wear, heat, and corrosion problems, a world-class manufacturer of components, and a service provider to a wide range of industries. Kennametal is your trusted source for the most innovative solutions that deliver productivity, reliability, and extended service life in the most demanding environments.

Our commitment to your most demanding applications is unparalleled. We have a long history of helping you achieve success and a tradition of exceeding your expectations.

MISSION Kennametal delivers productivity to customers seeking peak performance in demanding environments by providing innovative custom and standard wear-resistant solutions, enabled through our advanced materials sciences, application knowledge, and commitment to a sustainable environment.





Wear and Tooling Products for Your Applications

The Kennametal Engineered Components segment serves top-tier companies across varied earthcutting applications. We have solutions and capabilities to solve your toughest tooling wear problems in the most demanding applications.

- Surface Mining/Blast-Hole and Percussive Bit Drilling
- Raise Bore/Vertical Shaft Drilling
- Horizontal Directional Drilling
- Waterwell/Geothermal Drilling
- Tunnel Boring
- Specialty Applications



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Tungsten Carbide Inserts for a Wide Range of Drilling Tools

Kennametal manufactures tungsten carbide inserts and/or buttons to fit every bit type and application including

- Rotary/Tri-Cone
- Down-the-Hole
- Percussive Hammer
- Top Hammer

For the following drilling applications...

- Blasthole/Production
- Waterwell
- Geothermal Well
- Horizontal Directional



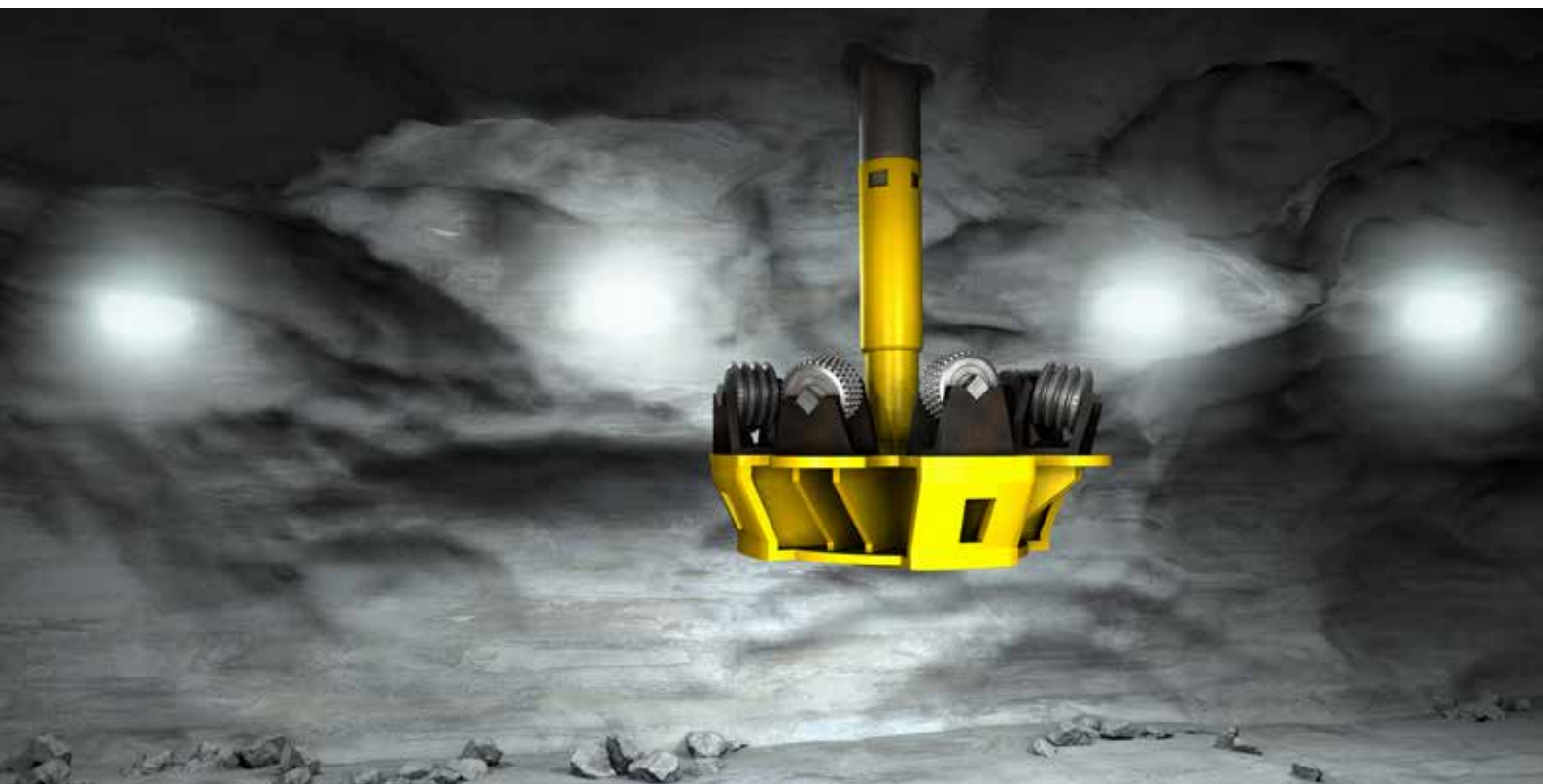
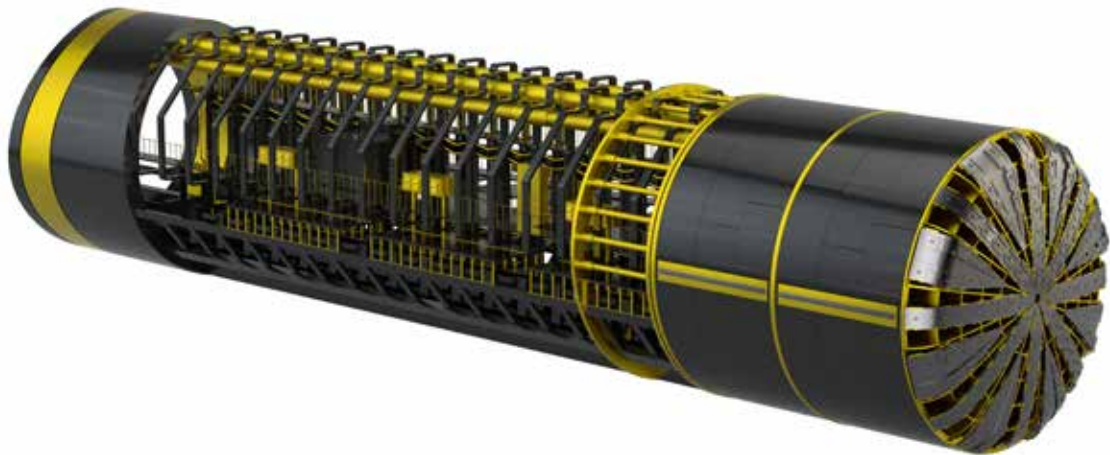
Tungsten Carbide Inserts for Other Applications

