Northwest Research Institute, Inc.

Carbide Processors Inc. Newsletter

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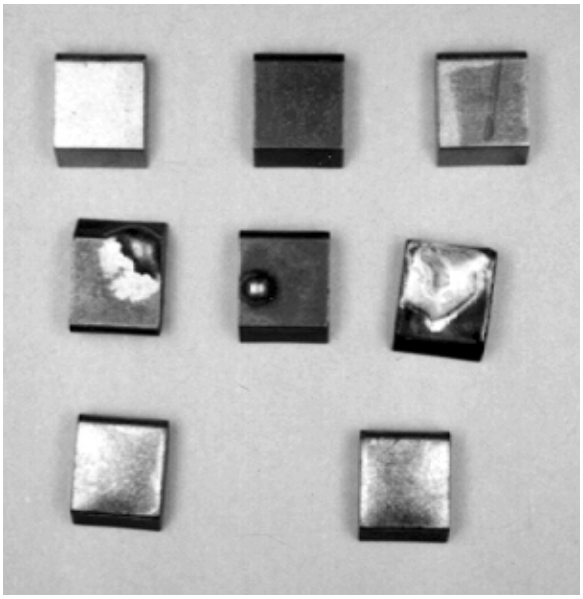
Customers Are Not Stupid

Several customers have called and complained about bad carbide. Three things make this unusual. First, there have been a more complaints than we usually hear. Second, they are absolutely correct. It is bad carbide. Third, the problem seems to come from more than one supplier.



Problem tips from a box of carbide

The top row is the way the tips came out of the box. The left one shows one of the really shiny tips. This appears to be a pretty good surface treatment. The middle one is one of the really dark tips. The right tip shows a definite pattern. These tips were made differently, treated differently or both.

The left tip was treated somewhere to make it shiny. A shiny coating is not necessarily good if the tip is bad. Sort of like painting over rust. The middle tip was treated, differently, not treated or the treatment just did not take. The right tip is from a batch that was treated but the treatment was not done well. You can see where another part rested across the top of this part. This prevents both parts from being properly treated. The middle row shows how bad some of these tips were.

These were supposed to be treated tips that did not need any other work to braze well. The customer got bad results. We got bad results here until we used one of our treatments then we got the results in the bottom row.

Sometimes They Can Seem That Way

We had a customer call with a major problem. He had a bad problem with tip breakage and tip loss. He was desperate because he was losing a fortune reworking saws and was going to lose a major customer if we couldn't solve his problem. The carbide supplier told him it was our fault. He didn't think it was our fault or his fault but he didn't know how to fix the problem either.

The important thing is to fix the problem and keep the customer. Because it was our reputation and our customer (sometimes) we bought tips from a different supplier. We did half with regular Cad Free and half with High Impact. The new tips with regular Cad Free reduced breakage by about 90%. Tips from the new carbide supplier with High Impact eliminated breakage entirely.

When we were through we told the customer that maybe he should switch carbide suppliers and use us exclusively. He said he would sure like to but he was getting such a good price where he was buying now that he hated to switch.

Two things. First, we solved his problem with the help of a carbide supplier who was also not at fault. Second, this guy thinks he is getting a better deal because he pays less money even if he spends a fortune in rework and loses customers.

Be careful what and where you buy. Many of us in pretinning, carbide, saws and diamond wheels are very careful to sell good quality. Some are not. If you buy from a competitor and have problems you will probably call us for help. You will call us because we can and will help. The problem is that if you buy poor quality there is not much that anybody can do to help you. Ask about guarantees. Ask about return policies. Ask for references from other customers. A bunch of you are having the same problem and being told that it is all your fault. This may be true but when you switch suppliers the problem goes away.

We offer two free booklets Brazing Tungsten Carbide and Tool Tipping Materials.

