Carbide Processors, Inc.

Northwest Research Institute, Inc.
Newsletter June, 2007
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President's Message

Superfilers

Jim Fox of Diamond West Lumber in Monroe , Oregon said our Purified Flux helped him solve about 90% of his tooth loss.

Russell Hartley of Anthony Forest Products has promised us a video of his tipping station. He described it to us at the Southern Saw Filers meeting and it sounds really good. We will put the video on the web and make it available on DVD.

A smart Purchasing Agent Steve Fogg of Buse Timber & Sales Inc. in Everett, WA stopped by to sell us some scrap carbide. He was good enough to take some time and chat with us. One of the things he said was that he believed filers should do their own buying. He sees his part as helping out when they need it. I have been in a lot of meetings where good filers were trying to make bad carbide work because purchasing told them to. It is nice to see it work this way, the right way.

Charles B. Ponton, MS Mechanical Engineering, Virginia Polytechnic Institute and State University has written his master's thesis:

Finite Element Analysis of Industrial Circular Sawblade With Respect To Tensioning, Rotating, Cutting, And Expansion Slots

Contact Bob Ponton at ICE for a copy 800-424-3311

Cermet 2 (II) Works

Other Cermet grades do not
(Cermet II is pronounced Cermet 2)

The first generation of Cermets were steel cutting grades such as KT 195 from Kennametal. They were an excellent steel cutting grade but only worked sometimes in wood. KT 195 was very hard to grind, you typically had to take half a thousandth of an inch off on a pass and even then they were likely to break in grinding.

They sometimes worked extremely well and sometimes they failed miserably.

The best results were with KT 195 from Kennametal in green Western Red Cedar. In this case the corrosion resistance of cermets worked very well.

About this time Kennametal changed directions. Instead of working on advanced grades with us they concentrated on carbide from China and they bought Camco.

We started working with other suppliers to develop truly excellent grades. We now have several grades of 2nd generation cermets (Cermets 2) that are much more suitable for wood cutting.

1. Several times the life in a window and door plant.
2. 3 times the life in Corian.
3. 8 days instead of 5 in MDF and we have an even better grade coming.
4. Twice the life in beetle killed Lodge Pole pine.

And Cermet 2 is easy to use – it brazes and grinds just like carbide – it is just a lot tougher and longer wearing.

You only get the good grades here. We are talking to Kennametal and others but so far we don't have an arrangement.

See P. 6

Customer Service

These two look like a couple of pretty young blondes. (They make me add the pretty part.) What you don't see is how hard they work and how polite they are. They regularly get both job offers and proposals.

Our promise

1. A real person answers the phone
2. They answer it fast.
3. They talk to you like you were important because you are to us.
4. They work really hard to get you what you want
5. They keep their promises
6. They work really hard to help you solve problems
7. If they don't have it they will find someone who does
8. Quality is great
9. Service is great
10. Prices are honest and reasonable

We will do all your work. Many companies just call us for carbide and we call everyone else. We then come back with the best price and delivery.

No Problems with billing. Just order from us and we will do all the work. If you want to simplify your billing we would be happy to take your order, order the tips from whomever you prefer and then bill the pretin and tip on the same invoice.

Sometimes we get really busy and a confused old man answers the phone. He is smart enough to take a message. Please put up with him.

The Truth About Jerry Adams of Adams Saw

We always thought of Jerry Adams as being a nice guy, a lot brighter than most and someone well respected personally and professionally. Then he sent us these truly horrible puns.