Kennametal also manufactures tungsten carbide inserts and/or buttons for other earthcutting applications

- Tunnel Boring
- Raiseboring

Kennametal's Infrastructure division has a robust catalog of wear materials and wear solutions that can be custom fit to meet your needs.

If you have wear issues on any tools or tool components, then we can help.
Contact us today to find out how!



Insert Types and Formations

Formation Hardness	Very Soft	Soft	Soft - Medium	Medium - Hard to Hard	Very Hard
Formation Type Examples	Sand, Gravel, Clay, Silt	Soapstone, Shale, Lignite	Limestone, Caliche, Bauxite, Anthracite	Dolomite, Limestone	Granite, Basalt, Iron Ore
Cutting Condition	Soil	Light	Medium	Heavy	Severe
Cutting Action	Gouge, Scrape	Gouge, Scrape	Gouge, Scrape, Chip, Crush	Chip, Crush, Gouge, Scrape	Chip, Crush
Dome Extension Length					
Insert Type Examples	<p>Wedge Crest Chisel 3 Facet Chisel</p>		<p>Single Conical Parabolic Ballistic</p>		<p>Single Dome Double Dome Dual Conical Extended Dome</p>

Kennametal application specialists should be consulted to assist in selection of dome type and extension length if not already determined by design engineering.

Application suitability should be evaluated from initial field performance data.

Wear Protection Components for Bits and Other Tools



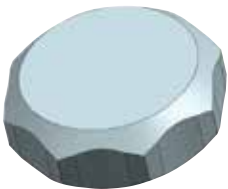
Flat

Flat compacts are used to reduce wear on abraded surfaces found in roller cone drill bits, diamond bits, down-hole stabilizers, and numerous other applications.



Serrated Flat

Serrated flat compacts are also used to reduce wear on abrasive steel surfaces and in applications where less precision is required in hole drilling.



Thrust Button

Thrust buttons provide wear protection for internal bearing applications.



Roof Top Inserts

A wide range of sizes and shapes provides a versatile wear solution for numerous applications.

