AUTOMOTIVE

SUSTAINABLE SOLUTIONS

Automotive Manufacturing and Advanced Materials for a New Generation

KENNAMETAL®

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AUTOMOTIVE

Kennametal leads the way with innovation, engineering, and service in standard and custom tooling.

ENVIRONMENTAL SUSTAINABILITY: A CORE VALUE

At Kennametal, we are deeply committed to designing and manufacturing environmentally responsible products that deliver high performance and proven value. With decades of experience in tooling and manufacturing, the synergies of superior engineering, leading technology, and tailor-made solutions offer customers some of the most effective opportunities for sustainable manufacturing in the industry. Our comprehensive range of products, convenient locations, and excellent customer service make Kennametal your complete supplier of sustainable automotive tooling solutions.

AUTOMOTIVE

Kennametal's intimate understanding of the economics of the automotive value chain enables us to offer unparalleled custom 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, leading to continued delivery of highly innovative ways to enhance your productivity. Certification to ISO 9001, QS 9000 TES, and VDA 6.4 guarantees 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 you identify new methods to improve your overall performance.

LESS ENVIRONMENTAL IMPACT

To learn more about our sustainable solutions for the automotive industry, contact your Kennametal Representative or Authorized Kennametal Distributor today.

ADVANCED MATERIALS

For more than 70 years, Kennametal has been recognized as the leader in delivering advanced material solutions.

We have a long history of developing superior coatings — more than 2,500 proprietary material grades.

Kennametal has set the global standard for material and coating combinations that are as efficient as they are environmentally responsible.

Kennametal is one of only three companies in the world that is able to produce titanium master alloys that meet the rigorous specifications of the aerospace industry. We leverage these technologies for our global automotive customers.

DID YOU KNOW

CUSTOMIZING AT THE MOLECULAR LEVEL: KENNAMETAL SUPER ALLOYS

Turbocharger manufacturers throughout the world rely on Kennametal's proprietary refinement technologies to deliver APF super alloys, a fine-grain structure that offers improved corrosion resistance, reduced heat transference, and excellent ductility for high-impact strength.

Our knowledge of refining and customizing materials enables Kennametal to deliver automotive solutions that satisfy future requirements for emissions control and next-generation fuel technologies.

FROM TOOLING TO TURBO TO HYBRIDS: ADVANCED CERAMICS

Kennametal is the leader in development and manufacturing of engineered ceramic components designed for automotive applications.

We specialize in solving wear problems by engineering and installing customized systems made from the world's toughest ceramic materials. Kennametal develops proprietary ceramic-metallic (cermet) materials that are lighter than steel and provide exceptional performance and functionality over metal wear systems.

THE SUPERHARDS: PCD AND PCBN

The rigorous conditions encountered in synthesizing and depositing Polycrystalline Diamond (PCD) and Polycrystalline Cubic Boron Nitrides (PCBN) require specialized materials and knowledge. With more than 1,100 highly trained research scientists and engineers in four global technology centers, our customers trust us to evaluate their special needs and tailor a superhard material solution for their individual applications.

By improving process efficiency, we not only save our customers money, but we also improve the use of our planet's scarce resources.

KENNAMETAL TUNGSTEN CARBIDE: THE HALLMARK SOLUTION FOR EXTREME WEAR PROBLEMS

Ideal for countless automotive applications, Kennametal Tungsten Carbides possess unique engineering properties that often outlast tool steel and other wear materials by as much as 10:1. They are used for parts that must withstand deflection, deformation, extreme wear, impact, corrosion, heavy loading, and high temperatures.

Because we process our own powders from well-known and trusted raw material sources, Kennametal Tungsten Carbides ensure the highest quality — from start to finish.

Our submicron grades have a much finer grain and a more uniform structure than those of our competitors. The resulting higher hardness improves wear resistance, strength, and toughness.

ULTRA-PURE MATERIALS: DELIVERING SERIOUS REFINEMENT TECHNOLOGY WITHOUT WASTE

In manufacturing, one of the best ways to meet present needs without compromising the future is to control the raw material stream. Kennametal has taken this concept one step further.

Our proprietary processing methods enable us to remove impurities from raw materials that might otherwise be discarded. Aluminum, chromium, molybdenum, and other specialty metals are refined to perfection and never wasted.

SURFACE TECHNOLOGIES

Automotive component surfaces are one of the key battlegrounds in environmentally friendly manufacturing.

Surface treatments not only improve the appearance of the part, but also enhance its wear resistance, provide corrosion protection, and improve friction control.

These subtle manufacturing enhancements can provide big dividends in the form of fuel efficiency, reliability, performance, and longer part life.

