

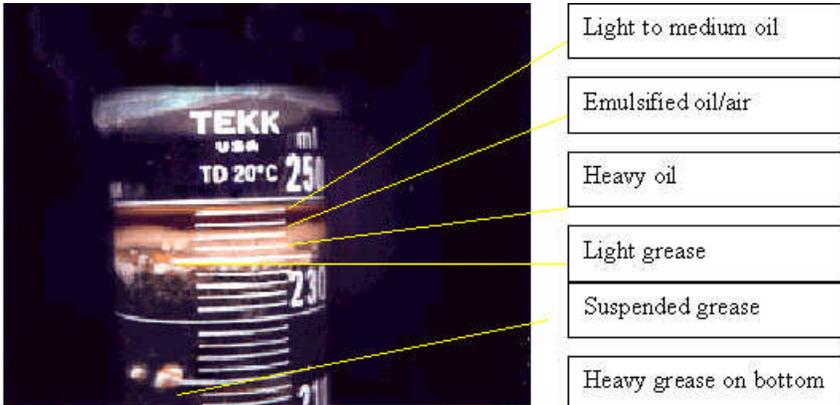
Northwest Research Institute, Inc.
Carbide Processors Inc.
Newsletter

3847 S. Union Ave. Tacoma, WA. 98409 800 346-8274

January 2000

tomwalz@email/msn.com www.carbideprocessors.com

Coolant Analysis Prevents Grinder Failure



This is the top of a graduated cylinder. We took a sample from an unfiltered grinder sump and let it sit. In a 250-ml. sample there was 5 ml. of oils and greases. The owner was sure that this grinder was in excellent condition. In fact about 2% of his coolant was oil and grease. This was enough to shorten diamond wheel life by about 10%. Analysis by layer showed problems with bearings, seals and hydraulic cylinders.

High stress cutting - Winter, high speeds and feeds

We have special alloys we developed for high stress and high impact cutting. We call these "High Impact" alloys. They really work. They are a little more expensive but a lot cheaper than broken teeth. Since we developed High Impact alloy others have relabeled their standard alloys as High Impact.

Dianite - Superior performance - Multi Metals

Shawn Teague from Multi Metals sent us literature on Dianite. There are good tests in real plants shops showing where Dianite is used successfully. Shawn says that Dianite is not necessarily the answer for everything but it can increase run time and reduce breakage in many applications.

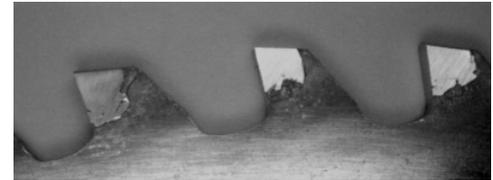
Cermets - How to use them - Portland show

Maureen Scherz of Universal Saw & Tool will be in our booth at the Portland show. Maureen is doing a lot of the work introducing cermets and finding suitable applications.

Free publicity

If you have something you would like to see in the newsletter please send it to us. We cannot promise to run it all but we try. We do not charge for this newsletter or sell advertising so we are limited on space by our budget. This newsletter will be out in January, April, August and October.

Talonite® tipped saw Looks good & works better

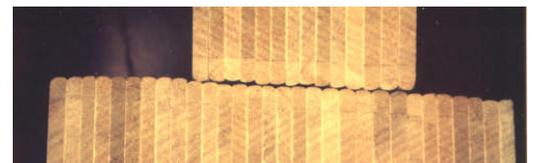


Round tipping rod

Talonite® costs less / works better

We sell round tipping rod three ways. 1. Plain rod, which may have voids, 2. HIP ed rod that has been pressure treated to eliminate hidden voids and 3. HIP ed rod that is polished and ground to exact dimensions.

This rod is from a supplier that is not as famous as the big guy. We found a better supplier, better quality and lower costs. This means fewer problems for you. We are young and hungry and know we have to give better quality for less money to beat the big guy. Try it
Call Bob (800) 346-8274



Cermets cut cleaner, faster

It should cost about \$2,000 to get started making cermet tipped saws. \$800 for wheels, \$200 for cermets and \$1,000 for your time and labor. It will take some time to figure out how to make and use them but they do sell for double the price, which means triple the profits or more.

Peerless - Great News

Ken Lloyd and Tim Gase bought Peerless. They have been and still are the sales manager and president.

Peerless makes quality saw plate, does laser cutting, heat-treating and surface grinding. They also do what may be the best hammering seminars in the industry.

The Peerless folks are completely honest, genuinely nice and really devoted to customer service. They are warm, friendly folks in a quiet mid-western way. They are so quiet that one person remarked that they didn't seem too bright at first. However, after he talked to them for a while, he realized that they were plenty sharp. They are "plenty sharp" and it is nice to see the good guys win one. (800) 973-3753
Peerless also has a separate West Coast Saw tip inventory

Solving saw problems

Chris Comer

Eagle international Carbide

"Hello Tom,

Sorry it's taken so long to get round to a reply to your e-mail of 11/9. It was good seeing you at Saw tech.

