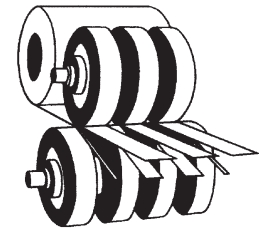




SLITTING KNIFE CLEARANCE



SLITTING CLEARANCE :

Proper knife clearance minimizes burr, increases knife's life by reducing wear and tear. It also reduces stress on the machine and improves slit width tolerance.

While slitting, knives cut partially through the metal. The material then fractures, the rest of the way. The angle of the fracture is same, regardless of the metal being processed. The thickness and tensile strength of the metal determine knife clearance.

WHAT HAPPENS IN SLITTING :

As the metal strip enters the knives (step 1 in diagram), the strip penetrates the knives (step 2) until the forces exceed the ultimate tensile strength of the material and the strip separates (step 3). The penetration forms nick at strip edge and the separation is called the break. The depth of penetration is determined by the ultimate tensile strength of the material and its relationship to the yield strength and the thickness of the strip.

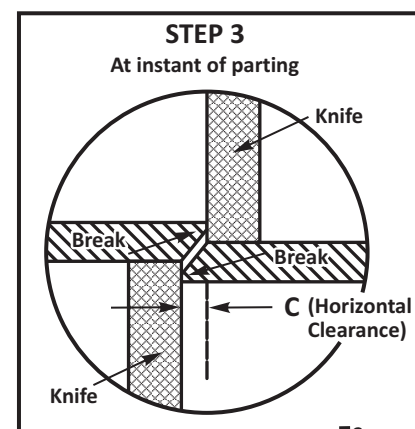
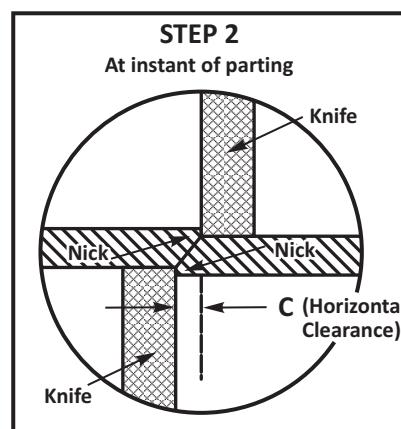
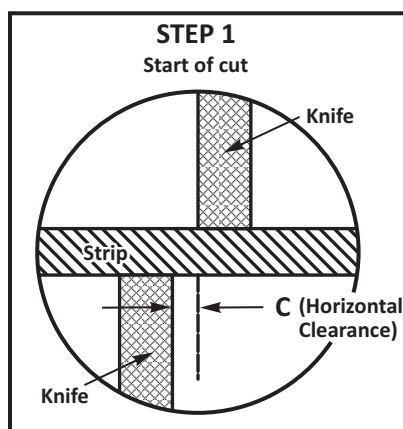
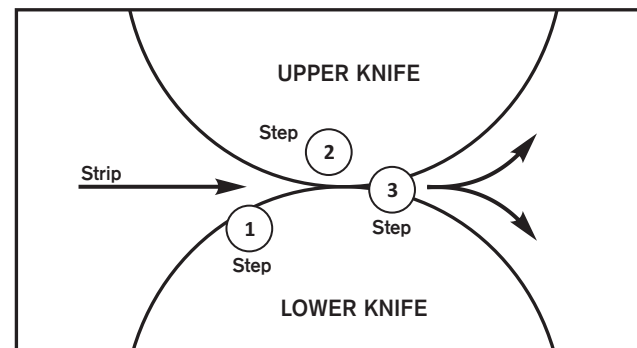


Fig: Progressive Knife Action



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Dee Tee stands for total quality movement

When knife clearance is correct and the knives are in good condition, a good slit edge will be produced. The ideal slit edge will have:

- A shiny penetration zone (or nick)
- A smooth, matte grey separation zone (the break)
- A relatively straight demarcation line between the two zones

1. HORIZONTAL CLEARANCE OF THE SLITTER KNIVES :

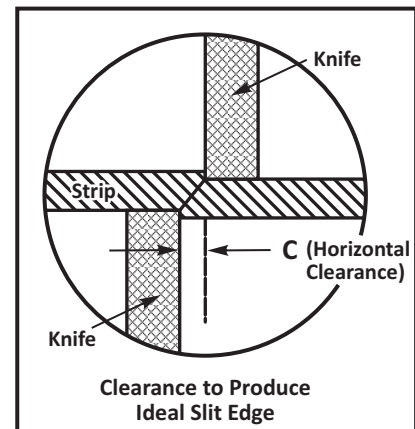
The most important factor in achieving an ideal slit edge is the horizontal clearance between a pair of slitter knives. The proper horizontal clearance depends primarily on the:

- Thickness of the material
- Tensile strength of the material

In general, as the gauge of the strip and/or its tensile strength increases, so should the horizontal clearance between the knife faces.