Cermet Report

If the Japanese can cut steel with cermets, Americans can cut particleboard

The Japanese are already selling steel cutting saws in this country with cermets. The metal machining industries have been using cermets on steel for years. Cermets will be excellent in high abrasion / low impact applications

Short History: We developed a process to braze cermets easily and cheaply. Then we found out how much the Japanese are using them. Cermets apparently have replaced about 40% of tungsten carbide in Japan. We tried getting people to use brazed machining inserts because that was all that was available. These inserts are about $10 each and nobody wanted to use them. We had some cermet saw tips made. The first batch was grade 54 and are 6mm x 3mm x 2mm. They worked very well in secondary wood processing and particleboard. We went ahead and ordered about dozen sizes. Our supplier suggested we try their new 541 grade. Two customers tried the 541 grade. One had breakage during grinding. The second customer ground them successfully but they broke as soon as they started cutting.

We are now experimenting two ways. 1. We have the grade 541 WDC 7185. We have ordered two other grades of WDC 7185 from a different supplier. We will see if any of these work as well as Japanese cermets. 2. We now know that if you grind cermets wrong they will break. Cermets chip much more easily than carbide. Cermets need to be ground differently than tungsten carbide or they will break. Carbide wheels will destroy cermets.

What you get: Cermets are going to replace carbide in this country the same way they have in Japan. They are just considerably superior in some applications. We will supply parts, pretinning and grinding information so you can try and successfully use cermets.

What we get: We have a patent application in for ceramic tipped tools. We can make cermets and other ceramics braze really well for very little cost. We will do the surface treatment and pretinning.

Free Saw tips
I have about $9,000 worth of cermet saw tips in nine sizes. I won't sell them because I cannot guarantee that my customers can use them successfully because no one ever has. I will give you saw tips and lots of grinding information if you want to test them.

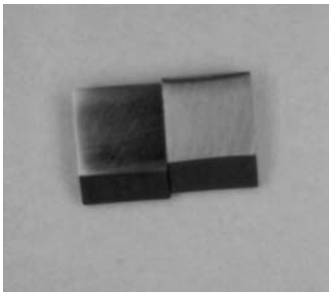
Hardness comparison
C-4 carbide and cermets
Knoop Microhardness
ASTM E384-89, 500 gram load

	Multi Metals	Cermets	
	C-4	carbide	Grade54 & 541
Test #	1	1967	1669	1565
	2	1962	1684	1582
	3	1924	1658	1572
Average		1951	1670	1573

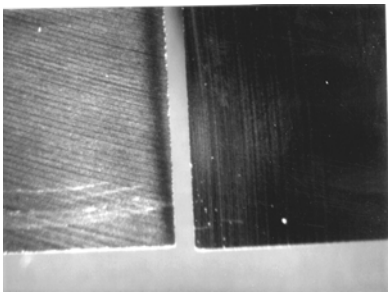
If Japanese can cut steel with cermets, Americans can cut particleboard

Grinding Cermets

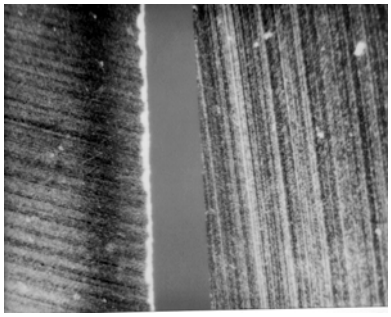
Cermet saw tips are a solid material while tungsten carbide saw tips are cemented. Cermets need to be ground to a much better finish than tungsten carbide. Because of the nature of cermets any crack or chip in the cutting edge will serve as a stress concentrator and weaken the cermet.



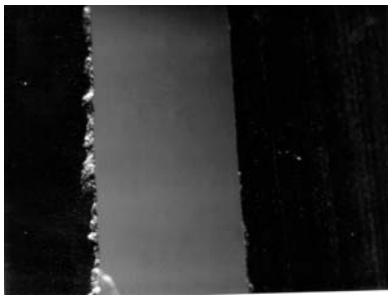
Normal view



20 x magnification



40 x magnification



100 x magnification

As you examine these photos you see that the 100 grit carbide wheel on the left is considerably rougher than the 240 grit cermet wheel on the right. Two things happen. The broken edge serves to start crack propagation, which weakens the material. As the edge cuts material gets forced into the crack and you get a wedge effect tearing the tip apart. This is critical with cermets. It also explains a lot of the reason for carbide breakage.