We are sending you some blurb about Jonalloy. Klaus will also give you some ideas of where we are having successes. Basically it has all the advantages of HSS and carbide rolled into one. It can be sharpened to an edge like a razor and will run red hot if required, without losing its edge. It's no good in MDF or glue line but outruns carbide 5 to 1 in Cedar, Oak and similar corrosive materials especially in kiln dried applications. It can be ground with same equipment as HSS! Has to be brazed with care and attention to temperature.

Winter cutting for your next article. Basically, use the softest most user-friendly grade possible. We have RK35 which is used in Quebec and Northern BC and pretty well unbreakable. It won't last forever but will run a shift anywhere and tip loss will be zero. After all most mills resharpen after one shift.

As you know tip failure is normally due to poor brazing practice, cheap hi-temp brazing alloy and cheap and nasty grinding wheels being used on clunky old dry grinders. Seldom do we have problems with customers using good equipment and well-trained staff. Many companies only look at the bottom line of an invoice and make their buying decisions based on the visible cost without thought to true value for money which often accompanies a higher priced and higher quality product. This true value for money is realized thru lower production costs, fewer rejects, better end product quality and happier customers..... hey Tom, I'm beginning to sound like you !!!!

Seriously, as much damage can be done by using cheap, hard wheels as can be done by a monkey with a brazing torch. Maybe we can do a bit of a blurb on grinding for one of your next issues?"

We ran the above article by Chris Comer because it makes some important points and is well written. It is also honest enough to admit that his material is not perfect in every application. We ran it pretty much as he wrote it because he has a clear, interesting style.

How to tell a good supplier

A good supplier does what you want them to do. If you have a problem a good supplier helps you. A bad supplier tells you that it is your fault.

Your Christmas card is feeding a child.

This year we made a donation to a food bank instead of sending out Holiday cards. What we would have spent on cards will feed a lot of babies. Food banks need cash to pay salaries, buy utilities and buy some foods, such as baby food, that doesn't get donated. Good food banks will give out \$20 to \$35 worth of food for every dollar in cash they receive. \$500 will pretty well fill the back of the little pick up truck with cases of baby food or help provide 3,000 to 5,000 meals at the food bank. We do this because we have this newsletter to wish everyone holiday greetings. I know that a lot of you donate to charity and send out cards. We just thought that this made sense for us.

How a filter can filter smaller than its rated size

A filter rated at 10 microns will trap all the particles 10 microns or larger. First, It is not a series of ten-micron holes but it is either layers and layers of string or a cloth bag of a definite thickness. Basically there are lots of holes smaller than 10 microns but none larger. A lot of particles get caught in the smaller holes. Second, This filter is thick. As the filter gets used the holes get gradually smaller and smaller.

Our filter systems are designed to work better as they get used a little bit. When they are brand new the flow is very strong. As they get used the flow gets weaker but the coolant gets cleaner. It is sort of like a bulldozer that goes pretty fast to the work site but that is really designed to put its blade down and push dirt. It starts out fast but works slow and strong.

Call for a list of distributors for our filter systems.

Preventing Ripped Shoulders

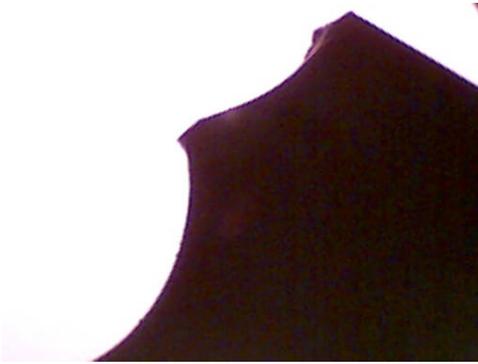
Customer service from an excellent supplier

The problem

Some shoulders ripped on about one saw out of ten. This occurred in a single mill. Typically only one shoulder ripped. The supplier could have just blamed the customer as some suppliers do. In this case the supplier decided to fix the problem. He started by annealing the shoulders, which helped but did not eliminate the problem.



Ripped shoulder



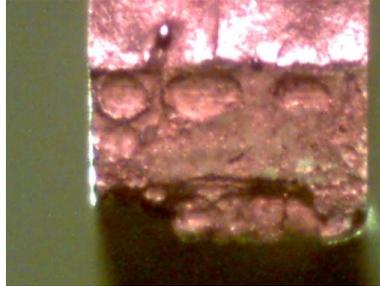
Profile of shoulder

We were called in to do an analysis. It did not look like a brazing problem to us so we took it to a steel expert. The first thing he noticed was the curved marks running from side to side in the rip. These are called “beach” marks and they are a sign of failure due to metal fatigue.



Beach mark close up

The curve sort of looks like the kind of marks that waves put in sand. There were maybe 100 of these in the rip.



