

Modern Machine Shop

How Kennametal Is Helping Automakers Electrify Car Sales

James Langford | Feb 15, 2023

You can't judge a book by its cover—or an electric vehicle by its exterior, which doesn't look much different from the outside of the gasoline-powered car your parents drove.

Beneath the surface similarities such as wheels and doors, however, lies a streamlined power train that requires far fewer machined components than the internal combustion engines that have powered automobiles since the late 1800s.

The parts that are needed to build it, in some cases, require new and unique tools, creating a surging demand that global manufacturing tool supplier Kennametal has positioned itself to meet with strategies including the use of industrial-scale 3D printing, or additive manufacturing.

"Additive manufacturing enables us to make any shape of tool that a customer may need—one that will be exclusive to their needs and meet any demands they may have in production," says Paul Culp, senior global key account manager with Kennametal.

Overhauling Car Manufacturing

The company's focus on electric vehicle manufacturing equipment is spurred by a seismic change in the habits and expectations of drivers over the past two decades. In the U.S. alone, electric vehicle sales have climbed more than 40 percent a year since 2016, according to the *consulting firm McKinsey*.

A tipping point occurred in 2020, *McKinsey says*, when electric vehicles expanded their market share despite the financial restrictions of a global pandemic.

Both Europe and the U.S., meanwhile, have set regulations including tighter environmental standards for fossil fuel usage that they hope will help electric vehicles capture 50 percent of the market by 2030, in time for bans in some countries on sales of new vehicles with internal-combustion engines five years later.

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By 2035, electric and internal-combustion vehicles will each command global sales of a little more than 40 million a year, Kennametal projects. Afterward, electric vehicles sales may climb to 80 million by 2050 while internal-combustion sales drop toward 10 million, reversing the positions they held in 2015,

the toolmaker estimates.

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Kennametal

The rapid transition is requiring overhauls not only for automakers, whose manufacturing facilities were designed for internal combustion engines that required thousands of machined components, but for their tool- and equipment-making suppliers.

For them, the difference is stark: The number of machinable components required for an electric motor and simple drive-train system—in a vehicle whose undercarriage is dominated by the battery and its housing components—is probably less than 50, Culp says.

“It’s important that we capture as large a share of that as we can,” says Culp’s colleague, regional product manager Chad Hefflinger.

Trimming Lead Time for New Tools

Other machinable parts for electric cars include rotors and shafts, housing for the stator—the stationary part of an electric motor’s rotary system, and traditional parts such as differentials, gears, axles and CV joints.

