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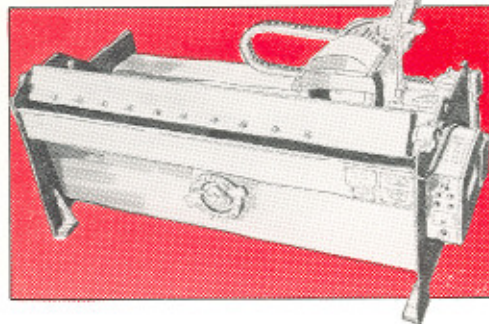
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SIMONDS®

KNIFE GRINDING TIPS AND TECHNIQUES



KNIFE PRODUCTS

Chipper	Brush Chipper
Counter	Granulator & Dicing
Flaker	Lily Pad
Hog	Slabbing Head Rig
Planer	Chip-N-Saw®
Smooth	Feeder
Corrugated	Ice Scraper
Score	Face Mounted
Veneer Lathe	Curved Beaver
Waferizer	Pole Peeler

KNIFE GRINDERS

20-36" Manual and Automatic Models
40, 45, 46, 60, 64" Bench Models
48, 54, 60, 72, 84" Horz. Spindle Floor Models
48, 54, 60, 72, 84" Vert. Spindle Floor Models
8, 10, 12, 16 Knife Chip-N-Saw®
6-14" Dia Cutterhead Models
Slabbing Bent Knife Models
Profile Grinder

77 & 80" Ice Scraper Blade Models
Grinding Wheels For All Models
Special Grinding Fixtures

SERVICES AVAILABLE

Saw Sharpening
Band Saw Roll Re-conditioning
Band Saw Leveling Block Resurfacing
Carbide Saw Repair
Circular Saw Repair

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This booklet is designed to illustrate typical knife failures caused by poor grinding practices. We offer these examples to aid our customers in obtaining greater knife life and superior performance from our products. We are by no means criticizing your grinding techniques by suggesting the material in this educational booklet. If your experience can add to our illustrations, we would welcome added tips for our next printing.

All knives (chipper, counter, veneer, clipper, planer, flaker, hog, score, lily pad, feeder, etc.) must be kept sharp at all times if good machine and knife performance is expected. The chief cause of poor cutting performance is dull knives.

Dull knives are caused by:

1. Stopping the feed of the wood and allowing the knives to rub against the unfed wood.
2. Feed speed too slow for chipping machine speed.
3. Excessive resin or glue on material being cut.
4. Dirt, grit or foreign objects on wood.
5. Use of wrong cutting angles and bevels.
6. Improper care of knives.
7. Long overdue knife changes.
8. Poor grinding procedures.

Dull knives take a great deal more horsepower and cause a greater strain on the knives and woodcutting machine. A machine is strained trying to feed wood through dull knives.

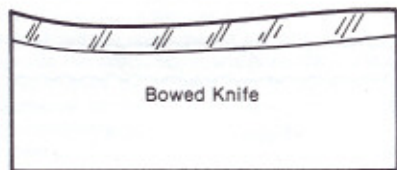
ILLUSTRATION #1



Irregular Edge: A wavy or irregular edge on the knife is due to being crowded in grinding; that is, the "in-feed" of the grinding wheel to the knife is too fast or aggressive, or the grinding spindle bearings are bad.

Remedy: Slow down the "infeed" of the grinder. Replace worn bearings in the spindle.

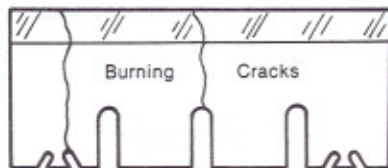
ILLUSTRATION #2



Bowed Knife: A bowed knife is caused by the excessive heating of the knife cutting edge due to forced grinding, insufficient or no coolant, or a glazed wheel. The knife bows due to the high tensile stress set up on the surface of the cutting edge. The surface contracts and cups the cutting edge along its own length. A bowed knife may be caused by forcing the grinding wheel into the knife and as the knife heats, it swells and expands towards the wheel causing the knife to be hollow ground longitudinally or bowed. Long, thin knives are especially susceptible to heat caused expansion through steel contraction after cooling.

Remedy: Slow down infeed on the grinder. Get a softer grinding wheel. Be careful in setting grinding wheel to knife. Use plenty of coolant with adequate lubricating qualities.

