Carbide Processors, Inc.

Northwest Research Institute, Inc.

Newsletter June, 2011

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sales@carbideprocessors.com www.carbideprocessors.com

Sell Your Grinding Sludge

It is now the best time in 30 years to sell your grinding sludge, swarf or whatever you call the stuff in the bottom of your grinder sump.

We just paid $983 for 7 five gallon buckets of grinding sludge. This is an incredibly high price. The reason for this high price is that tungsten as a raw material has gotten really high. In addition the Chinese are restricting the export of tungsten and tungsten carbide.

Free pickup

If you have 1,000 pounds or more of grinding sludge we will arrange to have it picked up **free** from your loading dock. To help with your calculations, you can figure that dry grinding sludge is about 14 pounds per gallon. A 50 gallon drum of dry sludge should weigh about 700 pounds.

UPS shipping

We will use you UPS Account to ship to you if you wish. The more you ship, the bigger your discount is. Some companies refuse to use their customers UPS account number for this reason. We will do it however you wish

CafePress for Sawfiler Gear

We sell Sawfiler gear with our sawfiler logo on it.

We sell T shirts, sweatshirts, caps and other items. Order online or call Emily at 800 346-8274

http://www.cafepress.com/sawfiler

Free Onesie (sort of like a sleeping bag for little babies.) If you have a wee small child or a grandchild we will send you one free in either pink or blue.

The story behind this logo on page 2.

ISKA Annual Members' Meeting and Reception At Bally's in Las Vegas Meeting 6:15 Reception 7:00 pm Friday July 22, 2011

Why Carbide Wears Out

In this issue we have a report on why carbide wears out. This is a report I did on some saw blades cutting the edges of sheets of gypsum.

Theoretically gypsum is extremely soft and chalky. As anyone who has worked with sheet rock, wallboard, gypsum board or whatever you want to call it knows it really is extremely fine and chalky. However, mixed in with the fine, soft gypsum material is a fair percentage of extremely hard particles.

If you design your saw blade for cutting gypsum then you will use very hard tips to get the longest life. If you do this then you will suffer an awful lot of edge chipping from extremely hard particles in the gypsum. If you go with a very soft grade for toughness against the hard particles then you won't get the wear life.

Many years ago carbide was either hard for long life or soft and tough to resist breakage. Our research, over the last 15 years, has identified about 17 contributing factors to carbide wear. Any one of the 17 is more or less important depending on what's being cut.

If you need help

If you need help we will be more than happy to work with you. We don't have all the answers or all the solutions we are developing a nice, long list of people we have helped. We're always happy to do an analysis and happy to do it free if we might have a chance to sell you carbide.

Improve Bandsaw Performance

Western Saw Filer's Educational Association Conference in September

September 16th and 17th at the Monarch Hotel in Portland, OR.

This year's workshops will be all bandsaws. It will cover bandmill alignment, bandmill maintenance, saw geometry and many other issues related to bandsawing. There will also be workshops on band wheel grinding and tooling.

Some of the most knowledgeable people in the industry will be presenting a series of workshops designed to address a wide variety of problems and solutions to those problems.

We encourage any and all sawmills to send their Saw Filers to this program. Dollar for dollar you will not find a more comprehensive one day workshop anywhere. For less than the cost of a consultant for a day you can send the whole Filing crew to these workshops. The information they bring back to the mill will pay dividends for years to come.

As always, Filers are welcome to invite their Management or Maintenance personnel to join them at the workshops.

For more information please contact Bill Saily at billsaily@hotmail.com or bsaily@frontiernet.net.
Hope to see you all there.

There Will be Free Food

Our Sawfiler Logo

I was speaking at a conference when the subject came up about the term "Sawfiler". One opinion was that saw filer was not an appropriate term anymore because a good saw filer did so much more than just file saws. I was of the opinion that the term is what someone makes it.

I wanted a logo that illustrated just how impressive Sawfilers really are. Thought about it for a couple months and then I happened to see the movie, Adventures in Babysitting. The hero is named Thor. He fixes a car and rescues a beautiful woman and some kids. So he is a hero, extremely good with machinery and loved by women and children. That pretty well sounds like a saw filer.