When you start using cermets, we will pretin them beautifully and we can supply a great deal of information on grinding them as well.

One of the original CP 2000 units. 3 years - No problems. This unit is dedicated to the constant filtering of a single machine. After a year and half the owner had it converted to a CP 2002 to increase filter life from three days to over a month.

23 Top Reasons to Filter Coolant

Make more money

1. Longer Machine Life
2. Longer time between rebuilds
3. Less down-time
4. Less equipment replacement
5. Faster operation
6. Faster cycle times
7. Fewer wheel replacements

Better quality

8. Smoother grinds

Greater Lubricity with clean coolant

9. No burning
10. Cooler grinding

Reduced consumable costs

11. Longer coolant life
12. Longer grinding wheel life

Reduced Labor

13. Less machine maintenance
14. Less dressing required

Cleaner workplace

15. Perhaps increased operator safety
16. Retards bacteria growth
17. Eliminate smells

Fewer problems

18. Less OSHA exposure
19. Less EPA exposure
20. Less waste
21. Cleaner waste
22. Lower coolant recycling costs
23. Turn an expense into income

When and Why to Filter

In grinding operations you want to filter out all the particles that are larger than 10% of the grit size of the wheel or 10% of the tightest dimension specified. A way to explain this is the tire and 2x4 analogy. An automotive tire is about twenty inches in diameter. If you run over the two-inch dimension (10%) of a 2x4 you will feel a bump. The little divider bumps (wake-up bumps, turtles) in roads are generally much less than an inch and you sure feel those. If particles of any size come between the tool and the work it will tend to damage both the tool and the surface of the work the same way that a rock in your shoe will try to make a hole in both your foot and the shoe.

Machine damage is much harder to quantify. One way of determining acceptable particle size is to ask what grit sandpaper you would allow to be used on the hydraulic cylinders of the machine. As the coolant gets sprayed it gets on extended hydraulic cylinders and is then abraded as the cylinder moves in and out.

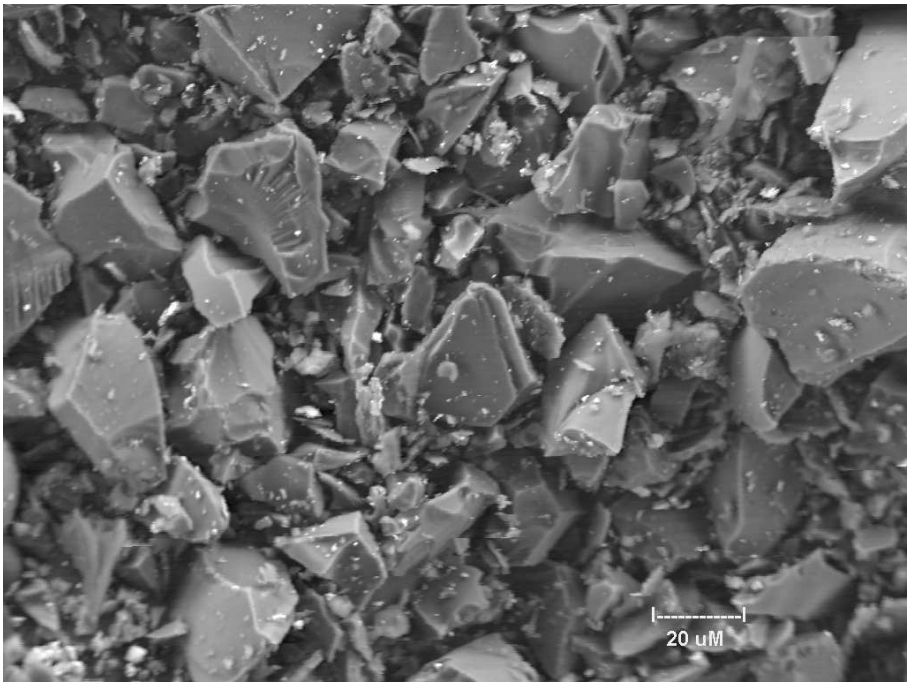
Filtering in Carbide Tool Grinding Operations

