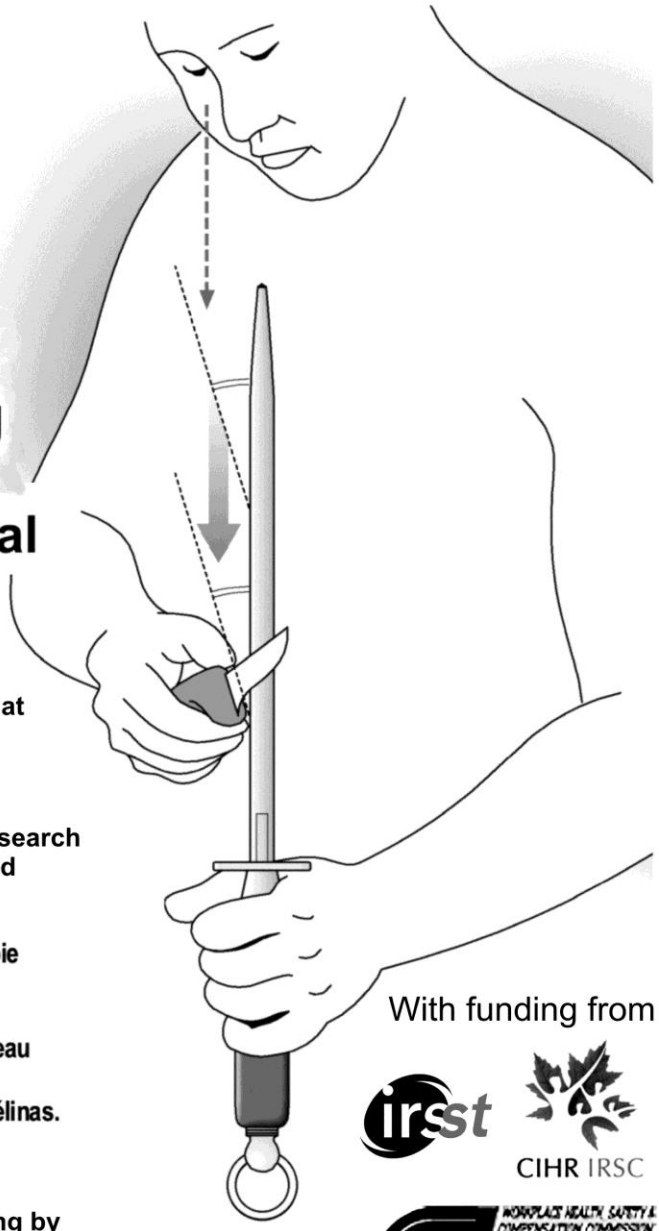
Université du Québec à Montréal

MEMORIAL UNIVERSITY
Newfoundland & Labrador, Canada

Training in Knife Steeling

Trainer's manual



Developed by expert workers at six plants for butchering and processing pork, and

CINBIOSE, UQAM

Centre for interdisciplinary research on biology, health, society, and the environment.

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irsst

CIHR IRSC

WHSCC Workplace Health, Safety & Compensation Commission

National Seafood Sector Council

Section 1
Objectives of the training and its origin

The trainer and participants introduce themselves and the schedule is outlined.

Video "*Will it make the cut?*" 1st part: Introduce the video; stop after the group meeting (**On motivation and the reasons for training, up to the introduction of the tools)** and ¨*It is following these steps that the training was created*¨. 7:04.1 Origin of the training

This training program resulted from an ergonomic research project undertaken at the Université du Québec à Montréal. Originally, this training program was designed thanks to the close cooperation of a group of 18 expert-workers from six pork abattoirs and processing plants. The information in this document is based on their collective knowledge and expertise, and was the subject of numerous discussions.

This is where our program comes from. It has been tested at Country Ribbon and Beothic Seafood Processing and adapted for use here.

2 Why train in knife steeling?

The sharper your knives, the less stress on your body, and also your productivity could improve. If you are given a sharp knife to work with, steeling it correctly will keep it sharp for a long time.

Trainers Note: Use overheads as information to present

When we are done you will:

Know (T-1.1m)

- *the difference between sharpening and steeling*
- *the importance of a sharp knife*
- *what a good steel is*
- *how to maintain a knife's edge and a steel*
- *how, why, and how often, to steel*

Be able (T-1.2)

- *to check a knife's bevel and cutting edge*
- *to produce a and smooth effective movement during steeling*
- *to work without damaging your knife*

Section 2
Importance of the cutting quality of knives and good steeling.

How important is the cutting quality of knives?

2.1 Comparison between a knife that cuts and a knife that does not cut

How do you recognize a knife which cuts?
(Wait with slide 2.1.1 until the following has been done)

Answer: no effort needed, slides well in the meat, etc.

EXERCISE 1:
Each worker takes his knife and cuts through a piece of paper towel to see if it cuts. Also have them try it with a knife that cuts.

Some people are impressed to see for the first time how sharp a knife can really get.

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The cutting quality of a knife is very important because it will affect your work.

When the knife is not sharp :

- You use more force;
- You may use more cuts on a piece of fish or meat;
- There is less time to do each piece.
- The quality of the work may be less.

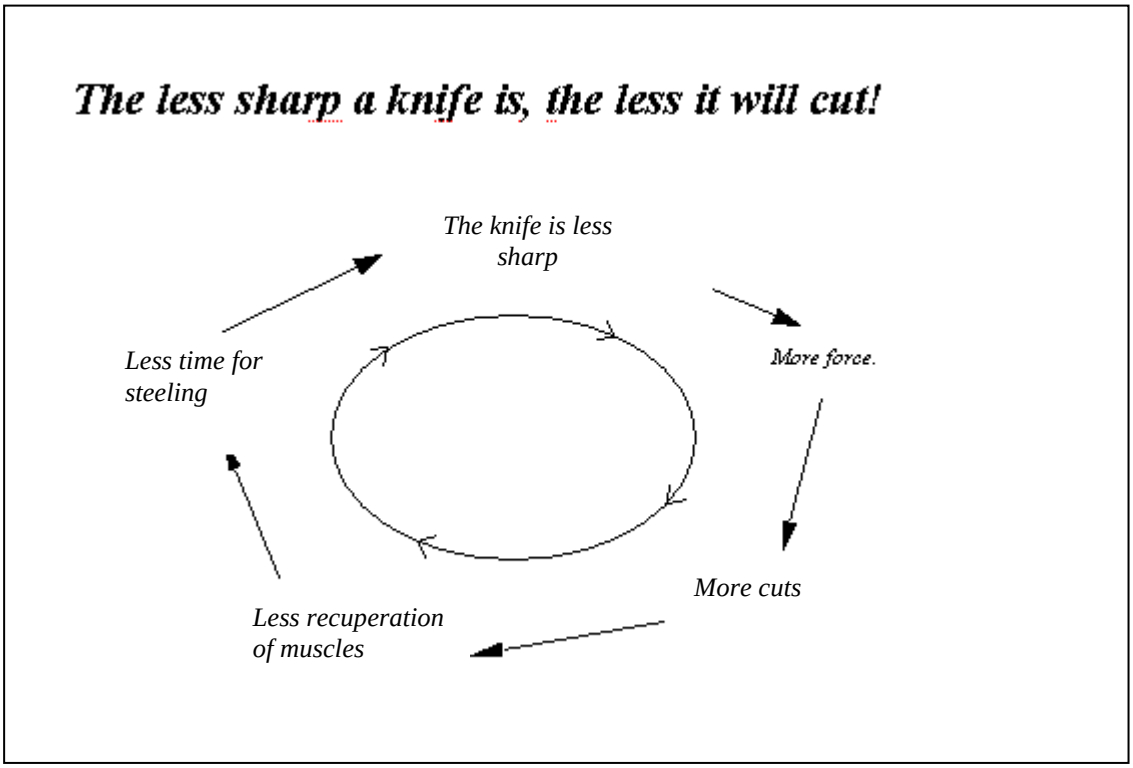
T-2.1.1

A most important point in this course is that you should steel well and steel often. That is how you maintain the sharpness of a knife. If you have to keep up with a certain rate of production, the more time it takes to cut each piece the less time you will have to steel.