* I wondered why the baseball was getting bigger. Then it hit me.
* Police were called to a day care where a three-year-old was resisting a rest.
* Did you hear about the guy whose whole left side was cut off? He's all right now.
* The roundest knight at King Arthur's round table was Sir Cumference.
* To write with a broken pencil is pointless.
* When fish are in schools they sometimes take debate.
* The short fortune teller who escaped from prison was a small medium at large.
* A thief who stole a calendar got twelve months.
* A thief fell and broke his leg in wet cement. He became a hardened criminal.
* Thieves who steal corn from a garden could be charged with stalking.
* We'll never run out of math teachers because they always multiply.
* When the smog lifts in Los Angeles, U C L A.
* The math professor went crazy with the blackboard. He did a number on it.
* The professor discovered that her theory of earthquakes was on shaky ground.
* The dead batteries were given out free of charge.
* If you take a laptop computer for a run you could jog your memory.
* A dentist and a manicurist fought tooth and nail.
* What's the definition of a will? (It's a dead giveaway)
* A bicycle can't stand alone; it is two tired.
* Time flies like an arrow; fruit flies like a banana.
* A backward poet writes inverse.
* In a democracy it's your vote that counts; in feudalism, it's your Count that votes.
* A chicken crossing the road: poultry in motion.
* If you don't pay your exorcist you can get repossessed.
* With her marriage she got a new name and a dress.
* Show me a piano falling down a mine shaft and I'll show you A -flat miner.
* When a clock is hungry it goes back four seconds.
* The guy who fell onto an upholstery machine was fully recovered.
* A grenade fell onto a kitchen floor in France , resulted in Linoleum Blownapart.
* You are stuck with your debt if you can't budge it.
* He broke into song because he couldn't find the key.
* A calendar's days are numbered.
* A lot of money is tainted: 'Taint yours, and 'taint mine.
* A boiled egg is hard to beat.
* He had a photographic memory which was never developed.
* A plateau is a high form of flattery.
* Those who get too big for their britches will be exposed in the end.
* When you've seen one shopping center you've seen a mall.
* When she saw her first strands of gray hair, she thought she'd dye.
* Bakers trade bread recipes on a knead to know basis.
* Acupuncture: a jab well done.

If you have an invention you would like to share let us know. We will be happy to run it here.

It has to be better than these.

However there is a lot to be said for using 2 x 6's for a spoiler and plywood for a truck cab.

This is Dave Stevenson of Gramstad / Stevenson Sharpening In Zumbro Falls, MN and his family. They are wearing free cheap straw hats and doing it well.

This is just a silly, spring promotion. Family is important to us and a lot of that involves goofiness. Somehow cheap straw hats just seem to fit. I ran both photos because I love the differences in them. In the top photo everyone looks pretty dignified. In the bottom photo the tall, pretty girl has her hat on sideways, the short pretty girl still looks very much like a dignified lady, one boy has decided to dance and the other boy is deep in his own thoughts as little boys will do. Even the horse got bored and went looking for treats.

Anyway we have free cheap straw hats perfect for spring and summer goofing around. Call if you want some. Sizes are kind of iffy.

Used Equipment

Not free but high quality and really good prices

Rebuilt Akemat BT6-125

Completely rebuilt
New powder coating instead of painting
For saws up to 30", 5" index unit
Capable of doing shear faces up to 30º
Double Bar slide system
Magnetic saw blade clamping
0.9Kw (1.2 HP) reversible grinding motor, 1 year warranty
Price including 1 year warranty----------$ 24,950.00

1988 Used Akemat BT6

For saws up to 30", 5" index unit
Capable of doing shear faces up to 30º
Machine uses 6" diamond wheel
Magnetic saw blade clamping
0.9Kw (1.2 HP) reversible grinding motor
Price as is, in good working order----------$ 14,000.00

Equipment Ltd.
441 19th Street SE • Post Office Box 3508 • Hickory, North Carolina 28603
Phone: 828-328-8104 • 1-800-533-2006 • Fax: 828-322-4928

