

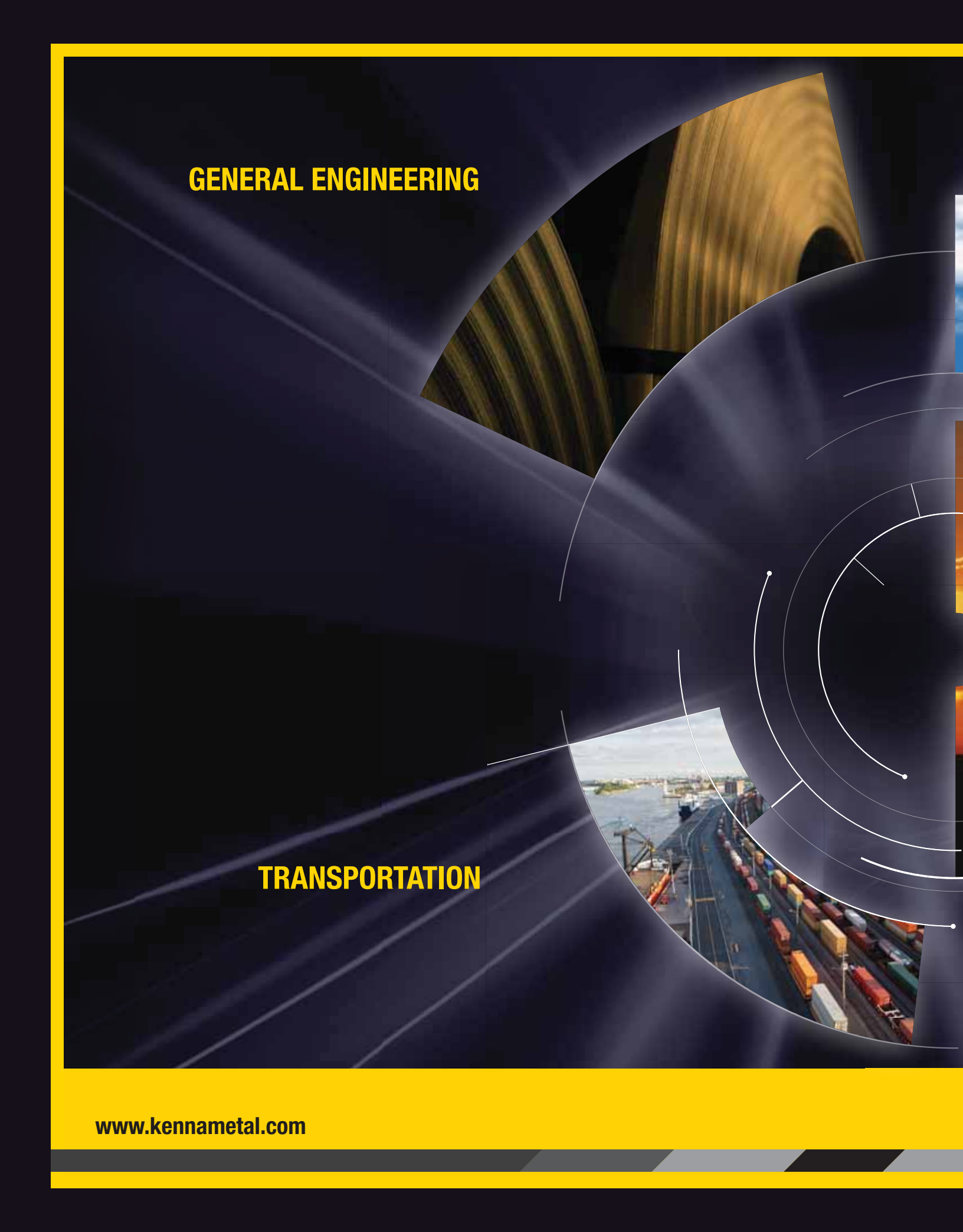
INNOVATIONS  
**MASTER CATALOG**

**TOOLING SYSTEMS**  
2013



[www.kennametal.com](http://www.kennametal.com)

 **KENNAMETAL®**



**GENERAL ENGINEERING**

**TRANSPORTATION**

[www.kennametal.com](http://www.kennametal.com)




**AEROSPACE & DEFENSE**

**EARTHWORKS**

**ENERGY**





Since its inception in 1938, Kennametal has understood precisely how to improve manufacturing performance and profitability — by introducing unparalleled products and services to reduce operating costs and lead times.

These 1500+ pages bring you the latest tooling systems products and superior services — all specifically engineered to enhance overall productivity, even in the most challenging metalworking applications. Rely on Kennametal to significantly boost manufacturing competitiveness. To learn more, contact your Kennametal Representative or Authorized Kennametal Distributor.

Visit us at [www.kennametal.com](http://www.kennametal.com).

## Table of Contents

Introduction .....	i-xix
Services and Support .....	xx-xxxv
KM Quick Change .....	A1-A635
<b>KM Selection Guide .....</b>	<b>A18-A28</b>
<b>ERICKSON Selection Guide .....</b>	<b>B4-B19</b>
HSK Shank Tools .....	C1-C166
BTKV Shank Tools .....	D1-D37
CVKV Shank Tools .....	D38-D67
BT Shank Tools .....	E1-E95
CV Shank Tools .....	F1-F83
DV Shank Tools .....	G1-G77
QC Shank Tools .....	H1-H22
R8 Shank Tools .....	H24-H27
Straight Shank Tools .....	I1-I27
Collets and Sleeves .....	J1-J81
VDI Adapters .....	K1-K13
Accessories .....	L1-L58
Technical Information .....	M1-M105
Index by Order Number .....	N2-N32
Index by Catalog Number .....	N33-N63
Global Contacts .....	O2-O3
Icon Legend .....	O4-O5

# Less Environmental Impact

To learn more about our sustainable solutions for your industry,  
please contact your Kennametal Representative or  
Authorized Kennametal Distributor, or visit [www.kennametal.com](http://www.kennametal.com).