I had an artist create the logo. We deliberately went for something out of a Marvel comic book because it was more fun that way.

We made the hero look like Thor because store was a Norse hero was a smith and who was extremely good with a hammer. This ties in well with the extremely difficult part of saw filing which is hammering saws.

We wanted to go for multi-ethnic but couldn't figure out how to do it so we went with the traditional Thor image.

On the website

Saw filers design, build, repair and maintain ultra-precision tools and make them run beautifully. The term comes from old, steel saw blades. Now saw filers may work with several million dollars worth of equipment. They must know different materials and their applications. They are, perhaps, the single most important person in determining whether a cutting operation is profitable or not.

They may be men or women of any ethnicity. They are invariably extremely good looking with a high intelligence and universally loved by children and animals. They are dependable, hardworking, quick to solve problems and generally the kind of people the world needs. If you are fortunate enough to know or meet a saw filer you really ought to do something nice for them in appreciation.

Conclusion:

I worked my way through college in a manufacturing plant and I have spent 40 years in industry since. I have a tremendous appreciation for people who go in and do the best job they can day after day. I have seen a great number of people go above and beyond the minimum required in their job just because that's the kind of people they are. Many, many times these people do not get nearly the recognition they should. Our Sawfiler looks like a hero because that's the way we think of sawfilers.

Neighbor Problems

My neighbour knocked on my door at 2:30 am. Can you believe that? 2:30 am? Luckily for him I was still up playing my Bagpipes.

Grinding sludge can be worth a lot of money

We just paid $1,000.00 for 35 gallons of dry, carbide, grinding sludge. That was seven 5 gallon buckets. The 35 gallons of sludge weighed 473 pounds. The sludge was dry enough that it measured only 5% water and grease. It was pure tungsten carbide grinding sludge (or swarf - the stuff at the bottom of the sump on your carbide grinder.) so that it measured about 40% tungsten.

I don't know whether tungsten is going to go up or down. I don't know whether grinding sludge is going to be worth more in six months or less. I do know that this is the first time in 20 years we have been able to get enough money for grinding sludge to make it worthwhile buying.

If you have 1000 pounds or more of scrap carbide, grinding sludge or a combination we can arrange to have it picked up at your location at no cost to you.

This is all on a case-by-case basis but we would be very happy to walk you through it. Just call 800-346-8274 and ask for Emily. You can also e-mail sales@carbideprocessors.com.

Remember that grinding sludge or grinding swarf is not a hazardous material if it is held for recycling. Here is your chance to recycle and put money in your pocket.

We had a guy leave here yesterday who said he still has all the grinding sludge from the 15 years he's been in business and he was a real happy camper when he found out what it was worth and that we were going to arrange to have it picked up.

The scrap markets are like any other market. There is only so much capacity to them. Right now they're buying carbide sludge or swarf from the bottom of your grinder. Just as we can't guarantee a future price, we cannot guarantee how long we are going to be able to buy.

If you call and make a deal with Emily we will guarantee to buy it and we will give you a guaranteed price then we take the risk on what to do with it. You just worry about what you're gonna do with all that cash.

$6,000 or old carbide?

Which do you want?

We buy obsolete inventory of good carbide. We buy carbide scrap. We also maybe buy carbide sludge. We just paid $3 per pound for some grinding sludge. **We Buy Scrap Carbide & the prices are really good. They are about at a record high.** Prices change daily so Call Emily at 800 346-8274

Two Wolves

One evening an old Cherokee told his grandson about a battle that goes on inside people. He said, "My son, the battle is between two wolves inside us all. "One is Evil - It is anger, envy, jealousy, sorrow, regret, greed, arrogance, self-pity, guilt, resentment, inferiority, lies, false pride , superiority, and ego.

"The other is God - It is joy, peace, love, hope, serenity, humility, kindness, benevolence, empathy, generosity, truth, compassion and faith."

The grandson thought about it for a minute and then asked his grandfather: "Which wolf wins?" The old Cherokee simply replied, "The one you feed."

