

A Structured Repair

By Alan Richter, Editor

With a structured cutting tool repair program, significant cost savings are realized while tool quality remains intact.

Regrinding, repairing and otherwise refurbishing cutting tools and related tooling is a well-established practice. However, not all part manufacturers are aware of the cost savings a tool repair program can generate without sacrificing tool quality.

“We find even nowadays the biggest competition is still the garbage can,” said Kevin Began, sales manager for GKI Inc., Crystal Lake, Ill., which specializes in repairing indexable insert cutters and is also a full-line tooling distributor. “We fight that all the time.”

Began explained that a repaired tool functions as good as new while costing considerably less when the repair is performed properly. “The whole goal of tool repair is cost reduction,” he said, noting that tool life of a repaired tool is equal to a new one, in part because GKI hardens the repaired pocket area to 36 to 42 HRC. “If it needs to be harder as per a blueprint spec, we will do that.”

GKI, for example, repairs several hundred tools a year for Velan Valve Corp. and the valve manufacturer saves about half the cost compared to buying new tools, noted Mark LeClair, tooling engineer for the Williston, Vt., company. He added that Velan uses GKI to repair toolholders, such as a 6"×6"×8" toolholder block for an old Bullard vertical turret lathe. “They’ll machine some of our holders that we can’t get or are very difficult to purchase,” LeClair said.

This article covers the elements of a

structured, or integrated, cutting tool repair and management program, including tool collection, shipping and pricing. In addition, it examines what an end user should consider when targeting a proactive repair program, the benefits that can be realized and potential pitfalls to avoid.

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No ‘Cookie Cutting’

The initial stage in establishing a structured tool repair program involves a “meeting of the minds,” noted Julie Reiling, president and owner of Carbide Tool Services Inc., Anoka, Minn., which re-

pairs indexable cutting tools. That meeting includes the end user’s operators, engineers and purchasing personnel, as well as CTS’ sales team and cutting tool specialist. Together, the team determines customer needs, when tools are released for repair, pricing structure, components included in a repair and frequency of when repaired tools are released.

“It can get very complicated, depending on the customer,” said Pat Hjelm, cutting tool specialist for CTS. Therefore, the company customizes every program.

One fairly straightforward aspect of a tool repair program is determining what damaged tools to send for repair. “In most cases, we would just receive all of the damaged tooling and then we would determine what should and should not be repaired,” Reiling said.

Began concurred, noting that about 99 percent of damaged indexable tools are repairable and GKI prefers making that judgment call based on its inspection



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techniques, experiences and evolving repair capabilities. "Tooling that even we would have turned away a few years ago, we can now repair because of improved techniques," he said. That includes tools with pockets that were entirely burned off and extensively damaged screw holes.

Of course, some tools are obviously not repairable, such as an indexable drill that was split down the middle after a crash. "It's just not worth it," LeClair said.

On the flipside, some tools that look repairable to the eye might be bent and distorted or have hairline cracks down the flute that, if repaired, could compromise tool integrity. "We catch that here when we do the upfront evaluation," Hjelm said.

Other tools, such as cutoff tools with thin-wall pockets, might also be beyond repair even though damage doesn't appear to be extensive. "You risk the metal becoming brittle and fatigued when you do too much welding and machining and apply too much heat," Began said.



US Tool Group

US Tool Group workers repair cutting tools on Walter CNC tool grinding machines.

Packaging and shipping the damaged tools is also straightforward. "We use a 6"×8"×8" cardboard box, and when that is about full, we send it off," LeClair said.

Began noted that when a GKI sales

person packages damaged tools for transport in his vehicle, when feasible, or via a delivery service, he will pack them in paper or Styrofoam to prevent movement in the box. "Typically, anything going out

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for repair is already damaged, so it almost doesn't matter," he said.

Reground Round

In addition to indexable-insert cutters, structured repair programs are available for rotary cutting tools, such as drills, reamers, taps and endmills. One company resharpener rotary tools is US Tool Group, Desloge, Mo., which has 380 employees at its reconditioning site and also sells new tools and manufacturing supplies, as well as providing refurbishment of cutter bodies and toolholders through a partner. "We are an integrated supplier," said Bruce Williams, president of US Tool. That includes managing toolcribs and vending equipment for manufacturers. "It's one-stop shopping for our customers where, at the end of the month, they pay from one invoice and are supplied all required manufacturing supplies from one source."

The process of efficiently delivering products to the manufacturing floor provides considerable cost savings for customers, according to Williams. For example,



he noted that some aerospace manufacturers experience costs of up to \$300 to place a purchase order themselves.

When US Tool receives a shipment of worn tools, it sorts the jumbled assortment according to diameter and material/

Even a badly damaged indexable-index drill (left) can be repaired. Regardless of damage, GKI states that it removes the entire damaged section of the tool, adds material congruent with the parent metal to the damaged tool and machines tool features, such as pockets, screw holes and coolant holes, into the tool.

catalog code and determines what tools are viable for resharpener based on tool history and upcoming customer needs. In addition to reducing costs, a well-managed cutting tool repair program reduces shop inventory, noted Mike Baugh, vice president of business development and supplier management for US Tool. "We have visibility of the product going through the reconditioning process," he said, "where end users who are managing their own tools may be buying new tools when, in fact, they have dull tools going through the regrind process because they don't have that visibility."

US Tool's reconditioning process also includes chemically cleaning the tools to remove any buildup or contamination,

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reoxidizing drills with a black oxide surface treatment, sharpening and placing a bar code of the customer's part number on the tool packaging. "The reground package often contains more customer-specific information than what was available when the tool was received as a new item," Baugh said.