If you keep the edge of a knife sharp so that it takes less time to cut each piece, the more time you will have to steel which allows you to steel more often. The rate of production may stay the same, but even if that is the case, the stress on you will be less.

A vicious circle :

We sometimes call what happens if you don't steel well and often a vicious circle: if a knife cuts less well, the work takes longer to perform and workers have less time to steel their knives. Cutting quality will continue to deteriorate and increased effort will be required. (T-2.1.2)



2.2 Steeling and preventing pain and discomfort

Parts of the body affected

Have you ever felt discomfort or pain during your work? In which regions of the body? Circle them on the image below. (T-2.2.1)

(Don't show slide T-2.2.2 with the regions marked until the trainees have answered this question)

A few tips to optimize steeling

Since injuries often develop gradually while repeating a movement with force, ***every possible means*** *of reducing the stress of those actions becomes important.*
Prevention is the best tool!

Steeling correctly and often is the most important lesson in this course

Each steeling is important *because the edge of a knife is at its best and more easily maintained with regular and careful steeling. Waiting too long between two steelings or poor steeling can cause permanent damage to the knife.*

It is easier to maintain the cutting edge of a knife than it is to try and fix it once it has been damaged. Maintaining the cutting edge is very important!!

It is important that you fully understand the benefits of effective steeling on the effort required in your work and on your health.

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IMPORTANT TO REMEMBER!!

T-2.2.2

Prevention of soft tissue injuries
• You reduce your force requirement with a sharp knife
• Each steeling is important • Your motivation is critical

2.3 Importance of steeling and difficulty of learning the task (T-2.3.1)

- Steeling is repeated frequently (as often as possible, do not wait too long between each piece)
- Steeling can take up around 10% of your work time
- Steeling must be done according to the needs (of the work station and individual)
- It is important to be able to look after your tools

Why can it be difficult in learning how to steel well? (T-2.3.2):

You cannot see the cutting edge with the naked eye (though with a good light you may be able to see some defects in the edge by the way they reflect light.) You must develop other ways to check the edge, especially feeling the edge with your finger or thumb.

It also takes practice to be able to control your arm to move the knife correctly and hold the steel steady during steeling.

You are not alone in finding it difficult to steel well!

As you have seen in the video, workers with 10, and even 20, years of experience with knives have reported having problems keeping their knives sharp, before they had this kind of training.

Quote from a worker

"I've been working in this plant for 25 years and my knife does not cut properly."

Quote from an expert steeler

"When training is done only 'on the job', it can take 10 years to learn to steel!"

To repeat:

It is impossible to see with the naked eye what is happening with the knife during steeling or in use. Training in steeling is therefore necessary to develop these skills and to understand better what is happening to the knife during steeling.

Thus training in steeling can save you several years of difficulty, fatigue, and pain.

Section 3
The knife

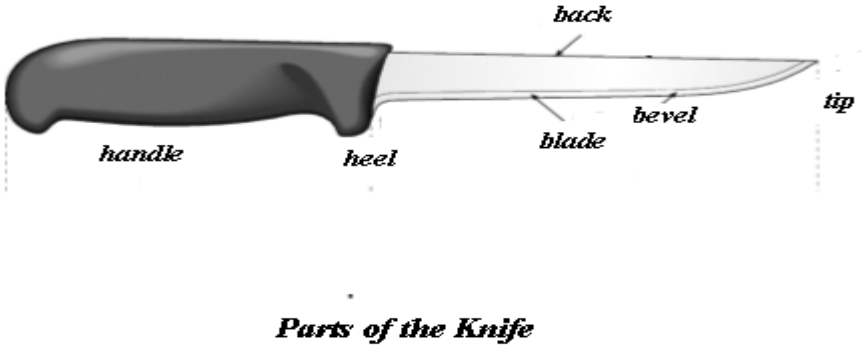
3.1 Parts of the knife

It is important that we use the same terms for the parts of a knife and its blade.

The bottom edge of the knife blade over its full length has been ground or sanded to form what is called the bevel.

All along the edge of the bevel of a well-sharpened knife there is a narrow strip, or bead, of very thin metal, about 1/10 mm wide. Some call this strip the *wire edge*, but others think of a wire edge as a term for a burr, which is taken to be a defect. We refer to this strip as the ***cutting edge.*** It is difficult to see the cutting edge with the naked eye because it is thinner than a hair. This very thin cutting edge runs along the length of the blade at the edge of the bevel. It is very **fragile and easily bent**.

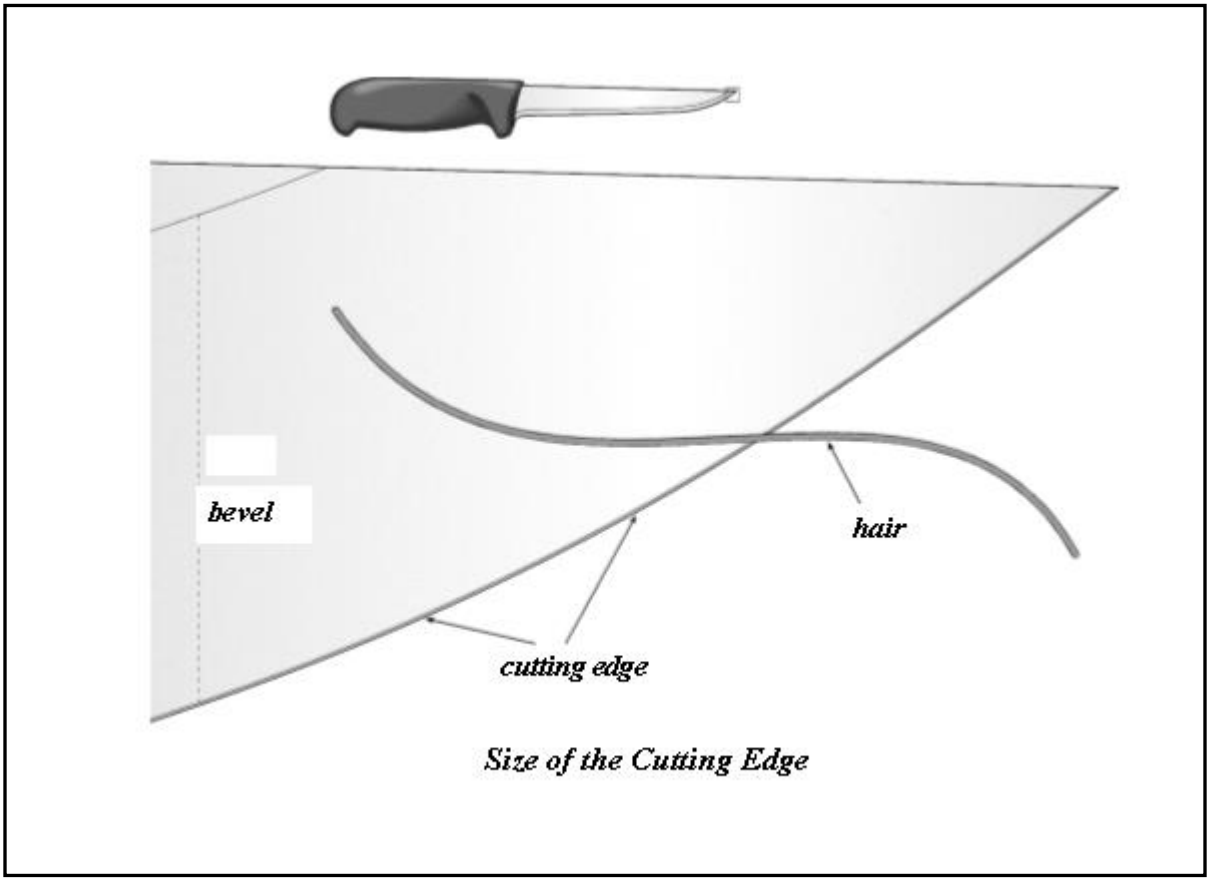
T-3.1.1



Parts of the Knife

The tip of the knife in this picture has been enlarged so that the cutting edge can be represented, and compared to the size of a hair.

