

Geometry of a Cutting Edge by [Allen Elishewitz](#)

There are many misconceptions about the cutting edge of a knife. Some people believe a knife's sharpness should be determined by its ability to shave or how aggressively it cuts. Others believe that by feeling the cutting edge they can determine the sharpness. A common misunderstanding occurs when a customer comments on how dull the edge feels. The maker must then demonstrate the sharpness by shaving the hair of his arm and/or pushing it through a piece of paper with little effort. This is a common experience amongst knifemakers.

Edge types can be divided into two categories: macro and micro levels. The micro level is not the angle of the bevel but the actual cutting surface. The surface of the cutting edge can be either smooth or serrated. A smooth cutting surface is when the edge has been honed to a mirror finish, the surface is so smooth that the cutting edge feels dull and non-aggressive. This type of sharpening produces the longest lasting edge available on a knife. A comparative example is a razor blade which has a smooth, long-lasting cutting edge. The serrated surface is similar to Spyderco's serrations, but on a much smaller scale. To produce a serrated edge the sharpener stops at a coarse grit such as 400 or 600 grit. This is a quicker and easier edge to obtain. The edge feels like a small saw, it is very aggressive and is similar to Damascus. The disadvantage of this type of edge is that once the teeth have worn away, you are left with a dull wire edge. The serrated edge is ideal for people who need to make quick, time-saving strokes, but are not concerned with the edge durability. Serrated edges will not last as long as smooth ones, but they will cut faster before they wear out.

The macro level is the grind and bevel of the blade. For each bevel or change of angles on the blade a point is created. These points affect the cutting performance of the knife. The more points a blade has, the more drag it creates. The convex grind (Moran grind) or "V" grind have been very successful over the years in regards to the cutting ability. This can be attributed to fact that it has no points (Fig. 1). The down side of these grinds is that it is very difficult for the user to correctly sharpen the knife. Another way to reduce the points is to employ a grinding technique made famous by the Japanese: chisel grind. This is done by grinding only one side of the blade, thereby reducing the angles by half (Fig. 2). Although this grinding technique makes the blade cut towards one side and is hard to control. For traditional grinding, which most makers are familiar with, there is the problem of too many points. By rolling the bevel on the cutting edge the sharpener will reduce the points by two. This will give the user a smoother cutting blade (Fig. 3).

Another factor which affects the cutting, chopping or slashing of a knife is the height of the bevel. The shorter the bevel is, the more of a wedging effect will be produced when cutting. Short bevels are ideal for knives that are designed for heavy work. Higher bevels are more suitable for knives that are designed for smoother cutting. If a bevel was kept at a uniform height, such as 3/4" on 3 different blade thickness, such as 1/4", 3/16" and 1/8" stocks, the blades would perform differently. This is due to the different angles produced ranging from shallow to steep. The steeper angle will perform better for slashing and fine cuts. This is within the same concept that the height of the bevel. It is all a game of angles when it comes to determining what edge is needed for a particular knife.