Other important factors that must be taken into account when choosing the horizontal clearance are:

- The condition of the equipment
- Arbor parallelism
- Condition of the Arbor bearing
- Arbor deflection



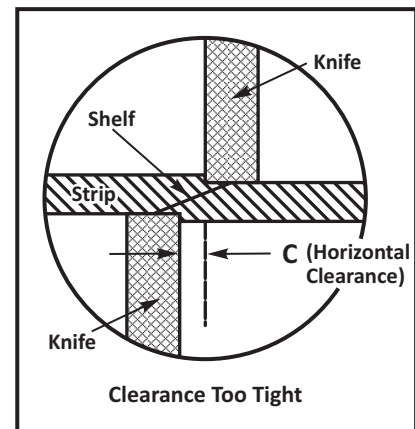
1.1 KNIVES SET TOO CLOSELY OR TIGHTLY (Lesser horizontal clearance) :

When the knives are set too close together, some material is left on the slit edge at the instant of parting. This may be either sheared off or folded over as the strip passes the knives. As evident, you will see slivers or filings around the machine.

When clearance is too tight, the slit edge that results will have:

- A deeper than normal nick
- A smaller than usual break
- A burr on the bottom edge

Because more force than normal is required to separate the strip when knives are too tight, the knives tend to chip off. Unnecessary forces are imparted to the strip and to the slitter head itself.



1.2 KNIVES SET TOO FAR APART (Excess horizontal clearance) :

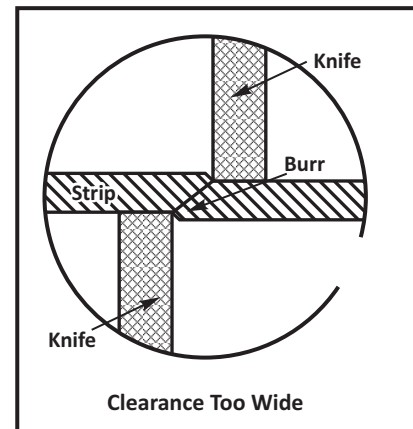
When the knives are set too far apart, strip tears. The resulting edge may have:

- No noticeable nick
- A heavy roll over on the top of the strip
- A heavy burr on the bottom of the strip

It is easy to see the roll over and the burr on the slit edge. In effect, the slitter knives are acting as bending dies.

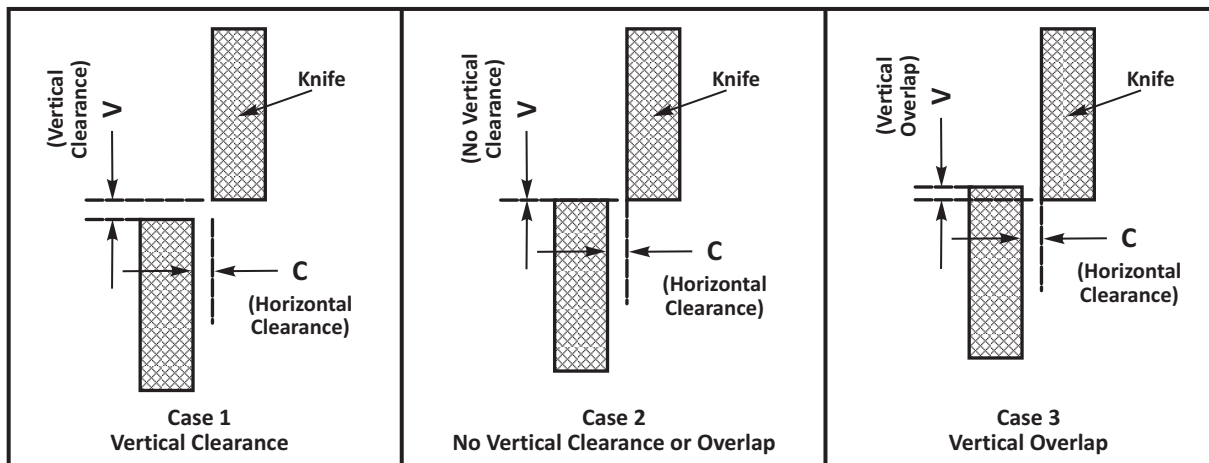
The quality of the slit edge and knife life will depend largely on the care with which setting between knives is made.

There is an optimum knife setting for every thickness and type of metal. When we speak of knife setting, we mean both horizontal clearance and vertical clearance. The clearance, vertical and horizontal, must be considered together because one affects the other.



1.3 VERTICAL KNIFE POSITION

The vertical relation of the top and the bottom knives is also an important factor in producing a quality slit edge. The correct vertical position depends on the strip gauge. Its tensile strength and the condition of the equipment. The horizontal clearance is also important in setting vertical position. If horizontal clearance is either too tight or loose, more vertical overlap will be needed to separate the strip, which can lead to problem.



A general rule is to bring the arbors together until cut is produced, then close them a little more to compensate for such factors as:

- Variation in strip thickness
- Condition of bearings
- Tolerance on slitter knives outer diameter and bore
- Tolerance in arbor positioning device
- Arbor deflection
- Knife wear etc.