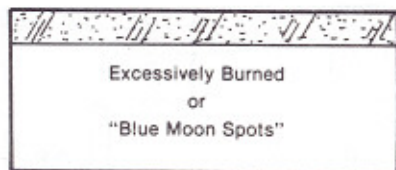
ILLUSTRATION #3



Burning & Cracks: Caused by excessive heat generated in grinding. Excessive heat on carbon steel knives like hog, counter and veneer may draw out the cutting edge temper. When the edge turns blue, extreme cutting edge of the knife temper is being drawn out or softened. On higher alloy steels (chipper, planer), it may temper the knives either in spots or on the entire edge surface - the result being known as "soft cutting edge". A hardened steel re-hardened by grinding will create a very brittle condition because the re-hardened areas are not tempered. Knives burned too severely may crack. These cracks usually run perpendicular with the edge. Excessive heating and quick cooling may cause cracks in any kind of steel. Some cracks will eventually expand to the area of least resistance resulting in cracking the knife in two pieces, usually through a babbitt lock or open slot. Probably more machine knives are ruined by excessive heat generated in grinding than from any other single cause. Knives may be burned due to the grinding wheel being too hard or too coarse, infeed too fast or grinding wheel speed too fast, grinding wheel being glazed (or loaded), or insufficient supply of coolant.

Remedy: Obtain correct grinding wheel or softer bond, dress grinding wheel properly, slow down grinding wheel speed or wheel infeeds, or increase supply of coolant.

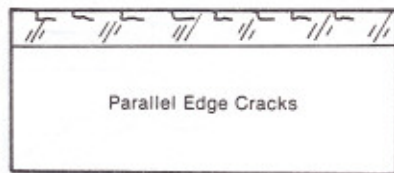
ILLUSTRATION #4



Checks, Cracks or Moon Spots: Very fine checks that do not have any definite pattern are usually caused by the grinding wheel being too hard and the knife is heated excessively. Knife cracks or moon spots are caused by stopping the wheel and excessive sparking out, too much knife projection, too fast a feed for the speed for the head, loose spindle bearings, poor coolant flow or no coolant, or excessive head speed for the infeed rate. When experiencing knife trouble, most operators are inclined to reduce the wheel infeed rate. This causes more rubbing and less cutting which will cause overheating and cracks.

Remedy: Use softer bonded grinding wheel and reduce spark out time (less rubbing).

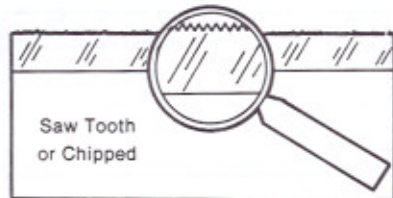
ILLUSTRATION #5



Edge Cracks: These are formed a short distance and parallel to the edge of the knife. These cracks start perpendicular from the cutting edge and as the heat from the grinding wheel expands the cutting edge, the crack is forced to travel in a direction parallel to the cutting edge. If the knife is then put into service, wood packing will occur in the perpendicular crack causing the knife edge to "pop out" in that section (See page 9). Edge cracks are usually caused by heat and expansion due to dry grinding, insufficient coolant flow, or use of an improper grinding wheel (too hard, fine grained wheel).

Remedy: Get a softer bonded wheel of grain which is not too fine. Use a greater supply of coolant having adequate lubrication qualities.

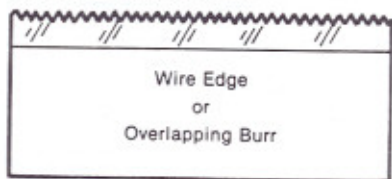
ILLUSTRATION #6



Chipped Knife: A chipped or saw toothed knife may be caused by the pounding of an unbalanced or loaded grinding wheel. Hollow ground or rotary tub grinders are particularly likely to chip knives. Rotary tub grinders are prone to poor coolant flow causing the wheels to load up and become unbalanced. The pounding of an unbalanced grinding wheel loosens, if it does not dislodge, small particles of the cutting edge. Theoretically, a correctly sharpened knife does not dull by abrasion, but begins its dulling by the breakdown of the sharp cutting edge. Highly magnified, you would notice the finest cutting edge to have a series of saw tooth points and many minute cracks from the crevices between these points. These small projections have been dislodged and leave a blunt point which is subjected to terrific abrasion by the wood fibres. When extremely sharp grinding angles are ground on the knives, the cutting edge becomes so weak that chipping is likely to occur. Generally grinding angles of less than 30° should not be used.

Remedy: Balance the grinding wheel and hone the knives thoroughly. Avoid hollow grinding whenever possible. Maintain adequate coolant flow.