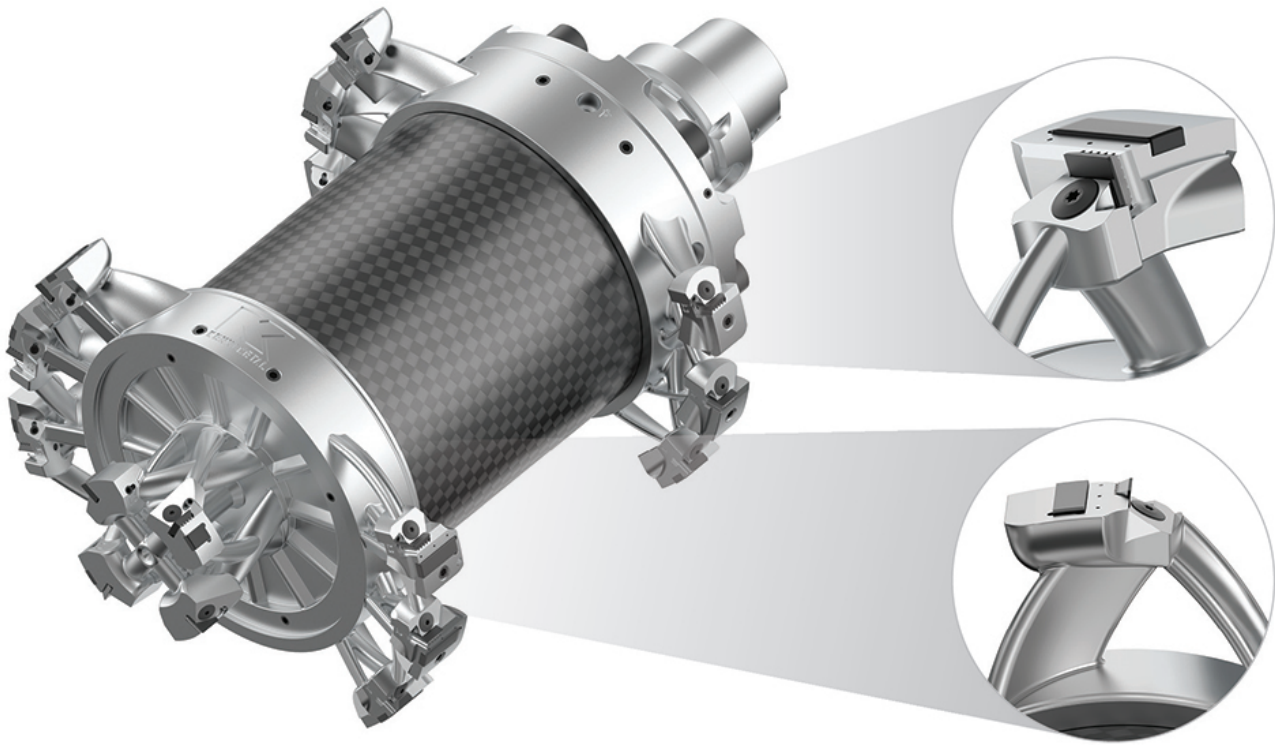
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For machining rotors and shafts, Kennametal’s tool portfolio includes the KBH10B and KBH20B hard turning PcBN (polycrystalline cubic boron nitride) grades for turning, deep hole drills and FIX8 turning inserts and toolholders.

For stators, the company offers not only standard tools such as the KBDM “Beyond Diamond” mill but custom products such as stator bore tools built with additive manufacturing.

“With the level of technology that we have, we’re confident that we can satisfy any need a customer has for EV components,” Culp says.

One client, for instance, sought Kennametal’s help with reducing the cycle time for machining a stator housing. Its existing process required two traditional tools, and they were heavy enough that they had to be changed manually.



Kennametal offers custom products such as stator bore tools, above, built with additive manufacturing. | Image courtesy of Kennametal

Kennametal used additive manufacturing to replace the two tools with one lighter-weight custom piece that's compatible with an automated tool changer.

Such capabilities benefit both Kennametal and its clients, allowing the toolmaker to cut lead time significantly, Culp explains. Once the design and development work on a tool is finished, additive manufacturing can produce a preform within a much shorter time than standard processes, he says.

Kennametal's Electric Vehicle Solutions initiative covers the gamut of automobile types, from *hybrids* whose batteries are powered by internal combustion engines to *plug-in hybrids* with batteries that can be charged by either a combustion engine or wall outlet to *battery-electric models* that rely solely on outside power sources for charging.

Technological Acceleration

Each automobile type will be important in the market's transition, Culp says, since many drivers will want a bridge between gas vehicles, which have a well-established network of mechanics and refueling stations, and electric vehicles, whose infrastructure remains a work in progress.

"The key to the market right now is that it's changing so fast that what you think is going to happen one day will change in some way by tomorrow," he says. It's a bit like the debate in the late 1970s over whether Betamax or VHS would prove the dominant medium for videocassette recording, a novel technology at the time, Culp adds.

VHS, the eventual winner, was later overshadowed by DVDs and Blu-ray Discs, both of which have faded with the advent of streaming and digital download services.

That experience illustrates how much markets might change during the years-long period in which forecasters expect demand for electric vehicles to catch up with sales of gas-powered models.

"Twelve years ago," Hefflinger notes, "the iPhone was still a new thing. It's amazing how quickly

technology advances.”

What specialized equipment does your shop need for electric vehicle work? Tell us in the comments below.

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