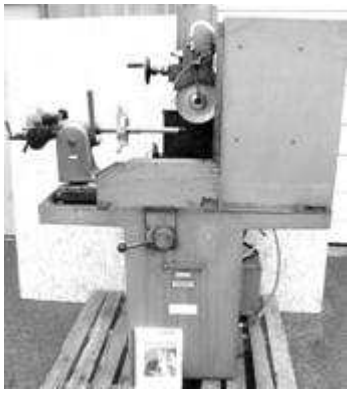
Kirschner brazer LS3H

Super Thin Saws has a 2000 Kirschner brazer with loader for sale. It is an LS3H and in excellent condition. If you know the kind of work Super Thin Saws produces then you know that this machine really is in great shape.
Call Dave Strom
802-244-8101
Super Thin Saws, STS, Inc.
PO Box 299
Waterbury, VT 05676

Wanted to Buy

Burl Swiger rebuilds machines as well as buying and selling them. He is looking for a CHCO25 (not a zero but an O.) Call Burl Swiger at Triple S 5437 NE Farmcrest, Hillsboro, OR 97124, 503 648-6297, cell 503 803-6838, Fax 503 693-3173
kbswiger@earthlink.net

Schneeberger Norma 1985 $12,900
Precise Manual Tool Grinder
Dave Rakauskas, Colonial Saw
www.csaw.com
Phone: 781-585-4364 • Fax: 781-585-9375 • E-Mail: info@csaw.com



Precise Manual Tool Grinder from Switzerland. Great for Mill Filing rooms looking to do large cutters up to 15". 3HP motor with WET dividing head, flood coolant. This machine has been mechanically rebuilt by factory techs and carries a 3 month warranty.

Tip Breakage Report

Zane.Lockhart, Jr
Robert Bosch Tool Co.
MULTI-METALS Division

What We Covered in May

We had a customer ask us if we could help them with a tip breakage problem. They were buying tips from us, from Multi Metals (where we also buy some of our tips) and from a Canadian importer of cheap Chinese carbide. We did a simple test, agreed with the customer and sent the saw blade on to Multi Metals. The tips that broke were not ours and were not Multi Metals. Multi Metals did the analysis as a favor to us and to the end user.

A 10" x 60-tooth, carbide-tipped circular saw blade was submitted by XXXXXXXXXXXXXXXX

Analysis was requested to identify if possible the cause of several tooth fractures and missing teeth. The blade was reportedly used on a table saw to cut only a small quantity of walnut wood before the blade failed. Several of the broken tip pieces were recovered and submitted as well.

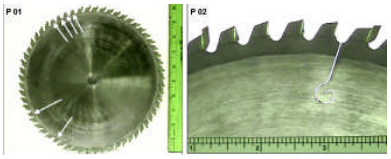
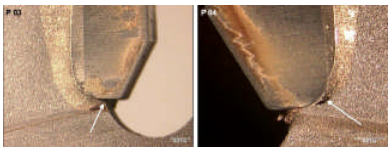


Photo 1 above left shows the condition of the as-submitted blade. At least six major fractures are identified by arrows. Photo 02 above right shows a bank of teeth including four consecutive failed tooth sections.

The blade was further identified as General Purpose, 10 inch, 60, 0.086 Plate, 0.130 Kerf, 4 laser-cut, hook type expansion slots, ATB ground w/European chamfer

In addition, the carbide was identified as "C-4 micro-grain." The face and sides were ground with 200-grit diamond, and the top with 400-grit diamond. Tip faces were finished with a 600-grit diamond grind. All grinding was performed with a water-based synthetic coolant. Tips were manually brazed with an oxy-acetylene torch.

VISUAL EXAMINATION



Visual examination noted that tip bases were not fully supported. Photo 03 (12.5X) above left shows a typical tip base that is only partially supported. It was also noted that the brazed joints were very thin along the base sections and in some cases inadequate braze flow left voids and gaps as documented in Photo 04 (20X) above right.
In order to better identify specific tips, the teeth were individually marked with a number from 1 to 60, which will provide a reference point for the remainder of the report.