If you use wheel grit (Sieve) Size	Wheel grit size in microns	Filter to this level in microns
100	150	15
200	75	7
400	38	4
635	20	2

What you need to filter out of your sump

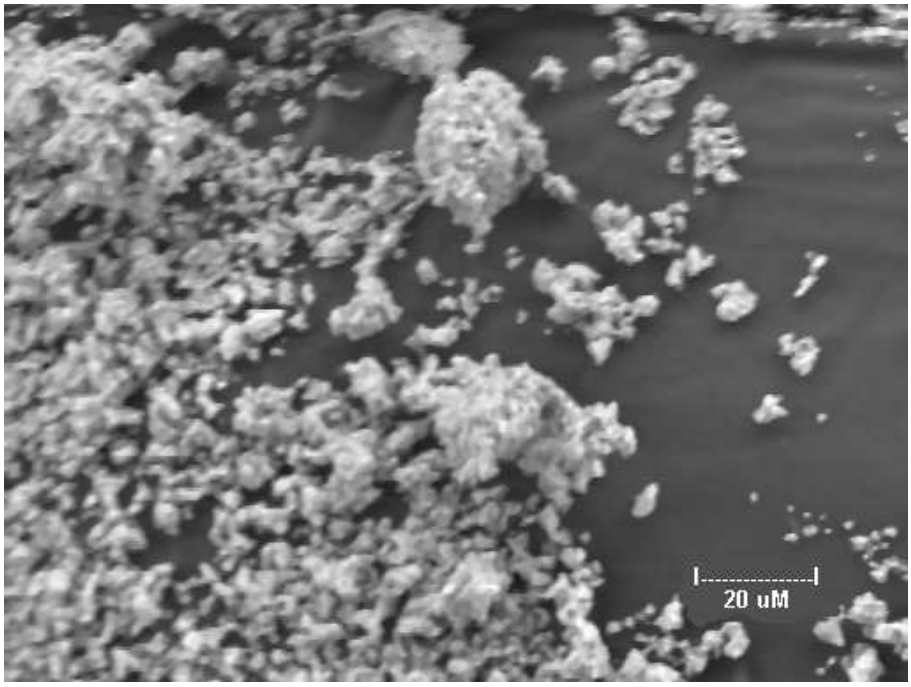
Or

What's tearing up your grinder



The dust in the air at 1,000 magnification.

The big chunks are broken diamond and the little bright spots are tungsten carbide. This was collected out of the dust collection system in a carbide tool grinding operation. Diamond is the hardest substance known and tungsten carbide is second. They both have a lot of sharp, fracture edges which means they cut, scrape and scratch metal wonderfully well.



Out of the sump

It is the same material but the diamond and tungsten carbide are glued into chunks with oil and grease. Some of these clumps are as small as one micron, which is 1/25,000 of an inch. There is no way to keep something this small out of all sensitive areas if there is any opening at all. The grease means they stick better to anyplace there is movement such as cylinders, bearing, bushings, controls, etc.

Coolant Filtering Works

It Saves You Money

Filtering grinding coolant is just like filtering the oil in your car. Dirty oil and dirty coolants wear out the equipment.

Increase Machine Life - save $2,000 to $8,000 per year

The big advantage in clean coolant is that it protects the machine. Dirty coolant can shorten machine life by 5% to 7% a year. Saw and tool grinding generates a huge amount of very small, very abrasive particles. These particles get into the coolant and then are sprayed all over. These particles get into controls, cylinders, rods and bearings where they increase wear and reduce quality. The CP 2002 removes particle down to one micron and removes them with incredible efficiency.