## Environment

Kennametal's intimate understanding of the energy marketplace — including customer processes and applications — allows us to proactively address production and sustainability concerns with solutions tailored to your needs. We deliver superior value because we listen closely to you, our customer, and innovate based on your feedback. Our goal is to help you be more competitive — both at home and on a global scale.



### Best Practices in Productivity

As your trusted partner for optimized production, Kennametal offers customers a unique commitment to research and development excellence, continually delivering highly innovative ways to enhance productivity. Certification to ISO 9001, QS 9000 TES, and VDA 6.4 provides the highest possible quality standards.

### Best Performance, Less Environmental Impact

With technology, we can do both. Kennametal helps customers focus on the root causes of unsustainable behavior in highly complex manufacturing systems, while at the same time improving cost structure, quality, and performance. In addition to offering the latest in metalcutting tools and technology, our Advanced Engineering team will analyze your existing production processes and help identify new methods to improve your overall performance.

# Kennametal Innovations Master Cutting Tools

## 2013 Catalog

The comprehensive, 2,000+ page Kennametal Innovations Master 2013 Catalog includes all our standard milling, holemaking, and turning products. By compiling our full metalworking portfolio together, and including new application guidelines, tool selectors, and technical information, Kennametal addresses key industry segments and the services that support that vision.

### **We Had the Environment in Mind**

By combining the contents of four catalogs into one, we were able to identify overlaps and make the most of the pages we printed. In doing so, we reduced our overall page count by 25%.







2,000+ pages of Kennametal's best tooling — all in one book!

See complete Rotating and Stationary tooling in our new **Master 2013 catalog!**

Download the INCH or METRIC version from [www.kennametal.com](http://www.kennametal.com), or request a printed copy!

# Tooling Systems

## Product Highlights

### KM4X™ • The New Choice for Heavy-Duty Milling

KM4X is the latest version of the KM™ spindle interface targeted at heavy-duty machining operations and is a top choice for machining large, structural, tough-to-machine materials, like titanium, for the aerospace industry. The portfolio consists of rotating adapters and static tooling to support the tough and heavy machining markets. Additional products include spindle component packages as well as static clamping units to support turning and mill-turn opportunities.



To learn more, **scan here.**

For instructions on how to scan, please see page xxxiii.



### KM™ Quick Change

KM Quick Change Tooling is a central component in achieving dramatic improvement in machine and cutting tool use. It's the choice of manufacturers requiring maximum machine output. The necessary tasks of changing, setting up, and gaging tools create an excess of machine downtime. For small batch manufacturing operations requiring these frequent setups, KM Quick Change Tooling is the most efficient method for reducing lost time and improving the overall quality of the machining process by generating greater productivity and increasing profits.



### HSK Shank Tools

ERICKSON™ HSK Face Contact short taper tooling is manufactured from premium materials and to the latest DIN/ISO specification standards. Form A versions are generally used in machining centers and milling machines with automatic tool changers.



### BTKV and CVKV

Manufactured from premium materials and to the latest JIS B 6339 specification standard with an AT3 7/24 Taper per ISO-1974, the BTKV and CVKV series offers controlled, increased flange thickness to the rear of the flange, rigid connection, and higher torque and productivity. Tools are prebalanced to a high specification that will perform effectively up to 20,000 RPM. For any applications higher than 20,000 RPM, Kennametal recommends that the complete toolholder assembly (toolholder, retention knobs, collets, hardware, and cutting tools) be balanced as one identity.

### HPMC Milling Chucks

The HPMC System is ideal for holding round shank cutting tools and extensions on various applications because it offers greater versatility. This makes it an excellent choice for end mills, reamers, indexable cutters, drills, straight shank extensions, and boring systems. The HPMC System, with its powerful gripping torque, provides the maximum performance for tough roughing and high metal removal applications, as well as delivering first-rate accuracy for finishing applications — all with the same chuck.



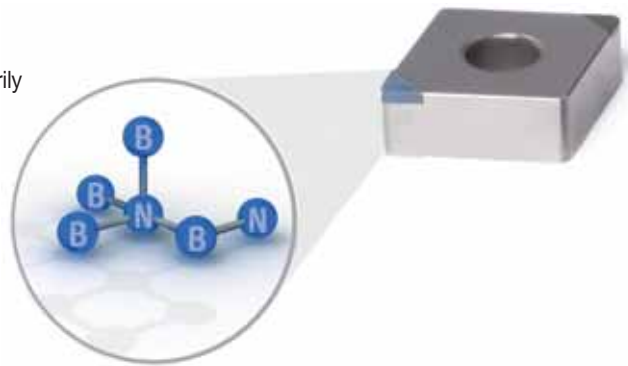
# Turning

## Product Highlights

### Superhard Materials • PCBN and PCD

Abrasion resistance and toughness are the two most important properties in assessing the efficiency of cutting tool materials. Abrasion resistance is primarily a function of hardness, and, in this respect, diamond (PCD) and cubic boron nitride (CBN) are superior to all other known materials.

For more information, see pages B132–B197 of the Innovations Master Catalog Cutting Tools 2013.



**beyond<sup>™</sup> BLAST<sup>™</sup>**

### Beyond BLAST<sup>™</sup>

An entirely different approach to machining high-temperature alloys. We determined that the most effective way to deliver coolant would be to channel it through the insert — ensuring that it hits exactly where it does the most good. That means, more efficient coolant delivery at a fraction of the cost of high-pressure coolant systems. By precisely controlling coolant application, Beyond BLAST enables you to lower your energy consumption, saving you even more money and reducing your impact on the environment.

For more information, see pages F2–F11 of the Innovations Master Catalog Cutting Tools 2013.





## Beyond™ PVD Grades

Advanced PVD coatings using Beyond technology are well suited to resist the high temperatures associated with machining tough alloys. By offering increased tool life (by 30–40%), the general engineering, transportation, aerospace, energy, and earthworks markets can experience benefits in their profitability. They can also realize benefits by utilizing the strength of the new PVD coating in combination with the broad product offering to perform turning, grooving, and cut-off operations in a wide array of materials and applications while maintaining consistent chip control and minimizing insert edge wear.