T-3.1.2



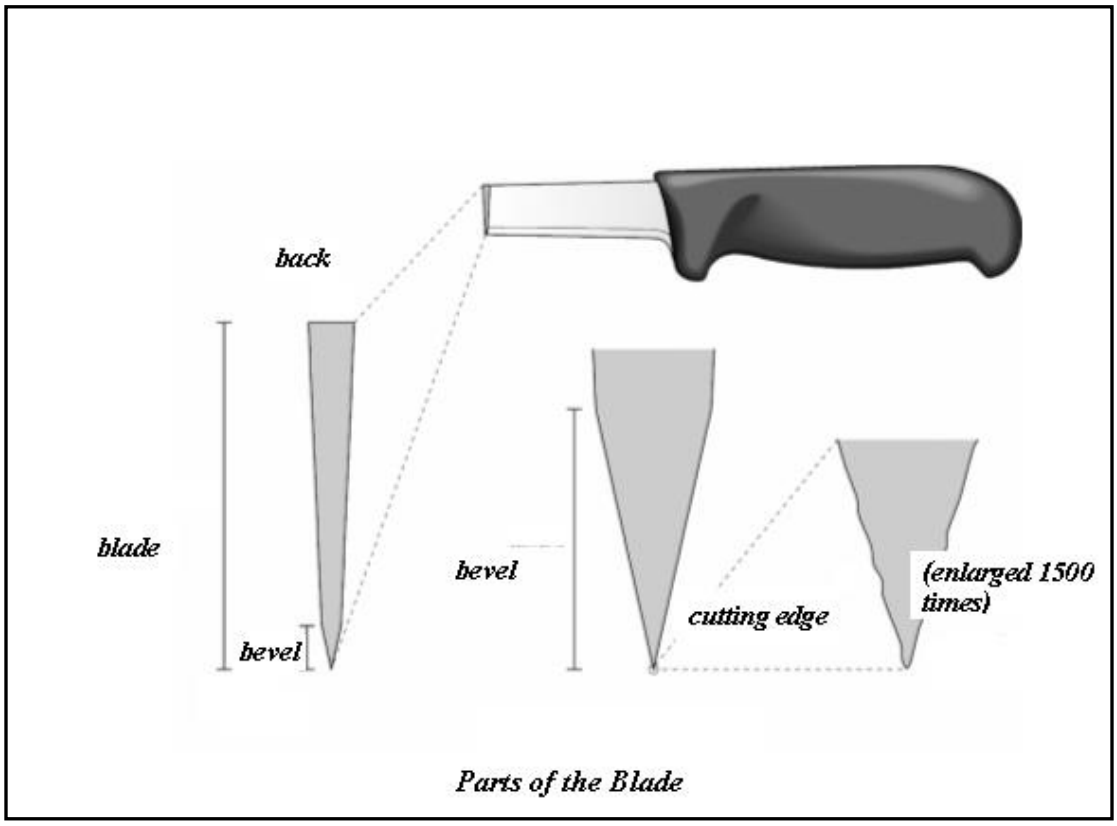
Size of the Cutting Edge

Later on we will discuss what can happen to the cutting edge and how small and delicate it really is.

3.2 Features of the cutting edge

Size of the cutting edge

T-3.2.1

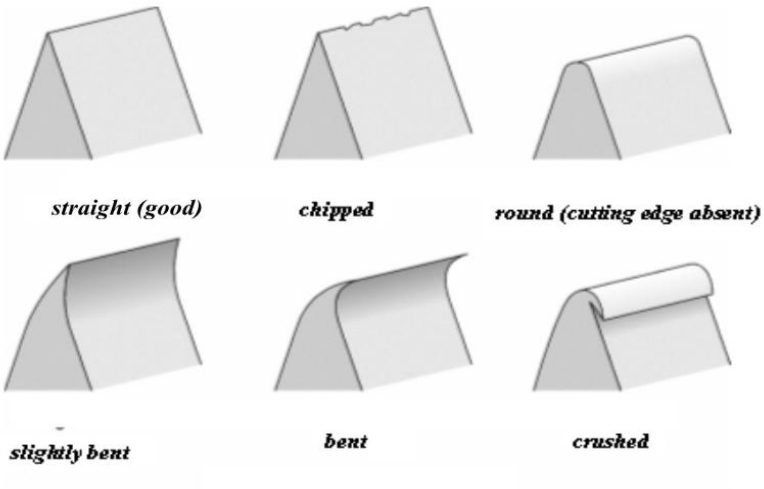


Parts of the Blade

When the cutting edge is viewed in a microscope with a high magnification the edge no longer looks perfectly straight. We were able to confirm that, on an infinitely small scale, the metal at the cutting edge is flexible and easily bent, and can break.

A good straight cutting edge and some of the ways it can be damaged.

T-6.1.1



A good edge and five defective edges

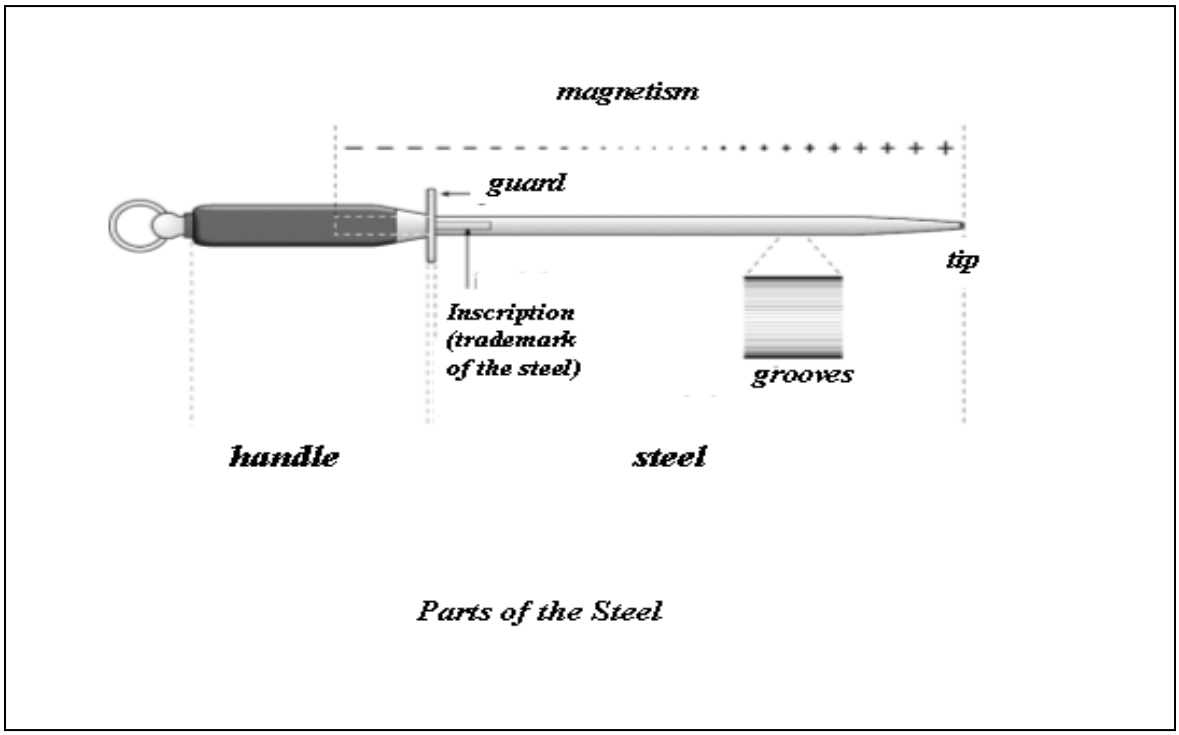
3.3 The steel and its characteristics

The steel is as important a tool as the knife.

Many steels have grooves, either coarse or fine. That kind of steel will cut the edge of a knife and can be used to sharpen a dull knife. However, if a knife is sharpened correctly with good stones, or using the appropriate machine, you should use a steel with a smooth surface to maintain the cutting edge. A knife that is prepared with a good cutting edge can be ruined by using a rough steel on it.

It is very important to maintain your steel well in order to ensure its effectiveness.