Where the rip started

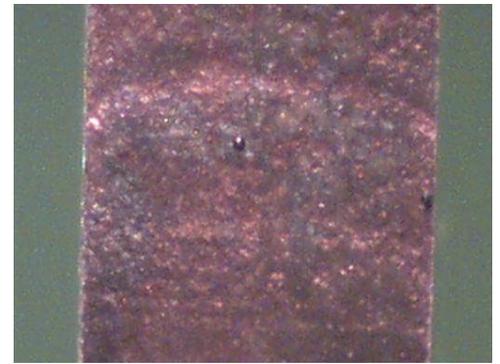
The three round holes were bubbles at the very base of the braze joint. These were most likely due to a little oil or grease at the very bottom of the notch. The braze alloy did not fully bond to the saw. When the saw started cutting the force started pushing on the tip. There was just enough of a hole here to let the tip start to move.



Where the rip ended

The ridge on the right is at the rim of the saw and is the last rip.

Metal fatigue here is just like using your hands to bend a piece of metal until it rips in half. In this case the pressure on the bottom of the tip moved it. Every time it got hit it moved a little more. Every time it moved it left another “beach mark” as the rip moved through the saw to the rim.



There were four rips

1. Where there were bubbles between the braze alloy and the steel.
- 2 the rip through the steel.
3. At the top the rip changed directions as the steel finally started parting.
4. The last small ridge where the steel pulled apart like taffy.

Two Lessons

This is a great saw supplier. They fought the problem until they fixed it. This operation is one of the best in the country. The get more tough problems because their saws are excellent in tough cutting.

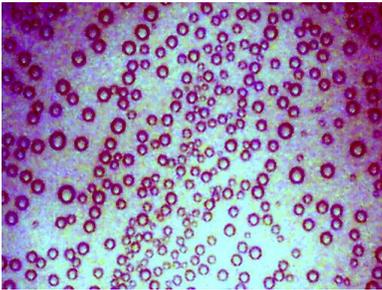
We solved the problem in two days. They had spent months and a lot more than we charged. We are not so much experts on saws as we are materials and science. Some times that makes a big difference. (800) 346-8274

Dirty coolant is expensive and Dangerous

10% annual loss of machine value

Dirty coolant is most expensive for the damage it does to machines. Dirty coolant can cause a loss of as much as 10% of the cost of the grinder. With a \$50,000 grinder this is \$5,000 a year.

Dirty coolant eats rubber, plastic, Plexiglas, insulation and human flesh.



Dirty coolant 60x

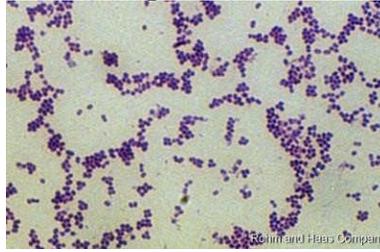
We received coolant from a shop that was unusually cloudy. Under a microscope, we found these growths. These are mold and bacteria colonies with millions of individual members.

Bacteria can be good or bad

E. Coli is the most well studied organism. It is a normal resident of your intestine and provides you with vitamin K and some of the B vitamins. It can also cause severe poisoning and death in food such as undercooked meats.

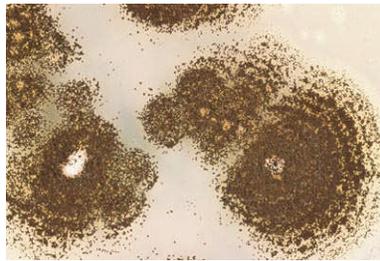
Dangerous bacteria

We took samples to two labs for analysis. The first lab said it had 1 million to 10 million per cc. The next lab identified heterotrophic bacteria. These are bacteria that eat organic carbon and live at human body temperatures. Organic carbon includes rubber, plastic, Plexiglas, insulation and human flesh. The count was 240,000 per ml. They definitely identified two disease-causing organisms. We took Pictures of both that were stained for clarity and photographed at 1,000 x.



Staphylococcus bacteria

Staphylococci cause abscesses, boils, and infections of the skin. They produce infection in any organ of the body. These bacteria are largely resistant to antibiotics.



Aspergillus Niger mold

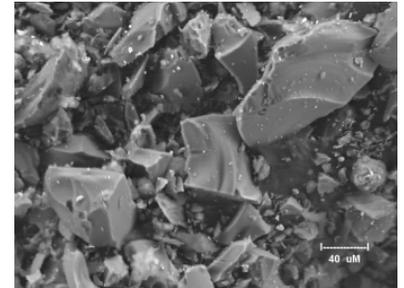
Severe reactions may occur among workers exposed to large amounts of molds in occupational settings. Aspergillus can produce severe disease involving a variety of body tissues. Superficial infections are generally limited to the outer layers of skin and hair. Cutaneous infections are deeper in the epidermis, hair and nails. Some infections involve muscles. Infections may be systemic, originating in the lungs. Some mycoses are opportunistic, and may involve a variety of body sites.

