

*Engineering
Your
Competitive
Edge®*



KenCast™



***A unique tungsten carbide
and steel composite for
superior wear protection.***



KenCast™ **Any Wear. Any Time.**

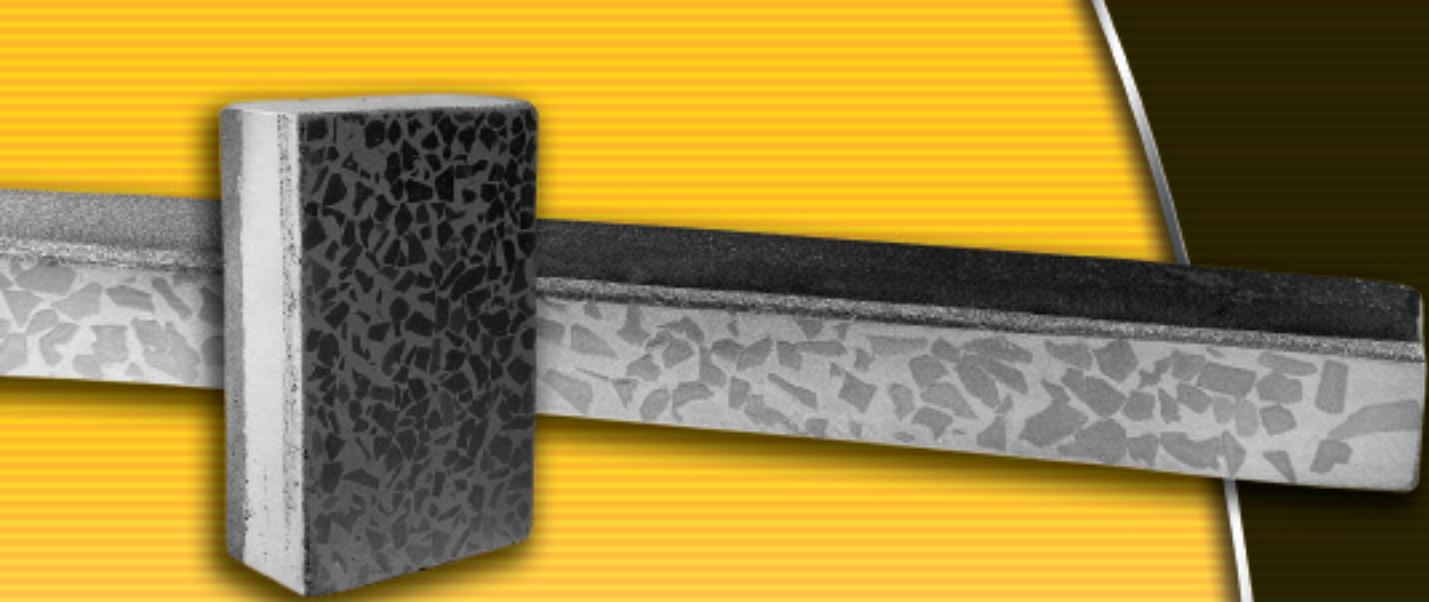
Wear.

One small word that describes a big problem for most equipment operators. Perhaps nothing is more troublesome, or more damaging, to virtually any equipment in any application, than wear. You experience it every day, and over time, it can add up to hefty equipment repair and replacement costs.

We understand wear. And we understand how important it is to you and your business to prevent wear damage to your equipment. That's why we developed KenCast™.

Whether you're working above ground or underground, on the road or in the pit, crushing rock or pushing snow...no matter what your application or equipment... Kennametal has (or can custom-make) a KenCast part to fit your particular wear problem!

Offered Exclusively by Kennametal!



Wear Protection for Every Part

KenCast is an *exclusive* Kennametal product protected by U.S. patents 5,279,902 and 5,094,923. We take tungsten carbide particles of varying sizes and metallurgically bond them to air-hardened steel. This combination of steel's durability with carbide's toughness creates a wear part that withstands extremely abrasive and high-impact applications.

KenCast helps your equipment last longer...in many cases, a lot longer, depending on the application and operating conditions. That means you save money with reduced downtime, repair costs, and inventory. Keeping our customers competitive and productive is our primary focus!

KenCast.
No one else has it...
because no one understands
wear like Kennametal!

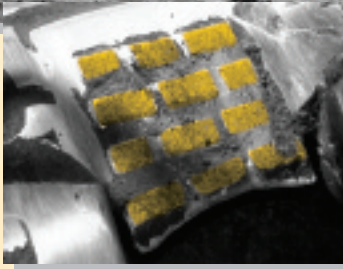
Let us prove it.