For more information, see pages B2–B115 of the Innovations Master Catalog Cutting Tools 2013.



**beyond**



## Grooving and Cut-Off : -CL and -GUP Geometries

The A2™ CL geometry maximizes your cut-off productivity. The A2-CL geometry offers tighter chipbreaker capabilities when machining low-carbon steel, excellent chip evacuation in low-feed applications, and improved stability and rigidity. The A4-GUP geometry, available in molded and precision-ground styles, provides a positive rake angle, enhanced chip control, and lower cutting forces. The -GUP geometry offers up to 180% longer tool life and higher productivity in steel, stainless steel, and high-temperature alloy materials.

For more information, see pages A2-CL: D13 and A4-GUP: D70 and D73–D74 of the Innovations Master Catalog Cutting Tools 2013.

## Kennametal Select

Kennametal Select products make it simple to get the most out of your inserts — and your money. Every insert is gold, which exposes wear as the tool continues to be used. This makes it easy to detect when an insert is ready to be changed — maximizing the product's value and protecting the workpiece. Also, because Kennametal Select inserts can be used in most applications, a single insert can take on any number of tasks, thus reducing your inventory. Kennametal Select products are also reliable enough to cut steel, stainless steel, cast iron, and high-temperature alloys, enabling quick changes in workpiece materials without the need to swap inserts, saving time and money.

For more information, see pages F106–F130 of the Innovations Master Catalog Cutting Tools 2013.



**KENNAMETAL**  
**SELECT**

# Holemaking

## Product Highlights



### Hole Finishing with Kennametal

Only Kennametal is capable of offering you the best, customized solution for your application. Kennametal owns the entire process chain, from raw material, insert pressing, tool body design, brazing, sintering, grinding, coating, and so on, up to reconditioning. Kennametal is the only source in the metalworking industry from where you can get all types of hole finishing tooling, from reaming and fine boring to motion tooling, directly from one hand. Therefore, Kennametal can offer you the best-fitting solution for your machining challenge, giving you the choice of tooling without any limitations in regard to portfolio or capability.

For more information, see pages K1–K205 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages K1–K212 of the Innovations Master Catalog Cutting Tools 2013, Inch version.

### Drill Fix™ DFS™

Drill Fix DFS combines the economical squared-outboard insert with the superior centering capabilities of the trigon inboard insert. The DFS indexable drills offer increased metal removal rates combined with high surface quality and hole straightness.

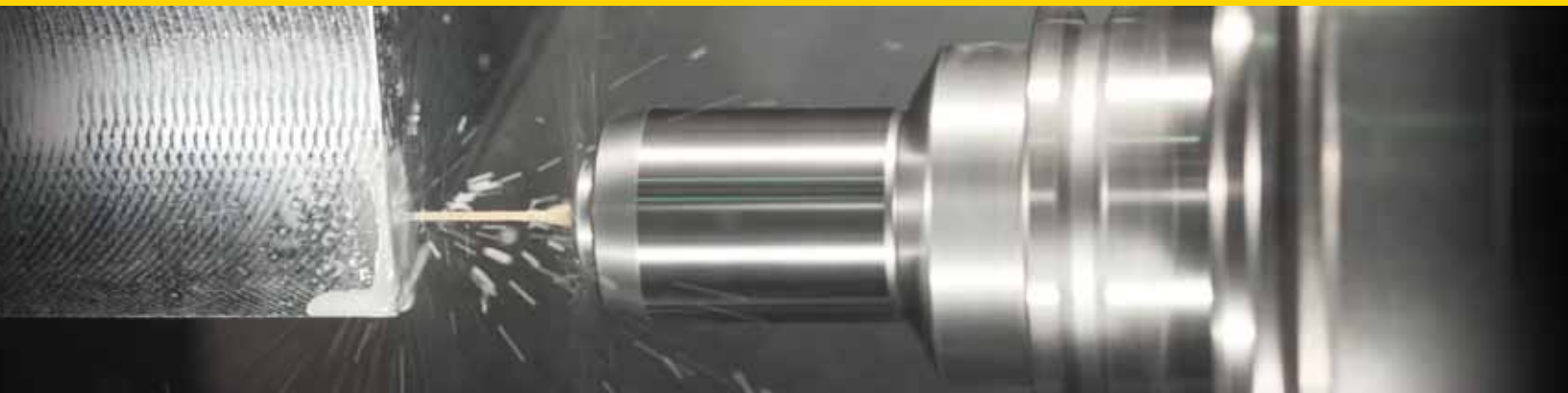
For more information, see pages J14–J22 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages J19–J35 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### GOdrill™ • Kennametal's First Microdrill

The all new GOdrill addresses drilling operations in a diameter range of .0394–.5" (1–12,7mm) in a broad variety of materials and applications, such as fuel systems or medical components. Due to its very unique design, the GOdrill expands the advantages of modular drills into the small diameter range: high-end grades, wear-indicator coating, and new, proprietary geometries enable full utilization of the drill's tool life capacity.

For more information, see pages G5–G14 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages G5–G15 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### HP Beyond™ Drills for Steel and Stainless Steel

HP Beyond Series Solid Carbide Drills are designed specifically for stainless steel and steel applications, offering high performance and long tool life in regular steel, titanium, and iron materials. By combining unique Kennametal technologies, such as the HP point, flute geometry, and a new Beyond grade technology into one tool, the B2\_HP Beyond is the ultimate high-volume production tool.

For more information, see pages G21–G37 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages G25–G43 of the Innovations Master Catalog Cutting Tools 2013, Inch version.

### KSEM PLUS™ Modular Drill System

The KSEM PLUS drill concept is simple but effective. It combines the benefits of the KSEM™ modular drill (high feeds and length-to-diameter [L/D] ratios) with the benefits of an indexable drill (high speeds and low consumable costs).