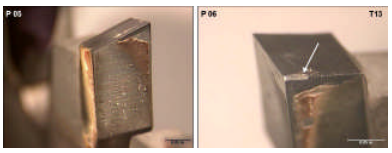


Photo 05 (10X) above left shows a typical ATB ground tooth from the blade. The tips are finely ground and exhibit sharp cutting edges with very little wear. This confirms that the blade had not been in use very long. In addition to the six major fractures, at least three tips (T13, T21, and T23) exhibited minor chipping to the corners similar to the side view shown in Photo 06 (25X) above right. These chips were all in the upper right corners of the ATB ground tips.

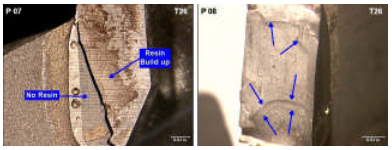
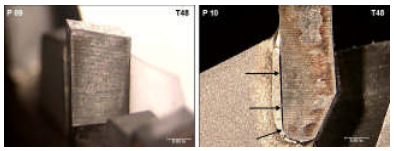
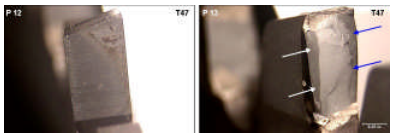


Photo 07 (25X) above left shows Tip #26, which was one of the major fractures. The tip is shown with its mating section. As seen in the photo, the resin build up is only visible on the front fractured section. This strongly suggests that the tip was fractured prior to cutting. The slight offset of the fracture prevented resin build up on the rear half of the fracture. Photo 08 (25X) above right shows the internal fractured carbide surface. Close examination shows stains on the lower half and the upper portion of the tip (see arrows). These stains were likely left by the coolant, which indicates that tip probably fractured during grinding. Capillary action then attracted the coolant into the crack.



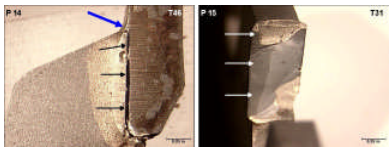
Tip #48 was another fractured tooth section. Photo 09 (10X) above left shows the tip with the recovered fractured face in place. As seen, there is no chipping, cracks, or other visible evidence of an impact to the front of the tooth. When viewed from the side, as shown in Photo 10 (10X) above right, it is clear that the tooth failed along the carbide/brazed joint interface. The fractured condition strongly suggests that the tip failed from a force pushing the tip from the rear to the front, such as applied during grinding.

Photo 11 (10X) at left shows the internal fracture. Only a thin remnant of carbide remains bonded to the back of the seat. The fracture also shows some large gas pockets and poorly bonded areas (see arrows) that may have weakened the joint and contributed to the tooth fracture.



Like previous tips, Tip #47 failed primarily along the carbide-brazed joint interface. Photo 12 (10X) above left shows the tip with the recovered face in place. Tip 47 shows no sign of a significant impact to the face or sides. Photo 13 (10X) above right shows the internal fracture. As with the previous fractures, the dark stains along the left and right sides (see arrows) was likely stained by dried coolant, which indicates the tip fractured prior to sawing.

This report is much more impressive with full size pictures. Call and we will be happy to get you a copy free.



Fractured Tip 46, shown in Photo 14 (10X) above left looks nearly identical to fractured Tip 48 in Photo 10. As seen, the tip joint failed from a force applied from back of the tip. Note how the brazed alloy at the top of the shoulder (blue arrow) has been pushed forward. When tips fail from a frontal force, this bit of braze alloy deforms backward toward the shoulder.