Control by sanitation is difficult. Disease can be reduced by good hygiene. No vaccines are currently available. There are antifungals but some are very toxic to the host and must be used with caution

Information supplied by: 1. Centers for Disease Control and Prevention (CDC) - National Center for Environmental Health (NCEH) 2. Emerging Infectious Diseases article: "Coccidioidomycosis: A Reemerging Infectious Disease" by Theo N. Kirkland, M.D., and Joshua Fierer, M.D., Departments of Pathology and Medicine, University of California, San Diego School of Medicine and Department of Veterans Affairs Medical Center, San Diego, California, USA

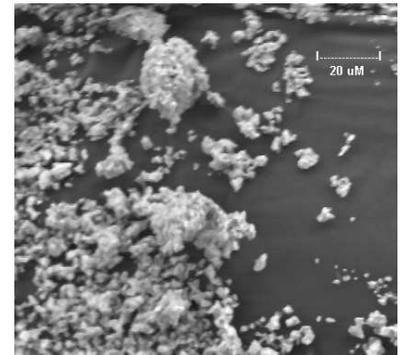
Clean coolant makes money

The cost of filtering coolant is more than recovered in longer diamond wheel life, longer coolant life, less labor and faster cleaner grinds and better cuts with the tools.



Diamond particles from carbide grinding at 1,000x

These are broken bits of diamond. They get into bearings, valves, cylinders, controls and everywhere else. They are very small, about the size of fine sand.



Abrasive grease clumps from a sump. 1,000 x

Diamond and carbide grit glued together by oil and grease.

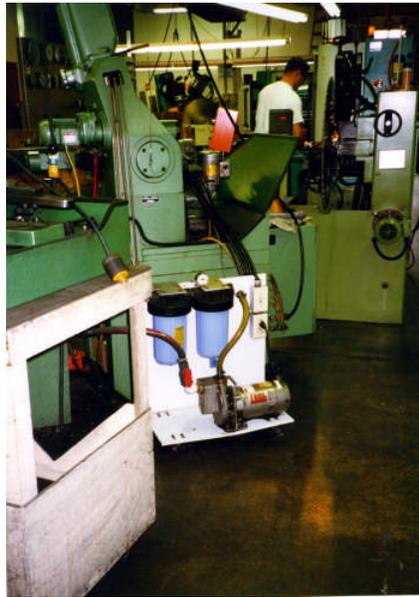
Dirty coolant tears up grinders like dirty oil tears up car engines. Several years ago the company driver told the production manager that the pick up needed an oil change. He ignored her. She kept telling him and he kept ignoring her. This went on for several months. By the time he left and somebody finally listened to the driver we needed \$2,700 worth of work on the engine of a \$12,000 pick up truck.

**Improving profits with filtering
Good shops make more money.
They are cleaner.**

They take good care of the people and the machines.



Machine supplied filter systems are good but not good enough. A lot of machines come with filter systems, which shows that they are important. These are good, general, light-duty filter systems but they are not designed for the kind of high speed, highly abrasive grinding that is done with saws and tools.

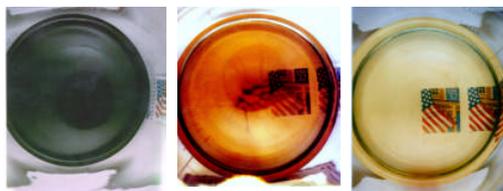


Operator wearing a white shirt
This is one of the best shops in the country. The fact that the operator wears a white shirt is only important because it stays white for the whole shift. In this shop the air is clean, the floor is clean, the machines are clean and the shop is successful.
(CP 2020 in middle of picture)

Getting started inexpensively
Filtering definitely makes you more money in the long term but there is the problem of buying the unit in the first place. The CP 2000 was designed as a starter unit. It is on casters so you can roll it from machine to machine. It starts at \$999. You usually get about three days between filter changes. We can also put it on a credit card.

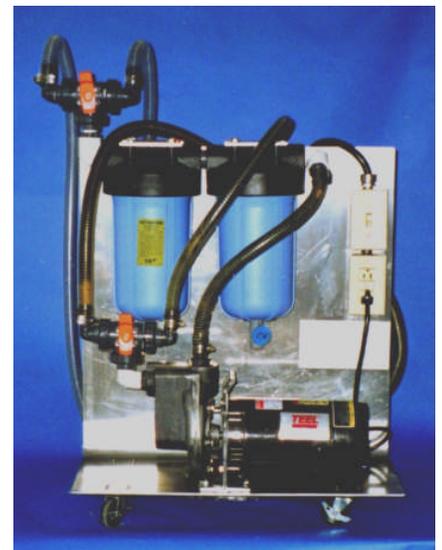


CP2002 \$1699
Over one month filter life



Dirty Filtered Unused
This is what filtering does.

These are pictures shot through three bottles of coolant. The red color in the middle comes from cobalt in the coolant. Filtering greatly helps reduce cobalt in coolant and extends coolant life.



CP 2002-2 \$2045
Easily switch between 2 machines
without moving hoses.

The filter unit that comes with the machine is good but usually not good enough.

CP 2020 \$1999
4 times the filter life

Cal Saw Canada

Good Grinding

William Podmore at Cal Saw Canada called. He wanted to make sharper saws. During the discussion we got talking about GE Superabrasives (614) 438-2000.

