

THE ACCU-CUT ADVANTAGE

Accu-Cut Diamond Tool Co. – Leading the bore sizing industry since 1985.

Volume 001

2019

Diamond tools outshine carbide for finishing powdered metal bores

While Marilyn Monroe famously sang, “Diamonds are a girl’s best friend,” she could have just as easily been singing about the benefits of diamond tooling on powdered metal (PM) bore finishing.

Choosing the right tooling can make or break the viability of a project. When calculating long-term expenses of a project, tool life is often overlooked. Case studies show that over the life of a program, diamond tooling consistently provides a better value over carbide.

Case Study #1: Tool savings of \$55,000 annually

A company manufacturing 100K automotive carriers needed to generate a 5 Rz μm (40 Rz μin) surface finish and spent \$150 for a carbide tool. Their carbide tool would last no longer than 250 parts, which meant their reaming costs were \$0.60 per part.

After switching to an Accu-Cut diamond reamer, this company saved over \$55,000 annually in tooling expenses. Despite the upfront cost being slightly higher, the company drastically reduced their tool expenses because each diamond tool lasted forty times longer than carbide.

Accu-Cut Case Study Cost Savings Analysis		
Application: Powdered Metal Carrier		
	Carbide	Accu-Cut
Tool Cost	\$150.00	\$473.00
Tool Life (pcs)	250	10,000
Cost Per Piece	60¢	5¢
Estimated Savings Per Piece		55.3¢
Annual Volume (pcs)	100,000	100,000
Number of tools required per year	400	10
Annual Tool Expense	\$ 60,000.00	\$ 4,730.00
Estimated Savings Per Year		\$ 55,270.00

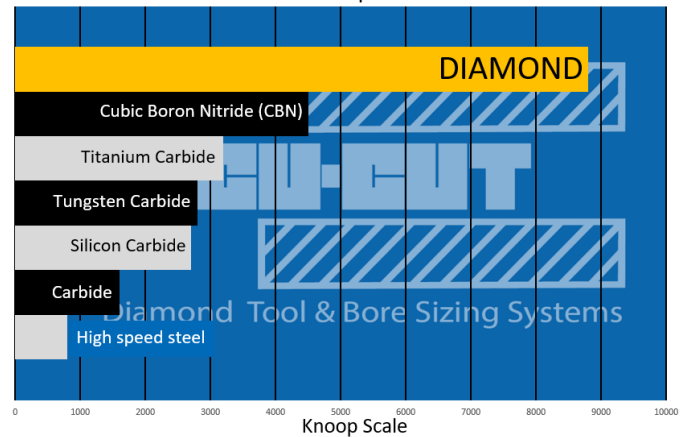
Switching to Accu-Cut diamond reamers saved a PM company over \$55,000 in annual tooling costs.

Earth’s hardest material means longest tool life

Carbide tools struggle to maintain a consistent finish on PM parts due to the hardness and abrasiveness of powdered metal. Diamond is over three times harder than most carbides and clearly stands out on the Knoop scale of hardness. Diamonds are not affected by the

abrasiveness of PM, which is why they are an effective cutting medium for powdered metal.

Hardness of diamonds compared to other materials



<https://www.tormek.com/international/en/accessories/grinding-wheels/information-tormek-diamond-wheels/>

The Knoop hardness scale shows that diamond is over three times harder than most types of carbides.

Due to the abrasiveness of PM, carbide begins to dull very quickly, resulting in higher surface finishes. This leads to more frequent tool replacement. Diamond tools retain surface finish throughout tool life because thousands of wear-resistant crystals cut the part. The stability of diamonds is an important factor leading to long tool life.



Diamond tools are ideal for powdered metal applications that have solid or interrupted bores.