Overlap should always be minimized. Too much overlap can cause differential between the linear speed of the strip and the linear speed of the knife at the point where the strip contacts it. When the speed of the knives and the speed of the strip do not match, there is an increase in heat resulting from friction between knives and strip. This heat can cause the knives to lose hardness by tempering, which results in knife failure. This frictional heat also leads to welding of the slivers to the knife face (commonly called pick-up).

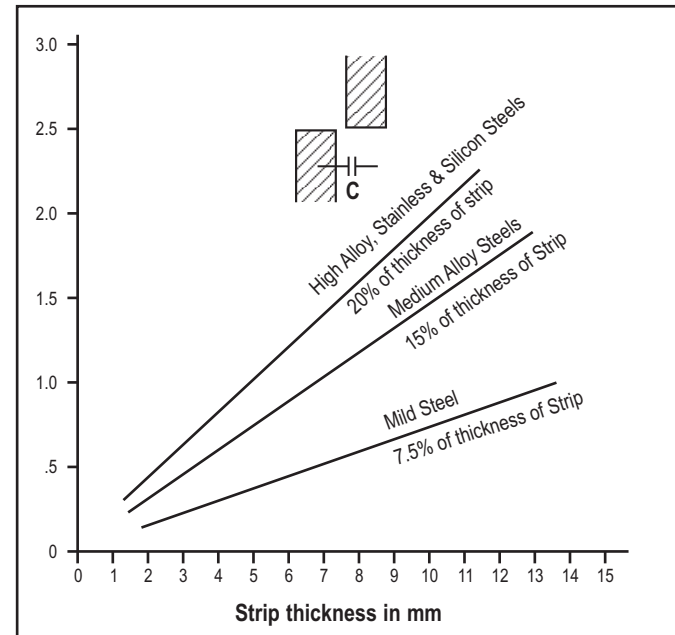
Knife Setting -

First of all Arbor collar perpendicularity should be checked within .02 mm. No exact setting can be determined except through trial and experience, because of the variables involved. These include the type of material being slit, arbor deflection (if any), slitter speed, quality of slit edge required and condition of slitting line.

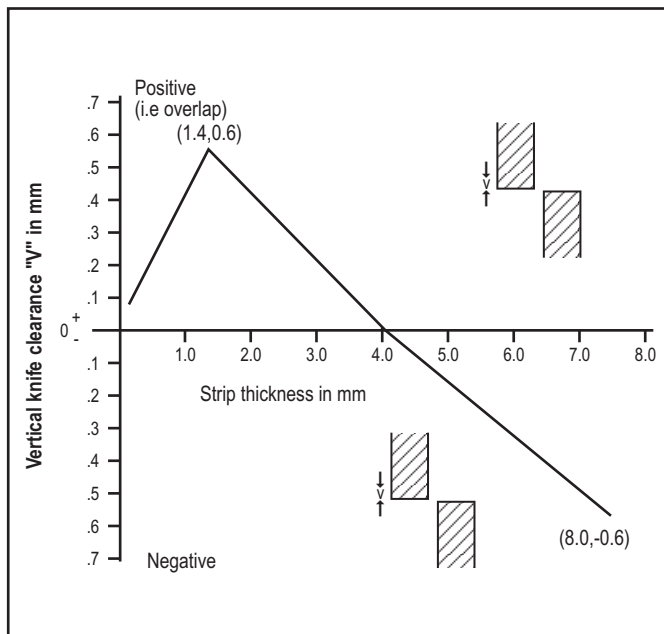
The horizontal setting is made first, Good practice demands that knives be accurately ground, and that the distance rings and nuts be smooth and free from nicks.

When Setting up Slitter arbors, it is essential that the knives and distance rings be perfectly clean and dry. The upper arbor should be raised so that the knives will pass freely, and then the slitter Knives and distance rings can be setup.

Horizontal knife clearance 'C' v/s thickness of material to be slit.



Vertical knife clearance 'V' v/s thickness of material to be slit.



After the Set up has been completed and secured by a locking nut, bring down the top arbor so that the knives overlap and check the clearance between the adjacent knives. They should be checked with a feeler gauge in at least four positions around the circumference of the Knives. It may be necessary to readjust the clearance between Knives.

In adjusting the arbors for vertical clearance, the initial setting should be such that the Knives are neither overlapped nor separated, but set to zero clearance. After the material is fed into the slitter, the knives are overlapped until they begin to cut. It is common practice to have the knives overlap about one half of the thickness of the material being slit, for light gauges. As the thickness increases, the overlap decreases. For thick material, the knives are usually separated from each other vertically.

Note : Please remove rust preventive oil before setting the tooling. After use, Knives and rings should be properly oiled.

Tools WHICH LAST LONGER - Slitting Line Tooling, Tube/Section Mill Rolls, Tube Cut Off Knives, Cold Rolling Mill Rolls, Leveller Rolls, Fins, Steel Centers, Friction Saws, Shear Blades, H.S.S. Saws & C.T. Saw Bodies, 20 Hi Mill Rolls.