

Tool Geometry And the Cutting Edge

By Lyndal Anthony

Photography by Joan Overhouse

"Insanity is doing the same thing
over and over again but expecting
different results."

Quote first appears in the book "Sudden Death" by Rita Mae
Brown

Common Turning Questions.....

Which tool is the best?

What tool angle is the best?

What grind angle is the best?

What grind profile is the best?

Why am I getting so much tear out?

Notice the numerical order

- (3) Which tool is the best? (This should be the third question!)
- (2) What tool angle is the best? (This should be the second question.)
- (4) What grind angle is the best?
(4) What grind profile is the best? (These should be the last question.)

(1) Why am I getting so much tear out?

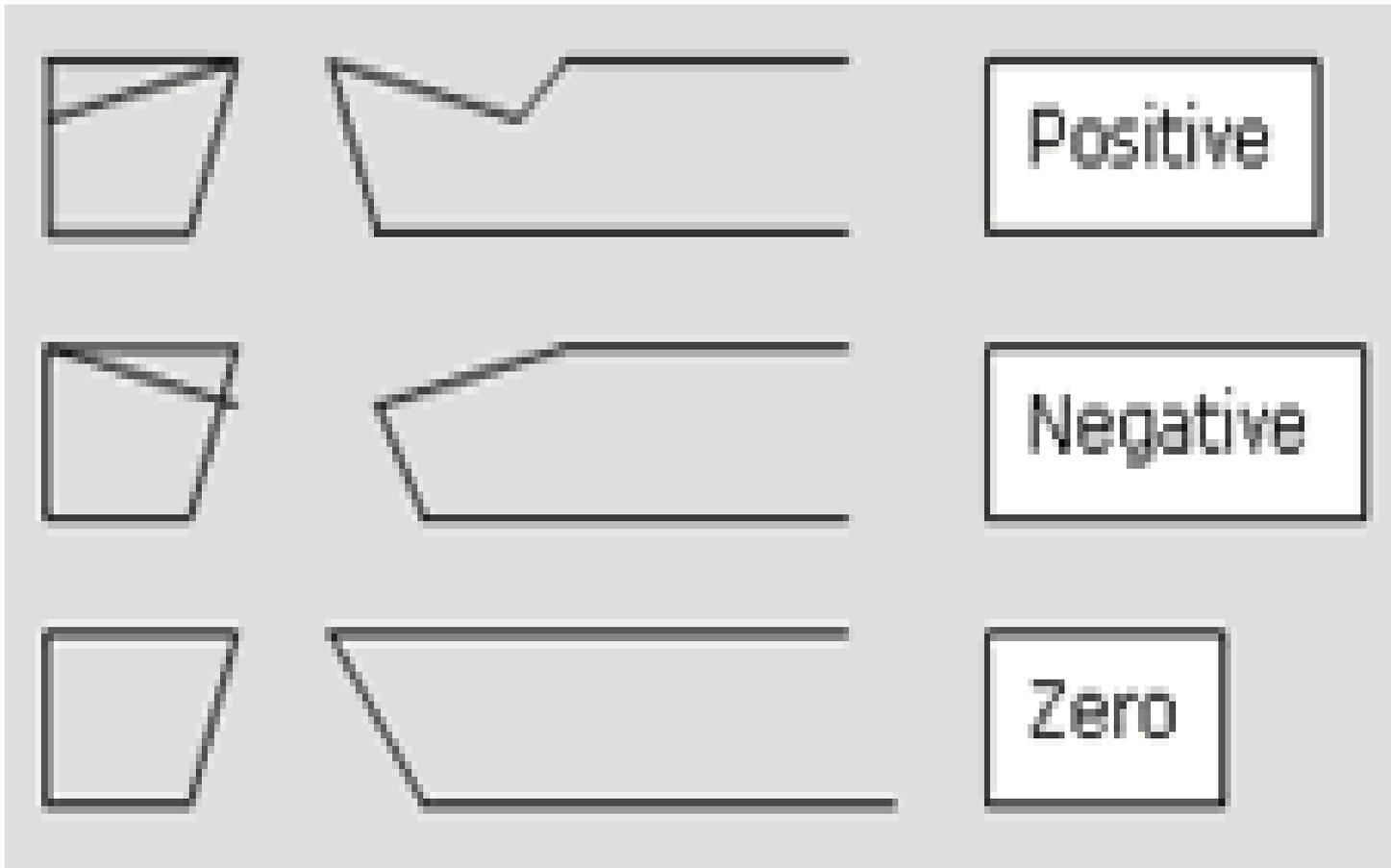
This should be the first question a person asks.

A person should know “How” the tool works and how it cuts wood before he can appreciate what tool to use, what grind angle and etc.

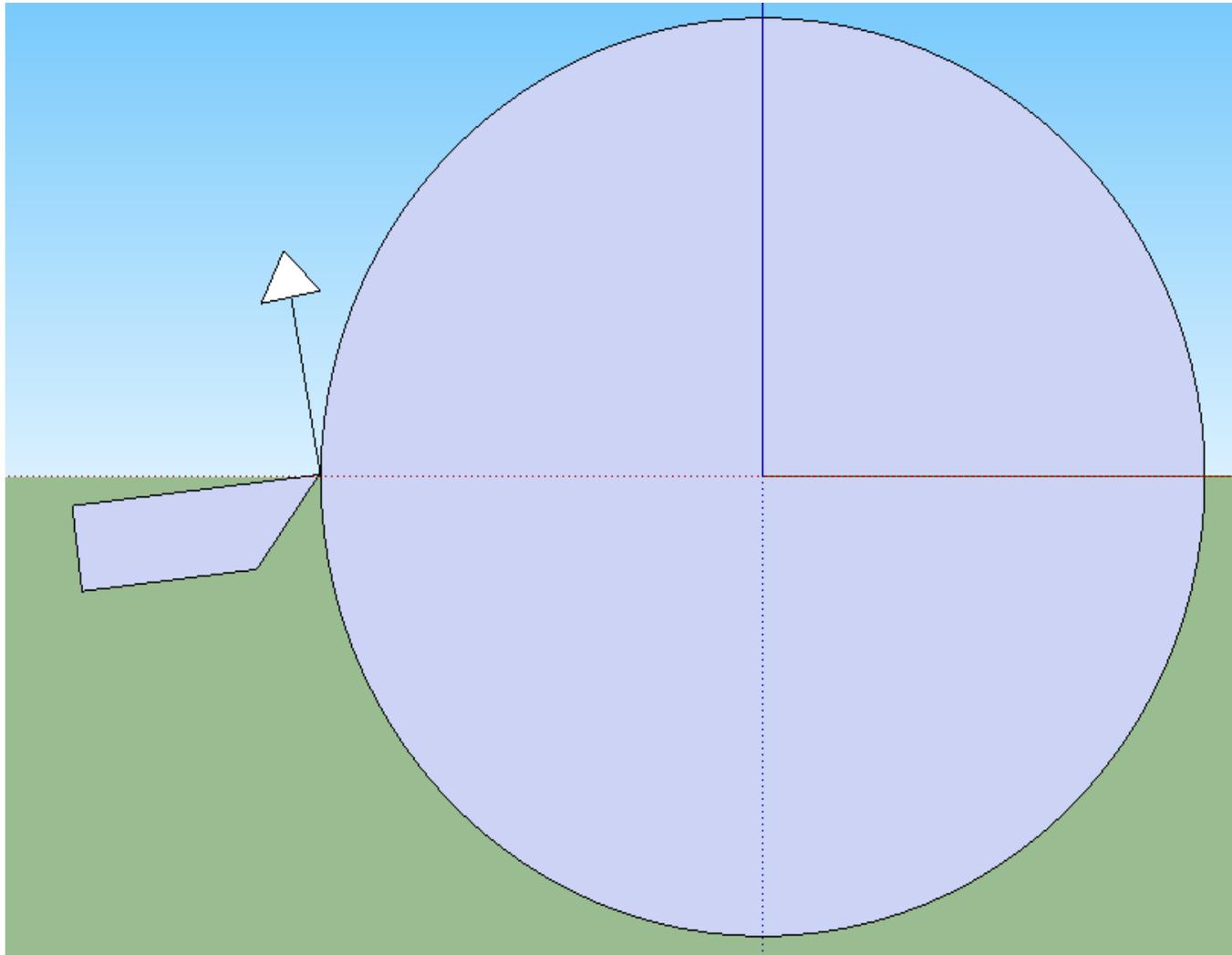
Number one rule:
Rub the bevel!