Case Study #2: Maintaining surface finish over time

Tool life and part quality was a key reason for a PM part manufacturer switching to diamond tooling. Using carbide, they reached the 0.4 Ra μm (16 Ra μin) upper limit of surface finish after only 400 parts, which required them to frequently change tools. A switch to Accu-Cut tools improved their tool life and reduced downtime since now they are able to run 200,000 parts before replacing tools. The surface finish of the part also improved as they maintained 0.1 Ra μm (4 Ra μin)

(cont. on page 2)

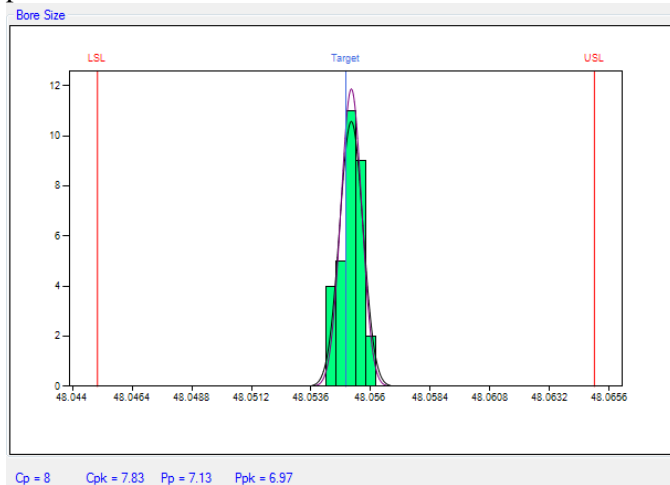
throughout the life of the tools. This welcomed change saved thousands of dollars.

These results are not uncommon. Powdered metal companies regularly ream over 100,000 bores before replacing a diamond tool.

High volume manufacturers producing high precision parts know that Accu-Cut diamond tools are essential to achieving the highest quality at the lowest cost. One company using carbide tools experienced machine downtime in excess of 25% due to the frequency of tool changes. Switching to Accu-Cut tools reduced that to less than one percent.

The importance of Cpk

Process capability (Cpk) is a measure of how well a process is in control.



This Accu-Cut diamond tool achieving Cpk > 7.0 on a powdered metal connecting rod indicates great control.

In his Six Sigma teachings, Ted Hessing compared Cpk to parking a car in a garage with the upper and lower part limits serving as the garage walls.

“If you have a process that is in control, you should be able to park the car easily within the garage and thus meet customer requirements,” Hessing wrote. “Cpk tells you the relationship between the size of the car, the size of the garage and how far away from the middle of the garage you parked the car.”

In the manufacturing world, a process that is not in control often leads to parts falling outside of the acceptable limits, which creates scrap or the need for rework. Using Hessing’s analogy, the car has hit the

garage. In either case, the lack of control will incur cost to repair or replace.

Quite often, the money saved with an Accu-Cut diamond tool pays for the tool itself through tool life and scrap savings.

Cpk levels are displayed using a bell curve. A narrow bell curve indicates a high level of control while a wide bell curve illustrates a process with high variability. Selecting the best tool for the process improves Cpk, reducing the width of the bell curve and reducing the chance of the car

hitting the garage.



Accu-Cut diamond tools and machines are designed to achieve the highest quality parts at the lowest cost.

It is also important to note that a more statistically capable tool generates less scrap and incurs less downtime. This can lead to big savings in the long term. Quite often, the money saved with an Accu-Cut diamond tool pays for the tool itself through tool life and scrap savings.

Accu-Cut diamond tools provide greater stability and consistency over carbide tools when cutting powdered metal. Carbide tools wear quickly and lose the ability to control surface finish and size. A tool no longer in control must be replaced, leading to increased tooling costs. The quality, consistency, and cost savings demonstrate why companies around the world choose Accu-Cut diamond tools to finish their bores.

Tooling - Machines - New Applications

ACCUCUT

Diamond Tool & Bore Sizing Systems
accucutdiamond.com

service@accucutdiamond.com 708-457-8800

Spare Parts - Training - Troubleshooting