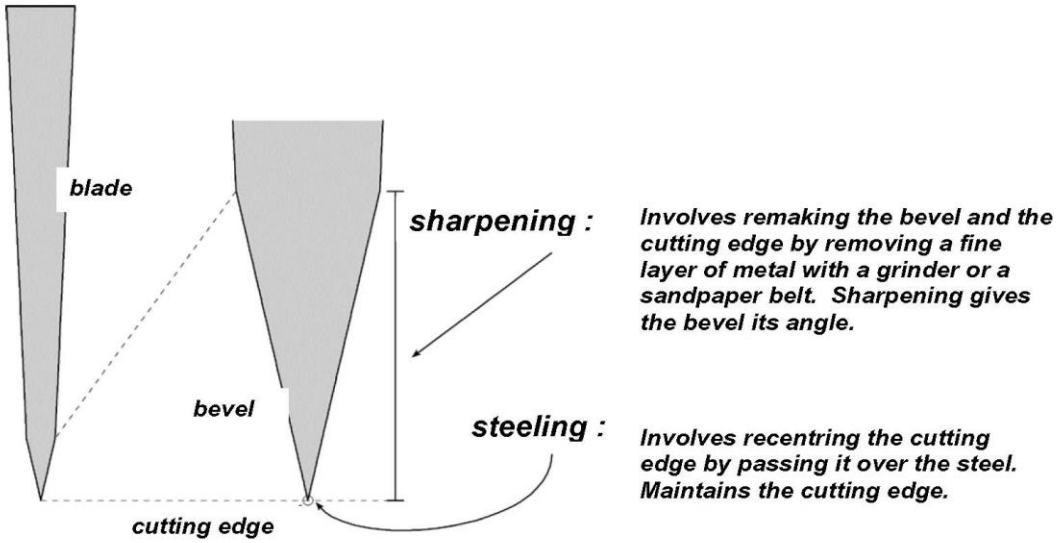
T-3.3.1



Parts of the Steel

The steel's metal is harder than that of the knife in order to have an effect on the cutting edge during steeling. The rod is slightly magnetized and the magnetizing force is concentrated at each end of the steel. The magnetization is noticeable primarily at the tip of the rod because the other end of the rod is inserted in the handle. An older steel will likely have very little, if any, magnetic effect. It could be re-magnetized, however, by placing it on a magnet for an entire night.

Section 4
Sharpening versus steeling



Sharpening and Steeling

T-4.1.1

The key points we are going to talk about are

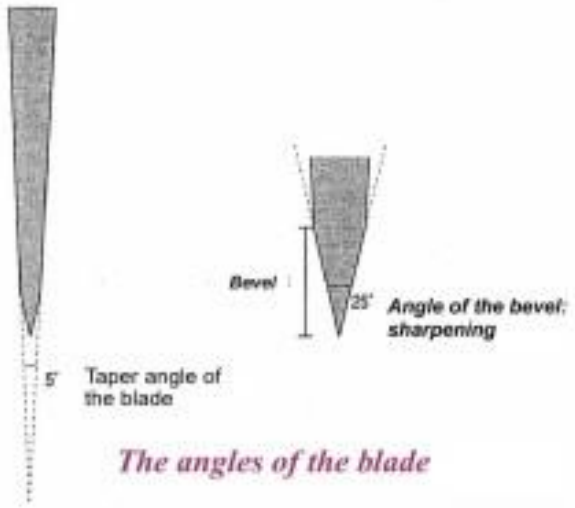
- how you hold a steel
- your grip on the knife
- the pressure and the angle of the knife on the steel
- the angle of the bevel

When a knife is used, the cutting edge is eventually damaged. Steeling realigns it.

Steeling consists of **re-centering the cutting edge** of the bevel by drawing it along the length of the steel. A knife that cuts well has a centered, straight, cutting edge.

Steeling refers to **maintaining** the cutting edge.

It is important to remember that steeling works *only* on the **cutting edge**, while sharpening shapes the bevel *and* the cutting edge.



The angles of the blade

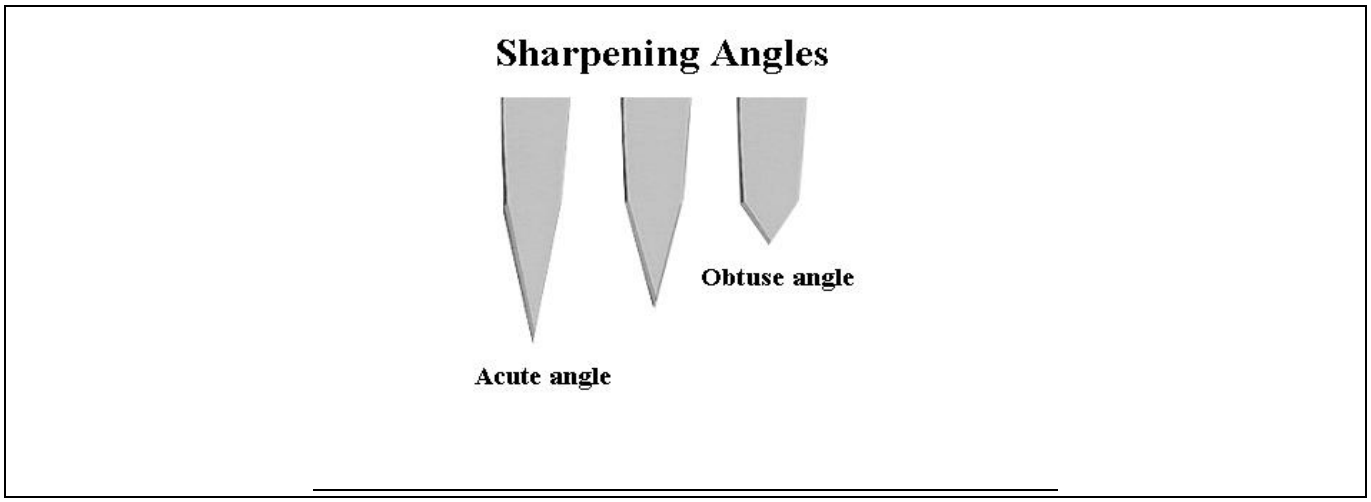
T-5.1.1

4.2 Sharpening

Sharpening consists of **re-working the bevel and the cutting edge** by removing a thin layer of metal using a grindstone or sanding belt. Sharpening gives the bevel its angle.

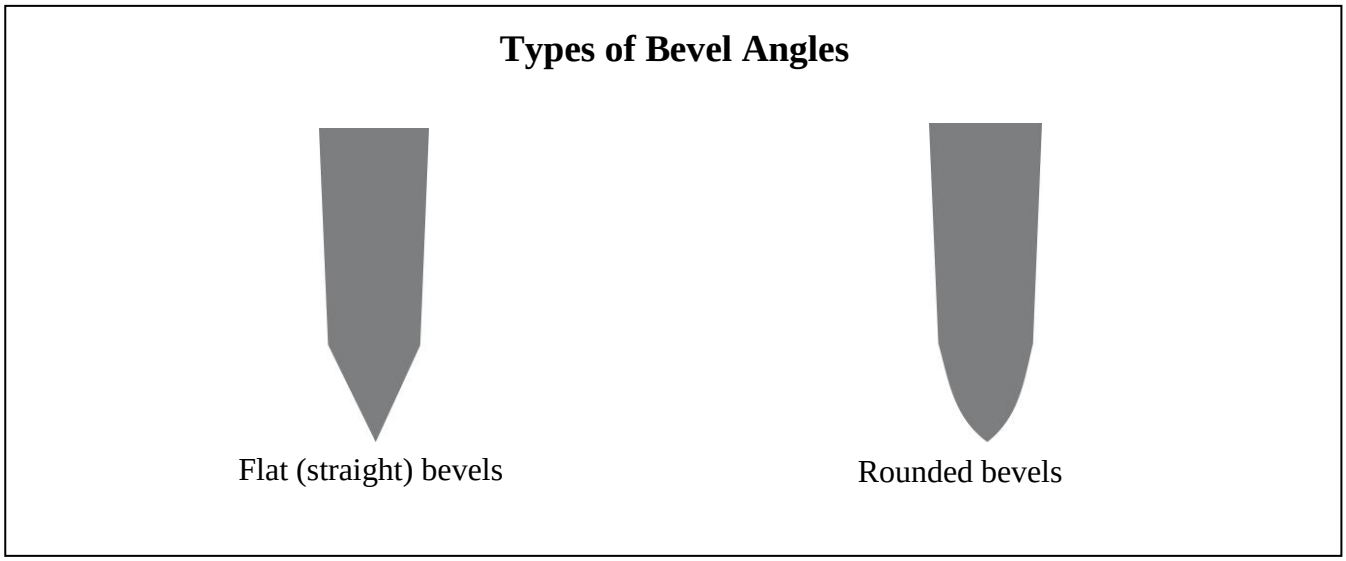
4.2.1 Angle of the bevel

The blade of many knives is tapered, so that it is thicker at the back than it is close to the cutting edge. This taper is not to be confused with the bevel. The sharpener sets the angle of the bevel when the knife is sharpened. The angle between the bevels on opposite sides of the knives used by the experts who participated in developing this training was, on average, 25°. The angle may be more acute (closed) or more obtuse (open). (t-5.1.2)



Rounded cut (balloon): A rounded bevel provides a tougher edge. However, the sharpener must have the equipment to produce this type of bevel and the steeler must be able to maintain the cutting edge well.