They have some really good pictures of diamonds at various stages of wear. It is sharp diamonds that do the grinding. Diamonds get worn down, rounded off and become dull. The wheel will look good because there are still diamonds exposed but it will not grind well.

Grinding metal cutting saws

1. It looks like the Japanese use a super finish such as 1,000 or 1,200 grit.
2. Dulling may be due to microfracturing of the edge. Try honing it to a very small radius such as .002" to .003". We have seen really impressive results when a fine, hand held hone is just gently rubbed over the edge once. A honed edge will be just a bit duller but it will often give much longer wear because it is much less likely to chip.

Each chip is a force concentrator and chips get larger which means the edge gets rougher and the saw gets duller. **Pete Sandell at Carbide Alloys** is very good with this. (800) 334-1165

3. Keep the coolant clean. You need a really smooth surface and the grit in the coolant will get between the wheel and the carbide and cause microfracturing. 635 grit is about 0.00008" in diameter. This is 20 microns. The particle size of most particles in sumps is about 1-10 microns. An additional 10% of the particles are in the 10-20 micron range. The particles getting between

the wheel and the carbide are about the same size as the wheel grit.

You might try an experiment. Let the sump sit overnight so much of the grit falls to the bottom and then try grinding. We have had this work for others. If you are filtering try switching to a finer filter. Boeing thinks that coolant ought to be clean to at least 10% of the tightest dimension. With a 635 grit wheel this would be 2 microns, which is pretty easily achievable.

4. Make sure there are no oils or greases in the sump. These clog the wheel and make it run hotter. If you don't have a system for filtering then use an oil absorbing blanket or sausage.

5. Get a microscope and look at the edges. You ought to see whether it is chipped or not. Here are some pictures of edge chipping.



Chipped strob bar actual size



10 x view



60 x view



200 x view

Depending on what you are cutting, how fast and how hard you are cutting and what material you are using for a saw tip the chipping can be very important. If you are cutting steel then imagine the steel getting jammed into the notch. There is tremendous pressure to both compress the steel and tear the tip apart. It is just a matter of what gives first.

These pictures were taken through an Intel electronic microscope that feeds into a computer though a USB port. You don't need to start with something this expensive. You can accomplish a great deal with the lighted scope on this page.



30 power lighted scope \$39.99

Increase tip life - check tip edges
Increase wheel performance
-Check diamond points

This scope is very easy to use and it is very helpful in a saw shop 30X is a very good level for examining for edge microfractures. Using this scope we have had customers totally eliminate tip failure. Use this to grind to a chip free edge or to check condition of grinding wheels. Call Bob or Wendy (800) 346-8274

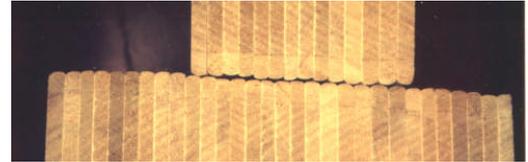
Cermets huge success cutting slats

Customer thrilled – Gives big re-order

This is a company manufacturing products where a very large number of slats are required for each item. They were concerned with time spent cutting but they were much more concerned with good cuts every time. The cost of sorting sloppy cuts was huge. The cost of sorting poor cuts was much more important than tooling cost or material cost.

Cermets make much cleaner cuts

Cermet tipped saws cut 30 slats at a time compared to only 14 for carbide tipped saws. The cuts were also cleaner. The top bundle of 14 slats has a line where the scoring saw cut. The bottom bundle of 30 slats also has a line from the scoring saw but the line is much fainter, which shows the better quality of cut.



End shot of cut slats



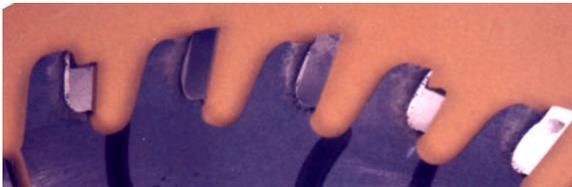
Slat cutting machine



Loading slats

Ten week saw life and still going strong Cuts still great but sounded a little loud

After ten weeks the saw was still cutting as fast and as well as ever but one morning it sounded a little louder so they checked it. The scoring saw had hit something. Five teeth were broken but the saw still cut and the cuts were still clean. Both saws were replaced. The main saw had some wear as seen in the picture but, again, the cuts were still very clean.



Broken tips after hitting steel - still clean cuts



10 weeks wear and still clean cuts

Everybody wins The customer was thrilled enough with the test set of ceramic tipped saws to order three more sets for \$1,725.00. When he uses ceramic tipped saws he cuts twice as much material in half the time for a 4 to 1 advantage. He gets beautifully clean cuts with no reject material. The saw is quieter; labor is lower and saw changes are dramatically reduced. Ceramic tipped saws cost about twice as much and the customer gets 5 times the value.

Northwest Research Institute, Inc. / Carbide Processors, Inc.