KENNAMETAL EXTRUDE HONE™ MEANS PRECISION FINISHING

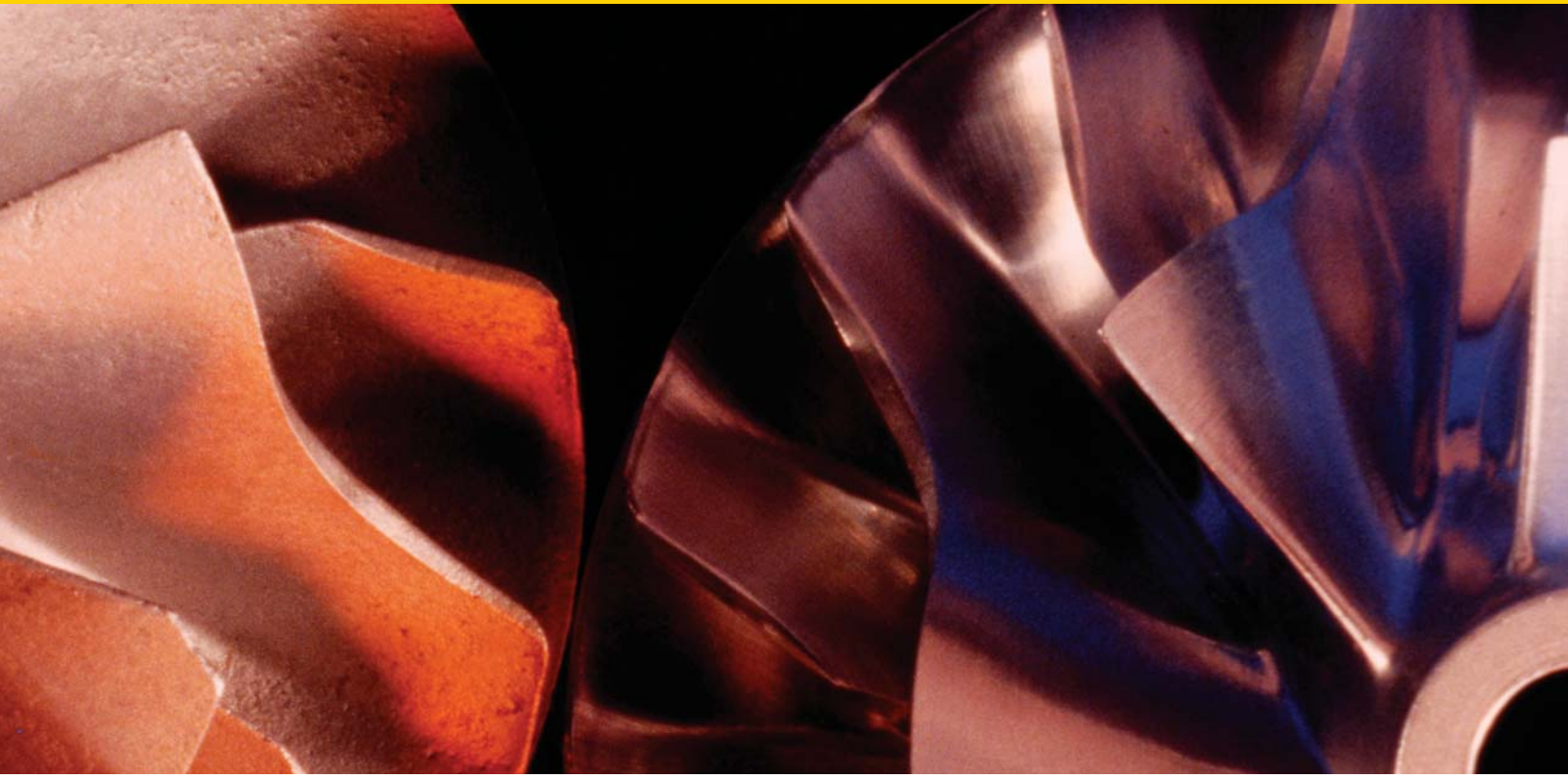
The world's leading provider of advanced manufacturing processes that produce some of the highest-quality engineered surfaces and edges on the planet, Kennametal Extrude Hone™ offers a menu of technologies and equipment for deburring, polishing, and producing controlled radii in automotive parts.

Any surface that meets fluid, fuel, and airflow can be improved through various proprietary technologies, including abrasive flow machining, electrolytic machining, and thermal energy methods of machining.

By processing housings, impellors, and turbines in turbochargers, for example, performance can be dramatically improved. Airflow efficiency can be increased by as much as 5% and the superior surface finish also provides increased strength and improved reliability for reduced environmental impact.

Kennametal continues to lead the industry with innovative modeling techniques, setting the standard for customized coatings that are as efficient as they are environmentally responsible.

DID YOU KNOW



CORROSION, ABRASION, AND EROSION ARE NO MATCH FOR KENNAMETAL CONFORMA CLAD™

Kennametal Conforma Clad™ is the leading global provider of wear protection solutions to high-performance industrial markets.

Our brazed tungsten carbide cladding significantly increases equipment life in extreme environments and works best when exposed to multiple modes of failure, including corrosion, abrasion, and erosion.

With next-generation fluid application processes, we are able to treat blind or enclosed surfaces on a wide variety of parts, including turbochargers and pump housings.

LEADING TECHNOLOGY IN PHYSICAL AND CHEMICAL VAPOR DEPOSITION

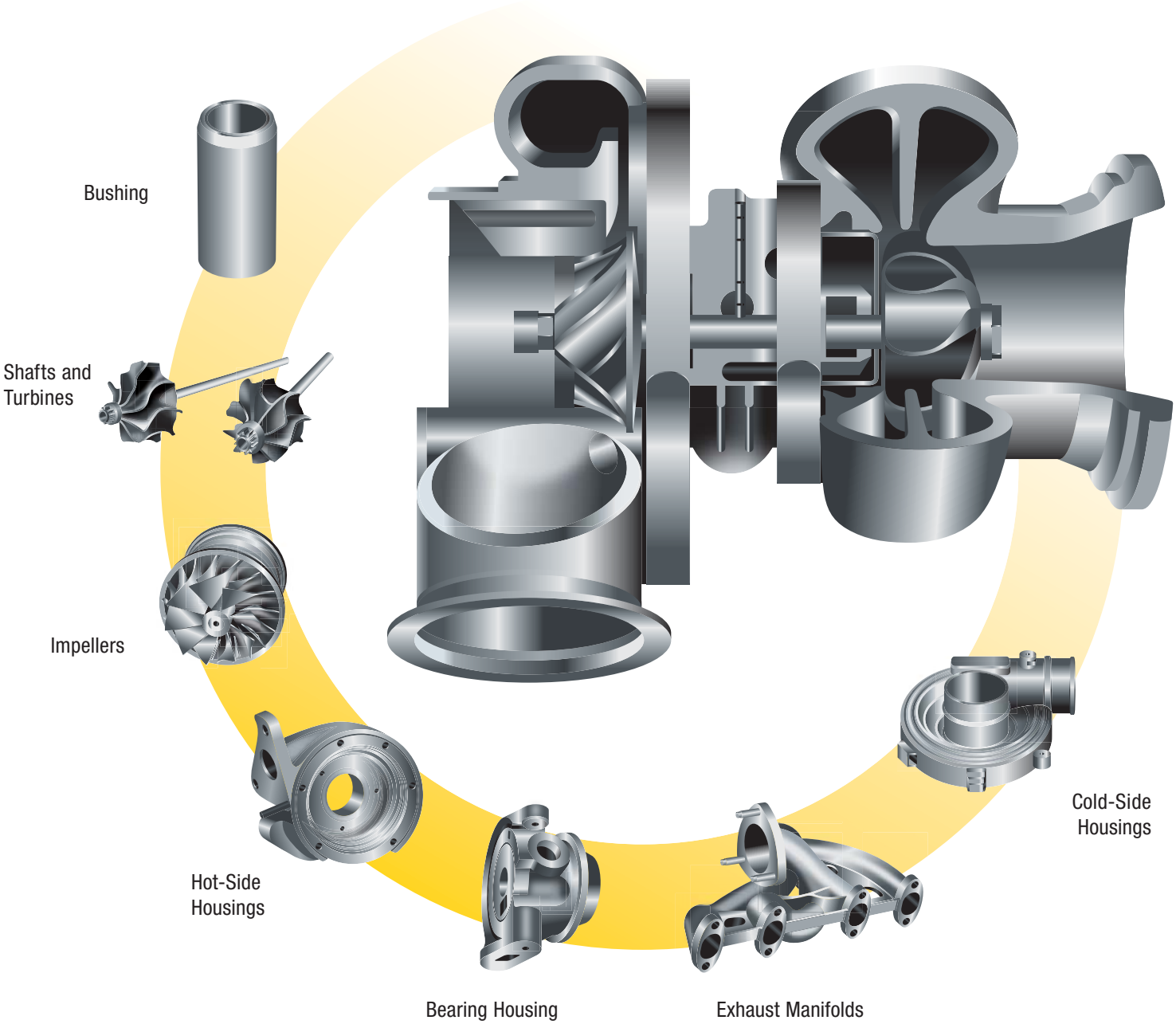
Kennametal is known throughout the industry for our expertise in PVD and CVD coatings, as well as nanolayer systems. Most coatings have high temperature tolerances, good impact strength, and excellent abrasion resistance.

