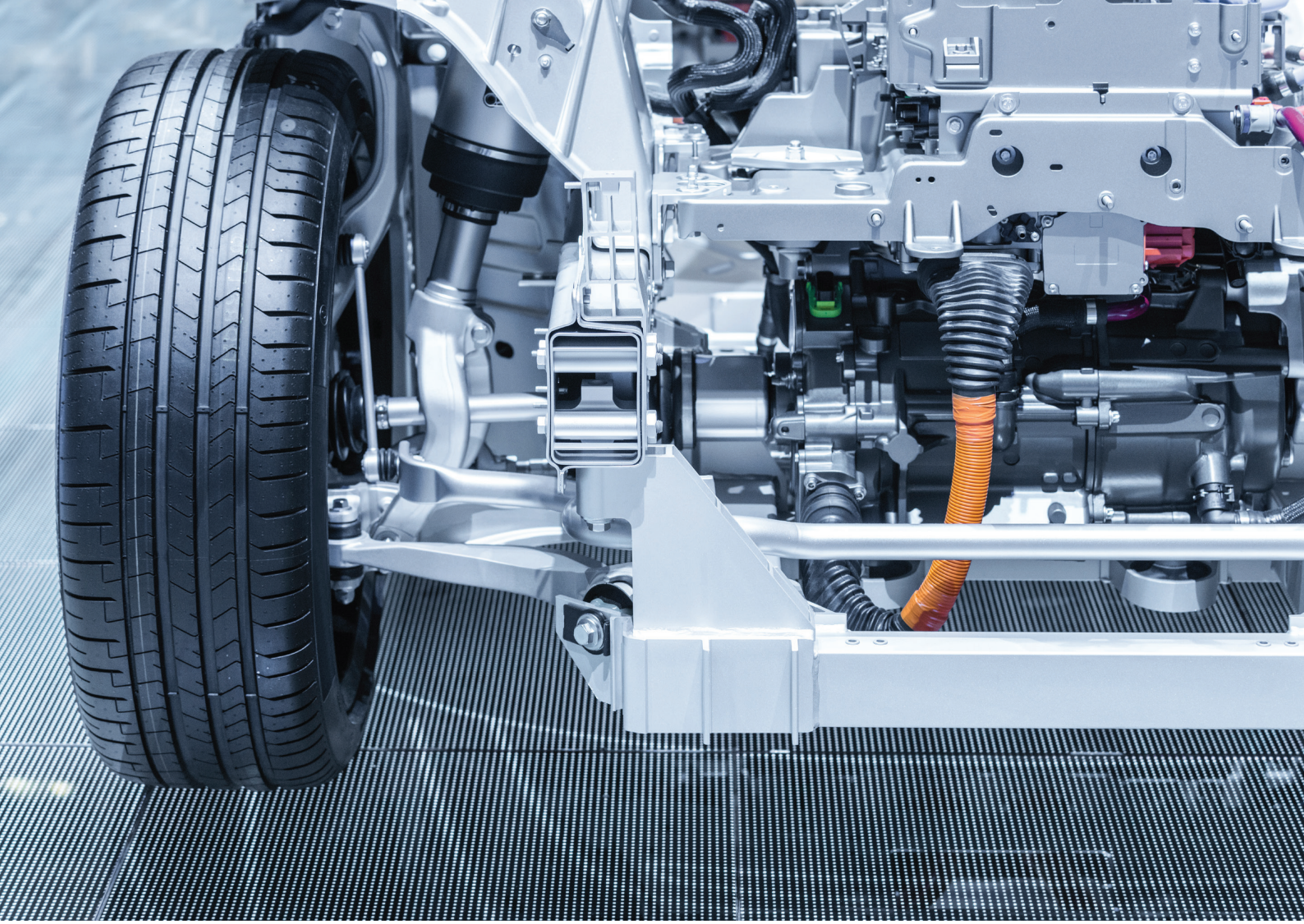
KENNAMETAL®

ACCELERATING INNOVATION. POWERING POSSIBILITIES.