Surface Mines

No matter how abrasive the material mined, Kennametal KenCast wear parts will significantly reduce costly wear on dragline and surface mining buckets when applied to bucket lips and wing shrouds.

PROVEN!

These KenCast parts were 75 percent intact after handling five million cubic yards of highly abrasive sandstone overburden. In fact, they were still usable after the bucket had to be replaced!



Aggregates and Quarries

KenCast protects grouser bars and track pads from excessive wear and losing their grip in the rugged terrain of quarries. It also provides optimum protection against abrasive sliding and impact wear on grizzlies and screens.

PROVEN!

KenCast on this grizzly of a primary crusher withstood 900,000 tons of highly abrasive impact, compared to the 75,000-ton average life of abrasion-resistant steel. The customer saved more than \$2,000 per month on maintenance costs!

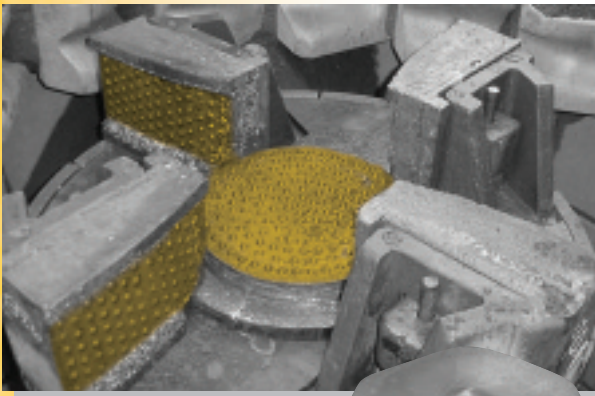


Crushing

Our new vertical shaft impact (VSI) crusher center feed disks with KenCast protection last significantly longer in severe operating conditions compared to traditional disk materials. Available in sizes up to 21" in diameter.

PROVEN!

In one recent customer field test, KenCast quadrupled the life of a VSI crusher center feed disk, from 200 hours to 800 hours!

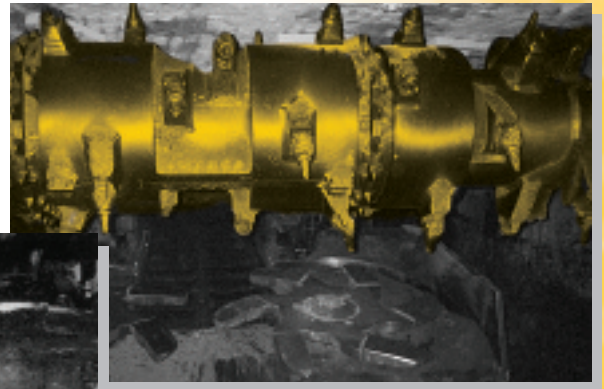


KenCast-protected VSI crusher center feed disk, above, and worn disk without KenCast, right.

Underground Mining

KenCast provides outstanding wear life protection in extremely abrasive conditions in underground mining. It is proven to substantially increase longwall drum-vane life.

Continuous loading arm (CLA) tips protected by KenCast maintain their shape and productivity longer than non-carbide CLA tips.



KenCast-protected CLA tips have outlasted standard all-steel tips by 3 to 1!



CLA tip with KenCast protection.

Highway Construction

KenCast parts on highway construction equipment help reduce significant wear in abrasive and extremely hard conditions such as asphalt and concrete. Use it on:

Reclamation equipment:

- pedestal protectors
- side cleaner bars

Road planing equipment:

- kicker plates
- drag shoes
- quick-change block-base protectors

Trenching equipment:

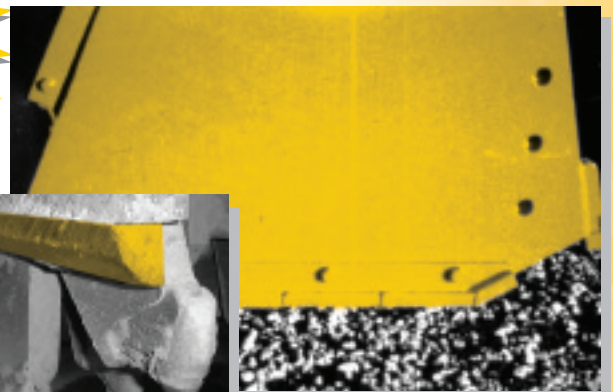
- base segment protection



You can get up to a full season - or longer - of performance from our KenCast pedestal and base protectors!