They are so durable that protective topcoats are rarely necessary. We use a wide variety of organic and inorganic coating materials on a diverse range of substrates that provide many different finish options.

Kennametal continues to lead the industry with innovative modeling techniques, setting the standard for customized coatings that are as efficient as they are environmentally responsible.

TURBOCHARGERS

To combat the technical causes of black exhaust, an automotive engine must have enough air for complete combustion. Turbocharging, often featured on diesel engines, performs this role.



To recycle the waste energy from the exhaust, a turbocharger forces more air into the combustion chamber. Increased delivery of oxygen results in a cleaner combustion cycle, generating reduced greenhouse gases and more power at each engine speed.

Kennametal's automotive engineers offer legendary expertise in turbocharger manufacturing. Our proprietary powder metal grades are designed to withstand the most punishing hot-side environments with superior efficiency.

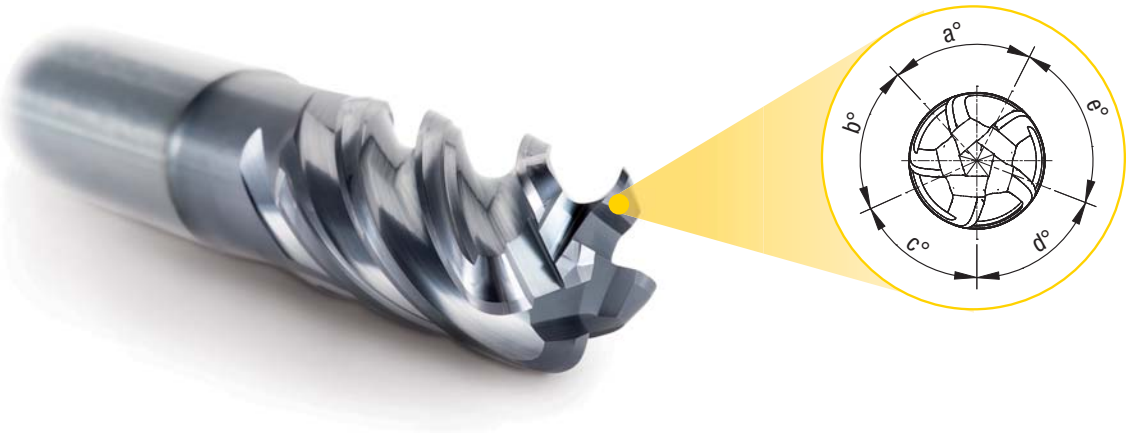
No other company offers our complete mix of metal shaping, surface finishing, surface technology, and advanced materials components specifically designed for the turbocharger industry.

SHAFTS & TURBINES

The assembly of the shaft and turbine is a welded combination of two materials (steel and INCONEL®) providing toughness for the shaft and high operating temperatures (up to 1000 °C) for the turbine.

Tight tolerances between the turbine and housing require exact profile finishing of the turbine component.

The precise balancing of the assembly is equally important, because of very high RPM (up to 300,000).