Particles per cubic centimeter:	Unused coolant	Dirty coolant	Filtered coolant
	11,885	76,299,682	40,000 to 100,000

96% to 99.9% particle removal

Longer Coolant Life - save $1,000 a year per machine + the saving in labor

If you filter your coolant you will get much longer life. In actual tests we see coolant last six months and it is still doing an excellent job. This saves you on coolant costs and the maintenance of sump cleaning and coolant changing.

Six months coolant life

Reduce Diamond Wheel Costs - save $3,000 to $10,000 per year

A good grinding operation will still dump huge amounts of oil and grease into the sump. We ran a test on a high production machine. In twenty-two days of double shift we pulled out about ten pounds of oil and grease. This oil and grease clogs the wheel. Clogged wheels mean slower grinds, worse quality and shorter wheel life. Clean coolant increases diamond wheel life by at least 30% overall and as much as 50% depending on the wheel and the application. This is saving of 25% to 35% in annual diamond wheel cost. (Tests run in Feb. & March of 1998. Six dry filters weighed 5.45#. Six dirty filters drained of water weighed 15.21#. The difference was 9.76 pounds.)

Removes oils and greases

Very Low Filter Cost

The CP 2002 comes with replaceable or cleanable filters. This is a low cost unit that is very effective. If you are concerned about the true cost of the unit then the CP 2002 is a better buy. The CP2002 runs a month without filter changes because it ran over a month of double shifts in repeated tests in an actual saw shop. We ran tests for two weeks and they worked. Then we ran tests for a month and they worked. Finally we wanted to run tests until the filters clogged up. It took 22 days of double shifts before the filter clogged up. The filters worked well all month. (We tested dozens and dozens of filters to find the right combination. If you use the wrong filters your performance can drop from weeks to days or hours.)

Filter Cost $24 a month and only one filter change

Our Units Do Not Harm Coolant

Building a filter system right is very difficult. It must take out tramp oils and greases without taking out the lubrication and anti-rust from the coolants. In addition to particle count we also tested for turbidity, pH, viscosity and conductivity. In all four areas the filtered coolant measured the same as brand new coolant.

	Unfiltered	New	1/2 hour	11 days	22 days
PH	**8.08**	**8.02**	**8.15**	**8.14**	**8.05**
Viscosity	**0.73**	**0.76**	**0.80**	**0.79**	**0.76**
Turbidity	**45,000**	**7.02**	**68.5**	**57.3**	**50.3**
Conductivity	**2,210**	**1,683**	**2,680**	**2,630**	**2,380**
Particle count	**76,000,000**	**12,000**	**2,600**	**2,600**	**2,400**

Lowest price
CP 2000 with standard filters

Cheapest to buy, own and use
CP 2002 with High Capacity filters

You can have the very best filter systems for the lowest price

- These are the best filter systems for grinding and machine coolants in small to medium shops.
- They trap the smallest particles.
- They trap oil and grease.
- They cost the least to buy.
- They cost the least to operate.
- They make you the most money of any system on the market.

The very best units. These are the only units we know of that were designed for small to medium grinding and machine shops including saw and tool shops. These are the only units that had so much of the design and testing done on the plant floor of actual shops. They do everything they should at the very lowest cost.

The lowest price. The one thing everybody told us was that the units had to be top quality at the lowest possible cost. We built top quality units for well under $2,000 and even under $1,000. These units work better and filter cleaner than most units that cost two to ten times the price.

The cheapest to operate. Filter life is heavily dependent on what is being filtered. A filter that may run a couple weeks with just dirt may clog in a couple hours with thick oils or greases.

The CP 2000 system filters typically last from one to two and a half days.

Filter change is easy and reusable filters keep the cost low.