800 346-8274 tomwalz@email.msn.com www.carbideprocessors.com



Test Instruments to Analyze Coolants

Test for oils and grease

100 ml. graduated cylinder

10" h x 2.5" base x 1" cylinder

- least expensive **\$25.60**

250 ml. graduated cylinder

13"h x 3.5" base x 1.8" cylinder

Much more accurate

Much easier to read **\$45.32**



PH papers - easiest to use

pH test papers - wide range

0 - 13 (Accurate +/- 1 pt.) **\$20.00**

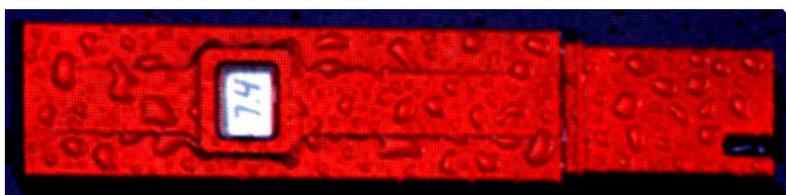
pH test papers - narrow range - more accurate

6.0 to 9.5 - 1 roll ea. 6-8, 8-9.5 **\$10.00**

8.0 to 12.0 - 1 roll ea. 8-9.5, 10-12 **\$10.00**

Accurate +/- 0.3 point

Comes together \$20 - All papers \$40



pH tester - auto calibration \$104.00

Recommended- waterproof, self calibrating

Easiest to use & most accurate



pH tester (meter, probe & battery)

Least expensive to purchase **\$48.90**

Calibration kit pH 4.0, 7.0 (need calibration kit)

4.0 solution 500 ml. **\$31.60**

7.0 solution 500 ml. **\$31.60**

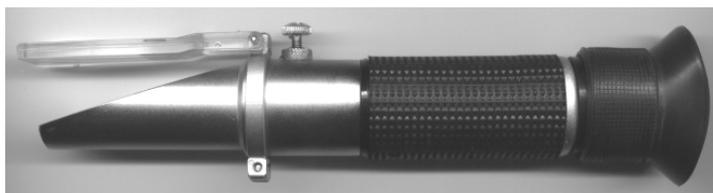
Total **\$63.20**

Meter & calibration kit \$112.10

Test for dissolved and suspended metals

Dissolved solids tester (conductivity)

high range to 10,000 necessary **\$49.90**



Refractometers – Essential for coolant concentrations

Good quality, General duty 0 - 32% \$170

Better quality, Easy read 0 - 32% \$322

30 power lighted scope \$39.99

Check tip edges & diamond points

Easy to use & very helpful

Floating Oil pads (3 # oil and grease should be about what you see in a 30-gallon sump in an average operation.)

These float on top of the sump and absorb oils and lubricants. Increases coolant life, keeps coolant cleaner. Extends life of filters. They help maintain pH and the retard bacteria growth by depriving the bacteria of a food source.

Sizes	order quantity	\$
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1" x 8" x 10"	absorbs up to 3 pounds of oil and grease	each \$15
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1" x 10" x 16"	absorbs up to 8 pounds of oil and grease	each \$20
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8" diameter tube x 20"	absorbs up to 40 pounds of oil and grease	each \$45
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Coolant Selection and Management

Special Report

We get more calls about coolant than anything else. Unfortunately there are a great many suppliers who have no idea what they are doing. What follows is our overview of the situation. Call if you have questions. 800 346-8274

It starts with coolant. We have been selling the finest coolant we could find. There are two other coolants that have come up that we think are worth considering.

Coolant performance is very specific to each operation. We strongly suggest that you try a 5-gallon pail of each of these and see which you like best.

Three Excellent Coolants

1. Carbide Processors
Ultra Synthetic 331 Grinding Coolant
2. ITW Rustlick Carbide Power Grind - Andrew Feucht
3. New coolant from Dr. Gittler at Systi Matic / IKS

Coolant #1

Carbide Processors

Ultra Synthetic 331 Grinding Coolant

This is a unique, heavy-duty synthetic coolant concentrate containing lubricity agents, anti corrosion additives and other components to satisfy the demands of today's higher performance machining operations. When diluted with water in the proper concentration, this premium product functions as a heavy duty cutting fluid. Containing no oil, this fluid shows distinct advantages over the more conventional "soluble" or "emulsifiable" cutting oils commonly used in industry, particularly in the areas of (1) ease

of mixing and clean up, (2) improved solution stability, (3) freedom from odor and rancidity, (heat) transfer, and (5) work face visibility.

Fluids prepared from this concentrate find special uses in a variety of metal working applications where the cooling effects of water coupled with a balanced lubricity-corrosion protection additive package serves to prevent chip and particle build up and wear at the critical tool-workpiece interface. This extends tool life and improves worked surface finish.