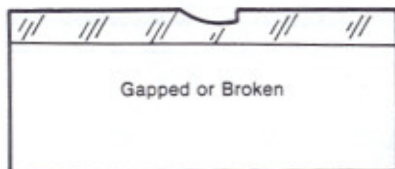
ILLUSTRATION #7



Wire Edge or Overlapping Burr: The cause of a wire edge on the knife is usually due to over grinding of the knife. It occurs when deep nicks or gaps have to be ground out or removed. After heavy grinding, the knife will usually have a wire edge or heavy overlapping burr. The wire edge is formed when grinding is continued beyond the point necessary to produce the intersection of the cutting angle with the face of the knife. In the case of a veneer (lathe) knife, these would be the bevel and face planes of the knife.

Remedy: Take a hand held honing stone and in a circular motion hone the knife thoroughly until the wire edge is completely removed. Follow up the honing operation by rubbing a hard wood stick down the cutting edge to help clean and break off remaining burrs. Store your honing stone in mineral spirits to keep from loading up your stone.

ILLUSTRATION #8

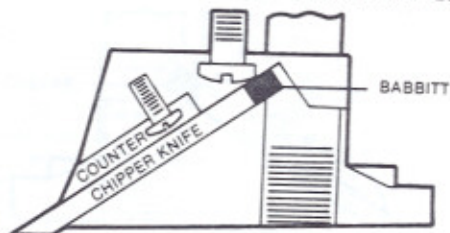


Gapped or Broken: This condition is usually caused by slight knife cracks caused by improper grinding procedures that are present in the knife before it leaves the grinding room. During a chipping operation, the knife is subjected to tremendous abuse. Existing grinding cracks weaken the cutting edge and when hard knots, foreign objects, or wood packing occurs, it "pops" out finger sized chunks from the cutting edge.

Remedy: Avoid poor grinding procedures that overheat the cutting edge. Do not install cracked or heat affected knives into operation.

A good, quick and simple test procedure to check if overheating is present is to hold the back of your fingers against the flat part of the bevel as soon as the knife safely exits the grinding wheel. If you can't hold your fingers there without discomfort, your knife is **TOO HOT**.

"PROPER" USE OF BABBITT ON CHIPPER KNIVES



When using babbitt to replace ground-away metal on the width of the chipper knife, extreme caution should be taken to insure that the babbitt is always slightly thinner than the chipper knife itself. This allows the clamp to contact the knife for maximum holding power on the upper and lower portions of the knife.

Firm, solid clamping prevents knife slippage, wood packing and movement of the knife as it cuts. Therefore, there will be less chance of the knife being exposed to undue stress resulting in severe damage to the disc, clamps and holder, and the knife itself.

Please note that the babbitt is, in all cases, thinner than the knife itself. This can be accomplished by rasping the babbitt as poured or by very careful pouring to avoid overfilling of the babbitted area.

"IMPROPER" USE OF BABBITT ON CHIPPER KNIVES



This illustrates what happens when babbitt is poured improperly. The babbitt flows "under" the knife, between the knife and the babbitt jig and/or thicker than the knife.

When the babbitt is poured thicker than the knife or flows under the knife, the clamp will not tighten down firmly on the knife itself. It will contact only the babbitt, leaving the knife virtually unclamped. This "void" or improper clamping between the knife and the clamp causes many expensive problems. Some are:

1. Knife Slippage
2. Clamp Distortion
3. Knife & Anvil Contact
4. Wood Packing
5. Disc "Wobble" or Distortion
6. Knife Breakage

Again the babbitt must be checked after each pour and at no point should be thicker than the knife itself.

SAW PRODUCTS

Wide Band Saws	Saw Bits
Narrow Band Saws	Shanks
Saw Guides	Cut-Off Teeth
Solid Tooth Saws	Solid
Inserted Tooth	Carbide
Cut-Off Saws	Inlaid
Carbide Saws	Carbide Tips
Inserted Tooth Saws	Stellite & Tips
Shingle Saws	Carbide Strobe Strips
Filing Room Tools	Saw Gumming Wheels
Leveling Blocks	Diamond Wheels

CUTTERHEADS & KNIVES

Planer — Corrugated & Smooth
"L" Type Mill To Pattern
Dovetail Mill To Pattern
Beveled Edge Shaper Steel
Square Edge Bar Steel
Generated Side & Profile Heads
Plain & Corrugated Side & Profile Heads
Shear Cut Profile & Side Heads
Splitter Heads
Planer Cylinders
Chipping Heads
Finger Joint Heads
Saw Collars

MISC. PRODUCTS

Babbitt
Babbitt Pots
Babbitt Ladles
Carbide Debarker Teeth
Hard Surfaced Anvils
Waferizer & Flaker Wear Parts