Fractured Tip 31 was another tip failure leaving just a thin remnant of carbide along the back joint. And like other failures, a distinctive stain from dried coolant is visible (see arrows.) Chemical analysis provided the following composition for the steel plate: Carbon 0.67%, Manganese 0.70%, Sulfur 0.006%, Silicon 0.29%, Phosphorous 0.013%, Chromium 0.29%, Nickel 0.05%, Molybdenum <0.01%, Copper 0.09%

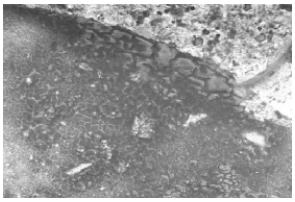
The steel analysis meets chemical requirements for AISI 1064, 1065, and 1070, although the high chromium residual suggests a European or Asian source. Hardness of the steel plate ranged HRC 42-43, which is typical of most hardened-and-tempered commercial saw plates.

Examination found that the tips were brazed with a straight silver brazing alloy, not a tri-metal shim. Analysis of the brazing alloy suggests the use of AWS Bag-24 type alloy (≈Lucas-Milhaupt #505) having a typical composition of 50% silver, 20% copper, 28% zinc, and 2% nickel. This brazing alloy is typical of those used in brazing carbide-tipped circular saw blades.

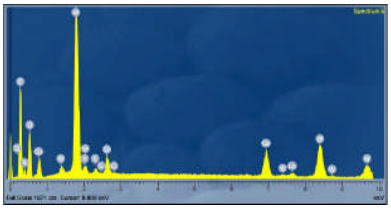
Critical properties of the carbide tips

Hardness	HRA 92.4
Density	15.07 g/cc
Coercivity	Hc 243

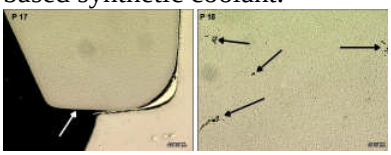
Analysis of the carbide indicates a straight grade with no alloying elements. The binder content is estimated to be approximately 5% cobalt. The closest Multi-Metals equivalent grade is RD-55.



The SEM (scanning electron microscope) was used to examine the stained areas of the tip fractures in more detail. Photo 16 (SEM, 125X, BSE) above shows the dark, honeycomb formation left by the dried liquid on the fractured surface.



X-ray energy dispersive spectrometry was used to analyze the dark areas of the fractured surfaces. The spectrum above shows a typical analysis. In addition to tungsten and cobalt, there is a significant residual of chlorine, sulfur, and phosphorous. These are elements that could be associated with a water-based synthetic coolant.



Samples of several teeth were sectioned, mounted and polished for metallographic examination. Photo 17 (25X, Unetched) above left shows a cross-sectional view of the poorly supported tip base. Also note the relatively thin brazed joint at the base and poor filleting. Examination of the carbide tips found some significant issues with metallurgical quality. Some tips exhibited numerous pores, voids, and areas of contamination, similar to that identified in Photo 18 (100X, Unetched) above right.

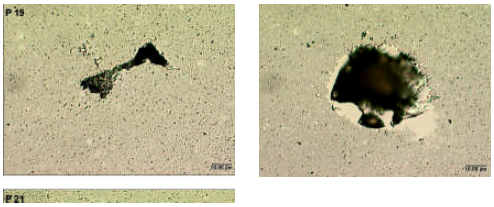
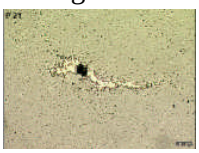
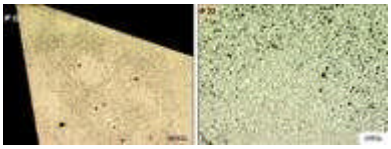


Photo 19 (500X, Unetched) above left shows a dog-bone shaped defect in a carbide tip. Photo 20 (500X, Unetched) above right shows a very large blow hole. Photo 21 (500X, Unetched) at left shows a cobalt-filled void within the carbide matrix. All of these defects are likely caused by contamination that burned out during sintering process. These deficiencies are not typical of a quality carbide grade.





Another issue with some tips was high-temperature oxide contamination. Photo 22 (25X, Murakami's Etch) above left shows a tip with balls of powder containing various quantities of contaminants. Photo 23 (200X, Murakami's Etch) above right shows an area of light and dark-etching microstructure in more detail. The dark-etching area contains massive amounts of fine oxide particles that did not burn out during sintering. The lighter etching areas are balls of powder, that are essentially free of the oxide contaminate.