The bevel not only guides the cut,
but it supports the tool during the
cut.

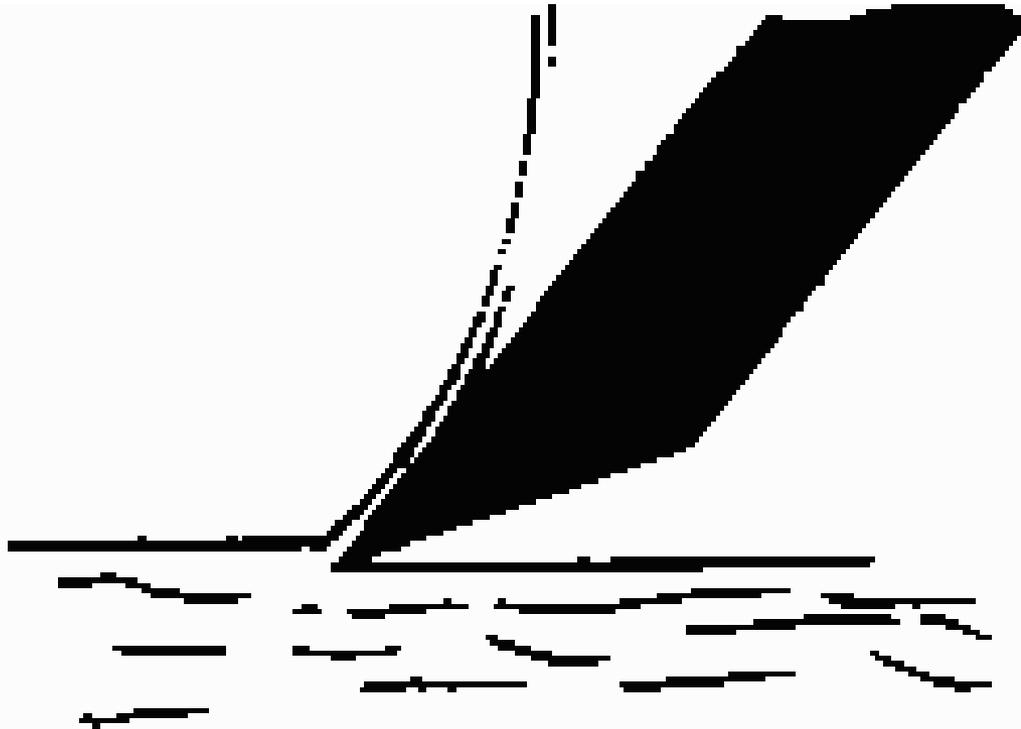
There are Three Types of Cutting Angles: Positive, Negative, and Neutral/zero