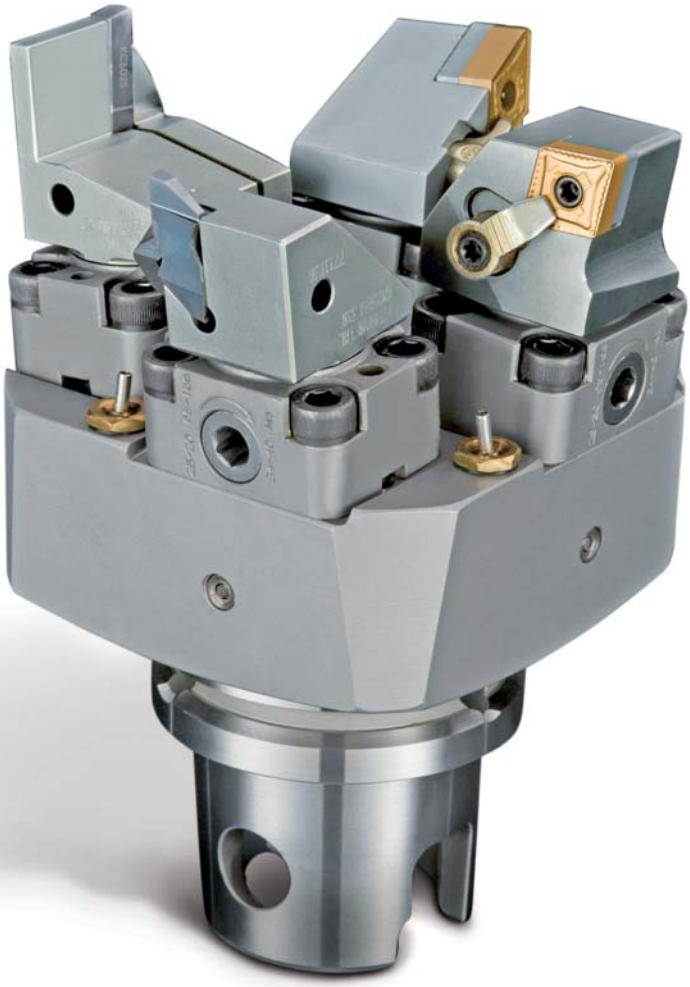
MILLING

VARIMIL II™

- Distinguished precision and tool life in conjunction with high speeds and feeds.
- The next generation in high-performance machining.
- High metal removal rates in high-temperature alloys.

NEW!

NEW!



TURNING

BEYOND™ — EXCEEDING EXPECTATIONS

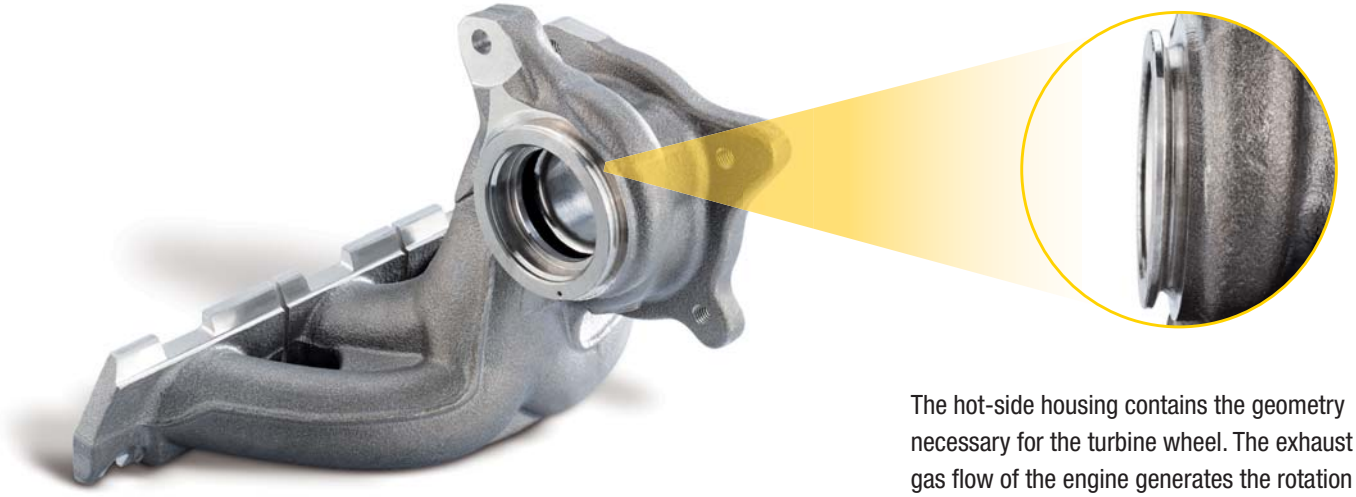
- Beyond delivers superior productivity.
- Experience a new level of predictable and dependable tool life.

TURNING

KM™ MULTI-STATION TOOL

- Increases tool capacity without the added expense of magazine expansion.
- Reduces cut-to-cut time by performing several operations with one tool.

HOT-SIDE HOUSING



The hot-side housing contains the geometry necessary for the turbine wheel. The exhaust gas flow of the engine generates the rotation of the turbine wheel.

The profile grooving operation for the assembly clamping band is often challenging due to accessibility issues, especially at integrated manifolds.

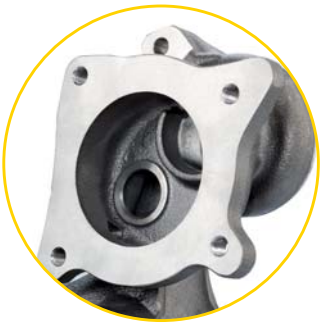
Hot-side housing material consists of either high-temperature cast iron or high-temperature alloy.

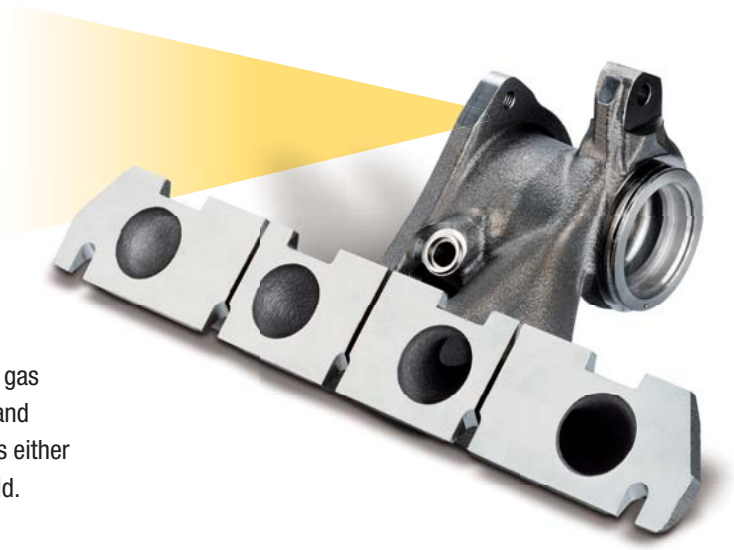
V-GROOVE MACHINING

MILLING OR TURNING

- Special milling cutter with profile inserts enables short process time and easy-to-use tooling for machining centers.
- Special turning tool with profile insert for lathes enables short process time and is appropriate for applications where accessibility is a challenge.
- Three cutting edges per insert guarantees cost-efficient production.