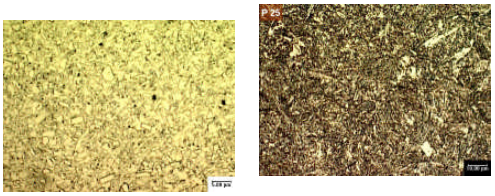


Photo 24 (1000X, Murakami's Etch) above left shows a typical microstructure for the carbide tips. The matrix exhibits a low-cobalt binder with a wide distribution of grain sizes ranging from 0-3 µm. The black spots are bits of fine oxide contaminants.

Photo 25 (500X, 2% Nital Etch) above right shows a typical microstructure for the steel plate. The plate matrix exhibits a hardened-and-tempered martensitic matrix that is typical of steels hardened by heat treatment. No deficiencies were found in the steel.

This is part 2 of a three part series on this report.

Cermet II© Successes

Several times the life in a window and door plant.

3 times the life in Corian.

8 days instead of 5 in MDF and we have an even better grade coming.

Twice the life in beetle killed Lodge Pole pine.

Benefits You Get

- Grinds like regular carbide
- Gives a better edge than carbide grades.
- Stays sharper longer than carbide grades
- Substantial increase in fracture toughness.
- More corrosion-resistant
- Better at high temperatures achieved when cutting and drilling.
- Cuts faster
- Cuts faster and longer while being tougher. Longer runs and less downtime.

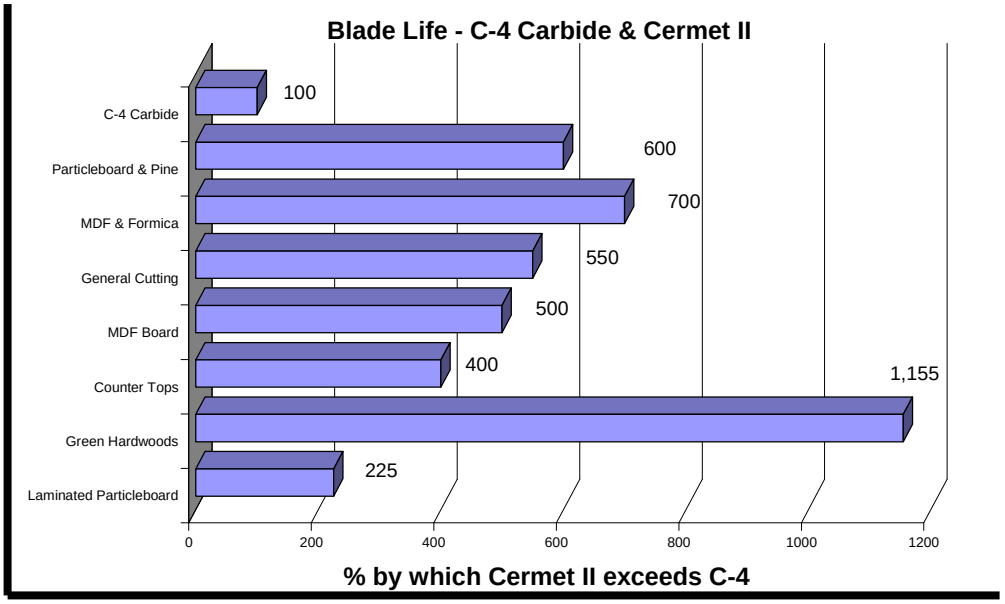
Making Cermet II Materials

What follows are some explanations of how to make advanced carbide.

Carbide wear is due to micro-fracturing, macro-fracturing, grain pull out, corrosion of the binder, adhesion between the carbide and the material being cut, and tribological functions which are similar to a naturally occurring electro- etching.