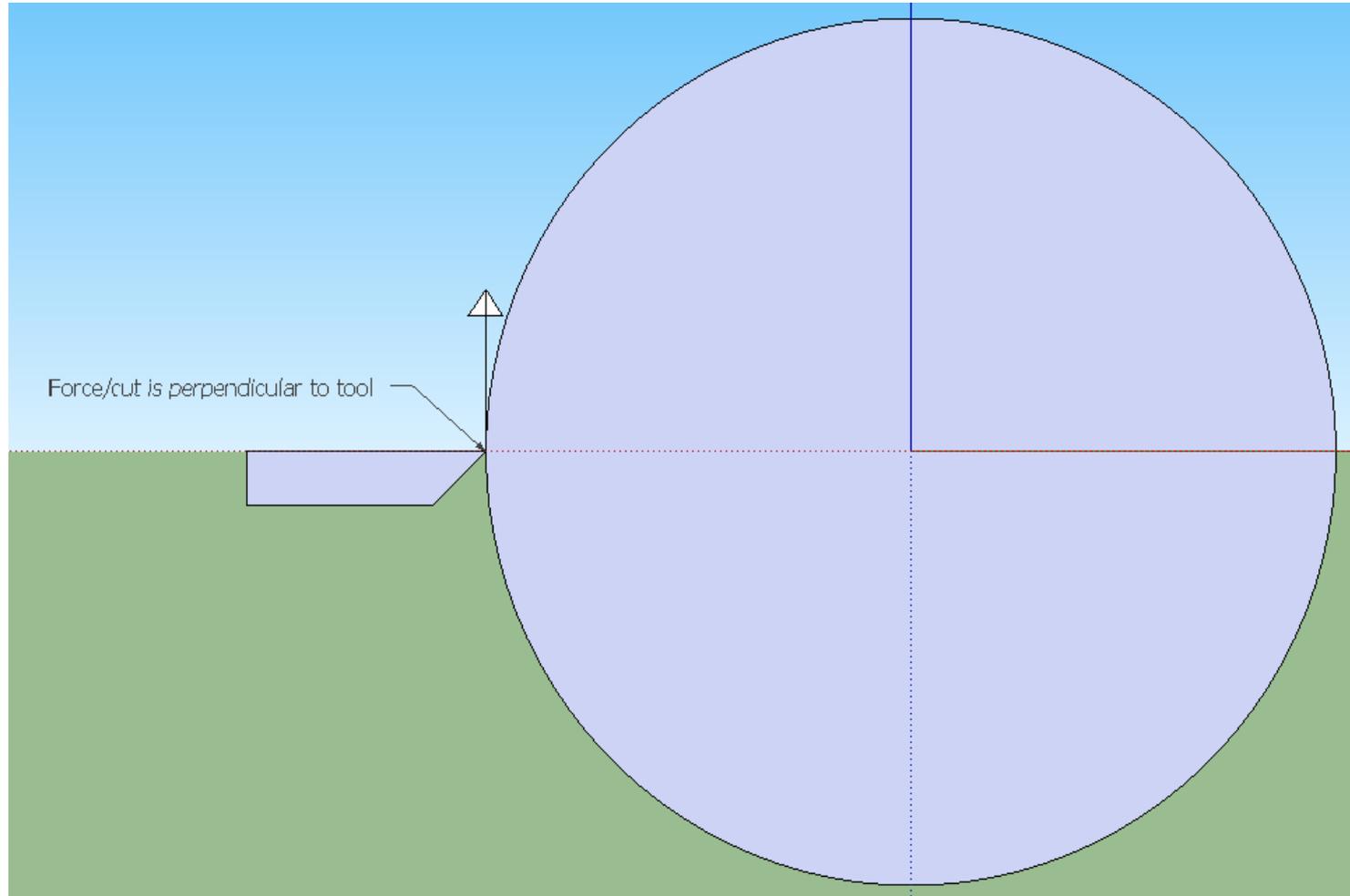
Positive Rake Tool



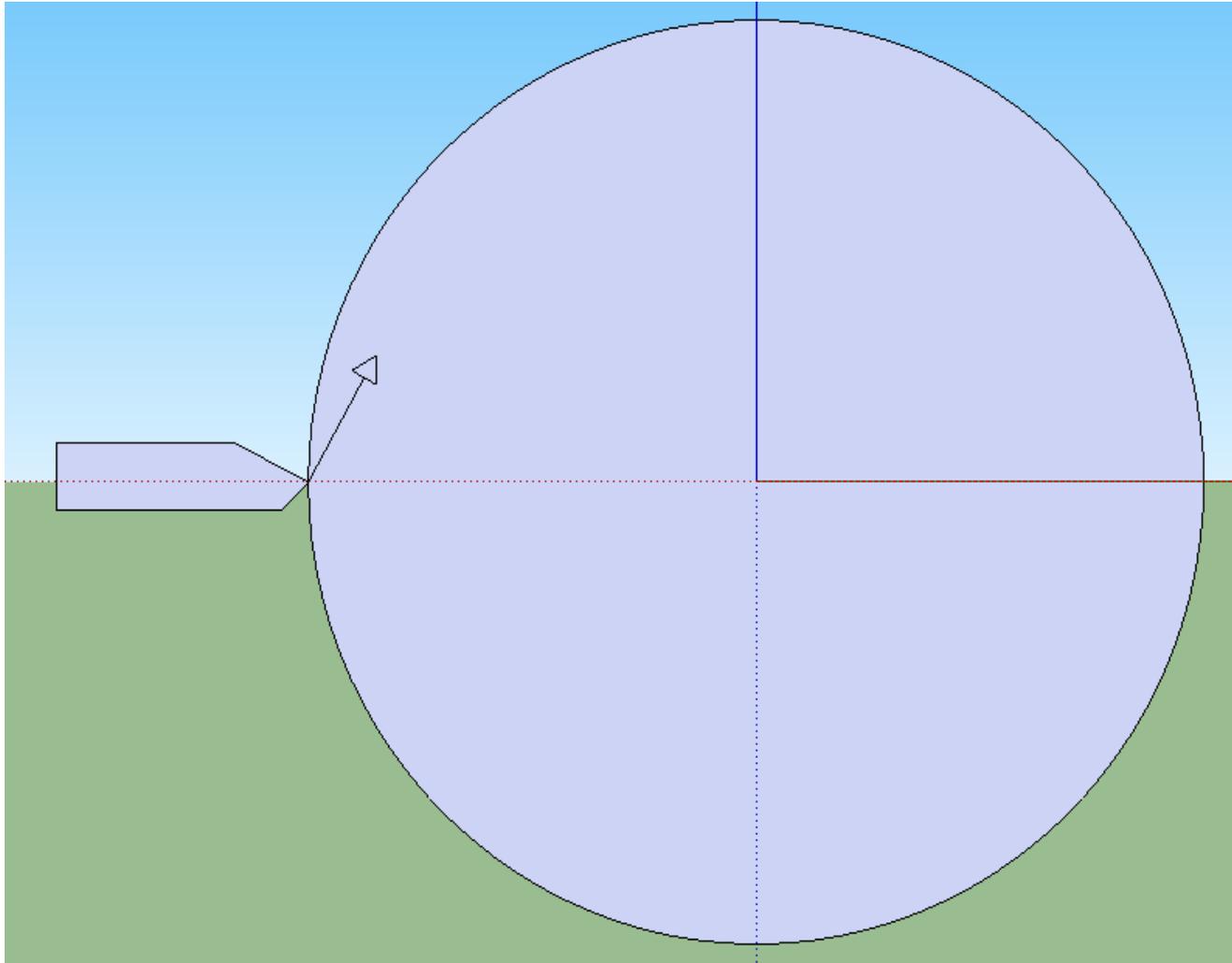
A Positive Rake Tool Lifts/Pulls the Wood Fibers Up



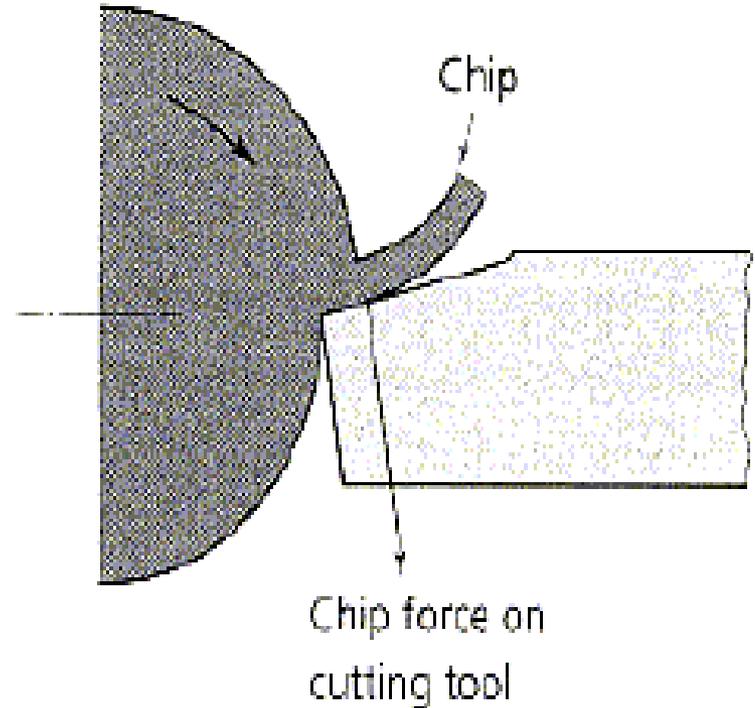
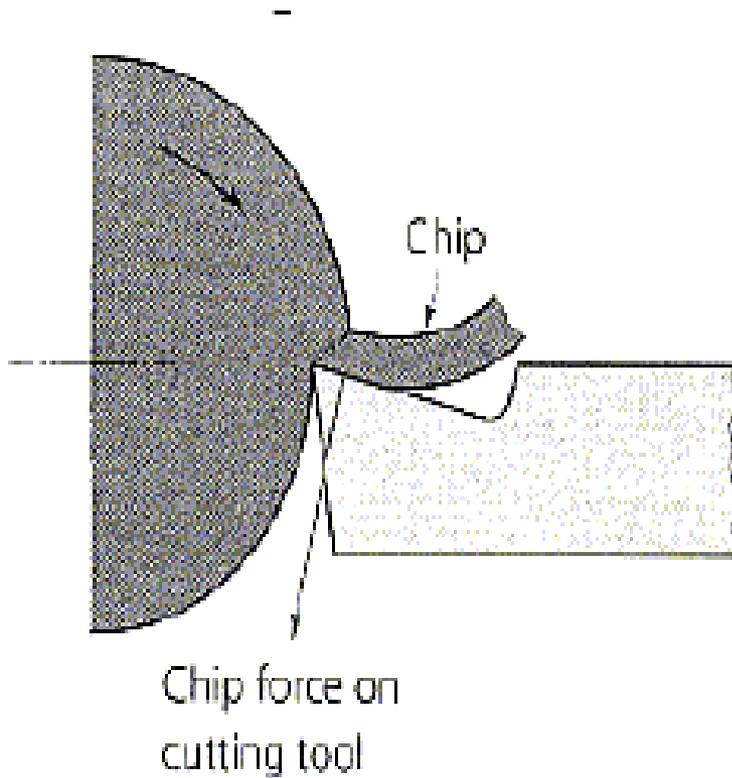
Neutral Rake Tool