EXHAUST MANIFOLDS





The exhaust manifold pools the exhaust gas on the exit of the combustion chamber and directs it to the turbine housing, which is either integrated in, or attached to, the manifold.

MILLING

FACE AND 90° FACE MILLING CUTTER

- Twelve true cutting edges per insert enable cost-efficient high speeds and feeds with lower overall cutting forces.
- 90° face milling cutter with super positive cutting rake for minimized vibrations in low power requirement applications.

BEARING HOUSING

The bearing (or center) housing accommodates the seals and bearing elements of the turbocharger. The cold- and hot-side housings are attached to the bearing housing, while the turbine shaft run centrally through them both.

Burr-free operations are important for the oil and water ways and the quality of the sealing surfaces. The precision of the central bearing hole is also of major importance. Material is gray cast iron.

HOLEFINISHING

RHM MODULAR REAMER

- Modular Reaming heads with high-precision KST interface (Kennametal Short Taper).

HOLEMAKING

SLIMLINE HYDRAULIC CHUCK WITH HP-DRILL

- The extended length of these hydraulic chucks and their slim shape make them the perfect solution for hard-to-reach applications.

HOLEFINISHING

RIQ GUIDE PAD REAMER

- The serrated four edge insert sits on high-precision splines, making setting easier.
- Only one adjusting screw needed.

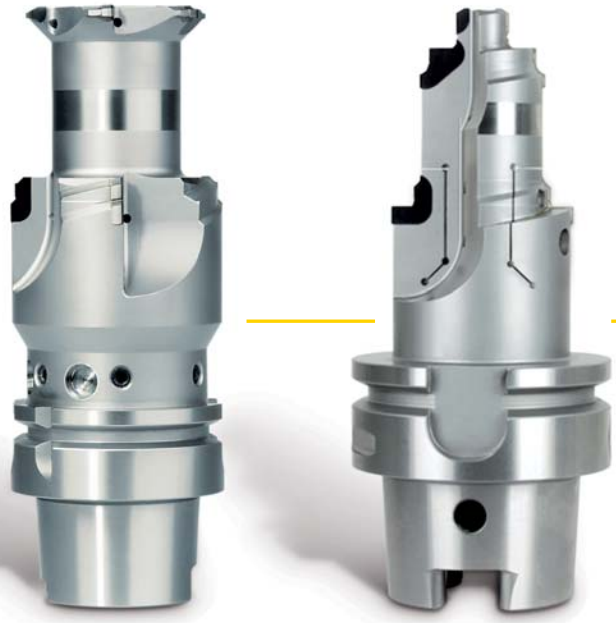
TAPPING

BLIND HOLE TAPPING

- Kennametal provides all the tools you need to create and finish the hole, including reaming, boring, and tapping.

TRANSMISSION HOUSINGS

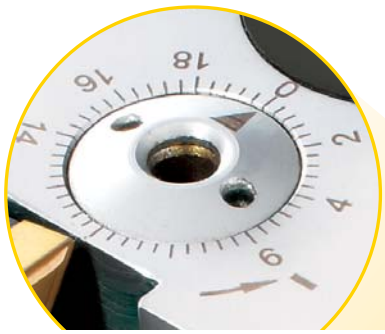
Choose Kennametal tooling for complete machining of car, truck, or general transmission housings on machining centers or transfer lines made of various aluminum alloys.



90° INTERPOLATION MILLING

PCD STEP COUNTERSINKING AND PCD COMBINATION TOOL

- For pre- and finish-machining and high surface finishing.
- Adjustable diameter.
- Wiper inserts available for fine finishing.
- Advanced cutting parameters reduce cycle time.
- Vc = 300–1500 m/min (650–820 ft/min)
  Vf = 6 m/min (20 ft/min)



Presetting with dial screws individually for each edge. One click, one micron.

HOLE FINISHING

MULTICRON

- Wear compensation via central dial. Adjusts simultaneously all cutting edges, manually, or fully automatic.
- Automatically adjust with the CLB (Close Loop Boring) process.

CYLINDER BLOCKS

Choose Kennametal on machining centers or transfer lines for machining car, truck, and stationary engine blocks made from materials such as cast iron, CGI, and aluminum.

BREAKTHROUGH FACE MILLING IN CAST IRONS

DODEKA AUTOMILL

- First choice for milling centers and transfer lines.
- Twelve effective cutting edges per insert.
- Real, soft cutting ensures lower spindle load.
- Tailor-made automotive standard inserts.
- High-performance Beyond™ grades for excellent tool life.
- Same tool for roughing and finishing.
- Easy-to-use wedge clamping.
- Cutters with 45° and 60° lead angle suitable with one insert style.

90° INTERPOLATION MILLING

CBN AND PCD INSERTS

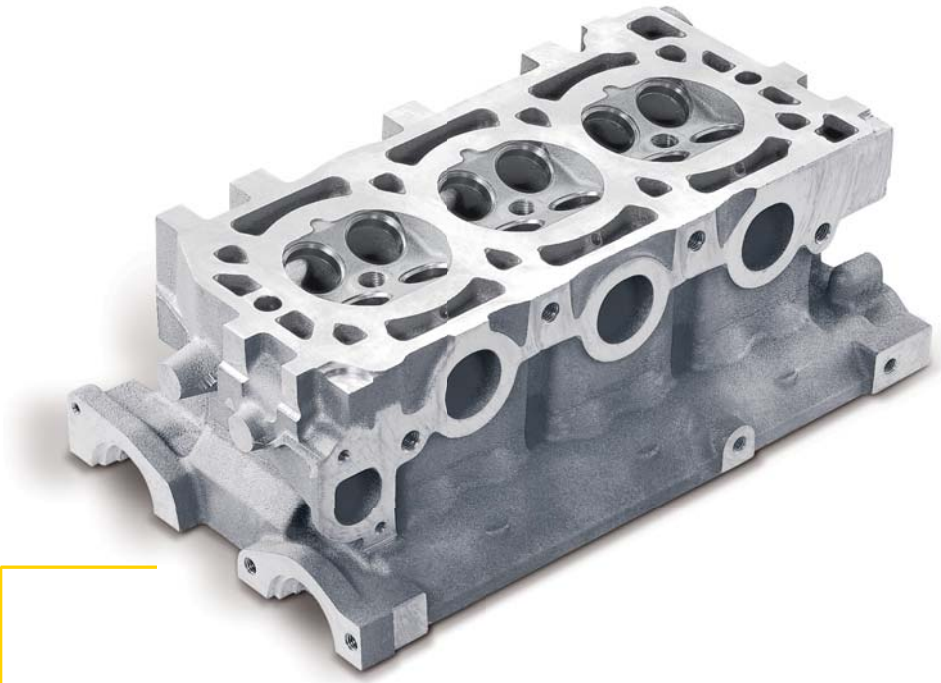
- Ultra-hard cutting material.
- Adapted grades, coated and uncoated, for each application.
- Solid, full face, and tipped inserts.
- Wiper inserts available for fine finishing.
- Advanced cutting parameters reduce cycle time.