Cermet II technology uses a variety of carbides such a titanium carbide, tungsten carbide, Tantalum carbide, Niobium carbide and others. Steel is iron with a very small amount of carbide but it is very different than plain iron. The addition of a very small amount of the right material can make a huge difference in carbide performance as well. .

Cermet II grades also use unique binder formulations. Cobalt is a good binder material and is used in standard grades. It was the first binder used and is still easiest to use. However cobalt is pure metal and is subject to chemical attack.

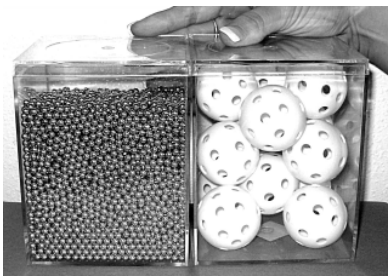


Cermet II grades have special binder properties so that they behave more as a solid piece of material than as a cemented piece of material. Think of a steel alloy as compared to concrete.

Grain Size

Better, cleaner powder has been achieved through improved solvent extraction in tungsten chemistry as well as new techniques in hydrogen reduction and carburization to improve the purity and uniformity of tungsten and tungsten carbide powder.

New powder milling, spray drying and sintering techniques have resulted in improved hardmetal properties and performance. Notably, the continuous improvement of vacuum sintering technology and, starting from the late 1980's, hot isostatic pressure sintering (SinterHIP) led to new standards in hardmetal quality.



A sub-micron grain size. This compares to ordinary carbide about like BB's compare to golf balls. As an example compare 0.5 microns for a sub-micron grade with 5 microns for a coarse grade. (A BB is 0.177" and a gold ball is 1.68")

Report from Marvin Windows

On the saw that we tried. How many times we resharpen a blade before we order new or have retipped we are not sure. Most blades get damaged by hitting something so we have the carbides retipped a lot. How often do regular blades have to be resharpened? We normally have our carbide tipped blades sharpened every week.

The new Cement II blade normally last twice as long before it gets damaged. The best so far is four weeks and one and a half million cuts before we changed it out which is four times longer.

Hope this helps and keep up the good work on those tips.
Nathan Hull, Grinderman
Marvin Wood Products

"Hit them where they ain't"

How little guys beat big guys in the saw business.

Wee Willie Keeler is one of the original members of the Baseball Hall of Fame because of his quote "Hit them where they ain't" and because he could do it.

Nicknamed Wee Willie because of his 5'4 inch, 120 lb stature, Keeler collected

2,947 hits, scored 1,727 runs and stole 495 bases. There probably never has been a more skillful bunter or batter who could poke the ball through the infield.

He was a Left-handed Outfielder, for the New York Giants, Brooklyn, Baltimore Orioles and New York Highlanders (Yankees) between 1894 and 1909.

Small businesses are growing rapidly selling tools made with our advanced grades of Cermet II

Carbide Pro Shops

Many of you saw our article in Timber Processing. We have more articles coming out in primary and secondary wood magazines well as specialty magazines such as man- made materials, kitchen cabinets, etc. We are telling people that the very best tools using our advanced technology are available from top end Carbide Pro Shops. If you want to be on our list of Carbide Pro Shops all you need to do is to successfully use our advanced grades of carbide.

Peerless Tip Clearance

Peerless tips at Carbide Processors

CWD 7215 C-4	$0.23
CWB 7105 C-3	$0.13
CWG 7200 nail cutting	$0.30
CWD 7150 C-4	$0.17
CWE 7140 C-3	$0.19

Peerless tips in Ohio

CWB = .281” Long x .078” Thick

CWB 7105 C-2	$.045
CWB 7105 C-3	$.045

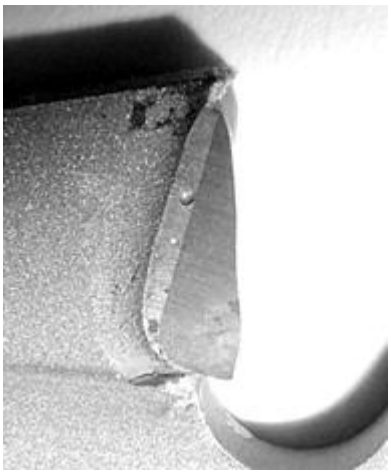
Braze Fillet Thickness

You want a small fillet but only a small one.