Tomorrow

Tomorrow is the most important thing in life. It comes to us at midnight very clean. It's perfect when it arrives and it puts itself in our hands. It hopes we've learned something from yesterday
John Wayne

You are Right

Whether you think you can or whether you think you can't, either way you are right.' -*unknown.*

Marine Training

Entering a classroom at MCAS (Marine Corps Air Station,) Yuma, a female Marine Captain encountered a clearly apathetic audience. She was selected to provide a full hour's instruction on Iraqi electronic warfare capabilities to 150 Marine aviators who showed by their body language deep skepticism about her ability to teach war fighting skills to an all-male class.

She began by noting that her voice had just been tested to see if it was suitable for some new cockpit recorder messages for Marine aircraft. She said that unfortunately she had not been selected to be the new "Bitching Betty." However, she said it was only fair to warn the audience the reason given for her non-selection was that an analysis of her voice pattern revealed that her particular voice had a tendency to lull to sleep any male homosexual within earshot.

The assembled officers shot upright in their chairs. 150 pairs of eyes were wide open and locked on her and stayed that way for the rest of the period.

Rules for Women From Men

From Monte Murphy at Murphy Saw in Oregon

These are our rules! Please note. They are all numbered '1' on purpose!

1. Men are not mind readers.
1. Sunday sports it's like the full moon or the changing of the tides. Let it be.
1. Crying is blackmail, and witchcraft.
1. Ask for what you want. Let us be clear on this one! Subtle hints do not work! Strong hints do not work! Obvious hints do not work! Just say it!
1. Yes and no are perfectly acceptable answers to almost every question.
1. Come to us with a problem only if you want help solving it. That's what we do. Sympathy is what your girlfriends are for.
1. Anything we said 6 months ago is inadmissible in an argument. In fact, all comments become null and void after 7 days.
1. If you think you're fat, you probably are. Don't ask us.
1. If something we said can be interpreted two ways and one of the ways makes you sad or angry, we meant the other one.
1. You can either ask us to do something or tell us how you want it done. Not both. If you already know best how to do it, just do it yourself.
1. Whenever possible, please say whatever you have to say during commercials.
1. Christopher Columbus did not need directions and neither do we.
1. All men see in only 16 colors. Peach, for example, is a fruit, not a color. Pumpkin is also a fruit.
1. If we ask what is wrong and you say 'nothing,' we will act like nothing's wrong. We know you are lying, but it is just not worth the hassle.
1. If you ask a question you don't want an answer to, expect an answer you don't want to hear.
1. When we have to go somewhere, absolutely anything you wear is fine... Really!
1. Don't ask us what we're thinking about unless you are prepared to discuss such topics as football or golf.
1. You have enough clothes.
1. You have too many shoes.
1. I am in shape. Round is a shape!

Thank you for reading this. Yes, I know I have to sleep on the couch tonight; but did you know men really don't mind that? It's like camping.

P.S. Monte's wife, Linda, is a real sweetheart. She also has a great sense of humor.

Vollmer Tip from Mike West

We just went through some grief with our side grinder where we were losing our tangential angles.

I went through all my literature on our Vollmer side grinder and found virtually nothing on how to correct my problem. So I tore into it, checking sensors and photo eyes and a messing with stuff until it didn't work at all. Contacted our buddy Burl about a rescue operation and before he responded I had it back up and running but still had an angle problem.

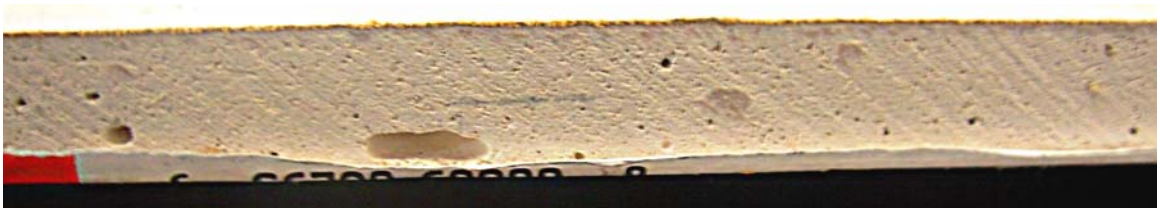
I wanted my feed finger to stop just a little bit higher so the tooth was above the grinding wheel spindle but all of the normal feed finger adjustments dealt with tooth pitch and speed and the bottom point is fixed.