KenCast on kicker plates can last up to four times longer than hardfacing material!



KenCast on a side cleaner bar of a reclamation machine.



Tunneling

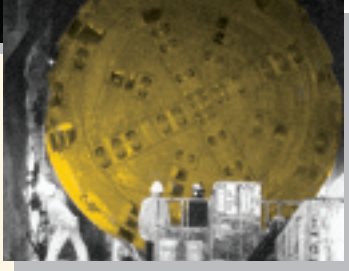
KenCast parts are extremely effective at reducing wear on tunnel boring machines in highly abrasive conditions.

Proven uses include:

- gage and cutter face protection
- roller cutters
- bucket lips

PROVEN!

KenCast bucket lips lasted five times longer than hardfaced 4140 steel in one recent tunnel boring machine application!



Grinding and Recycling

Kennametal's exclusive grinder hammer tips with KenCast material provide outstanding, long-lasting performance in recycling highly abrasive materials, such as asphalt roof shingles.

PROVEN!

Our grinder hammer tips with KenCast lasted 90 hours, or 10 times longer than competitive tools, during a field test at an asphalt shingles recycling operation!



KenCast grinder hammer tip.

KenCast lasted up to four times longer than brazed tools and up to 10 times longer than embedded hammer tips!



Raw asphalt shingles.



Processed asphalt shingles.



Swinghammer with KenCast protection for crusher.

Road Maintenance

Routine road maintenance exposes your equipment to a variety of high-wear conditions. KenCast provides excellent protection against abrasive wear on drag shoes for snowplows and street sweepers. Our drag shoes have a steel matrix of 52-58 Rockwell C hardness, compared to standard brazed carbide shoes that use mild steel to hold the carbide in place.

KenCast also can significantly reduce common wear damage on winter road maintenance equipment, including:

- snowplow blades
- plow frame shoes
- curb bumpers
- skid plates
- wing shoes
- moldboard shoes
- plow blade end protectors



Snowplow frame shoe.

KenCast snowplow shoes can outlast standard steel shoes by up to 10 to 1 and increase your snowplow blade life by up to 30 percent!



Our sweeper skid shoes with KenCast can give you up to two full seasons - or longer - of wear life compared to standard skid plates!



Vacuum sweeper drag shoe.

Railroad

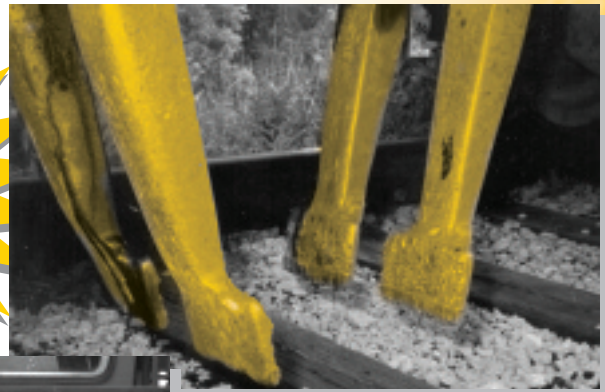
KenCast wear parts are excellent for use in abrasive applications on ballast cleaning and tamping equipment and other maintenance-of-way equipment in the railroad industry.

Proven uses include:

- ballast regulator plow skids
- ballast regulator Z-bars
- tamping tools
- undercutters



KenCast-protected tamber pads can outlast all-steel styles by up to three times and make it possible to rebuild the tamber shanks for continued performance.

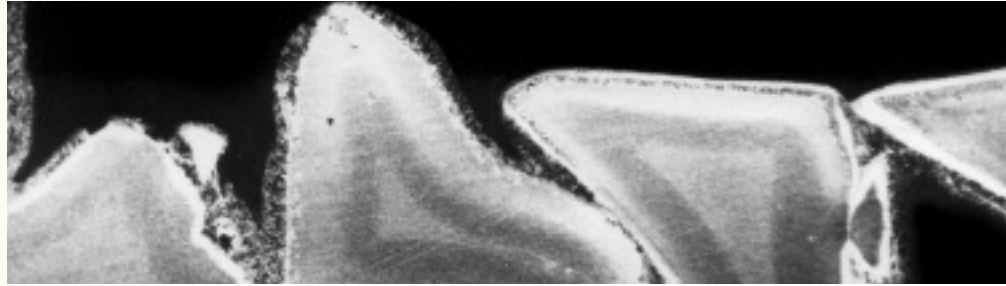


Railroad tamber tool with KenCast protection.