The CP 2002 filters routinely last as long as three or four weeks in actual shop tests. As a rule of thumb, it should cost about $25 a month to replace filters in the CP 2002. The CP 2002 has eleven times more usable filter volume than the CP 2000. The use of larger filters means that they are used more efficiently. The oils, greases and particulates penetrate to the full depth of the filter. Theoretically the CP 2002 has about 15 to 25 times the filter life of the CP 2000.

They make you the most money because you spend less to buy them. You spend less to use them. You have the fewest filter changes so you save on filter cost and labor.
You can increase coolant life from two to eight times what you are getting without filtering. We say this because this is happening in actual saw and machine shops.

The smallest particles. These units filter under one micron. The particles from saw and tool grinding are in the one to eight
micron range with a few larger than ten microns. Other filter systems only go down to ten microns. These units trap particles in the size you actually make. These units trap over 99.9% of all particles in the coolant.

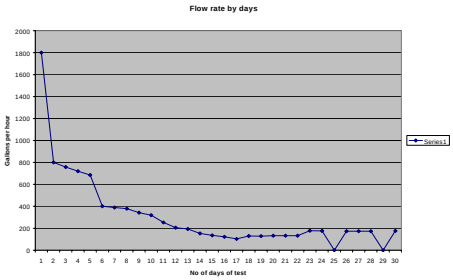
They trap oil and grease. These units trap oil and grease. They will remove up to ten pounds of oil and grease in a month. This makes for better, faster grinds and much longer diamond wheel life.

Guarantee - $100 if you find a better system. If you find a unit that filters smaller particles, costs less to buy and pays for itself faster I will give you $100.
Yours Truly,
Thomas J. Walz

CP 2002
When to Change Filters

As long as the filter system is keeping the coolant clean do not change them.

<u>The number one cause of low filter life is changing the filter too soon.</u>
The CP 2002 uses three-stage filtering. In stage one the flow rate really drops. A good operator will notice this and want to change the filter because the flow looks so slow compared to new filters. Do not change the filters here.



Flow rate by days (30 days dbl shifts**)**
First the pump without filters. The flow drops dramatically once the filters are inserted. Phase 1 is the steep drop in about the first week (these are double shift days shown here so about 4 days here). Stage 2 is the more gradual drop. Stage t3 is the steady stage where the flow actually recovers a bit. Many people see the drop in flow in stage 1 and change the filters. Stage 3 actually filters best. (Days 25 & 29 not taken)

Change the filters when they are no longer cleaning the coolant.
There are two ways to tell this.

1. Testing for filter change.
Is the coolant clean?

- Take a clear glass bottle.
- Fill it out of the end of the hose
- Let it sit one hour.

At the worst, the coolant should be clear with a light layer of sediment covering the bottom

2. Flow rate
Measure the amount of time it takes to fill the bottle. To keep a sump clean you should be filtering all the coolant once an hour.

The unit should be circulating enough to filter the whole sump every hour. This can be hard to judge by eye because we use a big pump and a three-stage filter. The unit has a big flow at the start. At the end of one week the flow is only about 1/15 (7%) of the initial flow. This is still about 90 to 150 gallons per hour. This will clean a 30-gallon sump three times and hour and a 10-gallon sump about ten times an hour.

When to change filters
Time to fill bottle

Sump size	1 gal. bottle	1 pt. (16oz.)
30 gallons	2 minutes	15 seconds
20	3 minutes	22 seconds
10	6 minutes	45 seconds
5	12 minutes	90 seconds

More reasons for short filter life

1. Changing the filter too soon.
We designed this system to give long filter life. We picked a filter that takes a couple days to settle in. As the filter gets loaded a little over the first couple days the flow drops off but the filter actually gets more efficient. The coolant is cleaner after 22 days than after one-half hour or eleven days.

A. The way the coolant looks
A new filter will clean the coolant so it looks clear and clean. There is a dramatic change. After a couple days the coolant will have a dirtier look to it. This is like oil in a car. Oil that is a couple days old does not look new but it is still good for months because it is filtered.