For more information, see pages H36–H47 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages H46–H59 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### Beyond™ High-Performance Solid Carbide Taps

Solid carbide taps offer higher productivity and outstanding performance in a wider range of materials than formerly possible. Get more production from a single tool and superior accuracy of product thread that surpasses the competition. Kennametal High-Performance Solid Carbide Taps are available in various specifications with enhanced precision and design, which translates into longer tool life, excellent performance, and exceptional wear resistance.

For more information, see pages L2–L29 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages L2–L33 of the Innovations Master Catalog Cutting Tools 2013, Inch version.

# Solid End Milling

## Product Highlights



### **HARVI™ High-Performance End Mills for Roughing and Finishing with One Tool**

HARVI takes high-performance roughing, semi-finishing, slotting, and profiling to the next level. The line is designed to provide maximum metal removal rates by achieving supreme surface conditions. A wide range of diameters and corner radii are available from stock.

For more information, see pages M10–M25 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages M8–M30 of the Innovations Master Catalog Cutting Tools 2013, Inch version.

### **KenFeed™ End Mills for High-Feed Milling**

A unique tool with new, 6-flute style for high productivity, the KenFeed end mill is specifically engineered to machine hardened steel up to 67 HRC at extreme speeds and feeds. Necked shanks provide extended reach in deep cavities and high feed rates up to .0230" per tooth on a 3/4" tool. Machine hardened materials at 2–3x the metal removal rate of competitive end mills. Wide range of cutting diameters, down to 6mm for small- and medium-pocket work. Innovative new geometry maximizes metal removal rates and lowers manufacturing costs.

For more information, see pages M26–M30 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages M31–M34 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### **KCN05™ Diamond Coated Carbide Routers**

Kennametal has the correct milling solutions engineered for machining difficult CFRP (Carbon-Fiber Reinforced Polymer) and non-ferrous components. KCN05 solid carbide router products provide excellent tool life and produce smooth finishes with improved edge quality. The unique geometries are free cutting, reduce heat generation, and provide high-quality machined surfaces.

For more information, see pages M65–M71 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages M62–M68 of the Innovations Master Catalog Cutting Tools 2013, Inch version.







### GOmill™ • The Economical Milling Cutter Line

The GOmill line is specifically engineered to work on short length-of-cut applications in multiple workpiece materials, like soft and hard steels up to 48 HRC, stainless steels, high-temperature alloys, and cast iron. With the very short overall length and soft cutting geometries, the line is made to conform to the growing market of mill-turn machines. The 3-flute sharp and 4-flute chamfer versions support roughing, semi-finishing, and finishing applications; the 3-flute ball nose tool supports roughing and semi-finishing applications; and the 2-flute ball nose version supports finishing applications. All three geometries work in slotting as well as side milling applications up to 1 x D depth of cut.

For more information, see pages M117, M122, M126, and M130 of the Innovations Master Catalog Cutting Tools 2013, Metric version. See pages M85, M87, M92, and M95 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### MaxiMet™ Carbide End Mills for High Metal Removal Rates and Superior Surface Finishes

Designed to significantly reduce machining time in aluminum! The innovative geometry designs include a wiper facet for superior surface finish on aluminum parts. MaxiMet takes roughing and finishing cuts with one tool. Slotting is effective up to full 1 x D axial depth. Side milling is effective up to 0.5 x D radial and 1.5 x D axial depth. The 3-flute series uses unequal flute spacing for chatter-free performance. Effective in a full range of machine speeds. Multiple corner radii and extended neck configurations are available as standard.

For more information, see pages M52–M53 of the Innovations Master Catalog Cutting Tools 2013, Metric version. See pages M42–M47 of the Innovations Master Catalog Cutting Tools 2013, Inch version.

# Indexable Milling

## Product Highlights

### **Dodeka™ Series • Leader in Advanced Face Milling Applications**

Dodeka Mini and Dodeka MAX™ are the most comprehensive face milling boosters on the market today. Twelve true cutting edges per insert mean low cost per edge and high productivity. With Beyond™ premium milling grades, you will see higher Metal Removal Rates (MRR), lower cutting forces due to real soft cutting action, and better tool life in light to heavy machining.

For more information, see pages O2–O29 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages O2–O26 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### **MEGA Series • Superior Heavy-Duty Milling**

With four true cutting edges per heavy-duty MEGA insert, you know you are getting the low cost per edge and high productivity you need and have come to expect from Kennametal. The soft cutting edge design enables 30% lower cutting forces, and the carbide shim provides protection to the cutter body. Choose MEGA inserts for all of your steel and cast iron indexable milling needs.

For more information, see pages O30–O47 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages O28–O43 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### Beyond BLAST™ • More Than Just the Right Tool — The Ultimate Solution

The Beyond BLAST KSSM™ 45° and KSRM™ platforms utilize Precision Coolant Technology (PCT) to aggressively apply coolant directly to the cutting area. Not only does this reduce heat at the cutting edge, but it also assists with reducing tool and chip friction, increasing chip evacuation, and relieving shear stress.

For more information, see pages O48–O53 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages O44–O48 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



### Rodeka™ • The New Round Insert Generation

Kennametal introduces a new and revolutionary double-sided round milling insert capable to run in multiple types of milling operations and workpiece materials, providing the latest double-sided insert technology to boost your productivity with the most efficient cost per edge.

For more information, see pages R12–R19 of the Innovations Master Catalog Cutting Tools 2013.

### Mill 1™ • High-Performance Shoulder Milling Platform

The multifunctional Mill 1 platform works with all tool materials in shoulder, ramp, slot, plunge, and helical milling with one insert style to improve productivity and reduce inventory and machining costs. The super positive cutting rake, soft cutting action, and low cutting forces enable higher feed rates and spindle protection. Innovative insert and cutter body designs offer improved ramping capabilities.