Qualities & Benefits:

1. Provides extreme pressure properties for heavy duty operations
2. Easy to mix - no special procedures required
3. Transparent for better viewing of the workpiece during processing
4. Eliminates oil mist associated with petroleum oil products
5. Contains no oil, leaves no gummy residues
6. Provides a stable mixture in hard water
7. Provides excellent rust and corrosion protection
8. Rejects tramp oil easily
9. Biodegradable-for ease of disposal in primary sewage treatment systems.
10. Contains a fungicide to protect against initial fungal growth in service. Monitoring microbial activity over extended service periods would be advisable to determine the need for additional treatment.
11. Contains no phenols, nitrites, PCB's or heavy metals
12. Resists sludge build up, economical
13. Distinctive blue color
14. Wash off parts in cool water

This coolant is recommended for use in internal and external grinding as well as form and thread grinding. It is suitable for a wide variety of metals as well as other materials such as carbides and ceramics. The recommended initial concentration is 20:1. With applications involving harder materials a higher concentration may be desirable. It may be possible to reduce the concentration if the results remain satisfactory.

Coolant #2

ITW Rustlick Carbide Power Grind

Andrew Feucht introduced us to this. Dave Snook of Snook's Saw service works very hard to do things well. In all honesty he has tried our coolant and prefers this, as you will see below. We will sell you either one you wish. We suggest you buy both and see which works best for you.

Letter from Dave Snook

"I have been concerned about the safety and disposal associated with coolants. This has led me to trying several different products over the past 23 years. The coolant turns pink when the cobalt leaches from the carbide. There is a safety issue and higher disposal cost with coolants that have cobalt levels above 30 ppm. We have experienced rust on our machines and on tools ground on those machines. I have done a fairly extensive search for a product that would address both problems including bringing a chemist in house to assist. This led to no avail.

Andrew Feucht of Voight Enterprises suggested that I try ITW Rustlick Carbide Power Grind in all

of my machines. I did and what a difference! Rustlick is specially formulated synthetic grinding fluid that minimizes cobalt leaching and provides superior rust protection for machines and tools.

Rustlick helps keep the machines cleaner because the diamond and carbide particles do not stay suspended in the coolant as with other coolants tried. Cleaner machines save money in the labor costs of cleaning machines and the wear factor of the machine is reduced. The particles do not seem to adhere to machine surfaces as with other coolants making cleaning much easier. We run it three times longer than other coolants that we have used. We are not filtering at the present time but I can clearly see where filtering would extend the life of the coolant when the filter inlet hose is kept midway or higher in the sump. Filtering out the swarf from the coolant is the most practical method of increasing the coolant life and reducing cobalt leaching.

The initial cost of the Rustlick coolant is less than other coolant used. I have used coolants that range in price from \$20 to \$70 per gallon. Some that claim to clean the machine as they are used did not. Rustlick at \$18 per gallon is a real bargain.

The Rustlick does not eat the paint off the machines. The Rustlick does not irritate the skin like some coolants do. The Rustlick keeps the diamond and Borazon grinding wheels from glazing. I am extremely pleased with this product."

Dave Snook
Snook's Saw Service, Inc.

Coolant #3

Systi Matic / IKS

Dr. Gittler has been developing a new coolant, which shows great success in tests. At the time this went to press I was not able to get any information. Call and perhaps we can get you a pail.

Why to test Coolant

Coolant changes as you use it. The water evaporates out of it. Coolant levels drop as it gets splashed out. Coolant dissolves and chelates metals. Coolant loses its ability to lubricate. It also loses its anti-rust ability. The pH will change which will encourage bacteria growth. It also becomes oily and can break down faster.

Official Lab test results

Turbidity (cloudiness)
Dirty filtered unused
45,000 15 7.02

pH is based on complex chemical analysis. It is important because almost anything you do to a liquid changes its pH in some way. So pH is good because it is easy to measure. It is important in this industrial process because it is pretty easy to control.

pH is the best easy indicator of how much bacteria you and other growths you have in your coolant. Bacteria eat oil and grease and their waste products change the pH of the coolant.

pH scale

The pH scale. The pH scale is based on hydrogen ion concentrations. 7 is neutral pH. Below 7 means it is acid. The further below it is the stronger the acid is. Above 7 means it is basic. The further above 7 it is the stronger the base is.

Official Lab test results

PH
dirty filtered unused
8.08 8.04 8.02

Conductivity

This measure how well an electric current travels through the liquid. It helps tell you how much metal is in the coolant.

Official Lab test results

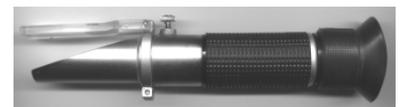
conductivity
dirty filtered unused
2,210 1,508 1,683

Cobalt mg./L
Dirty filtered unused
3,210 299 0.138

How to test

Refractive index A refractive index helps tell what your coolant concentration is. As the refractive index changes you will learn if you need to add more coolant or more water to your grinding coolant mixture.

Refractive indexes are based on how much the light bends when it passes through a liquid. Each coolant manufacturer or supplier needs to provide a scale for their particular product to tell how much coolant you need to add.



Refractometers \$170 or \$322

Testing with a Graduated

Cylinder This is a very simple and very helpful test. You fill the tube to the top line and then let it settle.