Well, after losing my last two hairs and staring at the machine like a cow looks at a train when it goes by I discovered a bolt with a nut that can be adjusted up a little to stop the feed finger as high as I wanted. <u>Pure old physical stop.</u>

I was looking so deep into the workings of my machine that I failed to see the easy stuff. I can admit that it was hidden, not only by being behind the cylinder but also in one of those places that don't get as clean as they should. Carbide wet grinding is a messy business.

Wear on Saw Blade Cutting Gypsum

Why This is Important: **What looks like straight wear from abrasion is actually wear and a huge amount of micro-chipping. If you treat it as just straight wear by using harder grade then the chipping gets even worse.**



End of gypsum board – notice saw marks

Theoretically these blades have been sawing gypsum however an analysis reveals a large amount of other minerals.

X-ray Diffraction Data						Rough
XRD#	101	102	103	104	Mohs	Hardness
Sample #	1	2	3	4	Hardness	Comparison
Gypsum	86.70%	91.40%	93.80%	93.40%	2	Cadmium, Bismuth
Anhydrite	9.80%	2.90%	2.10%	1.20%	4	Iron, Nickel, Platinum, Steel
Quartz	0.80%	1.70%	0.50%	0.70%	7	Quartz, Vanadium
Illite&Mica	1.40%	0.90%	0.50%	0.80%	1 - 2	lead soft
Kaolinite	0.50%	0.40%	0.00%	0.40%	2 - 2.5	gold, silver
RO M-L I/S 60S*	0.80%	2.70%	3.10%	3.50%		
TOTAL	100.00%	100.00%	100.00%	100.00%		

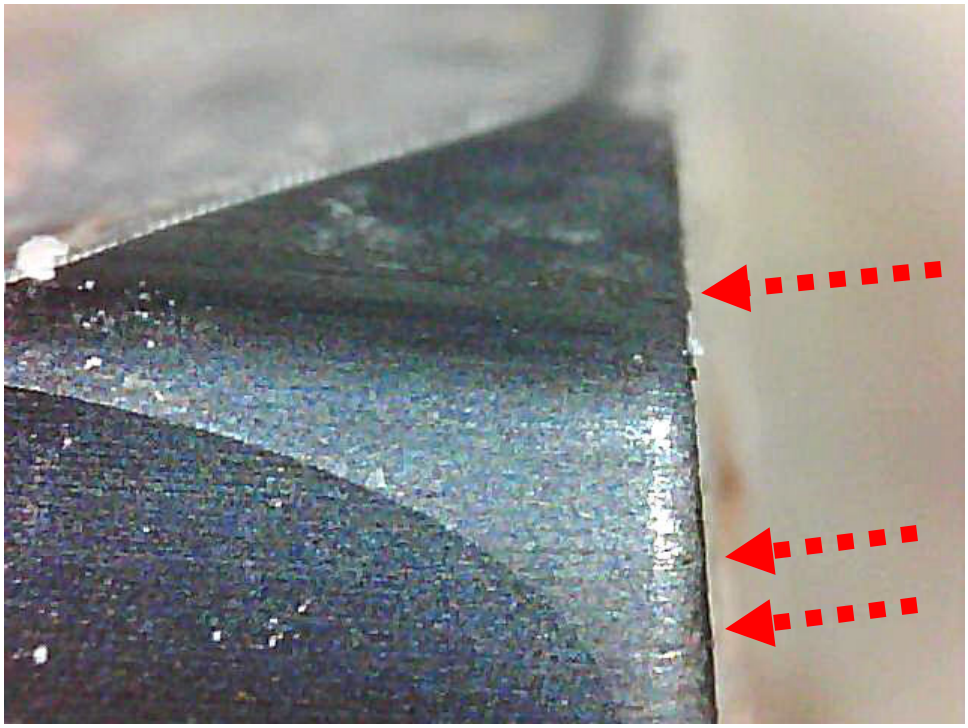
Gypsum has a Mohs hardness of 2. Some of the other minerals are in the same range. There are two minerals that are much harder than Gypsum and this is a big part of the wear issue.