CRANK BORE FINISHING

QUATTRO CUT™ (RIQ™) REAMER

- Z = 4 for semi-finishing.
- Z = 4 for finishing.
- Z-Feed increased by factor 4.
- Four cutting edges per insert.
- KST (Kennametal Steep Taper) interface for highest precision enables reamer head design.
- Easy to preset, avoiding adjustment of the back taper.

CYLINDER HEADS



Choose Kennametal on machining centers or transfer lines for machining car, truck, and stationary cylinder heads made from materials such as cast iron, CGI, and aluminum.

90° INTERPOLATION MILLING

PCD AND CBN TOOLING

- Highest productivity and accuracy with long tool life and reduced tooling costs.
- Secure process control and closest achievable tolerances.
- Increase overall quality and reduce scrap rate and inspection costs.

VS & G (VALVE SEAT & GUIDE) PARENT BORE FINISHING

BRAZED PCD REAMER

- Z = 4 for Valve Seat.
- Z = 4 for Valve Guide.
- Shrink-fitted hybrid steel/solid carbide body for highest stiffness.

VS & G (VALVE SEAT & GUIDE) FINISHING

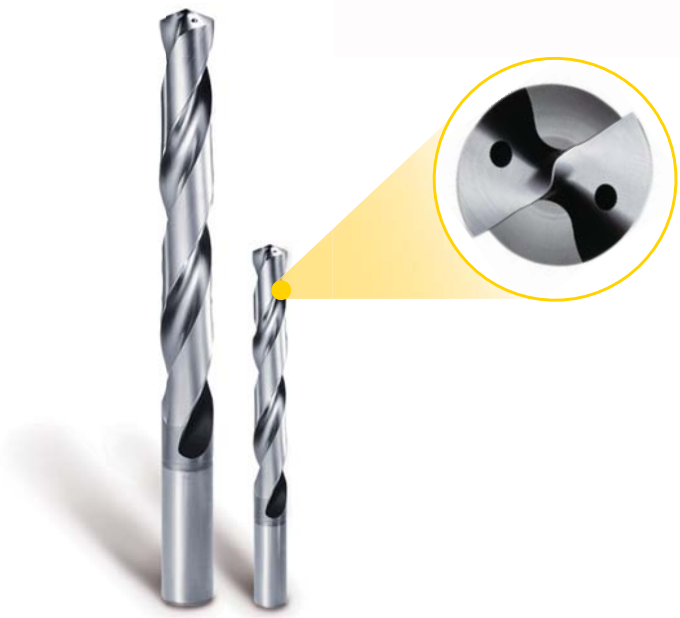
QUATTRO CUT™ TOOL

- One type of RIQ™ insert for all angles.
- 3 uses per edge x 4 edges per insert = 12 uses per insert.
- Available in solid carbide and CBN grades for lowest costs per part (CPP).
- Integrated hydraulic chuck for highest run-out accuracy between seat and guide.
- Simple cylindrical shank for guide reamer.
- Guide reamer available as: RIR™-guide pad reamer or solid carbide multi-flute reamer.

CONNECTING RODS

Get your holemaking costs under control.

Choose Kennametal tooling on machining centers or transfer lines for complete machining of connecting rods, in steel and sintered steel.



HOLEFINISHING

RHM MODULAR REAMER

- RHM modular reaming tools.
- Helical fluted heads.

HOLEMAKING

HP SOLID CARBIDE DRILLS

- High speeds and feeds.
- Superior cost savings, longer tool life, and high precision.

HOLEMAKING

MULTI-FUNCTION SEMI-FINISHING TOOL

- RIQ Reamer combined with PCD Reamer.
- Easy, fast, and precise setting.
- Very cost effective.

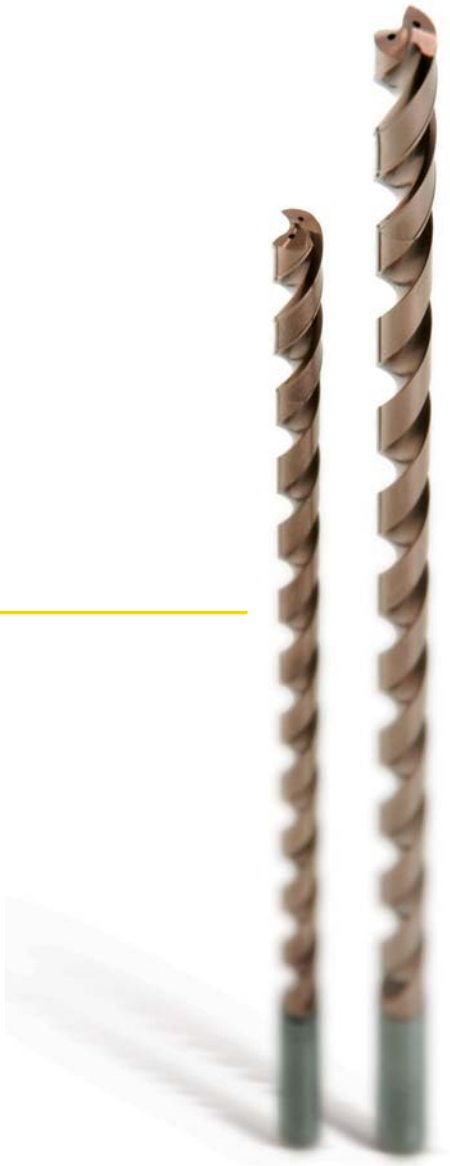
COUNTER SINKING

MULTI-FUNCTION SEMI-FINISHING TOOL

- Drilling, countersinking, and chamfering combined.
- Special design for easy setup.
- Increases your productivity.