Graduated cylinders \$26 or \$46

You may see some settling in fifteen minutes. If the coolant is very clean it may take two hours or more

to get anything to settle out. The best length of time would be to let the bottle sit for twenty-four hours. New coolant will be clean with no sludge layer, no oil layer and no reddish color.

How to analyze the tests.

1. How long it takes for the particles to settle to the bottom. The finer the particles are the longer it will take to settle. This will give you some idea of particle size. If you get a thick layer immediately and nothing later then it is probably all particles over ten microns. If you do not get anything on the bottom in the first minute and the sludge layer grows over a day then you probably have particles that are all under two or three microns.

Typically you will get a pretty good sludge layer starting in a few minutes. That layer will continue to grow for up to an hour. After an hour it should be pretty well settled out however the really fine particles may take up to day to settle out.

2. Measure the amount of sludge
Once everything has settled out measure the height of the particle layer on the bottom. A three-inch coolant sample can settle out to have as much as an inch or more of sludge on the bottom. It should only have a fine, light layer.

3. Check the top for an oily layer. Looking will tell you if you have tramp oils in your coolant. You can see them separate and identify the source according to what kind of oil or grease it is.

4. Cobalt levels and conductivity
In many coolants the dissolved cobalt will cause a color change and a reddish or purplish tint. The amount of color change relates to the change in conductivity of the coolant. This is important if it is being sprayed in sensitive areas.

The amount of color change relates to the amount of chelated (sort of like dissolved) metals in the coolant.

Note: test conductivity with a meter. Other factors effect it besides dissolved or chelated metals.

5. Look at the coolant. If you see things floating in the middle of the coolant you may have fungal or bacteria growth.

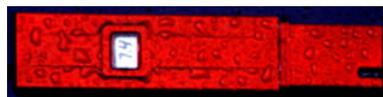
Testing pH

The pH of fluid can be tested using litmus paper or a handheld pH meter. Litmus paper provides a quick, low cost means of estimating fluid pH. Its accuracy is limited to plus or minus one full pH unit and is not particularly effective in predicting biocide failure.



PH paper \$10 each

Generally 1 broad & 2 exact needed
Long, long life out of a roll



pH meters are accurate to plus or minus 0.2 pH units, an accuracy sufficient for monitoring biological degradation.

pH meter \$104
accurate, self calibrating

Tips on using pH meters
pH electrodes must be kept wet and clean. If one dries out, soak it in water or an appropriate buffer solution for 24 hours. pH meters and testers must be calibrated with buffer solutions unless they are self-calibrating. It is best to use two buffers such as pH 7 and pH 4 to make sure the meter is working properly. Do not be alarmed when white crystals form on the electrode;

just soak the electrode in buffer or water.

Testing Cobalt levels

You can buy special dip papers. You need to keep the papers refrigerated to help extend the life of them. They work on the basis of ion exchange. You need to have the coolant sample below 7 pH.

To measure Cobalt with the dip papers you have to adjust the pH to 7 or below. Most coolants seem to run on the basic side, which means above 7. This means that you will have to add some acid to bring the pH to 7 or below.

These are expensive, awkward and don't seem to work all that well in shops. We suggest that you use a color check and conductivity meter reading for everyday use and use a lab when you need an accurate reading.

Conductivity

Conductivity measures how well an electric current travels through the fluid. Metals and other contaminants in coolant let electricity flow faster.



Conductivity meter \$49.90
Conductivity meters generally run only to 1990. The higher reading meters are called "Total Dissolved Solids Meters".

Testing costs

We can do government certified testing for the following charges.

1. Particle size and count	\$60
2. Turbidity	\$30
3. Viscosity	\$30
4. pH	\$20
5. Conductivity	\$30
6. Cobalt levels	\$34
7. Chromium levels	\$34
8. Cadmium levels	\$34
Total lab test	\$272.00



Portland Show Free passes here

March 15 - 17

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In this issue

- ❑ Stop Winter Breakage
- ❑ Superior saw tips
- ❑ Honing Helps
- ❑ Double profits with cermets
- ❑ Dangerous Bacteria in Coolants
- ❑ Prevent ripped shoulders
- ❑ Braze alloy for winter

Prevent ripped shoulders

This is a report on a consulting job we did. Our pretinning was excellent but the shoulders ripped off. The cause ended up being simple to fix and made the saws 100% reliable.

See the report inside

We sell

- ❑ Pretinning service for carbide
- ❑ Filter systems for coolant
- ❑ Coolant & coolant analysis instruments
- ❑ Tipping rod
- ❑ Ceramic (cermet) saw tips
- ❑ We do consulting and failure analysis



Clean shops make more money

Company and filers both win

The company saves money
Filers get a better workplace
Diamond wheel costs are lower
Machine maintenance is lower
Labor costs are lower
Machines need less servicing

See the report inside

Northwest Research Institute, Inc.

Carbide Processors Inc.

Newsletter

3847 S. Union Ave. Tacoma, WA. 98409