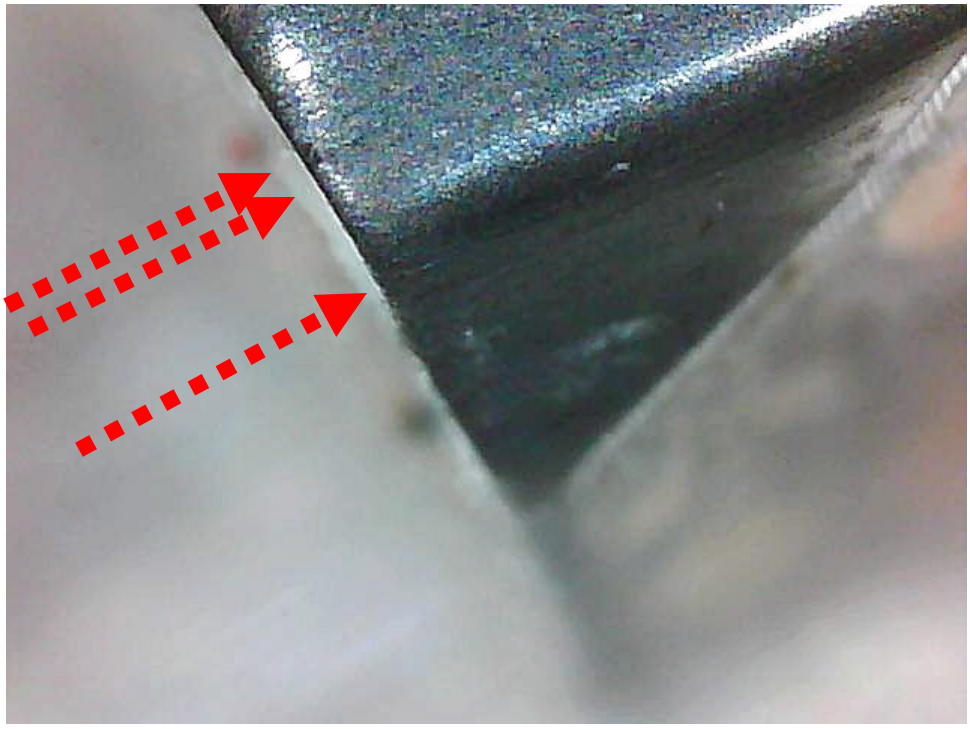
Anhydrite	9.80%	2.90%	2.10%	1.20%	4
Quartz	0.80%	1.70%	0.50%	0.70%	7
Hard bits anhydrite and quartz	10.60%	4.60%	2.60%	1.90%	

The 50x photographs show the kind of wear you would expect from cutting a highly abrasive material. It is a smooth, shiny, polished surface.

At 200x you still see the smooth, polished surface but you also see some very significant gouges in the edges of the tips. Plus you can see a general roughness to the cutting edge. For comparison, following is a picture of the jaws of a dial caliper at 0.001” magnified 200x

If you want a printed, color report just call
800 346-8274





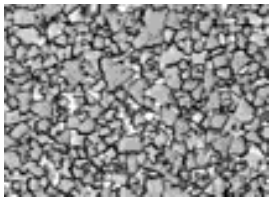
The fine, abrasive material is wearing the carbide greatly. However the wear from the fine, abrasive gypsum is greatly aided by damage from the hard particles such as anhydrite and Quartz.

It appears that the hard minerals are actually gouging out some of the carbide in some cases. They are also causing nicks in the edge. There does not appear to be any spalling or chipping, at least at 200x.

Each gouge or edge nick does at least tow things to exacerbate the wear. First it increases the wear surface. Wear is a square / cube relationship. Wear occurs along a surface area (square) of a mass (cube). One of the limiting factors in wear rate is the available surface area. If you have a surface area of 4 and a mass of 8 then the part will be worn down at a certain rate. If you increase that surface through chips, gouges, etc. then it wears faster. You might have a ratio 5 (square or surface) to 8 (mass or cube).