B. The flow rate
This can be deceiving. A new filter will look like a garden hose on full. A filter that has been in a while will look more like a drinking fountain but still be working fine.

2. Using the Wrong filters
The heart of the whole system is the filter. Lately we have had complaints about short filter life. It turns out the customer was just buying any filter from whoever was handy. This is like putting just any fuel in a car. If you put diesel or kerosene in a car that needs unleaded gas you will get big problems.

3. Use the system on more than one machine. Our filter life tests were done on one machine being filtered constantly. Two machines will generate twice as much material so filter life will be half as long. Better than not filtering at all but not as good as constant filtering.

4. Too much oil and grease
All grinders leak a little oil, grease and hydraulic fluid. The filter systems can handle a normal amount. Too much can dramatically shorten filter life.

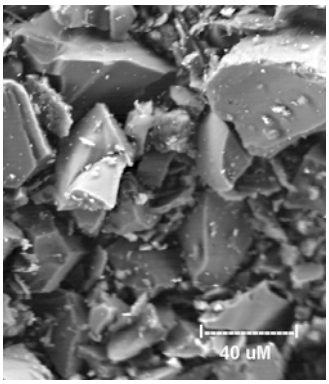
5. Heavy grinding
We took a full bag from a customer's operation and did calculations that show it ground the equivalent of 3623 saws. This is taking 0.005" off each side. If you take off twice as much you can only grind 1,800 saws before you need to empty the filter. More tips means less saws. Smaller tips than half –inch means more saws and soon.

6. Hose Placement
A lot of grit falls to the bottom of the sump and stays there. If you put your hose on the bottom of the tank you will suck all this up and shorten filter life. If you put the hose near the top of the tank (maybe six inches down from the top) you will be filtering the coolant only and you will greatly extend filter life.

7. Clogged Intake Screen
The end of the intake hose has a screen on it to keep large chunks out of the pump. This screen can get coated with grease and sludge. The hose clamp is stainless steel so it will not rust. Remove the filter screen, backflush it and replace it.

8. Only filtering once a week
When we say it ran 22 days of double shifts that means it ran all the time on a single machine. It ran 352 hours without a filter change. The key element here is how much it filtered out. If you run the unit one-hour a week it will filter out the same amount as if you had run it for 80 hours week.

Buy from a salesman who calls on you. We are really good on the science. We probably do not know your operation. We will sell direct but if you buy from a salesman who calls on you will get their expertise plus our help for the same price either way.



Why you need to filter your coolant.

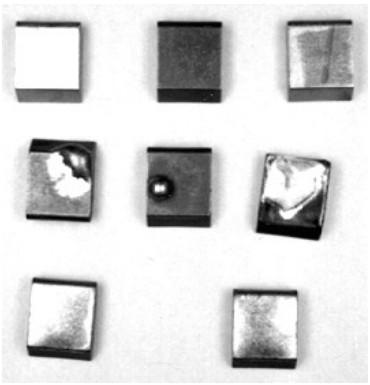
Saw grinding dust at about 1000 x magnification.

The big, jagged particles are diamond from saw grinding. The bright, little ones are tungsten carbide. The big diamond particles are about 0.0015". The little tungsten carbide particles are about 1 micron or 1/25,000 inch. This is what is tearing up your grinders if you do not filter. A filter system can pay for itself in a few months in diamond wheel, coolant and labor costs alone.

Saw Grinder for sale

Armstrong # 25 for circle saws - Excellent shape - $10,000 or best offer

Erin @ Keene Industries (707) 462-3700



Some carbide really is hard to braze

Why you need our pretinning.

The top ones are tips from the same batch. They are three different colors. Some braze well but a high percentage of them braze like the tips in the middle row. The carbide supplier said they are all perfect. The customer said they came right off. Our competition can make them look good but they will not work well. The bottom row shows the difference our treatment makes. **Our tips stay on the saw.**

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