CRANKSHAFTS

Choose Kennametal tooling on transfer lines with gauging equipment for complete machining of crankshafts made of various materials such as cast iron and steel.



INDEXABLE MILLING

DEEP HOLE DRILL

- Double your chip removal rate with two effective teeth; replace drills with just one effective edge.
- Wide range of standard and semi-standard drills available to cover all the needs of the car and truck industry.
- D = 3,0–16,0mm
  Length = 15, 20, 25, 30 x D as standard.
- Cutting conditions within a range of vc = 80–160 m/min, fz= 0,10–0,25mm.

TURNING

TANDEM TURN BROACHING

- Engineering available to complete the entire process.
- One cutter style to cover all possible processes at the bearings, including roughing, semi-roughing, and finishing.
- Single-disk design or multi-disk drums available.
- Customized but semi-standard insert design to meet customer needs most economically.
- Positive to negative rake angles based on process needs.
- Cutting conditions within a range of vc = 140–600 m/min, hmax= 0,10–0,30mm.

INDEXABLE MILLING

INTERNAL MILLING CUTTER

- Engineering available to complete the entire process.
- One cutter style to cover all possible processes at the bearings, including roughing, semi-roughing, and finishing.
- Single-disk design or multi-disk drums available.
- Customized but semi-standard insert design to meet customer needs most economically.
- Positive to negative rake angles based on process needs.
- Cutting conditions within a range of vc = 120–250 m/min.

INDEXABLE MILLING

HIGH-SPEED EXTERNAL MILLING

- Engineering available to complete the entire process.
- One cutter style to cover all possible processes at the bearings, including roughing, semi-roughing, and finishing.
- Single-disk design or multi-disk drums available.
- Perfect balance of ISO-standard inserts and customized design to meet customer needs most economically.
- Cutting conditions within a range of vc = 80–300 m/min, fz= 0,05–0,50mm.

STEERING KNUCKLES

Choose Kennametal for machining steering knuckles made of cast iron, forged steel, or aluminum, such as those used in car and truck swivel bearings.

INDEXABLE TAPER DRILL AND RIR TAPER REAMER

- Standard inserts deliver optimum performance and eliminate reconditioning.
- Best in productivity and cost per part.

COMBINATION OF MILLING AND DRILLING (INTEGRATED HYDRAULIC CHUCK)

SLITTING GANG MILL CUTTER

- Highest possible runout for drilling.
- Four operations in one tool: milling, drilling, chamfer forward, and chamfer backward.
- Minimize tool change time and increase production.

PRECISION HOLE FINISHING RIR™ AND RIQ™ SINGLE-BLADE REAMING

- Very high speeds and feeds.
- Significantly increase your performance.
- Regrinding possible.

CALIPERS

Choose Kennametal on machining centers for machining calipers manufactured from cast iron and aluminum.

W-LINE TOOL

Countersinking tool for finishing and face chamfering of piston bore and machining axial grooves.

- Time-saving combination tool.
- Wiper inserts available for fine finishing.
- Advanced cutting parameters reduce cycle time.

CIRCULAR MILLING TOOL

Seal groove tool with heavy metal.

- Three useable cutting edges.
- Less vibration.
- Wiper inserts available for fine finishing.
- Advanced cutting parameters reduce cycle time.

DID YOU KNOW

Kennametal's tungsten carbide grade K3109 is an industry standard for use in backward extrusion punches. Parts produced include wrist pins, bearing races, valves and valve tappets, sparkplug shells, bearing retainer cups, and propeller end shafts. With an average tool life of 35,000 to 500,000 pieces and pressures of 450,000 psi, this grade can also be sinter-HIP processed for additional strength.

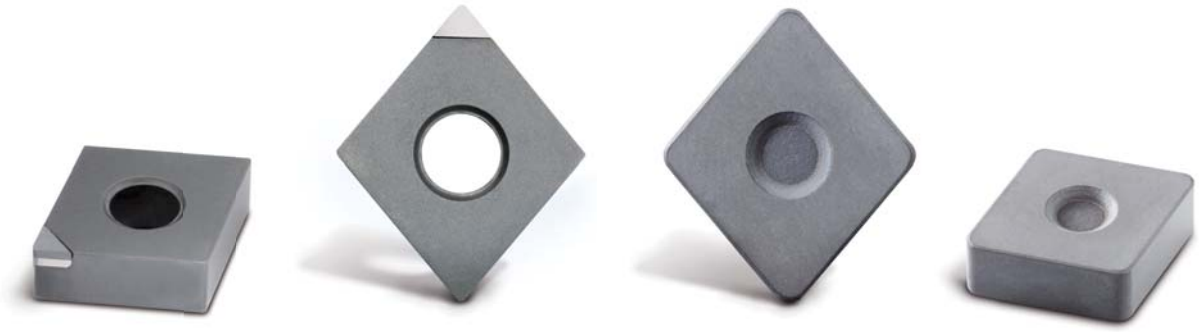
ONE SHOT TOOL

Bore piston in one step.

- Four useable cutting edges.
- Easily adjustable to save time.
- PCD guiding pads.

BRAKE DISCS

Metal matrix composites are well known for their excellent strength-to-weight ratios and good mechanical properties. However, high manufacturing costs and poor machinability due to the combination of the abrasive nature of the reinforcement component (e.g., SiC) and adhesion to leading metal compounds makes achieving high productivity levels a challenge.



90° INTERPOLATION MILLING

CBN AND PCD INSERTS

Ultra hard cutting material.

- Advanced cuttings speeds >2000 m/min.
- Advanced cutting parameters reduce cycle times.
- Grade KB1340 solid inserts for roughing.
- Dimple clamping ensures tight and rigid clamp.
- Grade KB1345 with wiper for fine finishing.
- Grade KD1405 for machining MMC.