For more information, see pages P2–P62 of the Innovations Master Catalog Cutting Tools 2013, Metric version.  
See pages P2–P64 of the Innovations Master Catalog Cutting Tools 2013, Inch version.



# Engineered Solutions

## **Coordinated global resources with world-class manufacturing process development and implementation capabilities.**

Whether it's a single tailored tool required to address a specific part feature or the development of a comprehensive manufacturing process for use on existing or newly acquired production equipment, Kennametal's team can manage the development, personnel training, and successful implementation of the complete solution.

Global implies just that. Globally coordinated manufacturing process development, implementation, and optimization support at machine tool builders, end user engineering or corporate offices, and end user production facilities, regardless of their respective geographies. Well-organized, highly linked staff reside in the Americas, Europe, and Asia/Pacific regions. Globally standardized design and manufacturing systems enable highly coordinated project management and implementation results.

Key alliances with machine tool builders and other leading manufacturing technology enablers ensure a complete solution, optimizing the entire process — not just portions of it. This results in the most effective and efficient manufacturing process possible, leading to low implementation time and cost and rapid return on investment.

For more information, please contact us at 1.866.646.7113.







## Energy

### Energy Engineered Solutions

Kennametal is more than a supplier of tooling solutions. With a thorough understanding of the energy segment's process and application challenges, we proactively address production concerns to deliver productivity to customers seeking peak performance in demanding environments. Kennametal's success is based on our capabilities — our ability to work with you on customized solutions to optimize your results and our willingness to engage with a broad spectrum of materials, metalworking solutions, application and custom component manufacturing, and supply expertise. Our drive for success, enabled through our advanced materials sciences, application knowledge, and commitment to a sustainable environment, results in a broad portfolio of innovative, custom, wear-resistant solutions.



Please also see the new  
Kennametal Energy catalog  
(B-11-02786).



# Engineered Solutions

## Automotive

### Automotive Engineered Solutions

Traditionally, Kennametal has been a strong player in the transportation field, pioneering innovative solutions with automotive, shipbuilding, and railroad customers. We deliver global services and products that exceed our customers' expectations and continually push the boundaries of science. In today's competitive world, no one can support our customers better, and in turn, deliver the continued service and quality that has become Kennametal's trademark.

Kennametal's global reach has helped our customers standardize processes and products to improve both cost and quality. We offer an intimate understanding of the economics of the automotive value chain and unparalleled customized solutions tailored to your needs. We can deliver superior value by listening closely and innovating based on what our customers say. Our goal is to help you be more competitive, at home and on a global scale.



*If it rolls, floats, or flies,*



## Aerospace

### Aerospace Engineered Solutions

From lightweight composite materials to exotic alloys, Kennametal is committed to reducing risks and costs in the manufacture of aerospace and defense programs. We partner with customers to implement standard and customized solutions with minimum cost per part and high repeatability in mind. Kennametal has unique capabilities and resources to cover the total manufacturing equation from roughing to automated deburring and finishing. Kennametal's best-in-class technologies and services deliver up to 30% cost reduction and 60% cycle time reduction.



Aerospace component surfaces are one of the key battlegrounds in environmentally friendly manufacturing. Surface treatments not only improve appearance of the part but also enhance wear resistance, provide corrosion protection, and improve friction control. These subtle manufacturing enhancements provide big dividends in the form of fuel efficiency, reliability, performance, and longer part life.



*Kennametal has a solution that delivers innovation and productivity.*

# KENNAMETAL REPAIR SERVICES

Milling cutters

Boring bars — standard,  
tunable, and de-vibe

Indexable drills

Line boring bars

Feed-out heads

Motion tools

Standard indexable tooling

ModBORE™ boring heads

Romicron™ boring heads

Eccentric toolholders

Electronic tightening fixtures

Floating toolholders

Hydraulic chucks

KM™ clamping units  
(manual and spring packs)

## Repair Services

**Tools are valuable. Protect them and get the most from your investment.**

You can be assured that when your advanced tooling products need to be serviced, the Kennametal Service and Repair Department has the highly trained, experienced staff to provide expert assistance. For about half the cost of a new tool purchase, you can have your existing, damaged tools serviced and repaired to like-new condition.



[www.kennametal.com](http://www.kennametal.com)





## Getting Started, and Getting Finished, Is Easy.

Follow these 4 simple steps and be on your way to restored tools and great savings.

- 1 Visit [www.kennametal.com](http://www.kennametal.com) to find the tool you're looking to have repaired.
- 2 Download and complete the form. Mail the completed form and the tooling to the Kennametal Service and Repair Department.
- 3 Kennametal will quickly respond to your request with a cost estimate and timetable for the completion of the repair.
- 4 Within 60 days of receiving the estimate, notify Kennametal whether you'd like the tooling repaired, returned, or scrapped.

*\*Please note that the tap adapters are not cost effective to repair.*

KM-LOC™ and KM-LOC II™  
clamping units

KSEM™ bodies

Live/driven tooling

Bearing milling chucks

Right-angle heads

SEFAS™ combination tools

Tapping holders  
(excluding tap adapters\*)

Integral tapping tools  
(excluding tap adapters\*)

Presetters

Tuned tooling units

ToolBOSS —  
Tool Management System





# Service and Support

## Kennametal Extrude Hone™

### Precision Surface Management

- Fuel efficiency through fine flow tuning — Diesel Fuel System (DFS) and Gasoline Direct Injection (GDI).
- Emission reduction due to better spray shaping.
- Noise, friction, and wear reduction for automatic gearbox components.
- Air flow path enhancement to improve jet or helicopter turbine performance.
- Energy savings with centrifugal impeller pump increased efficiency.
- Surface stress relief on high-pressured thin wall component for extreme safety.

### Core Technologies Offer

- **Electrochemical Machining (ECM):** Generator, fixture, and cathodes  
RADIUSING, shaping, polishing, surface stress relief.
- **Abrasive Flow Machining (AFM):** Media and fixture design  
RADIUSING, polishing, surface stress relief.
- **Thermal Energy Method (TEM):** Controlled combustion  
Minimising risk of hidden burrs and contamination.