Recommendation:

The carbide needs to be much tougher so that it doesn't gouge and chip as readily. Plus it needs hardness for survivability from abrasive wear.



Standard Carbide

Cermet II monolithic binder

Our Cermet 2 grade starts out as a hard carbide and then goes through a post sintering process by which the parts are infused with a Boron metalloid. This makes the parts behave much more like a monolithic part than a cemented part. It is sort of like adding rebar to concrete but on a molecular level. It changes the chemistry which greatly increases its resistance to chemical attack and helps it resist electrochemical effects caused by the extreme rubbing in this application. This material brazes and grinds like ordinary C-4 carbide. It is well proven and provides between 2 and 10 times the life of ordinary carbide depending on the application. This is an extreme application and performance towards the lower end should be expected.

How Carbide Wears

Tungsten carbide is actually tungsten carbide grains cemented with a metal, usually cobalt. What follows are failure mechanisms we have seen in industry.

1. Wear – the grains and the binder just plain wear down
2. Macrofracture – big chunks break off or the whole part breaks
3. Microfracture – edge chipping
4. Crack Initiation – How hard it is to start a crack
5. Crack propagation - how fast and how far the crack runs once started
6. Individual grains breaking
7. Individual grains pulling out by mechanical means
8. Chemical leaching that will dissolve the binder and let the grains fall out
9. Rubbing can also generate an electrical potential that will accelerate grain loss
10. Part deformation - If there is too much binder the part can deform
11. Friction Welding between the carbide and the material being cut
12. Physical Adhesion – the grains get physically pulled out. Think of sharp edges of the grains getting pulled by wood fibers.
13. Chemical adhesion – think of the grains as getting glued to the material being cut such as MDF, fibreboard, etc
14. Metal fatigue – The metal binder gets bent and fatigues like bending a piece of steel or other metal
15. Heat – adds to the whole thing especially as a saw goes in and out of a cut. The outside gets hotter faster than the inside. As the outside grows rapidly with the heat the inside doesn't grow as fast and this creates stress that tends to cause flaking (spalling) on the outside.
16. Compression / Tension Cycling - in interrupted cuts the carbide rapidly goes though this cycle. There is good evidence that most damage is done as the carbide tip leaves the cut and pressure is released.
17. Tribology – as the tip moves though the material it is an acid environment and the heat and friction of the cutting create a combination of forces.

Notes:

1. As with any chemical reaction of this sort the acids create a salt that protects underlying binder until the salt is abraded away so grain size and binder chemistry are also important.
2. Electrochemical effect – erosion compounded by the differences in electrical resistivity between carbide and cobalt
3. Heat from rubbing can affect carbide so a slicker grade can increase life.

Super "C" Carbide Grade

Tougher than C1 - Better wear than C3

What Makes Super C Tips Truly Superior

1. Superior Abrasion Resistance - Abrasion or straight wear is countered by smaller, better grain size.

And People Really Like Them - Call Today To Try Them – Most Sizes Readily Available

Super C	Hardness (HRA)	T.R.S. (psi)
	92.2 – 92.4	530,000 +

Typical C2 values

	Hardness (HRA)	T.R.S. (psi)
C2	92.1	334,000
C2	91.8	334,000

Cermet II® 8 days instead of 5 in MDF

Three weeks and three full loads of double side melamine laminate instead of 1 week and 1 load with carbide

1. 5 blades with standard C-4 carbide cutting 45 lb. single and double sided vinyl-laminated particle board
* Cermet II - 15,088 meters / old grade - 6706 meters **225% as much run life**

2. KM-16 industrial saw cutting 101.6 mm x 152.4 mm (4" x 6") Green hardwoods, oak, hickory, maple and walnut using 11 blades with standard C-4 carbide
*Cermet II / 462 hrs / old grade - 40 hrs
1,155% as much run life

3. 406 mm (16") 100 teeth cutting countertops
* Cermet II - 4 weeks / old grade - 1 week (4 times) **400% as much run life**
4. 406 mm (16") 80 teeth cutting MDF Board