Supercharge Your Machining with Our Cutting-Edge Solutions

kennametal.com/EV



Introduction

Kennametal has been responding to the rapidly growing consumer demand for hybrid and electric vehicles (EVs). We have the tooling solutions you need for working on commonly used hybrid and EV materials like aluminum alloys, quenched and tempered steel and composite materials. We've mastered delivering the lightness and precision necessary for manufacturers to eliminate weight, drag and friction in common hybrid and EV components like battery housings, transmission components and electric drive unit components.

We've been a global leader in automotive machining for more than 80 years, engineering varying components, from crankshafts to structural components for customers around the world. Today we continue to partner with machine tool builders (MTBs) and original equipment manufacturers (OEMs) to lead the charge in hybrid and EV solutions. We have the innovative tooling, global partnerships and experienced application support you need to evolve your operations and drive your productivity.

Supercharge Your Machining with Our Cutting-Edge Solutions

kennametal.com/**EV**

CORE CAPABILITIES IN EV & HYBRID TOOLING

It may seem complicated to adapt to the needs of the e-mobility market, but Kennametal is fully equipped to support your projects with innovative, precision-based tools and CNC know-how.

Automotive Expertise Powered from the Core

No one knows automotive machining like Kennametal. Our legacy is built on accuracy, speed, versatility and deep materials science. We can enhance your hybrid and EV capabilities with custom and standard tooling solutions that put your operations in the fast lane.

Skilled in Aluminum Machining

EV and hybrid means lightweight materials. We know how to work with the soft properties of aluminum and machine at higher spindle speeds to avoid disruptive warping while accomplishing outstanding surface quality that requires no deburring—driving your productivity.

Building Better with Dynamic Partnerships

Manufacturers choose to partner with us because of our established relationships, built over decades, with key customers, MTBs, suppliers and OEMs who work with us to support the industry's heightened focus on hybrid and EV production.

Global Application Support

Local MTBs, OEMs and suppliers count on our global application support team and you can too. We are ready to engineer solutions for your complex machines, fixtures and workpiece conditions in more than 60 countries.

PCD Tooling

The rigorous conditions associated with synthesizing and depositing Polycrystalline Diamond (PCD) require specialized material and knowledge. With hundreds of highly trained research scientists and engineers in four global technology centers, you can trust us to evaluate your needs and tailor a superhard material solution for your applications.

Process Optimization

We are prepared to assist you from tool selection to application to standardization and design strategically to reduce inventory, maximize value, minimize waste and improve process flow.

New Project Engineering

The innovation that drives us can secure you a competitive advantage when it comes to launching new manufacturing lines. We offer lean process development, custom tooling, cost assessments and scheduling, monitoring and procurement.

Reconditioning Services

Reconditioning services are a sustainable way to stretch tool life for reliability and increased profitability in your operations. We evaluate tools to be reconditioned based on wear and have a rigorous and robust process to ensure quick turnaround to deliver a product that closely matches original performance. Reconditioned tools can result in savings of up to 50%.

Reconditioning capabilities at our global facilities include:

Solid carbide drills
*Recondition up to **5 times***

Modular drills
*Recondition up to **2 times***

Solid carbide end mills
*Recondition up to **3 times***

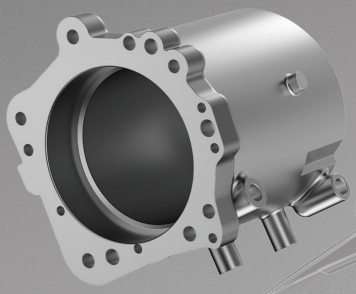
PCD tools
Retipping and regrinding

We've Been Cutting Metal Since 1938.