T-5.1.3



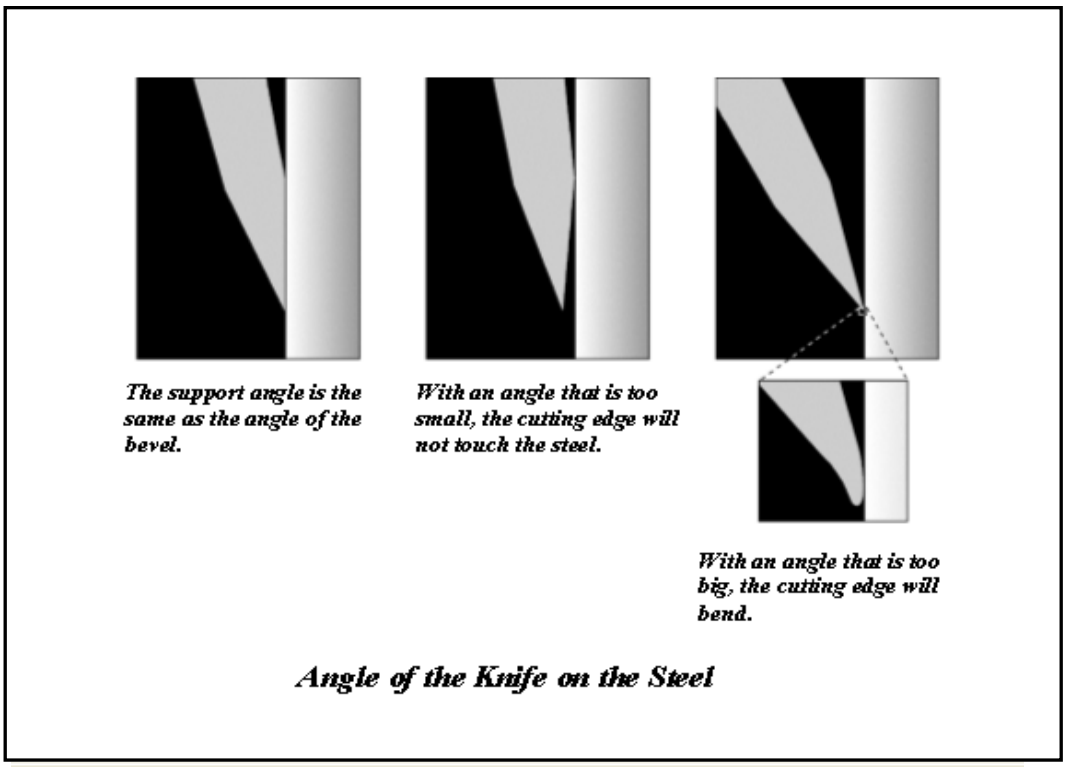
In order for steeling to be effective, you must find the correct angle of inclination between the blade and the surface of the steel, which depends on the bevel angle.

If the angle between the knife and steel is not large enough, the cutting edge will not contact the steel and steeling will have no effect on the cutting edge. If the angle is too large, contact will be only with the cutting edge. ***The pressure will bend the cutting edge*** towards one side of the blade and the knife will lose its sharpness (bent knife edge).

For steeling to be effective, for the cutting edge to be re-centred, the angle of the bevel at the cutting edge must be kept in mind as you slide the blade over the steel.

DEMONSTRATION
Show how the angle of the bevel is used as a guide for the angle between the knife and the steel.

T-4.1.2



Angle of the Knife on the Steel

When steeling with a rounded bevel, the angle of inclination of the blade on the steel must be larger than with a straight bevel for the steel to touch the cutting edge.

T-4.1.3

The cutting edge touches the steel.

Too small an angle will not allow the wire edge to touch the steel.

If the angle is too big it will bend the cutting edge.

Angle of the knife on the steel

Show and cut with a rough knife and a smooth knife.

Video "*Will it make the cut?*" 2nd part: On the introduction of the tools up to Mr. Thibodeau's explanation of the electron microscope photos. 7:05-11:39

Section 5
Steps and techniques of steeling

There are several different steeling techniques. Each individual must develop a technique that allows for the most comfort and control of movement. However, certain steps make it easier to follow essential principles that will maintain the cutting quality of knives. The steps suggested in this manual will help you learn the basics.

EXERCISE 3
Ask each of the workers to show you the technique they are using. You can also ask them what their first method of steeling was and tell them about your first steeling method. Try to find out, as the following exercises are done, which is the best position of the steel for each student, and encourage them to use that for the time being.

Step 1: Ensure that the knife and steel are clean prior to steeling

Principle: The tools must be clean.

The cleanliness of tools is essential for effective steeling. Every day must begin by *ensuring that the knives and steels have been cleaned* and that they have no particles or rust spots, particularly on the steel.

Step 2: Picking up and positioning the steel

Principles :

Watch and maintain continuously the angle at which the blade touches the steel.
The steel is held firmly during steeling.
The steel is held comfortably.

No matter how the steel is held and positioned, it is important to respect the following principles:

- **the steel must be held so that it stays very stable throughout the steeling activity**
- **the position of the steel should allow you to see the angle of inclination of the blade of the knife on the steel**
- **the steeling movement should be performed almost effortlessly throughout the steeling activity**

DEMONSTRATION
Show the different positions of the steel following each of the explanations.

The different positions of the steel

A) *Position the point of the steel downward and press on the table*

In this position, the *steel can be held straight and the angle of the blade can be seen clearly on both sides of the steel*. The steel must be positioned in the field of vision (in front of you), in order to be able to see both sides of the steel well. Also, the steel stays more stable during steeling when it is supported on a table. The steel must be positioned in front of the shoulder that holds the knife. In this way it is easier to keep the same angle on both sides.

This is the easiest technique for an apprentice.

T-8.2

Advantages

Easy to see the angle
Stability of the steel

Disadvantages

May force users to bend over to see the angle properly, particularly if the table is low
Not suited for work stations without a table

B) <u>Hold the steel with the point facing upwards</u>

This position *allows you to see the angles on both sides of the steel well*, if the steel is placed in the centre of the field of vision (in front of you). It is not as easy to keep the *steel stable* during the steeling activity compared to the 'tip supported on the table' position. Support against your waist the elbow of the arm holding the steel.

T-8.2

<u>Advantages</u>

Easy to see the angle
Practical when there is no table at the work station

<u>Disadvantages</u>

The steel may be less stable.

Workers who do not have a table to stabilize the steel but feel the need for support can brace the elbow of the arm holding the steel against their body.

C) Position the steel on a slant

This is used a lot, but is not recommended when starting out. This *position does not allow you to see the angle of the blade* on the steel, you must therefore use your sense of touch to find the right angle in this position. Also, this technique can lead to a movement of the wrist as the side of the blade is changed, which can alter the angle from one side to the other. *Thus it is more difficult to learn to steel using this technique.* It is preferable for apprentices to hold the steel straight, with the point up or down, and to look carefully at the angle of the knife on the steel.