KenCast on a Z-bar.

Our Exclusive Product



KenCast is unique because no one makes wear parts like Kennametal. These extremely durable wear-resistant parts are manufactured in our own foundry.

First, we use a sand mold of the right size and shape to suit your particular application. Next, we layer tungsten carbide granules and/or preformed solid carbide inserts in the mold, then pour in our patented molten steel. The outer surface of the carbide particles alloys with and becomes metallurgically bonded to our patented air-hardening steel composition.

Prior to first use, the outer surface of the KenCast part looks smooth because the carbide particles are encased. During use, the outer layer of steel gradually wears to expose the tungsten carbide particles. It's these particles that take the punishment of your abrasive applications so your equipment won't have to. Our tungsten carbide is known for its exceptional durability and toughness, and it's common for customers to see significantly longer tool life on parts protected by KenCast.



This new grinder hammer tip made with KenCast is used in horizontal and tub grinders in the recycling industry. As you can see, the outer surface is smooth prior to use. Cut-away shows the KenCast carbide particles embedded in the steel.



This is a KenCast grinder hammer tip after 40 hours of use in a highly abrasive asphalt shingle recycling application. Notice that the prominent carbide particles have sustained only moderate wear. This particular hammer tip continued grinding for a total of 90 hours, outperforming and lasting up to 10 times longer than competitive tools!



We use preformed carbide inserts in our KenCast wear parts for sliding abrasion, such as on this snowplow skid shoe.

Kencast is:

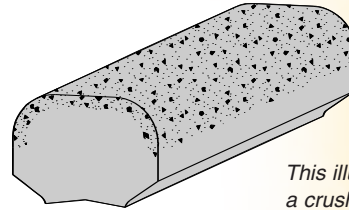
- *easier to apply and tougher than brazed-on solid carbide tiles*
- *longer lasting and easier to apply than hardfacing material*
- *more wear resistant than standard or AR-type steels*
- *better at protecting the carbide particles than embedded weld overlays*

Product Versatility

KenCast is exceptionally versatile. It can fit nearly any machine for nearly any application, with only a few limitations on size and shape. It is easily welded or attached mechanically into position.

Standard part sizes and shapes available:

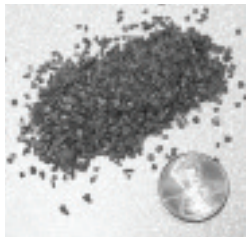
- thickness – minimum 1/4" to a maximum 8"
- width – up to maximum 20"
- length – up to maximum of 20"



This illustration shows a crusher bar with KenCast carbide particles on three sides

Carbide granules give KenCast exceptionally long-lasting protection. We blend same-sized and different-sized particles, or preformed carbide inserts, to create the right combination of carbide protection needed for a particular part or application.

Typical carbide particle sizes:



- fine (-12, +18 mesh)

– used for slurries and fine abrasive wear applications



- medium (-4, +6 mesh)

– used for general-duty applications that require a slightly denser carbide layer



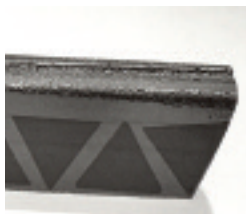
- standard (-1/4, +4 mesh)

– used for general-duty applications



- large (-3/8, +5/16 mesh)

– used for gouging wear applications



- preformed carbide inserts

– used for sliding abrasion applications

Attachment Guidelines

These are general guidelines on how to apply KenCast to your equipment. However, weld applications may vary substantially, depending on the material to which KenCast is applied. Consult a local welding representative or contact your Kennametal representative for recommendations on your particular application.

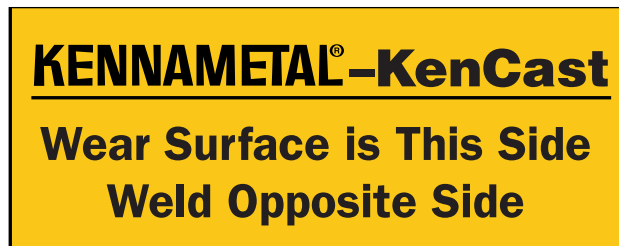
Weld Material

.052" wire (flux cored)	1/8" weld rod
<ul style="list-style-type: none">• 7100 ESAB or equivalent, shielded with carbon dioxide• 22 to 24 volts and 200 to 235 amps	<ul style="list-style-type: none">• 7018M or equivalent, low hydrogen• 21 to 33 volts/135 to 185 amps