Negative Rake Tool



Notice How The Negative Rake Tool Tends to Push The Chip Into the Work Piece



The negative rake tool actually pushes the wood fibers down and with that, the other wood fibers support the others so the fibers can be cleanly cut off.

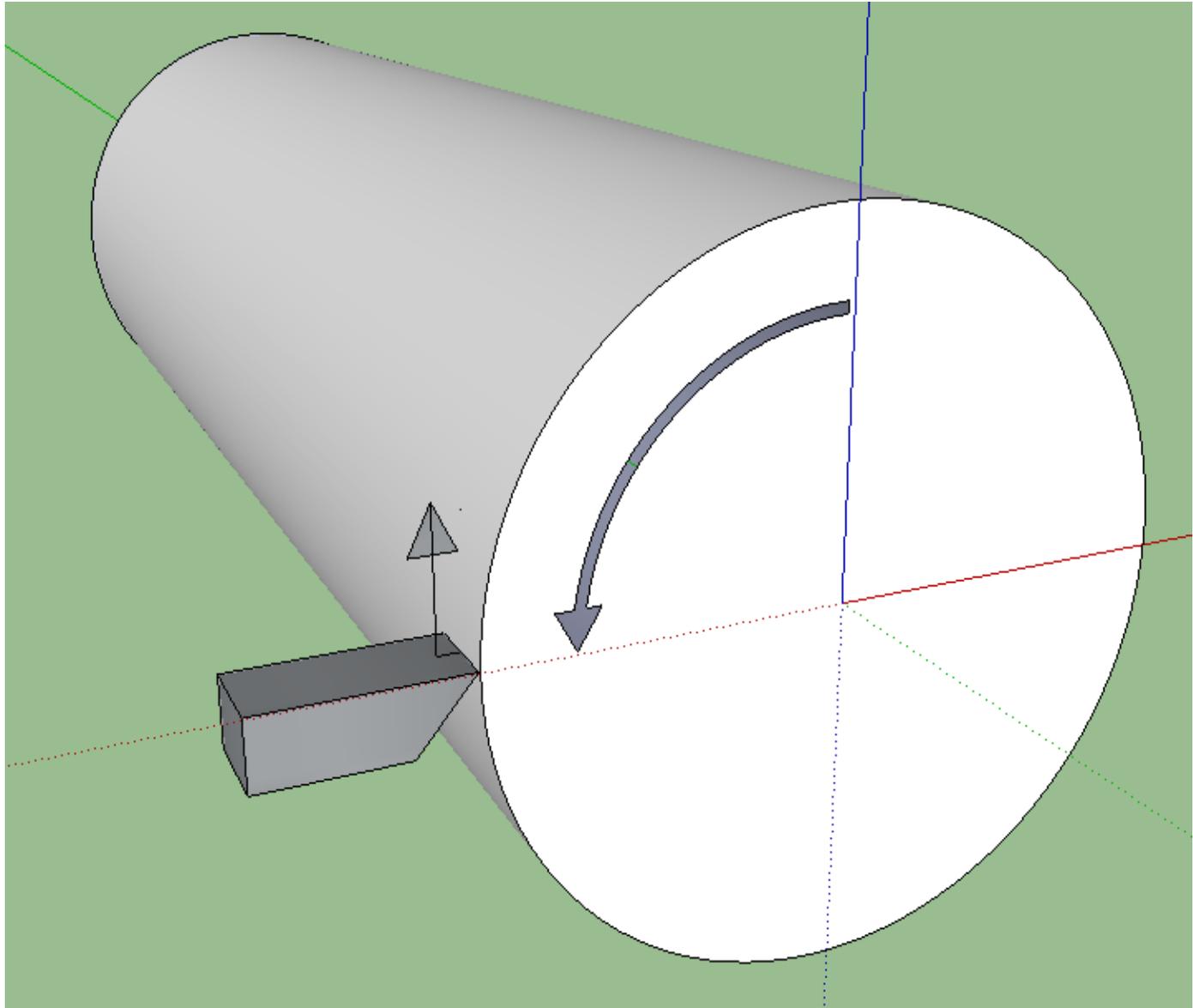
The Cutting Forces That We Are

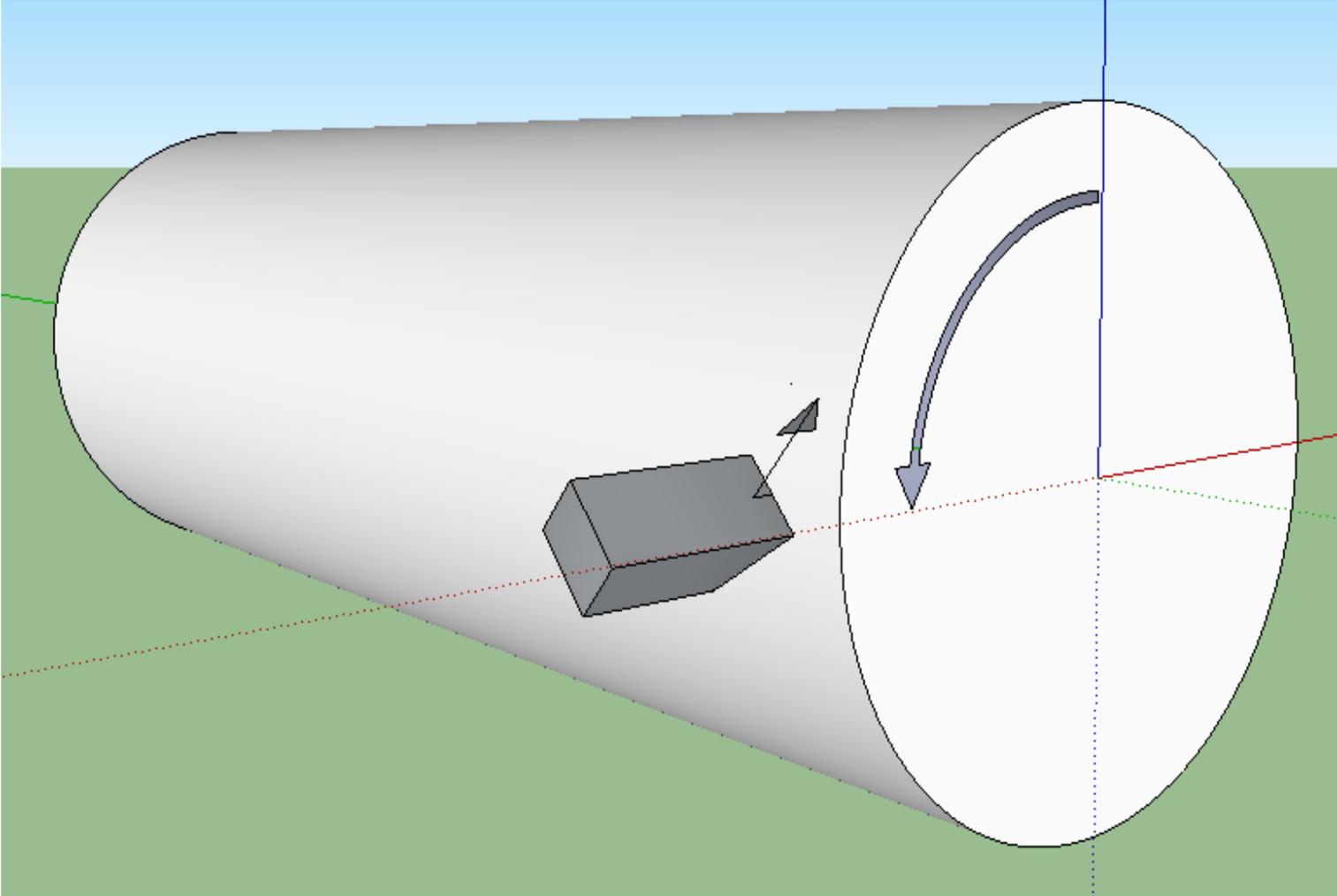
Going to Discuss Are:

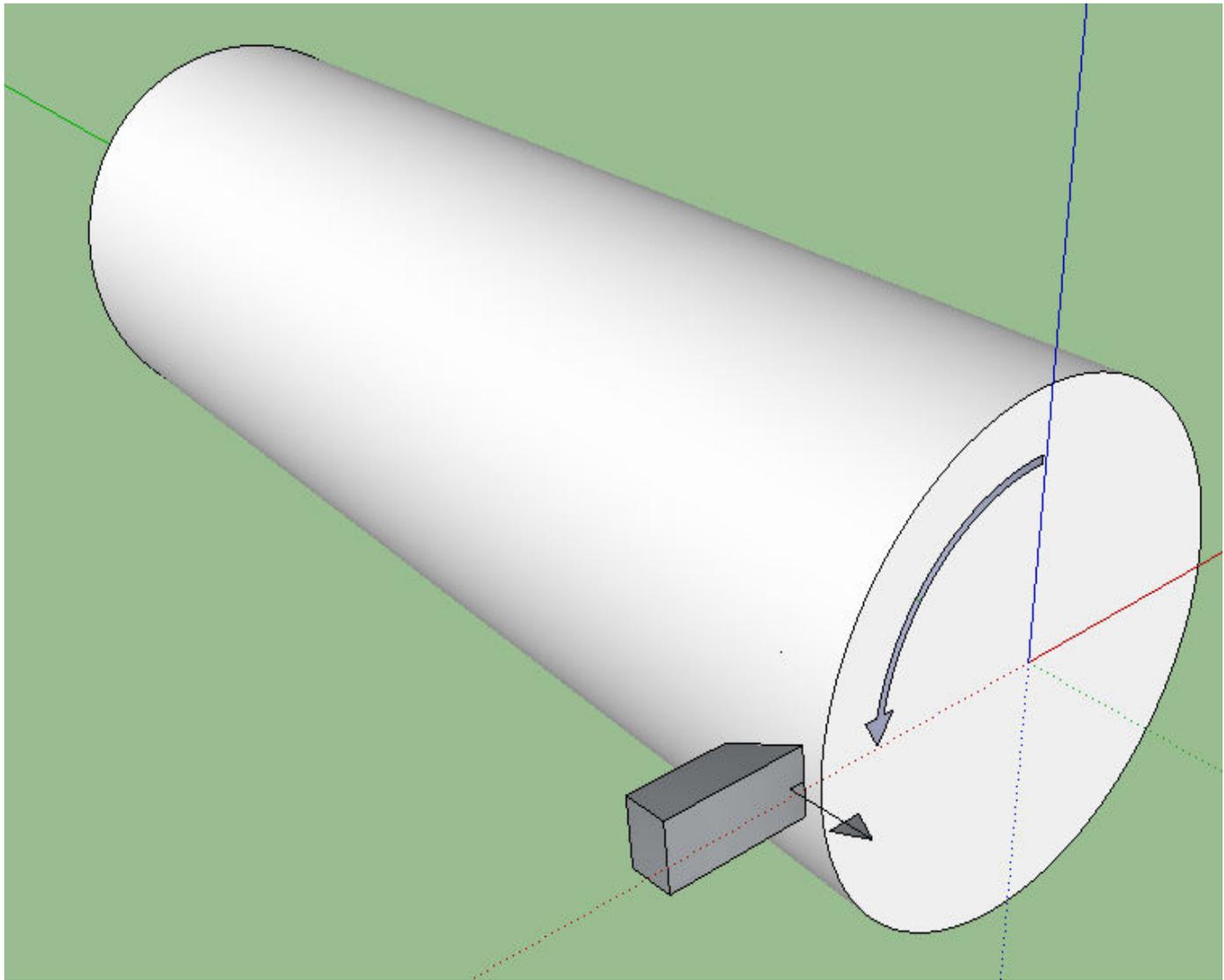
Scraping

Shearing

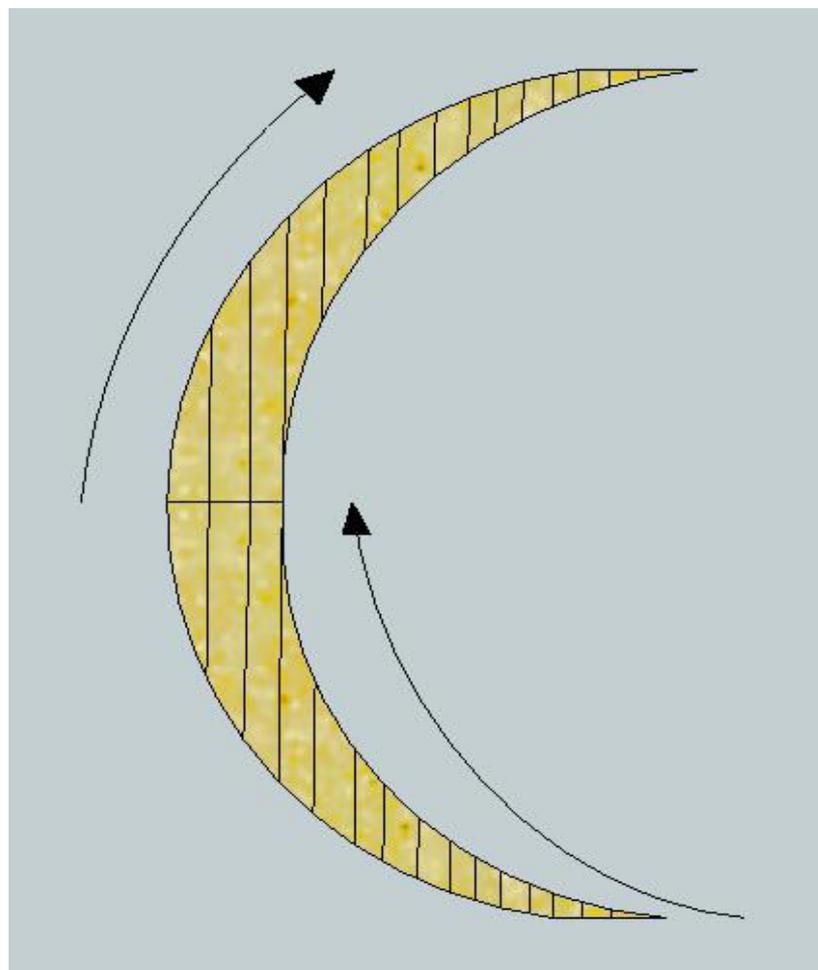
Slicing



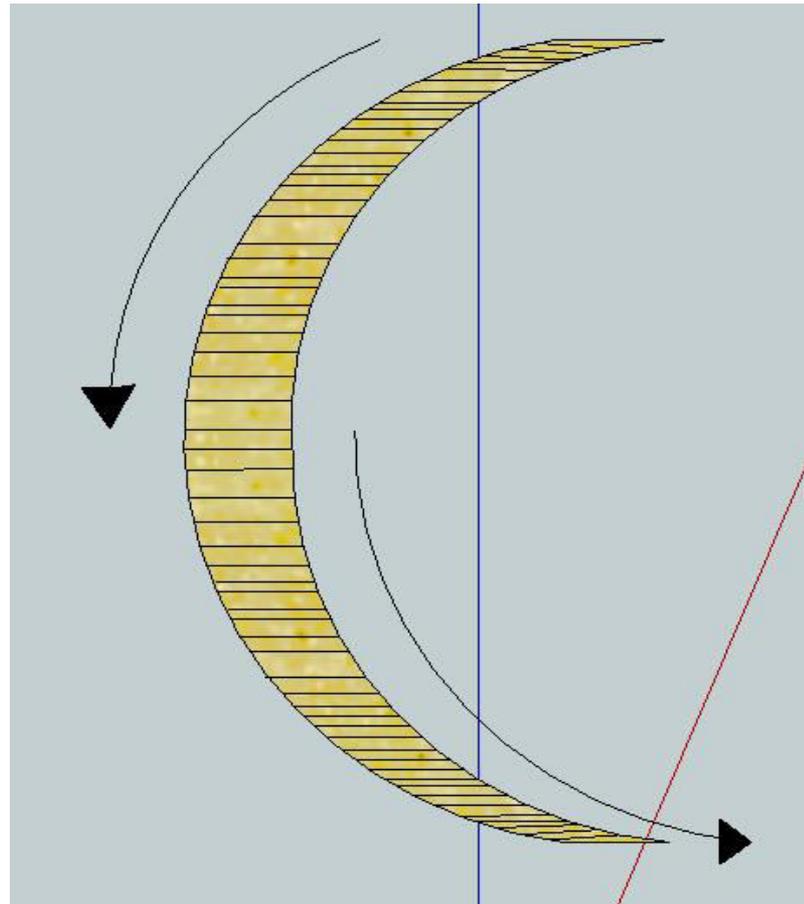




Standard Bowl Grain Direction



End Grain Bowl



I use the gouge with the flute about half open to rough turn. It may be hard to see, but I am rubbing the bevel to control the depth of the cut. Shear Cut.
Notice the positive gouge angle!



Typical Grain Tear Out With A Shear Cut