T-8.2

Advantage

Acceptable position when the worker is able
to sense by touch the contact of bevel on the steel

Disadvantages

You cannot see the angle
The steel may be less stable
It is more difficult to keep the same angle on each side

C) Position the steel horizontally

This position allows you to let the knife place itself freely and to find the cutting edge automatically. It is very important to support the knife in the hollow of your fingers and not to apply any pressure. This position does not allow you to see well the knife on the steel. It is important to feel the cutting edge on the steel and to make a straight horizontal movement by moving your elbow backwards. The wrist stays very stable. To steel both sides of the blade, you need only rotate the knife in your hand while keeping it on the same side of the steel, while the knife still rests lightly on your fingers.

T-8.2.1

Advantages

The pressure is ideal (weight of the blade)
You can find the bevel angle automatically
You develop the sense of touch easily

Disadvantages

The steel may be less stable (if not supported)

DEMONSTRATION
Demonstrate each of the positions of the steel so that each apprentice can try to replicate them.

Step 3: Holding the knife

Principle: One hand grips the knife gently, so as not to apply too much pressure and the wrist remains straight while the blade is moved across the steel.

Why is it important to have a gentle grasp on the knife?
Answer: Easier to develop a sense of touch; easier not to apply pressure.

Different Grasps

- *Hold the knife with the whole hand*

To ensure a gentle grasp, the hand should not be clenched; rather, the weight of the knife should simply be held in the hollow of the fingers. In this way, by not holding the handle tightly, it is easier to develop your sense of touch when steeling.

- *Hold the knife with the fingertips*

To ensure that the handle of the knife is not held too tightly, some experts recommend holding it with only the fingertips, which creates a gentle grasp. The fingers can be placed (A) on the sides of the handle (thumb on one side, index finger on the other), or (B) above (thumb) and below (index finger), or (C) resting lightly in your hand across your fingers.

T-8.3

A)

B)

C)

Step 4: Position the knife on the steel

When the bevel surfaces of the knife are flat:

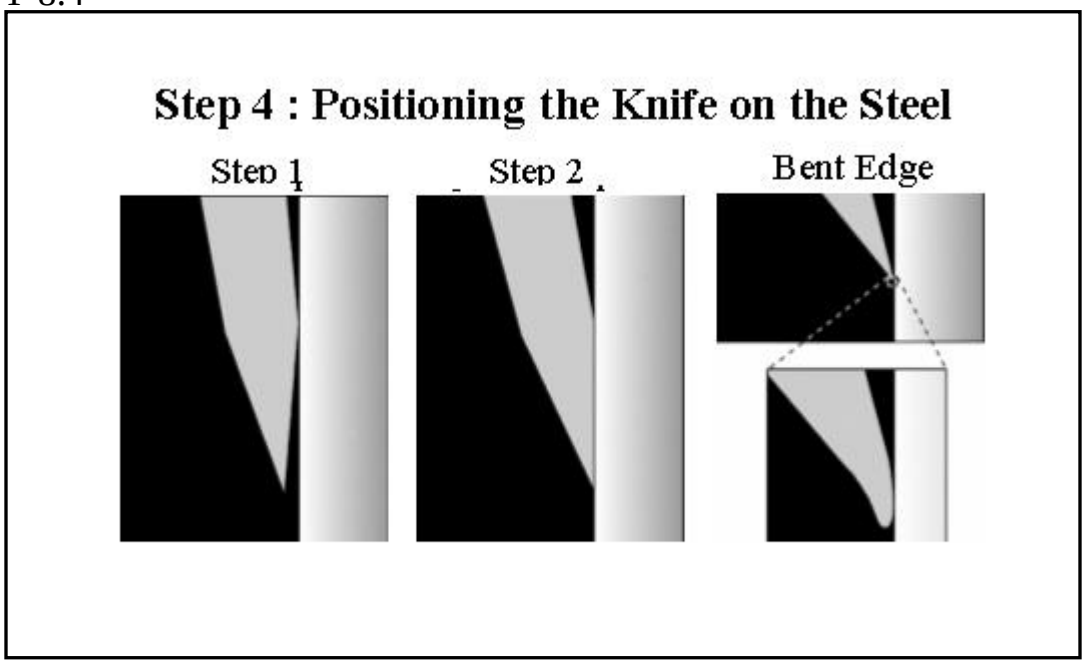
Principle*: *The angle supporting the blade on the steel is the same as the angle of the bevel.

Line up the surface of the bevel with the steel's surface. To do so, the following procedure is recommended:

1. Touch only the top of the bevel on the steel (step 1).
2. Gradually close the angle of the knife until the surface of the bevel is in complete contact with the steel (step 2).

CAREFUL!
The angle must not be too wide. This will prevent damage to the cutting edge during steeling (bent cutting edge).

T-8.4



Little Trick!
If the cutting quality of the knife does not improve after a few strokes, the angle can be opened slightly to ensure that **<u>contact is made</u>** with the *cutting* edge as the knife is drawn along the steel. However you must not make the angle too wide or you risk bending the *cutting* edge.

When the bevel of the knife is rounded:

Principle: The angle supporting the blade on the steel is slightly larger than what appears to be the angle of the bevel.

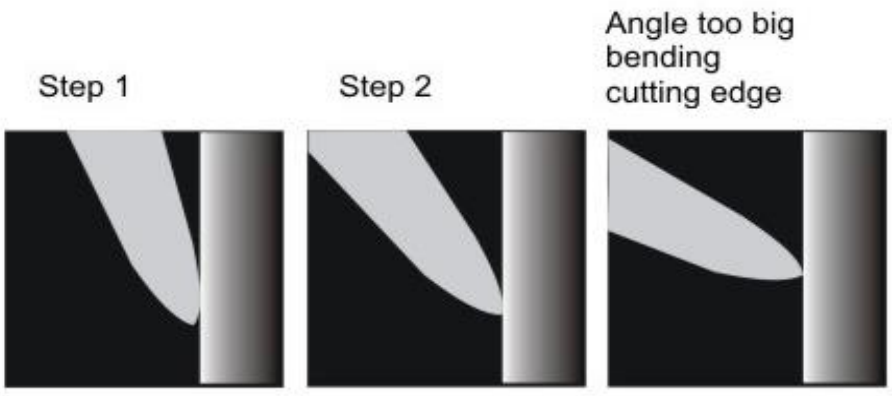
Widen the angle slightly more than for a straight bevel. To do so, the following procedure is recommended:

1) Press only the top of the bevel on the steel (step 1).
2) Gradually increase the angle between the knife and the steel until you feel the contact of the cutting edge with the steel. If you feel that only the cutting edge is touching the steel, reduce the angle slightly (step 2).

CAREFUL!
The angle must not be too wide. This will prevent the cutting edge from bending or breaking during steeling (bent cutting edge).

T-8.4.1

Positioning knife with rounded bevels on steel



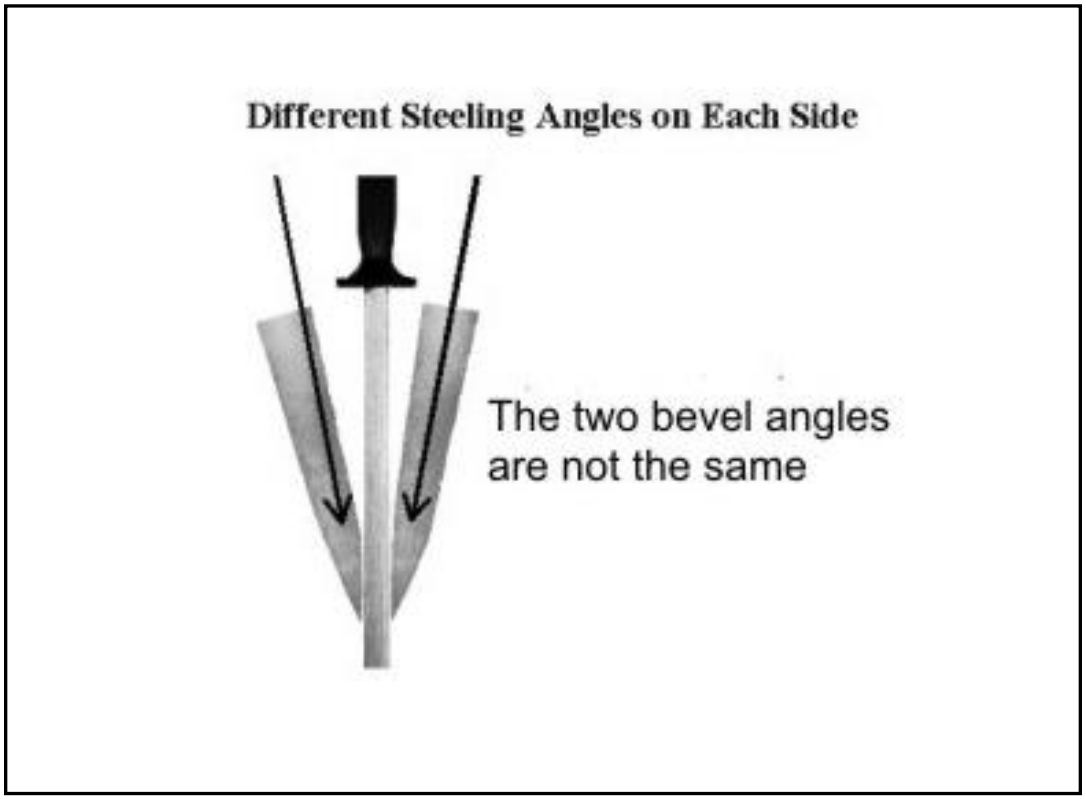
If the bevel is rounded, what should be the position of the knife on the steel?