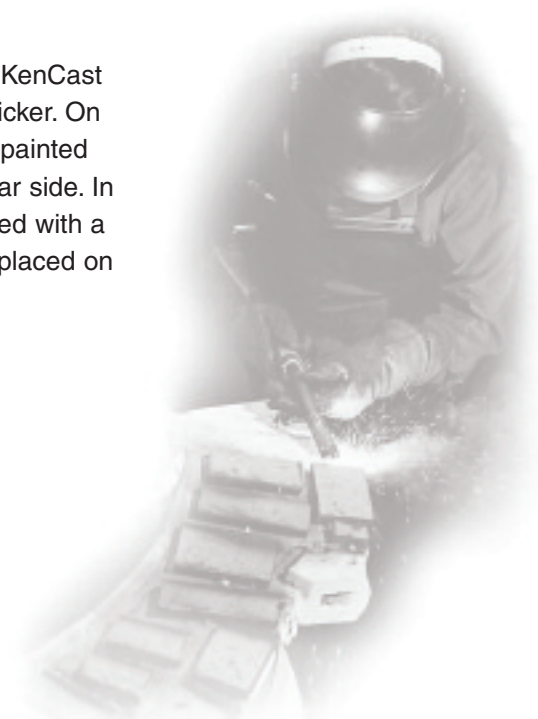
These specifications are for welding to low- to medium-carbon steels. When welding to specialty steels, such as stainless and manganese, contact your Kennametal representative for welding recommendations.

Welding Instructions

It's important to weld KenCast parts properly to achieve optimum performance. Always attach the castings with the steel side against the surface to be protected and the carbide wear surface facing out. Welding on the carbide surface can cause cracking and is detrimental to the carbide particles. The carbide wear surface of the KenCast part is identified with this sticker:

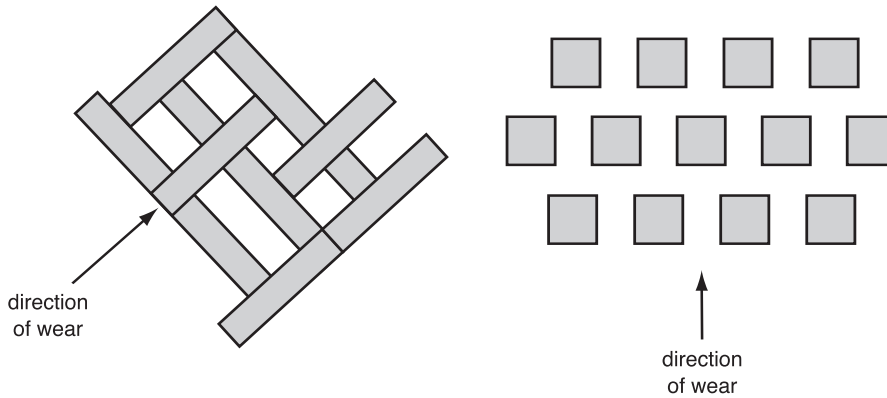


Sometimes the shape or size of the KenCast part makes it difficult to apply this sticker. On these parts, the carbide side will be painted yellow to clearly identify it as the wear side. In addition, if the KenCast part is marked with a part number, that number is always placed on the steel side of the KenCast part.

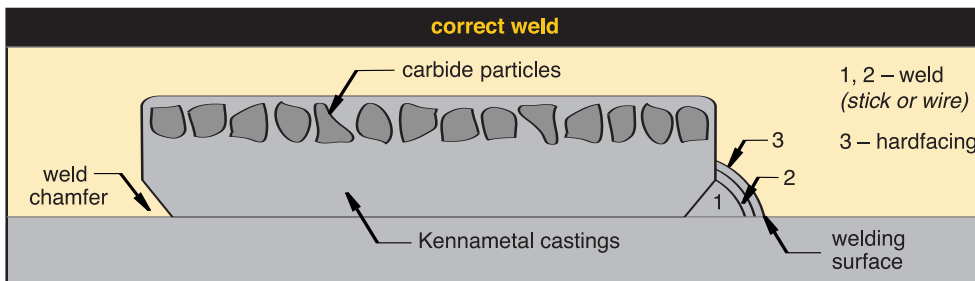


Recommendations

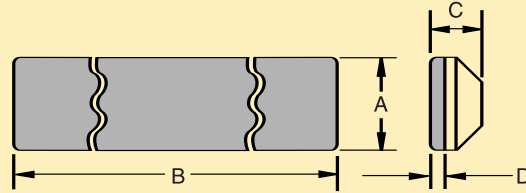
- Protect welds by using weld chamfers, hardfacing over the welds, or positioning the KenCast part to avoid wear on the welds.
- When using KenCast parts to cover large areas, create a “dead-bed” effect by positioning the castings so that the work material packs between the KenCast pieces (see illustrations).