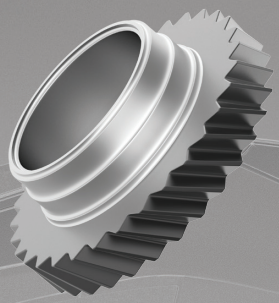
Our Story Is One of Continuous Innovation

It starts in 1938 with our founder, metallurgist Philip M. McKenna, who after years of research created revolutionary tungsten-titanium carbide alloy cutting tools specifically for working with steel. That single development not only led to a new class of machining tools that cut faster, lasted longer and drove productivity in everything from the automobile to the airplane, but also led to the opening of McKenna Metals Company in Latrobe, Pennsylvania, United States. Today, that company is Kennametal Inc.—a recognized leader in metalworking serving customers across continents and industries including transportation, construction, aerospace and defense, machining and cutting, energy and general engineering. We have a reputation for building innovative solutions for our customers' most challenging applications. The name Kennametal is synonymous for high-quality, high-performance tools that can withstand the most strenuous conditions and bring ease to a wide range of machining operations. We help our customers' operations run longer, faster and with greater precision. We don't cut corners. We cut metal. Your toughest materials don't stand a chance.

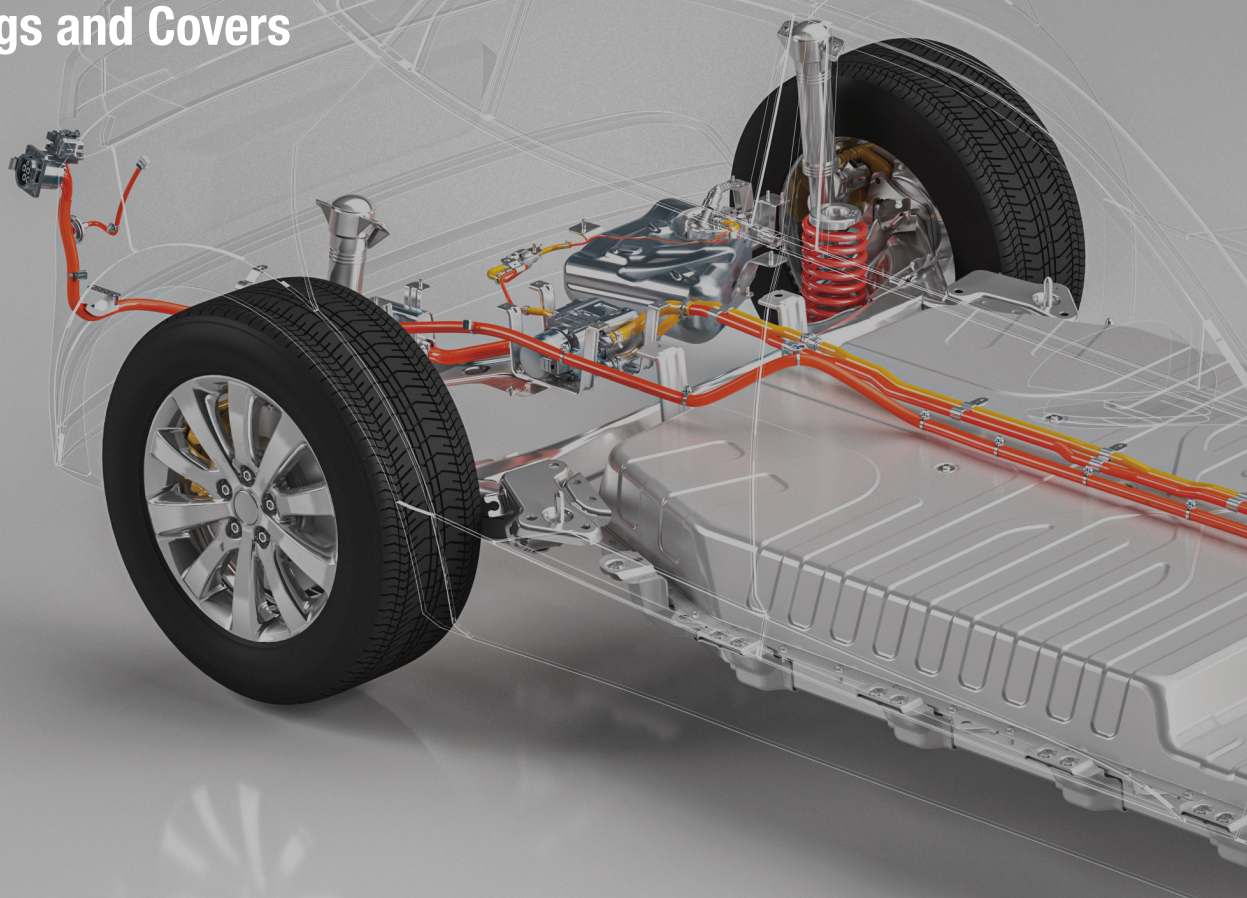
Component Overview

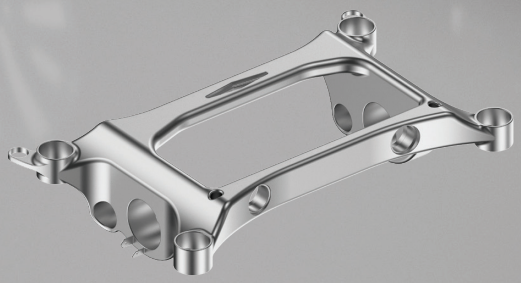


Housings and Covers

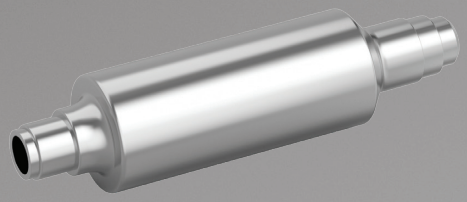


Gears

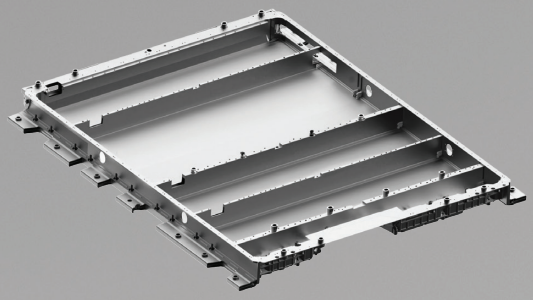




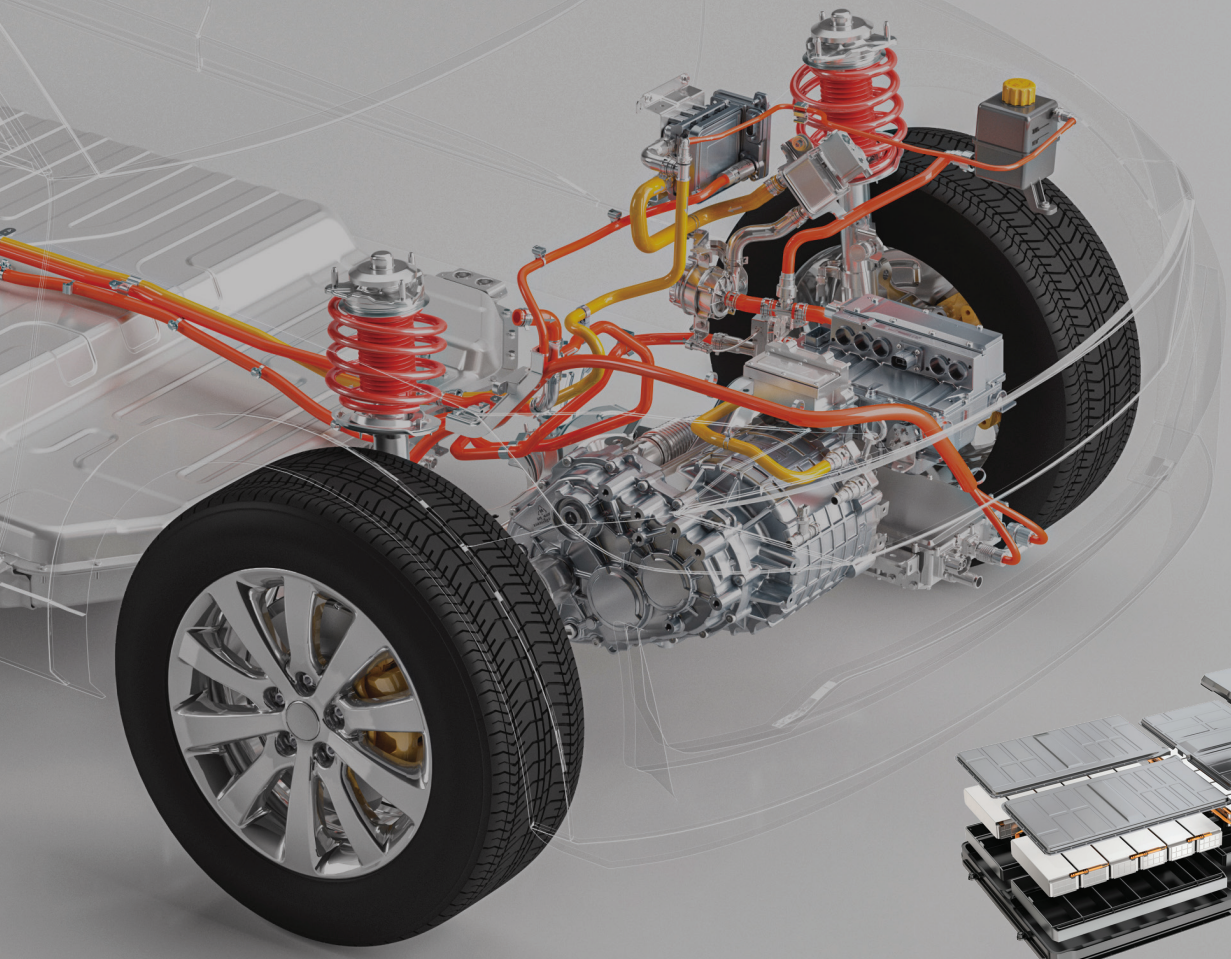
Structural Components



Rotors and Shafts



Battery Housings

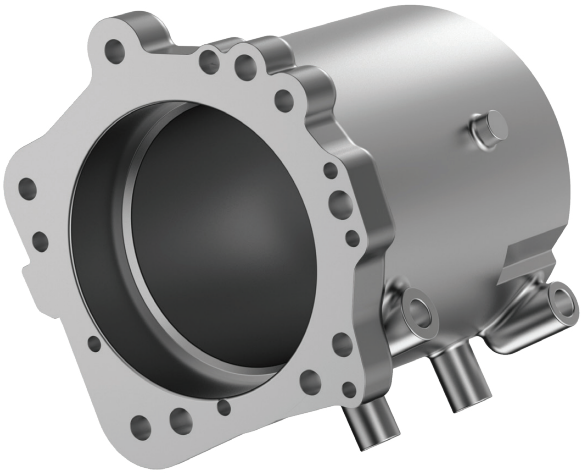


CFRP Components

Housings and Covers

Machining Challenges: Aluminum material can create long chips and burrs. Tight bore and concentricity tolerances create unique challenges.