Answer: Angle of inclination must be larger between the blade and the steel than for a straight bevel.

It is possible that the bevel angle will be different on each side of the blade. Examine the bevels before steeling. In the angles are different, both sides should be memorized.

You must **feel** that you are just resting against the ***cutting edge***. You have to develop a sense of touch to discover the exact place where the ***cutting edge*** should be positioned on the steel.

T-8.5



THE SENSE OF TOUCH…WHAT IS IT?

'When the ***cutting edge*** is resting against the steel, there is a little "break". You have to concentrate hard to feel it.'

The sense of touch is ***discovered*** with time, from **looking** for it and **feeling** it.

Step 5: Move the knife along the steel

Principles:

- ***Great concentration: visual attention, tactile perception, and coordination of movements.***
- ***Watch the support angle of the blade.***
- ***The blade is supported on the steel with very little pressure.***
- ***While moving the knife, the angle and the pressure are kept constant.***
- ***The shoulder makes slow, easy movements.***
- ***Keep your wrist stable***

First, try to feel the bevel's contact on the steel while maintaining ***constant visual contact***, then slide the blade ***from the heel of the blade to its point***. Let the knife slide on the steel *just touching the steel. It should be a fluid movement without pressure.*

EXERCISE
Hold the steel by the ring with the point down. Move the knife over the steel, from the heel of the blade up to the point. The steel should not move. That is how little pressure you should apply.

The shoulder and the elbow carry out the movement. *The elbow may move slightly backwards but it should not move sideways.* If the elbow moves sideways, you will produce a *"rocking" motion*, which means that the cutting edge will be bent over to one side on half of the blade and to the other side on the other half. This technique minimises the constraints on the muscles of the shoulder and the arm. We also recommend *holding the wrist stable*.

Why hold the wrist stable?

Answer: If you move your wrist, you change the angle of the blade on the steel.

Move the blade horizontally during the motion, in a line perpendicular to the steel, which will help you keep your wrist stable. In this way it is possible to see the bevel angle better.

Bear in mind that only the useful portion of the steel should be used. The engraved area near the heel and the cone-shaped tip must be avoided. It makes no difference whether a large or small portion of the steel is used.

T-8.6

EXERCISE 6
Ask the apprentices to show you the speed with which they slide the blade over the steel.

Performing the activity **slowly** allows for better **control of the angle**. Generally, experts take more than two seconds to stroke one side of the blade. Apprentices can therefore be expected to take even longer to steel, in order for their skills to progress.

Also bear in mind that the pressure applied to the knife on the steel must be minimal and the steel must be held **stable** throughout steeling.

'It is thus essential to <u>feel the angle</u> of the bevel against the steel to recognize the correct angle of support, in order to re-centre the cutting edge during the steeling activity.'

Step 6: Change sides and repeat step 4 (T-8.7)

Principle: Concentration, watch the support angle.

The experts all agreed that one may easily tend to open the angle between the knife and the steel when steeling on one's dominant side, which increases the risk of bending the cutting edge. However, on the non-dominant side, there is a tendency to maintain an angle that is too closed or too small. This prevents the cutting edge from making contact with the steel, so that the steeling activity ineffective on that side.

If your blade is less sharp and you think it is due to a bent edge, you can correct it on the next steeling by giving **2 strokes on the steel on the side of the non-dominant hand**. Then continue steeling alternating a stroke on each side. If that does not work and your blade is still less sharp, your cutting edge may be bent to the other side. In this case start your next steeling with **2 strokes on the steel on the side of the dominant hand.**

Apprentices often damage the cutting edge at the knife's point during steeling. It is harder to maintain the bevel angle once the point of the blade is reached. It is recommended to avoid moving the wrist at the end of the movement. When changing sides, workers must take care not to catch the point of the knife on the steel. A slight catch is all it takes to damage the cutting edge.

What are the important points to respect when changing sides?

Answer: Keep the same angle, do not move the wrist, be careful of the point, make the same number of strokes on both sides.

Step 7: Number and alternation of strokes (T-8.8)

Principle: Alternate, one stroke at a time on each side, passing the knife over the steel an equal number of times on each side.

How many strokes are needed on each side? From 2 to 4.

It is important that both sides are steeled the same number of strokes, one stroke on each side in turn, and that steeling is completed on the opposite side from which it began. Why?

Answer: So that the **cutting edge** remains centred.

Step 8: Assess steeling quality by cutting into meat (T-8.9)

Principle: Concentration, visual attention and tactile perception.

Even when steeling is complete, it is important that you pay attention to your knives. **When you begin cutting into meat, the feel of the knife can tell you about the condition of the cutting edge**. After each steeling, you will find it helpful to assess the cutting quality of your knife in order to plan for the next steeling.

Some workers wait until they notice a reduction in their knife's performance before they steel again. Experts recommend that you maintain a regular steeling rhythm instead (after every cut or two) in order to maintain proper cutting quality.

What are the advantages of steeling your knife regularly and for a short time as opposed to steeling less frequently but for a longer time?

Answer: To keep the cut as sharp as possible. The knife is repaired more easily.

Video "*Will it make the cut"?* 3rd part: On the techniques up to the introduction of all the factors that impact upon steeling (appearance of words on the screen). 11:39-17:15

Section 6

Flaws in the cutting edge and how to recognize them

6.1 Sharpening related flaws

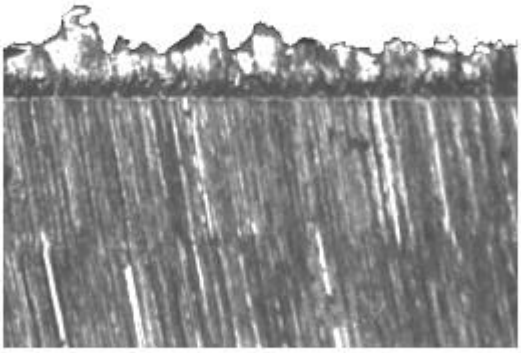
Burrs:

When the knife has just been sharpened, there may be burrs due to the sharpening. Steeling the knife will make these burrs disappear. You must remember that the more a knife is polished in sharpening, the more burrs there will be.

T-6.1.4

Presence of Burrs After Sharpening

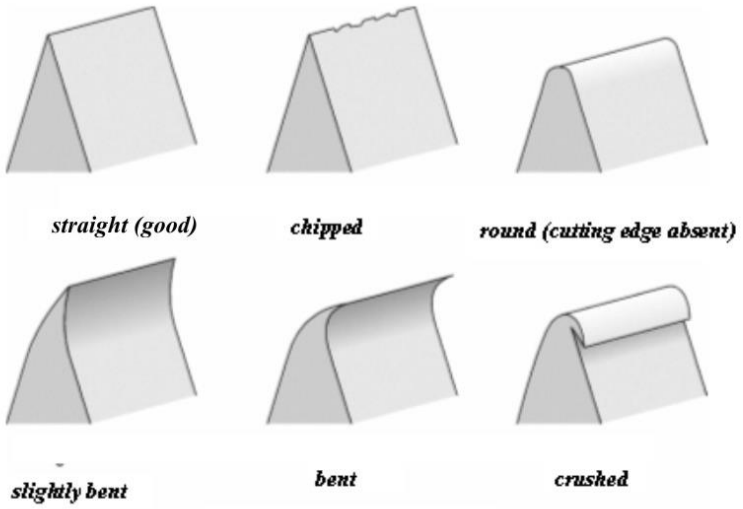
(bevel seen from the side)



6.2 Steeling-related flaws

In its optimum condition, the cutting edge is straight, and smooth. Flaws in the cutting edge can be related to various factors.