- Stagger the placements of the KenCast parts to avoid wearing troughs between the parts.
- Parts to be welded should be about 70°F.
- The KenCast part should not exceed 600°F at any time during welding.
- First tack weld parts lightly to ensure proper placement before total welding is done.
- Pre-heating and post-heating of KenCast parts is not usually necessary. However, if the material to which the KenCast part is being applied requires heating, then pre-heat the KenCast part up to 600°F (do not exceed 600°F). Our KenCast parts have been welded to 4130 and 4140 steel with no pre- or post-heating. Pre-heating is recommended to prevent underbead cracking when KenCast parts are applied to oil-and-gas string components and to high-manganese steels.
- If weld washout is a concern, we recommend applying hardface material over the welds.
- **Do not** weld on the carbide layer of the KenCast part.



KenCast Wear Parts Order Information



part number	order code	A	B	C	D
KCWB-0367	1094287	1	2	1/2	1/8
KCWB-0246	1012536	1	2	1/2	1/4
KCWB-0414	1624932	5/8	5 1/4	5/8	1/4
KCWB-0254	1012544	5/8	2	3/4	1/4
KCWB-0201	1012504	5/8	4	3/4	1/4
KCWB-0255	1012545	3/4	2	3/4	1/4
KCWB-0378	1155344	3/4	5	3/4	1/4
KCWB-0055-20	1012633	1	2	3/4	1/4
KCWB-0055-30	1012634	1	3	3/4	1/4
KCWB-0055-35	1012635	1	3 1/2	3/4	1/4
KCWB-0055-40	1012636	1	4	3/4	1/4
KCWB-0055-50	1012637	1	5	3/4	1/4
KCWB-0055-60	1012638	1	6	3/4	1/4
KCWB-0055-80	1012639	1	8	3/4	1/4
KCWB-0096	1012447	1	10	3/4	1/4
KCWB-0097	1012448	1	12	3/4	1/4
KCWB-0362	1083967	1 1/2	2	3/4	1/4
KCWB-0067	1012436	1 1/2	5	3/4	1/4
KCWB-0056-20	1012640	2	2	3/4	1/4
KCWB-0056-35	1012641	2	3 1/2	3/4	1/4
KCWB-0056-40	1012642	2	4	3/4	1/4
KCWB-0056-60	1012643	2	6	3/4	1/4
KCWB-0056-80	1012644	2	8	3/4	1/4
KCWB-0342	1012628	2	10	3/4	1/4
KCWB-0394***	1324494	2 1/2	8	3/4	1/4
KCWB-0395***	1324495	2 1/2	12	3/4	1/4
KCWB-0073*	1012437	2 5/8	5 1/4	3/4	1/4
KCWB-0057-20	1012645	3	2	3/4	1/4
KCWB-0057-35	1012646	3	3 1/2	3/4	1/4
KCWB-0057-40	1012647	3	4	3/4	1/4
KCWB-0057-60	1012648	3	6	3/4	1/4
KCWB-0057-80	1012649	3	8	3/4	1/4
KCWB-0337	1012622	4	13	3/4	1/4
KCWB-0484	1996381	5	8	3/4	1/4
KCWB-0333	1012618	6	10	3/4	1/4
KCWB-0345**	1080018	1 3/4	9	7/8	1/4
KCWB-0019**	1012422	2	9	7/8	1/4
KCWB-0389	1308317	5/8	3	1	1/4
KCWB-0399	1502226	3/4	8	1	1/4
KCWB-0471	1919347	1 1/2	6	1	1/4
KCWB-0084	1012443	1	4	1	1/4
KCWB-0022	1012423	2	10	1	1/4
KCWB-0105	1012452	2	12	1	1/4
KCWB-0098	1012449	5	8	1	1/4
KCWB-0094	1083557	8 3/4	10 3/4	1	1/4
KCWB-0496	2036144	2	6	1 1/4	1/4
KCWB-0284	1012573	2	13	1 1/4	1/4

All dimensions are in inches.