Industry-Leading Materials

Cemented Tungsten Carbide Grades Used in Oil & Gas, Mining, and Construction Applications

Kennametal Grade Name	Alternate or Legacy Name	Grain Family	Cobalt %	Hardness		Density (g/cm ³)	TRS (ksi)	B611 Wear Resistance (volume loss in mm ³)	Palmqvist Toughness (ksi in ^{1/2})	B771 Fracture Toughness (ksi in ^{1/2})
				HRA	HV30 (estimated)					
KHM42	K3076/P40	Medium	6	91.1	1485	14.95	515	45	10.1	9.9
KHM33	374/290/295	Medium	6	90.6	1420	14.95	510	60	10.3	11.0
KHM24	K3075/378	Medium	6	90.2	1370	14.95	480	85	10.5	11.9
KHC33	397/AF63	Coarse	6	89.0	1245	14.93	420	130	11.7	14.3
KHC35	308	Coarse	8	88.9	1235	14.74	480	135	12.7	13.7
KHC44	91	Coarse	8.5	89.2	1265	14.68	470	155	12.5	13.9
KHM27	400/NM3/MO9	Medium	9	89.9	1335	14.60	515	90	11.2	10.9
KHM36	393/386	Medium	9	89.6	1305	14.64	560	120	11.5	12.9
KHC45	376	Coarse	9	88.9	1235	14.64	490	140	12.7	13.2
KHC46	383	Coarse	10	89.2	1265	14.53	540	150	13.1	13.6
KHC55	651/241	Coarse	10	88.6	1210	14.52	485	190	14.3	15.5
KHC37	362	Coarse	10	87.9	1150	14.53	460	210	14.8	15.2
KHC28	380/231	Coarse	10	87.7	1130	14.52	460	215	15.8	16.0
KHC91	610	Coarse	10	87.3	1100	14.53	475	210	—	—
KHM38	248/363W	Medium	11	89.7	1315	14.43	545	125	11.5	11.3
KHC65	367/941	Coarse	11	88.6	1210	14.42	525	175	13.4	12.8
KHC29	931	Coarse	11	88.1	1165	14.42	495	200	14.9	14.3
KHC47	349	Coarse	11	87.7	1130	14.42	455	225	15.4	15.1
KHC39	355	Coarse	12	87.1	1085	14.33	465	255	18.4	16.3
KHE39	120V/365	Extra Coarse	12	86.6	1045	14.32	455	285	22.5	18.2
KHE86	MN1	Extra Coarse	13.5	85.1	945	14.18	395	355	—	—
KHC68	387	Coarse	14	88.0	1155	14.13	517	280	16.3	13.0
KHC59	369	Coarse	14	86.3	1025	14.13	445	335	21.1	17.4
KHE77	147	Extra Coarse	14	85.7	985	14.13	430	370	—	19.2
KHC97	375/55B	Coarse	16	86.7	1055	13.94	495	360	19.5	16.1
KHC88	368/45B	Coarse	16	85.8	990	13.94	460	380	—	17.4
KHC20	352	Coarse	20	85.6	980	13.57	500	460	—	16.5

Kennametal application specialists should be consulted to assist in grade selection. Application suitability should be evaluated from initial field performance.

Grade properties listed are nominal values and are subject to change or upgrade without notice.

Quick-Reference Key for Grade Nomenclature

Example: KHC37 = 10% cobalt binder with coarse grain structure

K	H	C	37
Brand	Binder/Primary Market	Grain Size	Binder Content
K = Kennametal	H = Cobalt/Compacts for Oil & Gas, Mining, and Construction	<p>N = < 0.2 μm Nano</p> <p>U = 0.2–0.5 μm Ultrafine</p> <p>S = 0.5–0.8 μm Submicron</p> <p>F = 0.8–1.3 μm Fine</p> <p>M = 1.3–2.5 μm Medium</p> <p>C = 2.5–6.0 μm Coarse</p> <p>E = > 6.0 μm Extra Coarse</p>	<p>XY = Sum of X + Y = Binder % (Up to 18%)</p> <p>06 = 6%</p> <p>15 = 6%</p> <p>67 = 13%</p>

Insert Grade Applications

Formation Hardness	Very Soft	Soft	Soft – Medium	Medium – Hard to Hard	Very Hard
Formation Type Examples	Sand, Gravel, Clay, Silt	Soapstone, Shale, Lignite	Limestone, Caliche, Bauxite, Anthracite	Dolomite, Limestone	Granite, Basalt, Iron Ore
Cutting Condition	Soil	Light	Medium	Heavy	Severe
Insert Grades	<p>Grades in these formation ranges are generally for rotary applications where higher breakage resistance is desirable.</p> <p>KHC20 KHC88</p>	<p>Grades in this formation range are generally for rotary applications and are 12–14% grades.</p> <p>KHC59 KHE86 KHC39</p>	<p>Grades in these formation ranges are both rotary and percussive applications.</p> <p>KHC47 KHC28 KHC37 KHC35 KHC33 KHM33</p>		

Kennametal application specialists should be consulted to assist in grade selection. Application suitability should be evaluated from initial field performance data.



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