

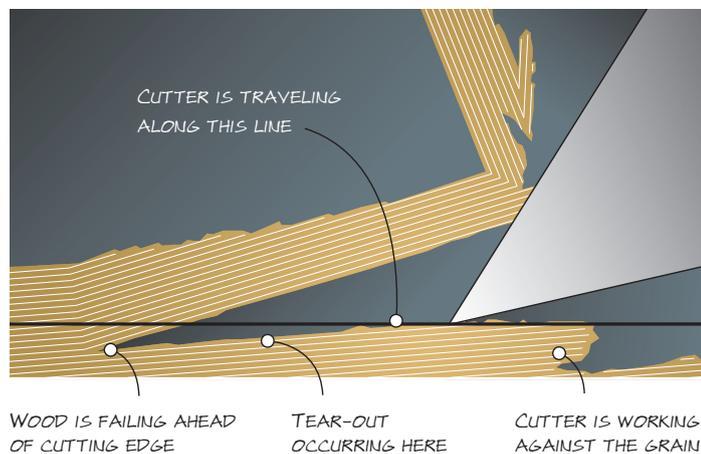
WHY YOU SHOULD UNDERSTAND HOW WOOD FAILS

TEAR-OUT IS UGLY, BUT HOW DOES IT HAPPEN? GROUND-BREAKING RESEARCH THAT BEGAN IN THE 1950S BY NORMAN C. FRANZ SHOWED HOW WOOD FAILS WHEN YOU CUT IT WITH HAND TOOLS OR POWER TOOLS. USING A MOVIE CAMERA AND A MILLING MACHINE, FRANZ MADE AMAZING PHOTOS THAT POINTED OUT HOW CERTAIN CUTS PRODUCE TORN GRAIN.

FRANZ DEFINED THREE TYPES OF CUTS, AND ONLY ONE TYPE CAUSES TEARING. AS YOU STUDY THE DRAWINGS BELOW, THE MOST IMPORTANT THING TO REMEMBER ABOUT TEAR-OUT RELATES TO THE LINE THAT THE CUTTER IS TRAVELING ON. IF THE WOOD FAILS ABOVE THIS LINE, NO TEAR-OUT HAPPENS. IF IT FAILS BELOW THE LINE, YOU GET TEAR-OUT.

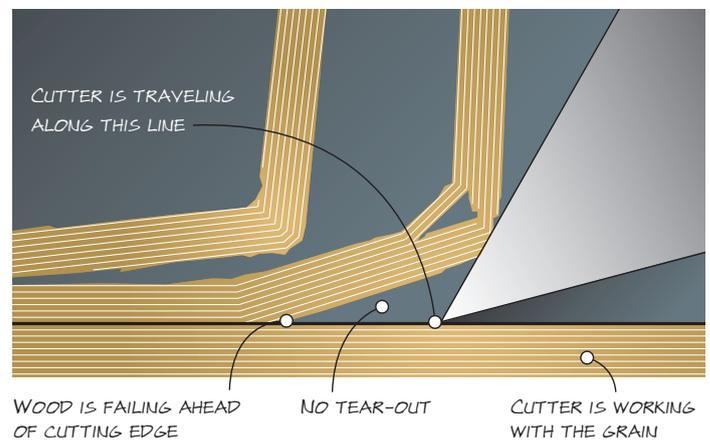
A "TYPE I" CUT AGAINST THE GRAIN = TEAR-OUT

A "TYPE I" CUT OCCURS WHEN THE WOOD FAILS AHEAD OF THE TOOL'S CUTTING EDGE. IF THE TOOL IS CUTTING AGAINST THE GRAIN OF THE BOARD, THEN THE CUT GOES DEEPER THAN INTENDED WHEN THE SHAVING IS LEVERED UPWARDS BY THE TOOL. BECAUSE THE FAILURE OCCURS BELOW THE LINE THE CUTTER IS TRAVELING ON, YOU GET TEAR-OUT.



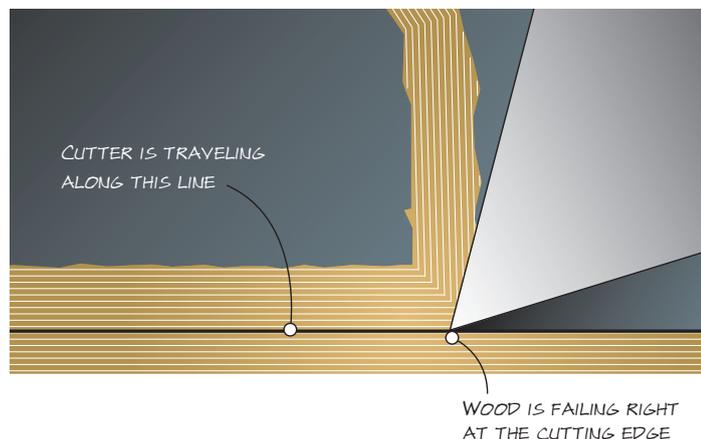
A "TYPE I" CUT WITH THE GRAIN = NO TEAR-OUT

WHEN YOU HAVE A "TYPE I" CUT AND ARE WORKING WITH THE GRAIN OF THE BOARD, THE WOOD IS LEVERED UP AHEAD OF THE TOOL'S CUTTING EDGE, BUT NO TEAR-OUT OCCURS BECAUSE THE WOOD FAILS ABOVE THE LINE THE CUTTER IS TRAVELING ON.



A "TYPE II" CUT = NO TEAR-OUT

WHEN YOU HAVE A "TYPE II" CUT (EITHER WITH THE GRAIN OR AGAINST IT) THE WOOD FAILS RIGHT AT THE CUTTING EDGE. AND NO TEAR-OUT OCCURS. YOU CAN ENCOURAGE A "TYPE II" CUT IN A PLANE BY USING A SHARP TOOL, A HIGH ANGLE OF ATTACK OR A TIGHT MOUTH APERTURE.



A "TYPE III" CUT CAN CAUSE A "TYPE I" CUT

A "TYPE III" CUT OCCURS WHEN THE WOOD FIBERS ARE COMPRESSED MIGHTILY AT THE CUTTING EDGE BY A VERY HIGH ANGLE OF ATTACK. THIS COMPRESSED WOOD CAN BECOME A PROBLEM. IT CAN COMPRESS TO THE POINT WHERE IT BECOMES A WEDGE AND LEVERS UP THE WOOD FIBERS AHEAD OF THE CUTTING EDGE, CAUSING TORN GRAIN.