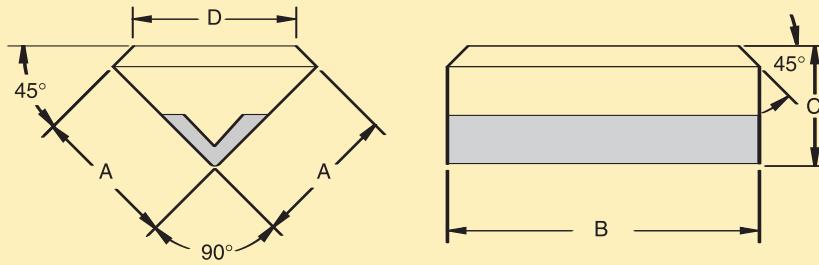
NOTE: Gray shading indicates carbide location on the part.

*3/8" radius along one 5 1/4" edge

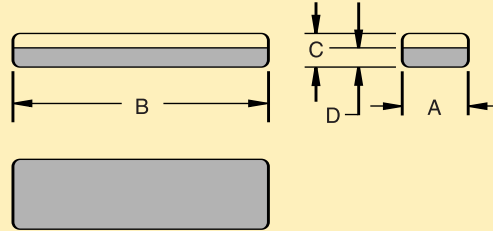
**1/8" radius along all edges on carbide side

*** weld bevels along length only

These drawings represent our most popular standard sizes of KenCast parts. In addition to these sizes, we also make special sizes to suit nearly any machine or application. Contact Kennametal at 800-222-9327 to find out more about special orders.

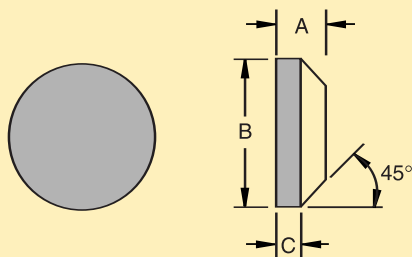


part number	order code	A	B	C	D
KCWB-0243	1012534	1 1/2	1 1/2	1 1/4	2
KCWB-0290	1012579	1 1/2	3 1/4	1 1/4	2 1/8

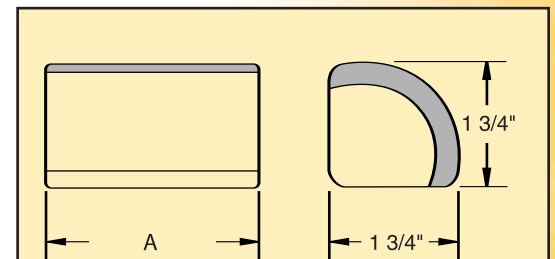


part number	order code	A	B	C	D
KCWB-0277	1012566	1	8	1/4	1/8
KCWB-0216	1012515	1 1/2	6	1/4	1/8
KCWB-0210	1012512	2	2	1/4	1/8
KCWB-0278	1012567	2	8	1/4	1/8
KCWB-0241	1012532	3	6	1/4	1/8
KCWB-0132	1012461	1/2	4	1/2	1/4
KCWB-0300	1012586	3/4	4	1/2	1/4
KCWB-0301	1174410	1	3	1/2	1/4
KCWB-0114	1012454	1	4	1/2	1/4
KCWB-0188	1012494	1 1/2	5	1/2	1/4
KCWB-0092	1012445	2	3	1/2	1/4
KCWB-0329	1012614	2	5 1/4	1/2	1/4
KCWB-0091	1012444	2	6	1/2	1/4
KCWB-0100	1012450	2	8	1/2	1/4
KCWB-0095	1012446	2	15 3/4	1/2	1/4
KCWB-0065	1012435	3	4	1/2	1/4
KCWB-0249	1012539	3	6	1/2	1/4
KCWB-0302	1714701	1	4 1/2	5/8	1/4
KCWB-0083	1012442	1/2	2 3/4	3/4	1/4
KCWB-0186	1012492	1 1/2	10	3/4	1/4
KCWB-0286	1012575	5	12	3/4	1/4
KCWB-0438*	1796637	2	12	1	1/4
KCWB-0010	1714704	7	13	2	1/4

* With 5.71" radius on carbide face.