By closing the flute, the gouge will slice the wood fibers with the nose radius instead of just cutting them. Notice that the cutting edge is almost parallel to the rotation of the wood. Again, note how I rub the bevel to control the depth of cut. Slicing Cut

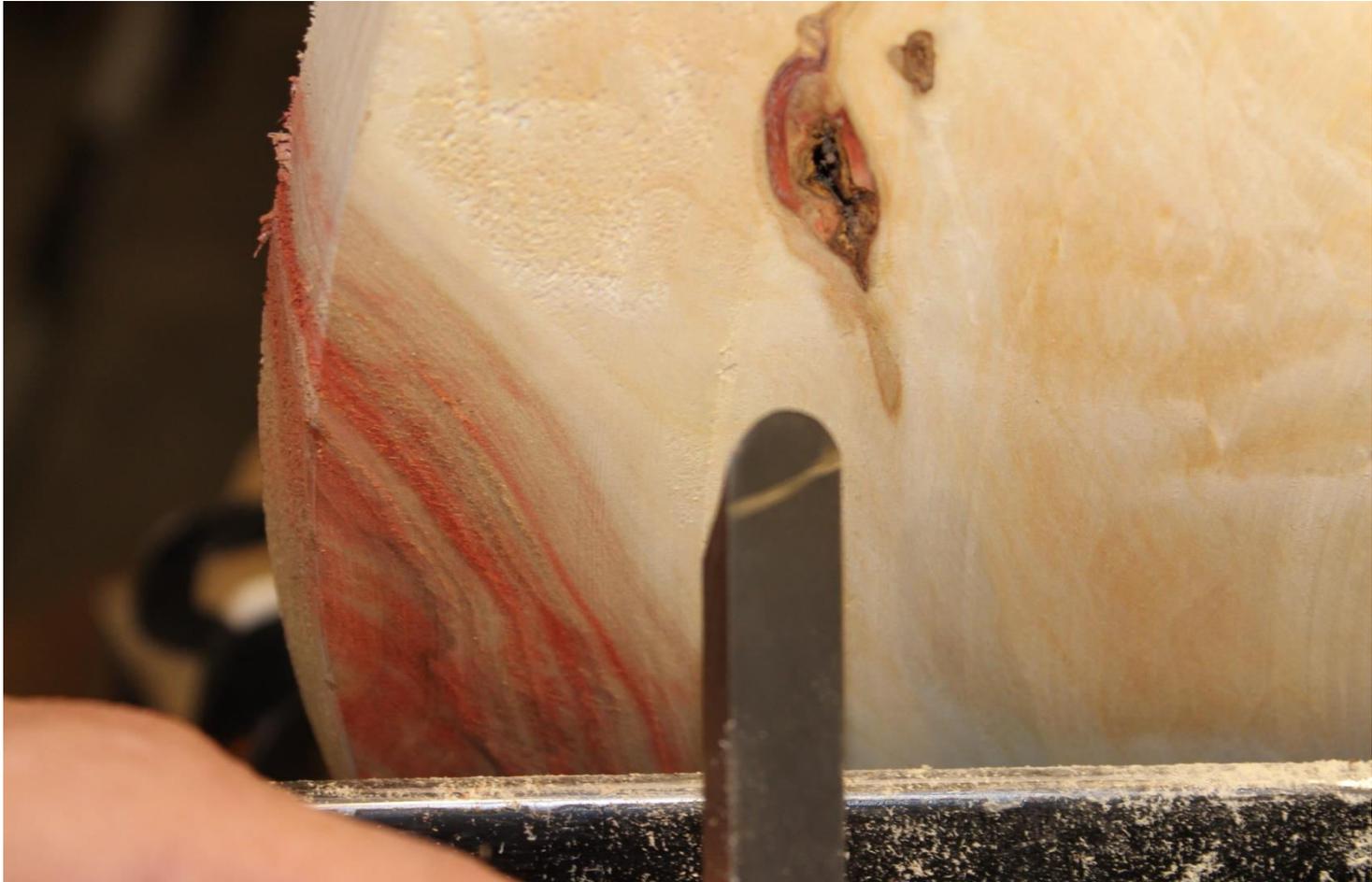


After finish turning with the nose radius in the closed position



Now, when you use your bowl gouge, pay close attention to the cutting edge instead of the angle. Turn the cutting edge to the work piece where it will slice through the wood fibers. The angle is then set.