Kennametal solutions
KBDM PCD Face Mills
KenDrill™ HPS
KOR™ 5^{DA} Solid End Mills
Custom Solution – PCD Round Tools



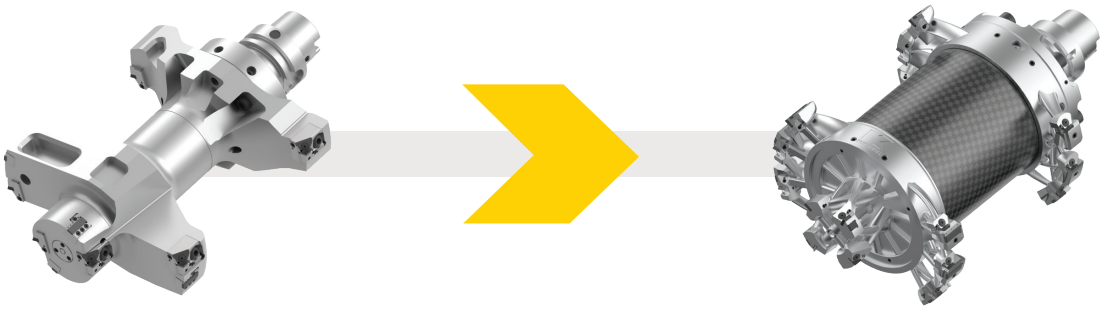
Structural Components

Machining Challenges: Aluminum material can create long chips and is more susceptible to built-up edge, vibration noise, deformation and bending. The components' thin walls cause unstable conditions and long tools are required.

Kennametal solutions
KenDrill HPS
MaxiMet™ Solid End Mills
DUO-λOCK™ Modular End Mills
Drill Fix PRO™ Indexable Drills

We're Printing the Future of Hybrid & EV Manufacturing Today

Our award-winning, 3D printed stator bore tool is just one example of how we're leveraging the design flexibility of additive manufacturing to create lighter weight solutions for boring deep holes.



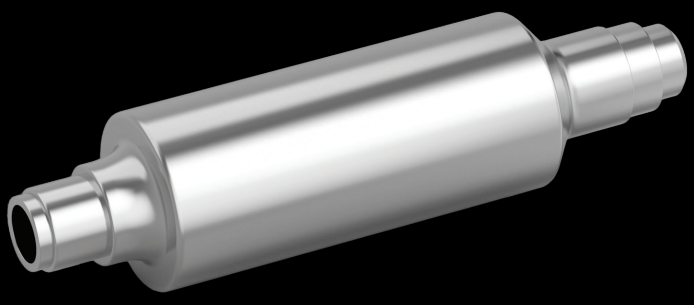
CONVENTIONAL DESIGN

KENNAMETAL'S HYBRID DESIGN

Rotors and Shafts

Machining Challenges: These components are typically subject to bending or twisting and need high surface hardness values with good core toughness.

Kennametal solutions
KCP25C Steel Turning Grade Inserts
KenDrill Deep HPR
KSEM™ Modular Drills
Custom Solution – Indexable Profile Cutters
Custom Solution – Solid Carbide Profile Cutters
Custom Solution – Bell Style Sinking Tools
KenDrill HPR
KBH10B and KBH20B Hard Turning PcBN Grades



Composite Materials

Machining Challenges: Composite materials are highly abrasive and are susceptible to delamination and vibration.

Kennametal solutions
SPF Solid Carbide Drills
DAL Solid Carbide Drills
Compression Routers
Down-Cut-Routers
Solid Carbide and PCD Twist Drills for CFRP Stack Materials
Custom Solution – Orbital Drills
KBDM PCD Face Mills
KenDrill TXD

Gears

Machining Challenges: Cutting conditions can vary from uninterrupted to heavily interrupted cuts.

Kennametal solutions
KBH10B and KBH20B Hard Turning PcBN Grades
KCP25C Steel Turning Grade Inserts

Continuous Innovation Using Additive Manufacturing

The EV and hybrid industry is advancing every day and we're setting the pace. We're skilled in both additive and traditional manufacturing processes and have mastered how that combined application can reduce your costs, improve your operational efficiencies and accelerate overall go-to-market lead times.

LET'S PARTNER TO MAKE YOUR EV & HYBRID PRODUCTION LINES MORE EFFICIENT.

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KENNAMETAL®

LET'S TAKE YOUR **MANUFACTURING** &
E-MOBILITY TO THE **NEXT LEVEL**

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