## Proven Solutions

### Easy Access to Service and Support

- Engineering and Feasibility departments.
- Capital equipment solutions.
- Contract Shop activities (ramp up and production).
- Spare parts availability program.
- Metalcutting tooling combined with Precision Surface Management.
- Benefits of worldwide Kennametal logistics.
- Lean expertise to conduct global projects with customers.
- Cost per part solutions/Clic model for equipment.
- Parameters, cathodes, fixtures designs.
- Media design to part.
- Global Full Circle Program increases productivity resulting in less downtime of your equipment.





# Service and Support

## Kennametal Extrude Hone™

### Proven Solutions: Save Energy, Save Money

- Improving closed pump impellers inner flow passage roughness to increase up to 11% peak efficiency and lower energy consumption.
- A coal-powered plant equipped with six boiler feed pumps can reduce parasitic loss, representing at least \$500,000 annual savings (driving the pumps) by 1% of the power generated.
- This process and savings can also be applied to natural gas centrifugal closed pump impellers.

### Precision Surface Management Matters

Kennametal Extrude Hone Abrasive Flow Machining (AFM) surface and flow enhancement solutions provide the energy segment with significant savings in pump efficiency improvements.

- The AFM process is the method of choice for material removal at the area of greatest restriction and surface improvement of passages not accessible by other methods.
- AFM has documented efficiency proven solutions in the automotive and aerospace industries.
- Two-way flow AFM process is a natural fit for closed impellers and diffusers.
- Inner flow passages of the impellers and diffusers benefit from AFM's selective material removal as well as surface finish improvement — both contributing to improved pump efficiency.



Before



After





## Proven Solutions

Delivering Results throughout the Value Chain

### Working with You

We have a strong focus on customer solutions, which helps develop an accurate understanding of industry needs. This is achieved through collaborative work with key players throughout the value chain:

#### Original Equipment Manufacturer (OEM)

Our business expertise is providing OEMs with key components, such as pumps, that deliver greater efficiency.

#### Foundry

Kennametal Extrude Hone™ specialists can bring added value early in the manufacturing chain, so you can deliver more than just a key component and exceed expectations every time.

#### End User

Currently in the best position to measure efficiency improvements, end users understand the direct impact of savings — anywhere along the value chain. They help us measure performance of the processed component against non-processed, providing a better understanding of efficiency improvement related to the Kennametal Extrude Hone AFM operation. The AFM Center of Excellence, in Irwin, PA, can perform feasibility testing with customer-specific parts to provide the optimal media needed for each process.

### Media Is the Edge

The Kennametal Extrude Hone lab provides the energy industry with specific, engineered medias that deliver the highest performance for closed impeller polishing. We also have specific media with dedicated characteristics to enhance productivity and quality when polishing a closed impeller.



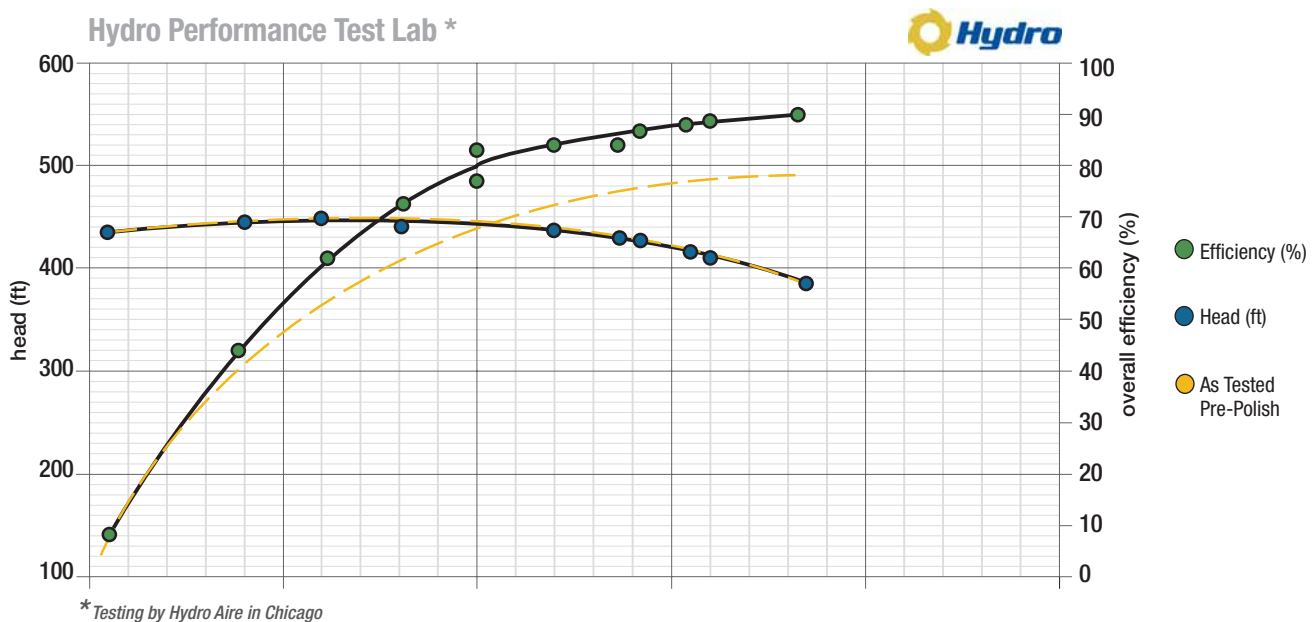


# Service and Support

## Kennametal Extrude Hone™

### Abrasive Flow Machining for Pump Market Validation Testing

Formed in 1969 by a small group of pump engineers in Chicago, Hydro Aire is now the largest independent pump rebuilder with service centers throughout the world. A complete 5000 hp, 42,000 GPM pump test stand, designed in compliance with Hydraulic Institute standard and API 610, is located in Chicago. This is the ONLY independent non-OEM facility with this capability able to generate pump efficiency curves using LabView software.