But also remember that a gouge is just
a cutting edge



Notice that this is a scraper, only used
like a bowl gouge



By using the cutting edge almost parallel with the rotation of the lathe, The finish is smooth.



And now a detail gouge



Notice the position/angle of the gouge



Nice finish!



Have you noticed how cleanly a skew chisel cuts? Why?

A skew chisel has a thin knife edge and is used by lining up the cutting edge WITH the rotation of the work piece.

The angle of the cutting edge

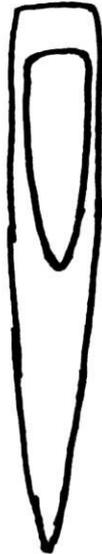
AX PROFILE GRINDS

SLIGHTLY
CONVEXED



GENERAL
PURPOSE

THICK,
STRONGLY
CONVEXED



SPLITTING

CONCAVE



LIMBING

NEARLY
STRAIGHT,
TAPERING TO
A CONVEXED EDGE



GLANCES
LEAST

When you need to make a finish cut and you are having tear out problems, remember the shape of the cutting edge.

Think of the difference between a
butcher knife and a fillet knife.

The butcher knife like a splitting axe
has a broader angle on the cutting
edge

The limbing axe is more like a fillet
knife

The nose angle is usually around
40 to 45 degree's

But the angle of the wing, sometimes called
the "cheeks" cutting edge is 30 degrees or
less, just like the difference between a
butcher knife and fillet knife.

Using the nose with the flute closed works, but here is another way



It is a lot harder to control the tool,
but it leaves a nice finish



Honing a gouge!