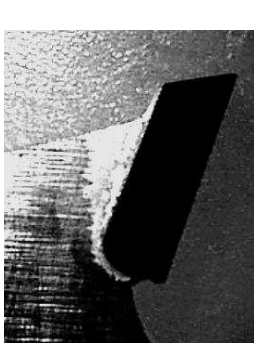
Braze alloy joins the parts together. It also serves as cushion between the carbide and the steel. As you braze the the steel grows about 2.5 to 3 times as much as the steel. When it cools and shrinks this stresses the carbide and can cause carbide fracture during grinding and during use.

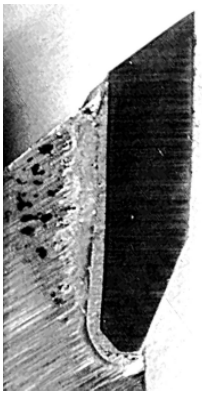
You need a thick layer of braze alloy between the carbide and the steel to compensate for thermal stress.

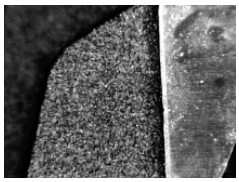
Here is a broken tip. There is huge amount of braze alloy that has been pushed out the side. You can see by the flow of alloy onto the plate that the temperature control was good and the plate was clean. **Too much pressure was used to seat the tip and too much braze alloy was pushed out the sides.**



Here are two more tips with the same condition. In this case the tips have not broken but others on the same saws did break either during grinding or during use.







Here are some really good brazes. After grinding there is only a very thin line of braze alloy behind the tooth. These are at 30 power magnification.

Here are some shots of a very good saw blade

The Small Business Savings Plan: 101 Tactics for Controlling Costs and Boosting the Bottom Line (Paperback) by Timothy R. Gase
Peerless Saw Co. 800 973-3753

Tim Gase has spent the past ten years working for Peerless Saw Company, a small manufacturing business, in Groveport, Ohio, the last seven years as co-owner. During that time, he helped grow the business from a $6.8 million company to one worth more than $10 million, dramatically improving the company's bottom line and net profit.

Prior to joining Peerless, Gase worked for Apex, a division of Cooper Industries, a $4 billion company, where he held eight positions over a twelve-year period, including Business Manager for three product lines with P&L responsibility for about $7 million in sales. He has an MBA from Ohio University.

(I got my copy at Amazon online. Tom)

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3847 S. Union Ave.
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Cermet II Tips Are This Good

The truth about Jerry Adams of Adams Saw P. 2

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http://bcsawfilers.com/

Do you want $3,008.50?

Be smart- Turn your Scrap Carbide into Cash

We are paying $5.50 per pound for scrap carbide. We wrote a check in January for $3,008.50 to a filer for scrap carbide. He called originally and he knew he had some. He had no idea he had that much carbide or that it was worth that much money.

Tim Gase of Peerless Saw Co.

Wrote a book on saving money and it works

Tim Gase (left) and Paul Duclos (right) working a trade show. See p. 7

You may not be this good looking but you can still get free hats.

The lady on the left has been identified by Mike West of Cascade Hardwoods as his fishing partner. The gentleman on the right is Ned Wood who works with Al Bouchard at Weyerhaeuser in Warrenton, Or. They are wearing our free, spring promotion cheap straw hats. To get free straw hats call 800 346-8274 . To see more really attractive people wearing free cheap straw hats see P. 3