2 & 3. Superior Adhesion and Diffusion Resistance (corrosion and chemical attack) Super C grade of carbide has an extremely fine structure so there is very little binder presented to the material being cut. This, combined with the special metallurgical formulation the Super C binder (hint - it's not just plain Cobalt) creates an extremely wear and corrosion material

C2	91.5	377,000
C2	90.4	435,000

Typical C Values

	Hardness	T.R.S. (psi)
C1	89 - 92.4	350,000 - 360,000
C2	91.2 - 92.9	250,000 - 400,000
C3	91.4 - 93.6	270,000 - 350,000
C4	89.6 – 93	260,000 - 450,000

Sawmill Grade Tips

* Cermet II - 10 days / old grade - 2 days (5 times) **500% as much run life**

5. 305 mm (12") 100 teeth TCG Miter cutting oak, Compressed Fiber Board, Plastic
* Cermet II - 154 hrs / old grade - 28 hrs (5.5 times) **550% as much run life**

6. 305 mm (12") 60 teeth cutting MDF, High Pressure Laminate (Formica)
* Cermet II - 56 hrs / old grade - 8 hrs (7 times) **700% as much run life**

7. G 1060A on Chop Saw cutting Particle Board and Pine Dowel Rods
* Cermet II - 48 hrs / old grade - 8 hrs (6 times) **600% as much run life**

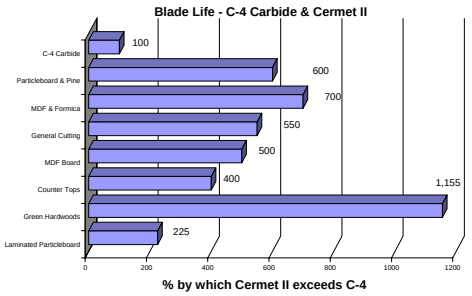
Use Cermet 2 instead of carbide and make your life much easier

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.



for use in wood, plastic or non-ferrous metals.

4. Superior Fatigue Resistance

- Transverse rupture strength well above 500,000 psi.
- Rockwell A hardness above 92
- Alloy binder for corrosion resistance
- Grain structure to inhibit both crack initiation and crack propagation
- Micro grain or mixed grain for superior wear

Carbide Processors, Inc.
800 346-8274

Twice the life in beetle killed Lodge Pole pine.

Benefits You Get

* Grinds like regular carbide
* Gives a better edge than carbide
* Stays sharper longer than carbide
* Great increase in fracture toughness.
* More corrosion-resistant
* Better at high temperatures
* Cuts faster
* Cuts faster & longer yet is tougher
* Longer runs and less downtime.

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

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ADDRESS SERVICE REQUESTED

Ship Scrap Cheaply

USPS Flat Rate boxes. We recommend 11 x 8.5 x 5.5 size with tape on it. It cost $10.95 to ship anywhere in the US. It holds maybe $400 to $500 worth of scrap. Scrap prices vary daily. Today, June 6, we are paying $8.50 with braze alloy on it and $9.00 per pound with no braze alloy.

It helps if you put the scrap into coffee cans, boxes, or plastic bottles and then put those in the box.

Grinding sludge can be worth a lot of money

We just paid $1,000.00 for 35 gallons of dry, carbide, grinding sludge. That was seven 5 gallon buckets. The 35 gallons of sludge weighed 473 pounds. The sludge was dry enough that it measured only 5% water and grease. It was pure tungsten carbide grinding sludge (or swarf - the stuff at the bottom of the sump on your carbide grinder.) so that it measured about 40% tungsten.

I don't know whether tungsten is going to go up or down. I don't know whether grinding sludge is going to be worth more in six

(cont. P.2)

You really should try our Super C and Cermet 2 grades of saw tips.

Super C replaces all grades from about a C 1 ½ to a C 3 1/2. It gives much longer life and is much harder to break than any of these grades.

Our Cermet 2 replaces C-4 and gives much, much longer life. The Cermet 2 is much better than the original cermet grades. Cermet 2 grades braze and grind just like C-4 carbide but stay sharp a lot longer.

Braze Alloy in Small Quantities at Good Prices

800 346-8274

We Also Sell Flux

White, Black and Purified Black