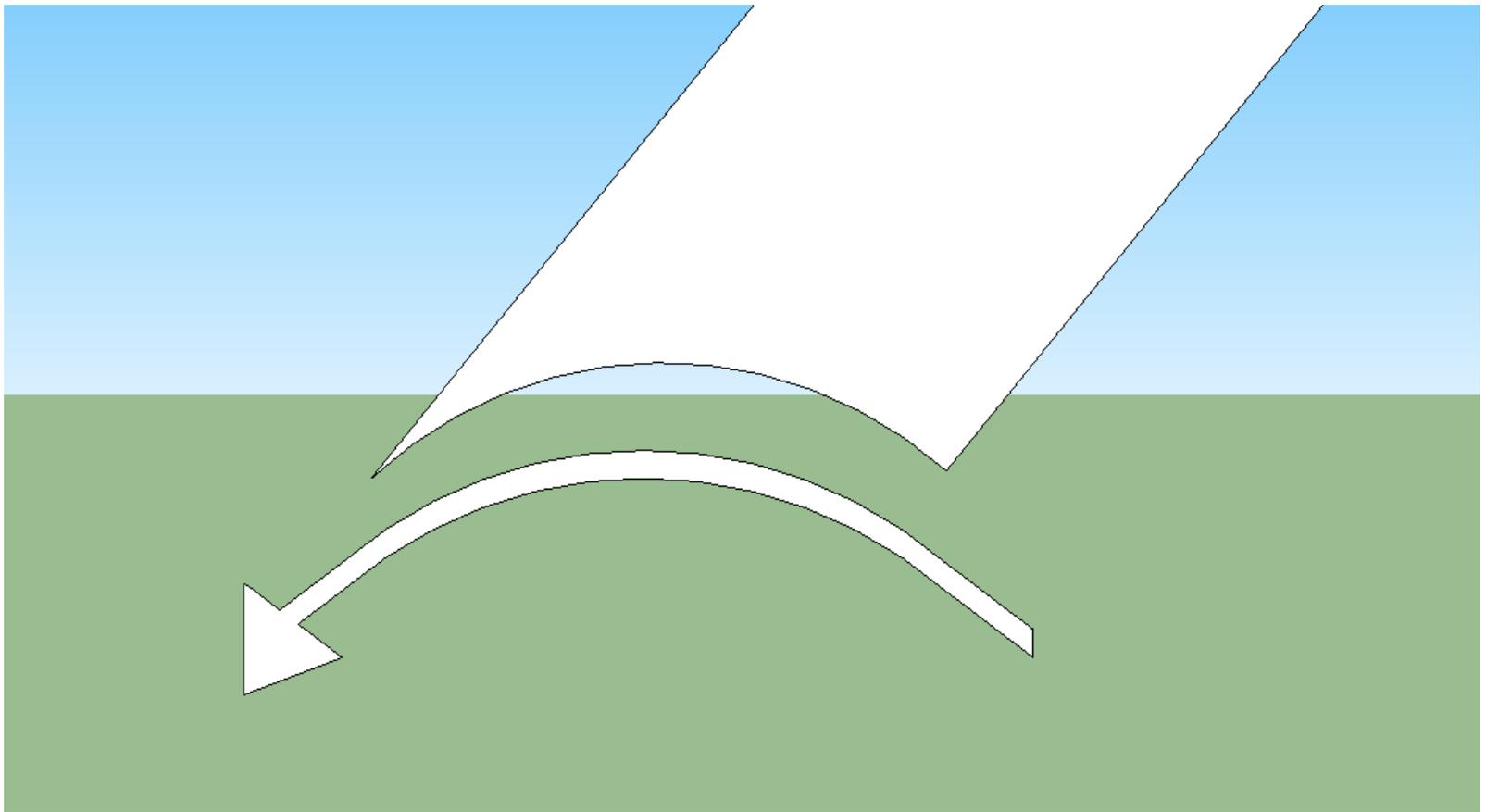
There are three the types of bevels

A. Hollow ground/concave

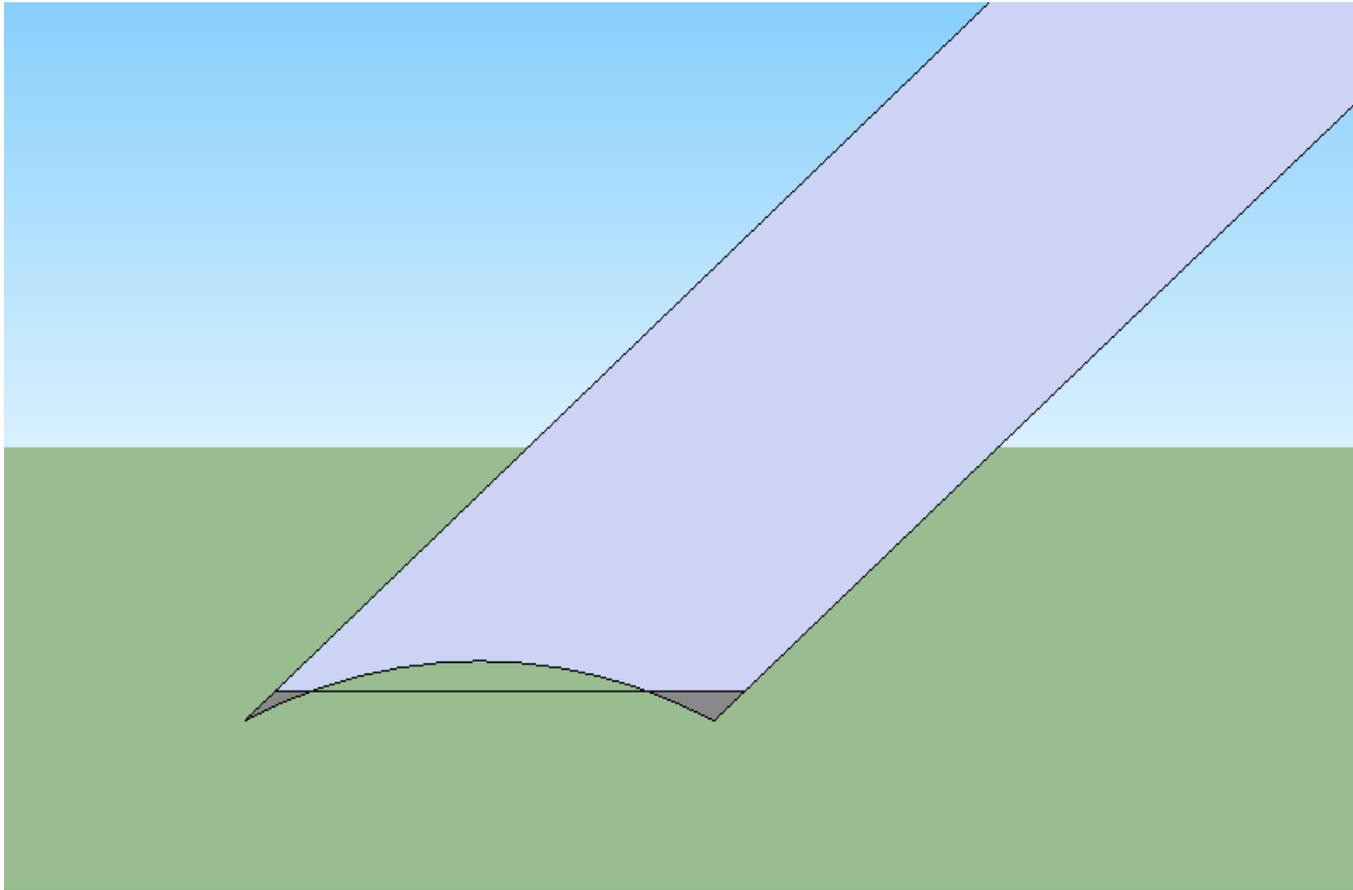
B. Flat

C. Convex

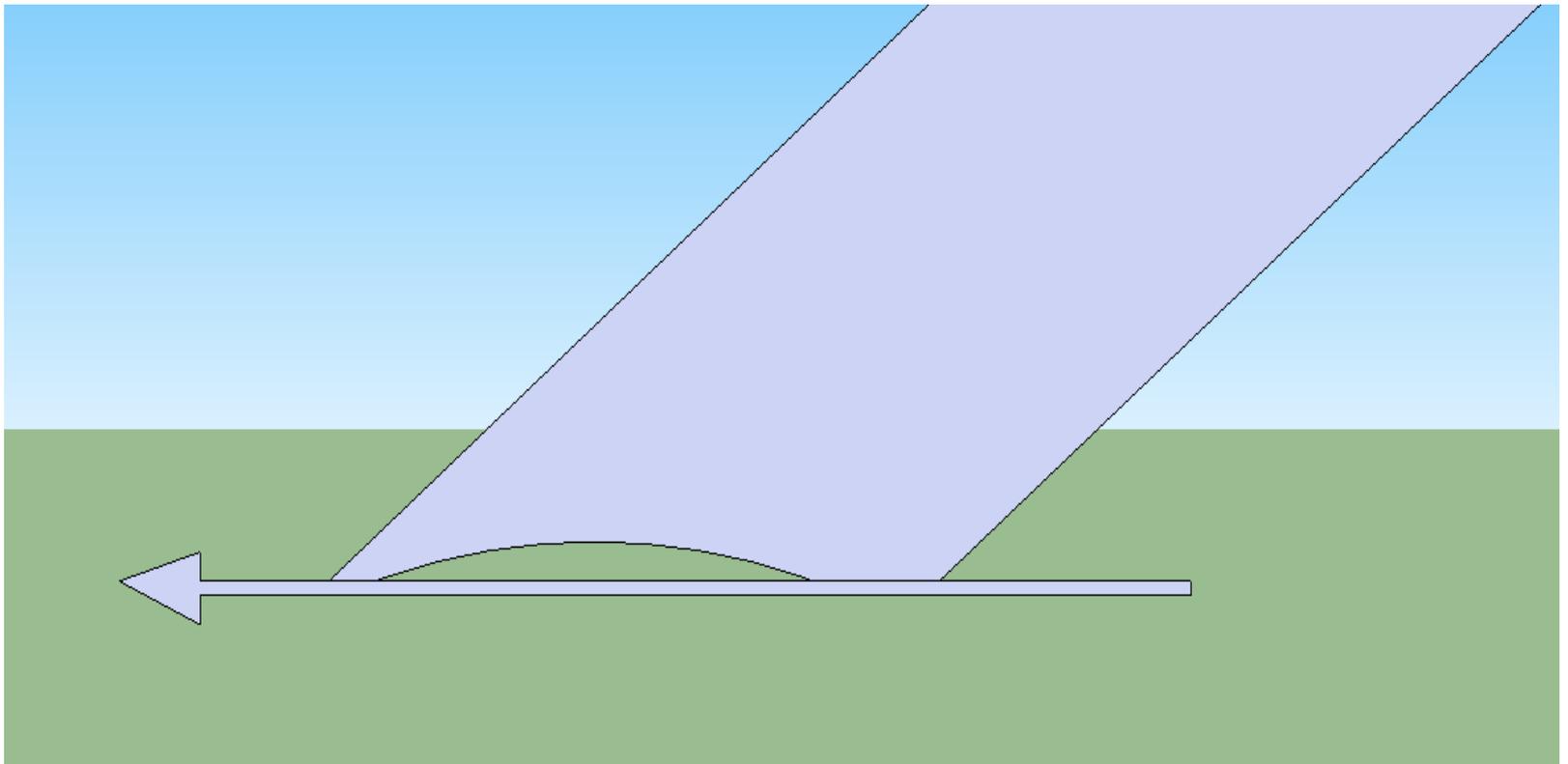
(Exaggerated hollow grind bevel)
Notice that the hollow grind wants to follow a radius into the work piece.



When you hone a bevel, you remove metal from the front and rear changing the radius to a flat bevel.



Notice that honing changes the cutting action. Instead of digging in, it will move straight ahead. It is still sharp, it just cuts (feels) different.



Much less used is a convex grind bevel, but it has an advantage; it works like a carving chisel. It wants to move up and out of a cut.