# Proven Solutions

## The Energy Story

### Proving the Pump Efficiency Improvement from the AFM Process

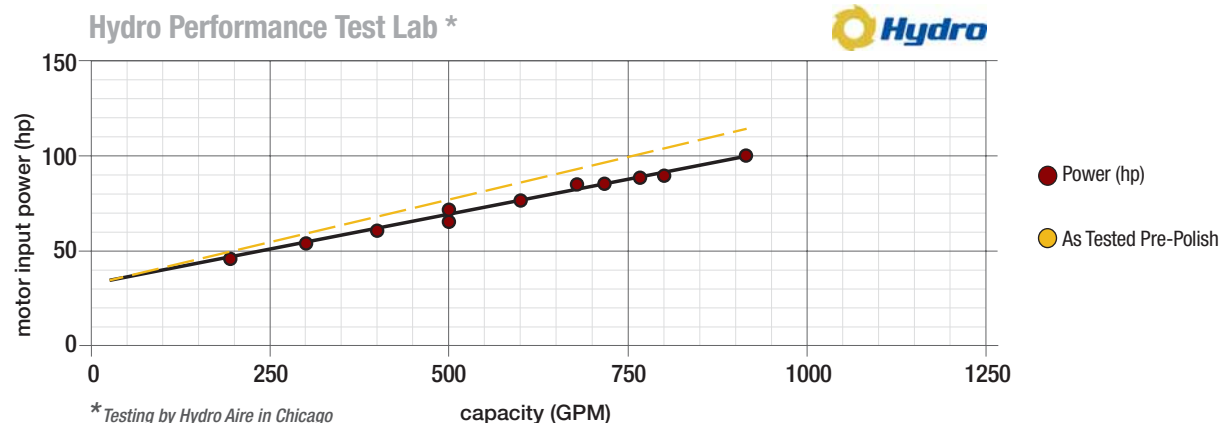
We have selected a 100 hp 1,200 GPM, single impeller overhung process pump as an example to validate the potential efficiency improvement able to be achieved with the AFM process.

- 1) New PACO™ pump purchased, which is about 79% efficient according to the manufacturer's data.
- 2) Pump tested and performance curve generated to confirm initial efficiency pre-AFM. Manufacturer data confirmed by our "before AFM" testing.
- 3) Pump was disassembled and impeller removed to AFM process. Pump was then reassembled.
- 4) Re-tested pump and generated performance curve.

Results: **Peak efficiency gain of +11%**, bringing the pump to 90% total efficiency! Gains were realized over the full usable range of the pump with **significant power savings** at given pressure and flow rate.

#### Test Component

<b>Pump Type:</b>	ITT Goulds 12BF
<b>Pump Size:</b>	3 x 4-10
<b>Serial No.:</b>	G1162372
<b>Stages:</b>	1
<b>SG:</b>	1.00
<b>NPSHr:</b>	n/a
<b>Speed:</b>	3600 RPM



# Service and Support

Kennametal ToolBOSS™

## Kennametal ToolBOSS™

### Secure, High-Capacity Solutions

ToolBOSS™ quickly and consistently delivers quantifiable savings in hundreds of metalworking companies worldwide. Much more than a vending unit, the Kennametal ToolBOSS system is a secure, electronically locked tool storage cabinet that can establish 24-hour tool control for high-value items. It issues tools, returns tools, sends to re-work, supports EDI ordering, and provides for multi-vendor security.

### Efficiency

Multiple drawers can be selected in one transaction, minimizing the time required to manage large stock volumes.

### Future-Port

USB interface, as well as a DCS expansion port, for use with RFID and other ancillary equipment.

### High-Speed Access

Rapid search and selection of an item is enhanced with LED identification system, guiding users to the correct drawer.

### Traceability

Software provides a complete audit trail, tracking component usage details.

### Expandability

Expandable up to 10 units per system, providing up to 1,121 secure locations.



To learn more about ToolBOSS, contact your local  
Authorized Distributor or visit [www.kennametal.com](http://www.kennametal.com)



## Reconditioning Services

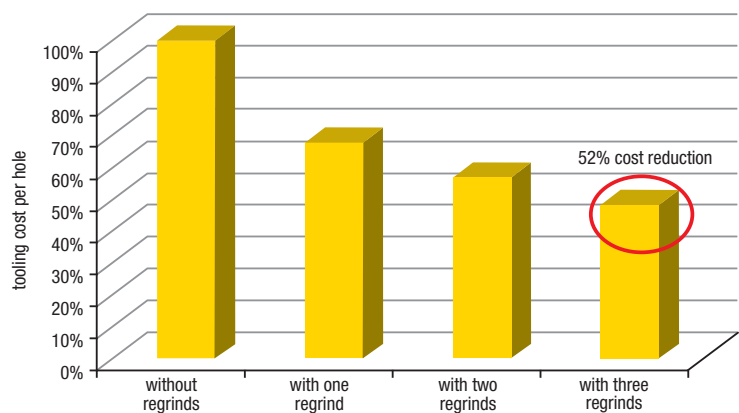
### Reconditioning Services

Our Reconditioning Services help optimize the total value of your metalcutting tools throughout their entire life cycle by giving the “like-new” performance characteristics — with rapid turnaround time — so the tools you need are always on-hand and perform just like new.



#### Reduce Tooling Cost by More than 50%

Example: 4" (10,5mm) HP-Drill B225A10500 KC7315 Material: Alloy steel 30 RC



Using Kennametal's Reconditioning Services provides considerable savings throughout the life of your cutting tools and can reduce your overall tooling costs more than 50%.

For more information or to find the nearest reconditioning location, contact your local Authorized Distributor or visit [www.kennametal.com](http://www.kennametal.com)

# Service and Support



## Carbide Recycling

Help Preserve and Protect Our Planet!

It's easy for your company to be environmentally conscious with the Kennametal Carbide Recycling Program.

