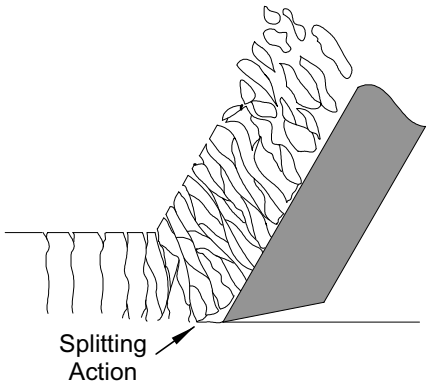
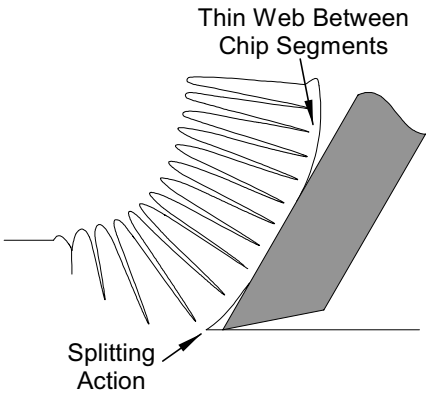
Chip Formation



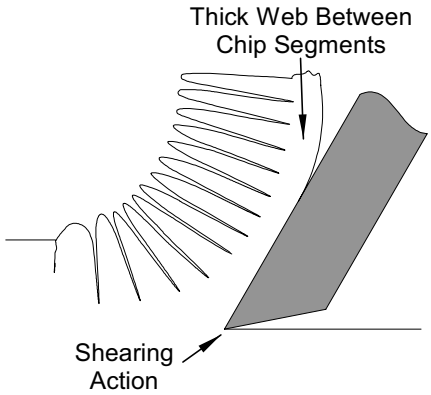
Cast Iron, Hard Brass and other materials that produce powdery chips

Chips begin breaking in front of the cutting edge. Chip controls is usually not a problem. Harder, more heat and wear resistant carbide grades such as 323 or 323F work well on these applications. Use sharp inserts for most Non-Ferrous materials. Most Cast Iron Inserts are honed to resist chipping. Abrasive flank wear is the primary failure mode.



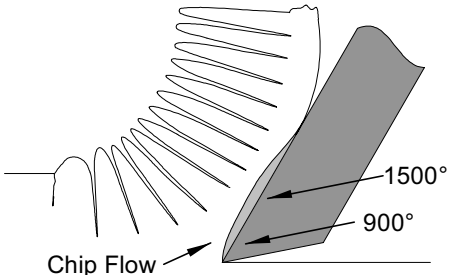
Carbon and Alloys Steels with Medium to High Carbon Content

1035, 1045, 1144, 4130, 4140, 4340 Carbon and Alloy Steels that contain at least .3% Carbon are hardenable by heating and quenching. The cutting action is similar to a wedge splitting wood. High pressure develops in the zone behind the cutting edge where chips start to curl. Cratering can occur in this area. Steel cutting grades and coatings help eliminate this problem.

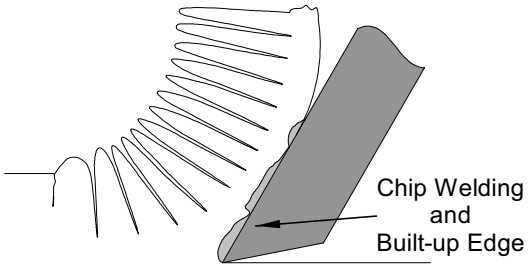


Low Carbon Steels, Stainless, Nickel Alloys, Titanium, Aluminum & Copper

Tough, gummy metals that need to be sheared. Chips are thicker and more difficult to break than those produced at the same feeds in Steel. Chip welding and edge build-up is a common problem in these materials. Sharp Inserts with positive rake chipbreakers work well in these applications. Horizon RK/LK style Grooving Inserts are recommended.



Under optimum cutting conditions, the underside of the chips soften to become almost fluid as they pass across the Insert. This helps chips flow easily out of the cut. The flow zone behind the cutting edge is where the highest heat and pressure develops. Cratering can also occur in this area.



Built-up edge occurs when the SFM is too low to generate enough heat to keep chips from pressure welding to the Insert. This results in poor finish and edge chipping. Increased SFM, positive rake geometry and coated Inserts reduce chip welding. Use grades 110 or 310 to resist chipping when the SFM can not be sufficiently increased .

A .002 to .003 wide area of chipping or cratering across the top face of a grooving Insert is usually an indication of edge build-up. In most instances increasing the SFM will correct the problem. Also check to insure that the tool is not running above center. Horizon RK / LK Chip Curler inserts help prevent build-up in tough, gummy materials.