Williams added that in addition to "reblackening," tools can be recoated with TiN, TiCN, TiAlN and other performance-enhancing coatings. "Our reground tools look like they are going to perform as new and they do perform as new," he said. "Looking new is very important to generate a good attitude from the machinist using the tools."

GKI's Began agreed. A repaired cutter with an unblended weld or without a black oxide coating, for instance, can function, "but it's ugly, quite honestly," he said. "There are not a lot of machine operators who are going to take a tool like that and use it. If you can't tell a tool has been repaired, we have done our job



Carbide Tool Services

Before-and-after images of a long-edge endmill repaired by Carbide Tool Services.

properly." Began added that the only noticeable difference should be the identification information GKI laser etches into each repaired item.

Price Point

The pricing structure a vendor establishes for its repaired tools varies. Hjelm noted that Carbide Tool Services quotes

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US Tool Group

Disorganized worn and damaged tools arrive at US Tool Group, where there are sorted, cleaned, refurbished, packaged and labeled for shipment back to the customer.

a repair and a customer would have to approve it before any work is performed. “Every tool gets damaged in a different way, so we’re looking at what our time

is involved in doing the repair,” he said. Even so, some customers build up a repair history to the point where CTS can establish consistent and upfront pricing,

according to Hjelm.

Regardless of damage, Began noted that GKI charges a flat rate for the “vast majority” of tool repairs, and each one

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goes through the company's 16-step process. That includes tear down, cleaning the damaged pocket, grinding away the damaged material, removing all insert scraps before welding and machining the tool on a 4- or 5-axis machining center or possibly a manual machine for some larger tools.

When a tool is not on US Tool's published price schedule, the company's product engineers determine the time required for setup and repair and send the customer a quote. Although the same tool type may require more or less work to repair, the company prices according to the average tool. "We give the same pricing for simplicity," Williams said, adding that US Tool processes nearly 500,000 tools a week.

Although pricing may be firmly established, the number of times to repair a tool isn't. Standard geometries, such as those on a twist drill, can be resharpened three to eight times, Williams noted, while more complex geometries may be limited to two or three times.



Velan Valve

A selection of damaged indexable tools at Velan Valve suitable for repair.

Although Began noted that the traditional rule is three repairs for an indexable tool, newer repair methods enable additional repairs without altering tool life. "Depending on how heavily the

tool is used, you may be able to get 20 repairs and not see any decline in tool life," he said.

According to CTS, the number of repairs depends on the type of tooling, the



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application, what caused the damage and amount of damage. "We don't anneal the tooling and we requalify every tool so we don't believe you can put a number on that," Reiling said. "Sometimes we get a tool in one time and we suggest they purchase new. Other times, we can repair a tool 20 times."

Shop Suitability

Part manufacturers of all sizes can reap the benefits of a structured tool repair program, with smaller shops possibly in a better position to do so, according to Began. "The larger facilities, due to the volume of tooling they use, command some pretty hefty discounts on new tooling, where the smaller shops are probably paying list price or close to it for a new tool," he said. "Typically, the cost reduction from tool repair will be higher at a smaller shop."

Baugh indicated, however, that US Tool targets reconditioning of cutting tools for high-volume applications. "We're not trying to push away a small customer, but the reality is the real lever-

age and value is with a customer in a production environment."

Whatever its size, a manufacturer considering a tool repair vendor must be diligent in scouting efforts. One area to focus on is a vendor's QC process, Hjelm noted, adding that the process needs to be controlled, repeatable and documented. Before a repaired tool leaves CTS' facility, it is inspected in three different locations to ensure its dimensions adhere to blueprint specifications, Reiling added.

In addition to quality systems, Williams emphasized the importance of repair consistency and breadth of services so customers avoid using multiple sources. "You need somebody who can handle volume, handle it accurately and handle a wide variety of tools."

Visiting a repair facility might also be in order to physically examine its equipment and be sure the projected tool repair volume doesn't overwhelm the vendor and delay deliveries. "We're happy to show our plant," Began said. He also emphasized the importance of looking at QC systems and noted that GKI un-

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going online to see what a vendor's capabilities are.

Pros and Cons

A suitable tool repair vendor should also have engineers available to modify tools to reduce breakage and improve performance, which is the case for the ones interviewed for this article.

Sometimes, however, a tool repair might cause an issue and the end user must work with the vendor to resolve that issue. For example, working with GKI, LeClair determined a land on a repaired tool was causing a problem and was able to fix it. In another Velan Valve application, the lack of a hard coating on the repaired tool shortened tool life, and, with GKI's assistance, LeClair was able to alter the speeds and feeds and achieve the desired results. "It's not as good as the OEM tool, but it's darn close," he said. "If a part takes 2 minutes more but we're paying half the price for the tool, it's definitely worth the savings."

However, LeClair is significantly saving time, as well as additional money, elsewhere. "I can get discontinued tools repaired from these guys rather than spending hours doing all the costly paperwork involved in cutting purchase orders," he said, adding that he doesn't have

communicates with people on the shop floor and takes ownership of their program," Hjelm added. "If they don't have that type of organization, a lot of times things fall through the cracks and they wind up buying cutting tools when it's not necessary."

A suitable tool repair vendor should have engineers available to modify tools to reduce breakage and improve performance.

Eventually, when a tool repair program is handled effectively, refurbished tools not only become acceptable but desired. "We are always pleased after several months of having our regrinds

to replace inventory because a toolmaker changed a tool style.

Even with a structured tool repair program in place, a manufacturer needs to regularly examine internal and repair vendor inventory to maximize the savings of using a tool repair service, CTS's Reiling explained. "There needs to be a point person," she said.

"Customers can maximize this type of repair program if they have a person who

on the shop floor when the end user actually prefers the regrinds because they perform as well as a new tool and they're saving the company money," Williams said.

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