By sending us your used carbide tools, you help preserve and protect the environment and ensure that these products are recycled responsibly. Kennametal accepts any coated or non-coated carbide items, including inserts, drills, reamers, and taps.

By using the Kennametal Carbide Recycling Program, you will receive:

- A partner who cares about a sustainable environment.
- Easy-to-use web portal to value your used carbide.
- Access to our popular Green Box™ options for carbide collection.
- Systematic and efficient disposal of carbide materials.
- Improved profitability.

*Program is not currently available in all geographical areas. For more information, please visit [www.kennametal.com/carbiderecycling](http://www.kennametal.com/carbiderecycling)*



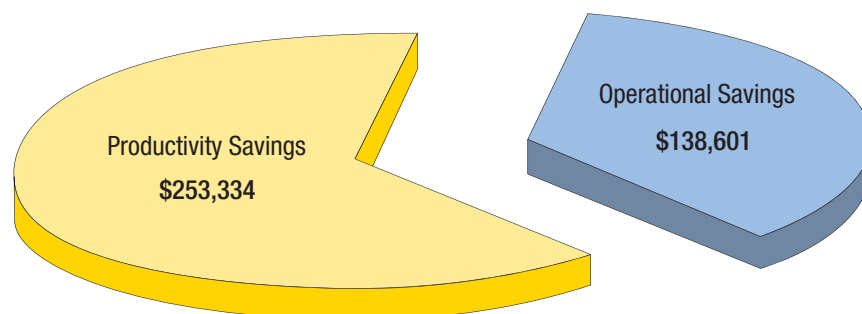
# Service and Support

## Cost per Part Services Program (CPP)

### Build a Long-Term Relationship with the Leader in Metalworking Solutions that Provides:

- Monthly cost savings documented and captured in standardized KPI reports.
- Availability of Kennametal's latest technology to increase productivity and lower cost of operations.
- Onsite technical support available on a constant basis.
- Billing based on the output of your plant that eliminates inventory risk.

**YTD Cost Savings Tracker**  
Site GOAL — \$300,000



### Cost per Part Services Programs Are Designed to Take Advantage of Our Wear Solutions Expertise by Outsourcing Your Metalworking Requirements that:

- Improve productivity.
- Reduce risk.
- Manage inventory.
- Lower operational costs.

For more information, contact your local Authorized Distributor or visit [www.kennametal.com](http://www.kennametal.com)

# Service and Support

## Customer Application Support (CAS)

### Customer Application Support

#### Get Fast and Reliable Answers to Your Toughest Metalcutting Problems

Our Customer Application Support (CAS) Team is the metalworking industry's leading help desk resource for tooling application solutions and problem resolution.

#### Easy Access to Proven Metalworking Expertise!

Kennametal Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of Kennametal tooling.

#### Service Level Excellence

- Fast telephone response.
- Quick technical solutions.
- Efficient case management.

#### Services

- Operating parameters.
- Process optimization.
- Hardware support.
- Tooling selection.
- Troubleshooting.

#### Best-in-Class Support Tools and Technology

- Materials database.
- Application calculators.
- Tooling performance experts.

#### Convenient Access Options:

Originating Country	Language	Phone	Fax	E-mail
Australia	English	1800 674037	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
Austria	German	0800 202873 *	0800 202874	eu-kmt.techsupport@kennametal.com
Belgium	English/French	0800 80850 *	0800 80868	eu-kmt.techsupport@kennametal.com
China	Chinese	440-889-2238	21-5834-2200	k-cn.techsupport@kennametal.com
Denmark	English	80889298*	80889296	na-kmt.techsupport@kennametal.com
Finland	English	0800919412 *	800919414	na-kmt.techsupport@kennametal.com
France	French	0805540367*	0805540028*	eu-kmt.techsupport@kennametal.com
Germany	German	0800 0006651 *	0800 0006649	eu-kmt.techsupport@kennametal.com
India	English	+1-724-539-6830	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
Israel	English	1809 449889	1809 449918	na-kmt.techsupport@kennametal.com
Italy	Italian	800 916561 *	800 917505	eu-kmt.techsupport@kennametal.com
Japan	English	0120 225429	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
Korea (South)	English	080 728 0880	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
Malaysia	English	1800 812 990 *	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
Netherlands	English	0800 0201130 *	0800 0201132	eu-kmt.techsupport@kennametal.com
New Zealand	English	0800 450941 *	0800 450921	ap-kmt.techsupport@kennametal.com
Norway	English	80010080 *	80010082	na-kmt.techsupport@kennametal.com
Poland	Polish	00800 4411887 *	00800 4411888	eu-kmt.techsupport@kennametal.com
Singapore	English	1800 6221031	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
South Africa	English	0800 981643 *	+1-724-539-6830	na-kmt.techsupport@kennametal.com
Sweden	English	20799246	20795474	na-kmt.techsupport@kennametal.com
Taiwan	English	0800 666 197 *	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
Thailand	English	1800 4417820 *	+1-724-539-6830	ap-kmt.techsupport@kennametal.com
United Kingdom	English	0800 032 8339 *	0800 028 5803 *	na-kmt.techsupport@kennametal.com
USA	English	800-835-3668 *	724-539-6830	na-kmt.techsupport@kennametal.com

\* Toll-free number.



## QR Codes

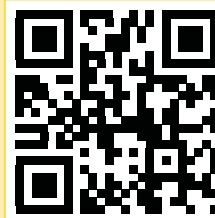
### Kennametal QR Codes

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Throughout the Kennametal Innovations Master Catalog Tooling Systems, you will find codes like the one shown here that will activate links containing more information about various products and services offered.

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# SHOP. BUY. PROMOTE.

Service and Support

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- 2 Click on the region to where your merchandise will be delivered.
- 3 Follow the region-specific instructions for ordering.



*\*Please note that the prices are adjusted by the region of delivery.*

Visit [www.kennametal.corpmerchandise.com](http://www.kennametal.corpmerchandise.com) to see all available merchandise and for ordering details.