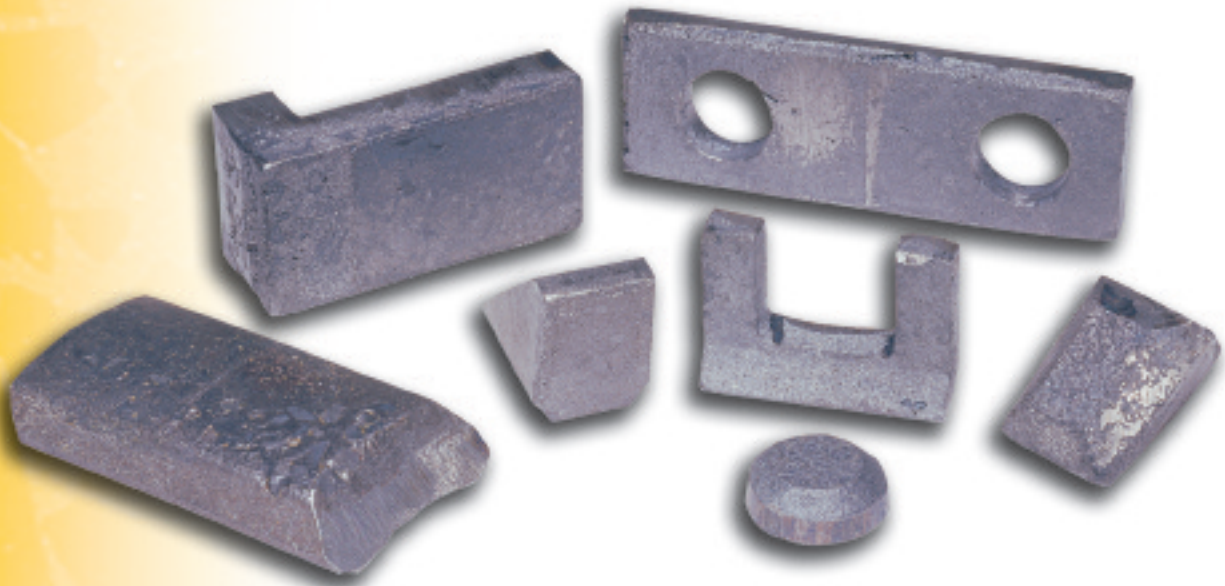
part number	order code	A	B	C
KCWB-0279	1012568	1/2	1 1/2	1/4
KCWB-0280	1012569	1/2	2	1/4
KCWB-0281	1012570	1/2	3	1/4



part number	order code	A
KCWB-0285	1012574	2 7/8
KCWB-0526	2426055	8

All dimensions are in inches.

NOTE: Gray shading indicates carbide location on the part.



KenCast Hardness Properties

Hardness ranges for composite ingredients:

- tungsten carbide = 86-91 HRA
- matrix steel = 52-58 HRC
(bonded to carbide)
- base steel = 38-50 HRC

Steel matrix composition:

- | | | | |
|-------------|-----------|--------------|-----------|
| • carbon | = .28-.35 | • nickel | = 1.0-2.0 |
| • manganese | = 1.5-2.0 | • chrome | = .80-1.2 |
| • silicon | = 1.3-1.7 | • molybdenum | = .20-.30 |
| • aluminum | = .08-.15 | | |

Steel matrix benefits:

- patented composition
- air-hardening matrix; no heat treatment necessary
- special compositions available upon request
- matrix is easily weldable
- machining of matrix not recommended
- hardness comparable to specialty abrasion-resistant steels

Visit www.kennametal.com because we have what you need!

Have you seen Kennametal's complete product offering for the underground and surface mining and highway construction industries?

Whether you work in an underground mine or on the surface in an aggregates quarry, whether you mill highways or dig trenches, whether you recycle C&D and wood waste or plow farm fields...no matter what your industry or application... Kennametal sells a complete line of cutting tool and block systems, cutting drums, and accessories for nearly every application in the mining and construction industries.



**Contact Kennametal Customer Service
800/458-3608**

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800/458-3608

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WITH QUESTIONS ABOUT KENNAMETAL PRODUCTS

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Kennametal Australia Pty. Ltd.

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KENNAMETAL

THE PROVEN GLOBAL LEADER
IN THE DESIGN, MANUFACTURE,
IMPLEMENTATION, AND SALE OF
PREMIUM-QUALITY TOOLING SYSTEMS
FOR UNDERGROUND AND SURFACE MINING,
ROAD REHABILITATION, AGGREGATES
PRODUCTION, AND WASTE RECYCLING!

KENNAMETAL

UNQUESTIONED TECHNICAL EXPERTISE
IN THE PRODUCTION AND APPLICATION
OF CEMENTED TUNGSTEN CARBIDE!



ENGINEERING YOUR COMPETITIVE EDGE