DRILLING

PCD DRILL

Polycrystalline diamond-tipped drills (PCD) achieve:

- Highest productivity for all aluminum alloys.
- Low adhesion and less built-up edges.
- High abrasive resistance to successfully machine high-silicon content aluminum due to adjusted PCD grades.
- Excellent hole quality and hole finish.
- Excellent chip removal due to highest-quality surface engineering in the flutes.
- Can be applied in flood coolant or MQL applications.

DRILLING

Y-TECH DRILLS

Solid carbide Y-tech style drills achieve:

- Excellent hole tolerance due to the unequal cutting edge spacing and three-margin design concept.
- Can be applied in flood coolant or MQL applications.
- Helix angled flutes enable excellent chip removal.
- Highest productivity for all aluminum alloys.
- Low adhesion and less built-up edges due to adjusted grades.

SUSTAINABLE ENGINEERING

Kennametal leads the way with innovation, engineering, and service in standard and custom tooling.

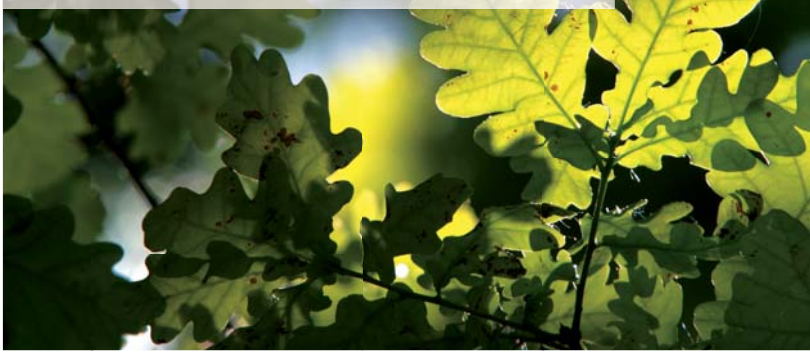
A proven methodology and partnership.

Successful project engineering requires planning, teamwork, and disciplined execution. Through our extensive experience in developing and implementing new project engineering strategies, Kennametal has pioneered a proven methodology to help you manufacture new products and bring them to market quickly. Service deliverables are carefully outlined and jointly agreed to before the project begins. We formally evaluate progress and results with you throughout the project through our stage-gate management system.

Kennametal can provide your engineering teams and machine tool builders with process engineering support, advanced metalcutting technologies, and project management expertise to help you achieve your sustainability goals. With our best-in-class process, you'll experience accelerated time-to-market, lower overall costs, and reduced risks to implement new technologies.

DID YOU KNOW

Kennametal has more than 700 highly trained and innovative research scientists and development engineers. They are creating new advanced materials for demanding applications and are designing proprietary components that deliver superior performance to our customers.



DISCOVERY AND PROPOSAL DEVELOPMENT

- Review project needs with customer and/or machine tool builder
- Customer decision gate: Request proposal

PROPOSAL PRESENTATION

- Discuss how Kennametal can be of service
- Customer decision gate: Request proposal

BUILD PROJECT PLAN

- Clarify technical and commercial aspects of projects
- Develop engineering and project schedule
- Approve drawings

PROJECT PLAN APPROVAL

- Present drawings and confirm order
- Customer decision gate: Approve project plan and deliverables

EXECUTION

- Manufacturing
- Procurement
- Project management
- Assembly
- Pre-setting
- Balancing
- Inspection
- Shipping
- Training
- Run-off support

ACCEPTANCE

- Review performance versus contract
- Customer decision gate: Formal acceptance

PRODUCTION RAMP-UP ASSISTANCE

- Support program launch schedule by assistance in spare part and consumable procurement planning, and further process optimization

KENNAMETAL COMPLETE™

Our Kennametal Complete™ Program addresses overall manufacturing productivity with advanced services and a network of strategic alliance partners that will enable you to significantly improve your productivity and profitability.

PROCESS OPTIMIZATION

Kennametal Process Optimization Services include:

- Tool selection, application, standardization, and design.
- Workholding and standardization to reduce inventory.
- Operation consolidation to maximize value.
- Lean principles to minimize waste.
- Process sequencing to create flow.

CARBIDE RECYCLING

Logistics Made Simple

It's easy for your company to be environmentally conscious, and there's an added incentive: It is profitable. Through our Carbide Recycling Program, Kennametal will purchase your used carbide (tooling credits available depending on region).

NEW PROJECT ENGINEERING

Using Innovation to Create a Competitive Advantage

Kennametal's New Project Engineering Services have supported the successful launch of hundreds of new manufacturing lines worldwide in the automotive, aerospace, heavy equipment, general engineering, refrigeration equipment, railroad equipment, and marine sectors.

Our Value-Added Services include:

- Lean process development.
- Custom tooling.
- Cost assessments.
- Scheduling, monitoring, and procurement.

SUPPLY CHAIN SERVICES

Why should you use Kennametal supply Chain Services?

Faster Results — Our proven expertise means we can help you to identify needs, provide solutions, and achieve measurable results quickly and cost effectively.

Disciplined Project Execution — We have implemented hundreds of customized supply chain programs with major manufacturers worldwide, achieving impressive efficiency gains, cost reductions, and other related benefits.

EDUCATION

The Kennametal Knowledge Center Supports your efforts to improve productivity and reduce costs by giving you access to:

- Comprehensive engineering courses.
- Industry- and application-specific courses.
- Customized onsite programs and self-paced e-learning.

TOOL RECONDITIONING

Kennametal Reconditioning Services help you optimize the value of your metalcutting tools throughout their service lives by giving them "like-new" performance characteristics — in rapid turnaround time — so the tools you need are always on-hand.

COMPREHENSIVE SERVICE PROGRAM

Through the Kennametal Complete Comprehensive Services Program, we build partnerships that focus on delivering year-over-year productivity improvements through integration into your engineering and production processes via:

- Continuous on-site optimization.
- Concurrent new product/project engineering.
- In-plant logistics.

KENNAMETAL

AUTOMOTIVE

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