T-6.1.1



A good edge and five defective edges

Bent:

As mentioned in part 4.1, an angle that is too great during steeling can cause the cutting edge to bend to one side of the blade, causing it to cut less efficiently. This is known as a bent cutting edge. The cutting edge can bend to various degrees to become slightly bent, or very bent. A cutting edge that is slightly bent can be corrected with a steel by increasing the number of strokes on the steel on the side of the blade to which the edge is bent or by applying slightly more pressure on the side to which the edge is bent. However, if it is too bent, only a rough steel can re-work the edge and, in such cases, the knife will partially lose its cutting quality.

Crushed*:*

The cutting edge can bend so much that it completely folds over. This is known as crushed. Inadequate steeling and severe contact between the blade and a hard surface can cause the same effect. Only sharpening will restore the knife's cutting quality.

Broken:

Steeling with too much pressure causes the cutting edge to bend from one side to the other until it breaks. Straightening a bent cutting edge several times also makes it harden, until it breaks. Long sections of the cutting edge may break loose, leaving

portions of the blade without a cutting edge. Once again, only another sharpening will correct the flaw.

6.3 Work-related flaws

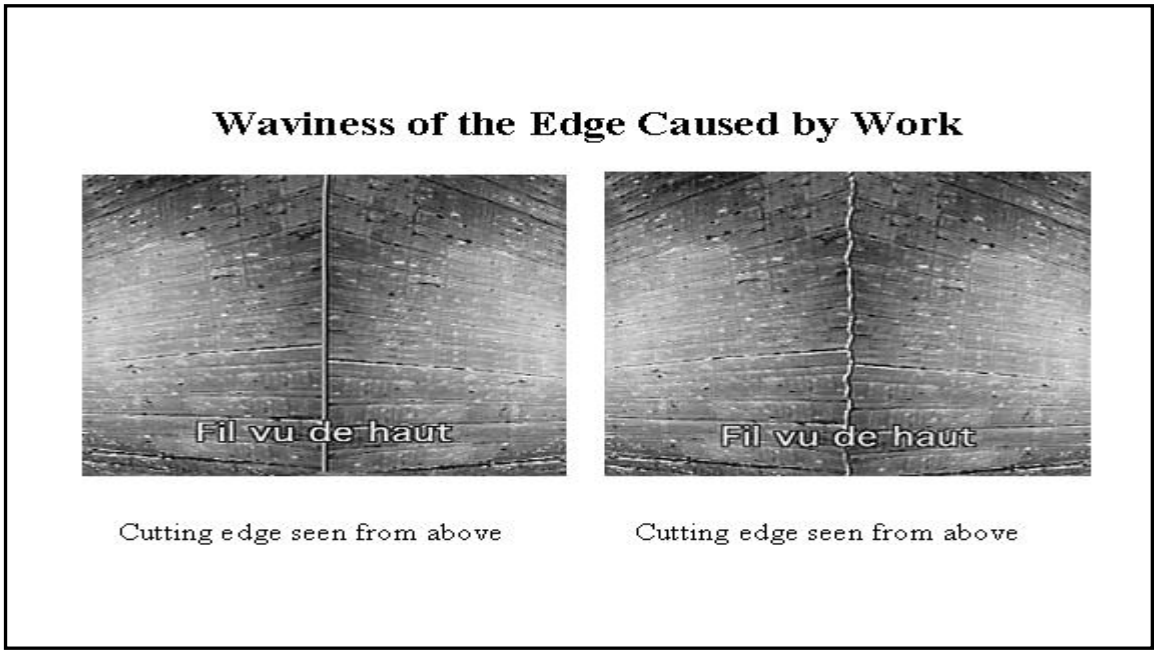
Contact between the cutting edge and any hard surface has an impact on its condition.

Chipped/Nicked:
Chips or nicks are flaws in the cutting edge caused by contact with the steel mesh glove or with bone during cutting. The condition is similar to a break but on a smaller section of the blade.

Round/Worn Down:
Like the lead of a pencil on paper, the cutting edge wears down with friction against the meat, cutting surface and steel. Microscopic particles break loose and the cutting edge gradually thins. Eventually, the cutting edge disappears; the tip of the bevel rounds and the knife looses all its cutting properties. A fresh sharpening is required.

Wavy:
Light contact with meat and bone causes the cutting edge to become uneven and wavy. Frequent steeling re-aligns the cutting edge before it becomes too wavy and the damage irreversible. A knife is also said to be wavy if it is not perfectly straight after steeling.

T-6.1.2



6.4 Recognizing flaws in the cutting edge (T-6.2.1)

It is important for workers to diagnose the condition of the cutting edge in order to plan for ways of improving the quality of their cut. Some of the flaws listed are difficult for apprentices to identify. Several means can be used to identify flaws in a cutting edge.

By touch, using fingers
Some flaws can be felt with fingers. This method is particularly effective for detecting a bent cutting edge or round knife. However, since most cutting stations require that gloves be worn, this method may not be practical. It is mainly sharpeners who use their fingers to assess the condition of a knife. However, other workers may use this type of check during a break. Most importantly, to avoid an accident, this test should not be conducted hastily.

***By sight*:**
A bent cutting edge, nicks and broken sections can be seen with the naked eye. A bent cutting edge can be seen by how light reflects off the blade.

By sound:
When the knife moves over the steel, if the angle is perfect, there will be very little sound, whereas if the angle is not adequate, you will hear a more grating sound.

***With a steel*:**
Once workers have sufficiently developed their sense of touch, they may learn to discern the cutting edge's condition when steeling their blade. Wearing gloves can make it more difficult to develop a feel for this. Furthermore, their sense of touch may diminish when their hands are cold. Workers will feel the cutting edge more when there is a flaw, that is, when it is not perfectly smooth. If the cutting edge is a bit rough, workers can adjust their steeling (their contact angle may be too great on one side). If the cutting edge is very bent, it will feel rough. Workers can then decide whether to try to re-align the edge or return it for sharpening.

***In meat*:**
The experts all agreed that the best way to assess the cutting quality of a knife is by cutting into meat. If the cutting edge is bent or has burrs, workers will feel the knife drag in the meat. Each work cycle is a good opportunity to assess the blade's cutting edge.

"**It is important for all workers to be able to identify the various possible conditions of a cutting edge in order to make the necessary corrections to their steeling or to simply decide that they must change knives."**

EXERCISE 7
Take each of the various knives prepared for this exercise and give out the worksheets that help to identify the faults in each.

6.5 Realigning the bent cutting edge of a knife (T-8.11)

If, upon assessment, the knife-edge appears bent, it must be decided whether to straighten it by changing one's steeling technique or return it for sharpening. There are two main ways to do this:

- Either slightly increase the pressure applied to the side of the cutting edge towards which it is bent.
- Or steel the blade for one additional stroke only on the side towards which the edge is bent.

Generally speaking, workers who bend the cutting edge of their knives while steeling tend to always bend it to the same side. Right-handed workers usually bend it to the right and left-handed workers, to the left. Note how the right and left sides of a knife are defined.

Right side of knife **Left side of knife**

You can examine your knife to check which side you bend the edge towards most often. If it is difficult for the apprentices to diagnose which side the edge is bent towards, when they feel that their knife is cutting less well, they can *first* give it **two strokes** on the side of the non-dominant hand while steeling, *then* alternate the strokes 'normally' (one stroke at a time on each side). This should correct the cutting edge.

<u>What are the advantages and disadvantages of fixing a bent cutting edge?</u>

Answer: *A realigned cutting edge will never have the same cutting quality as a freshly sharpened knife.*

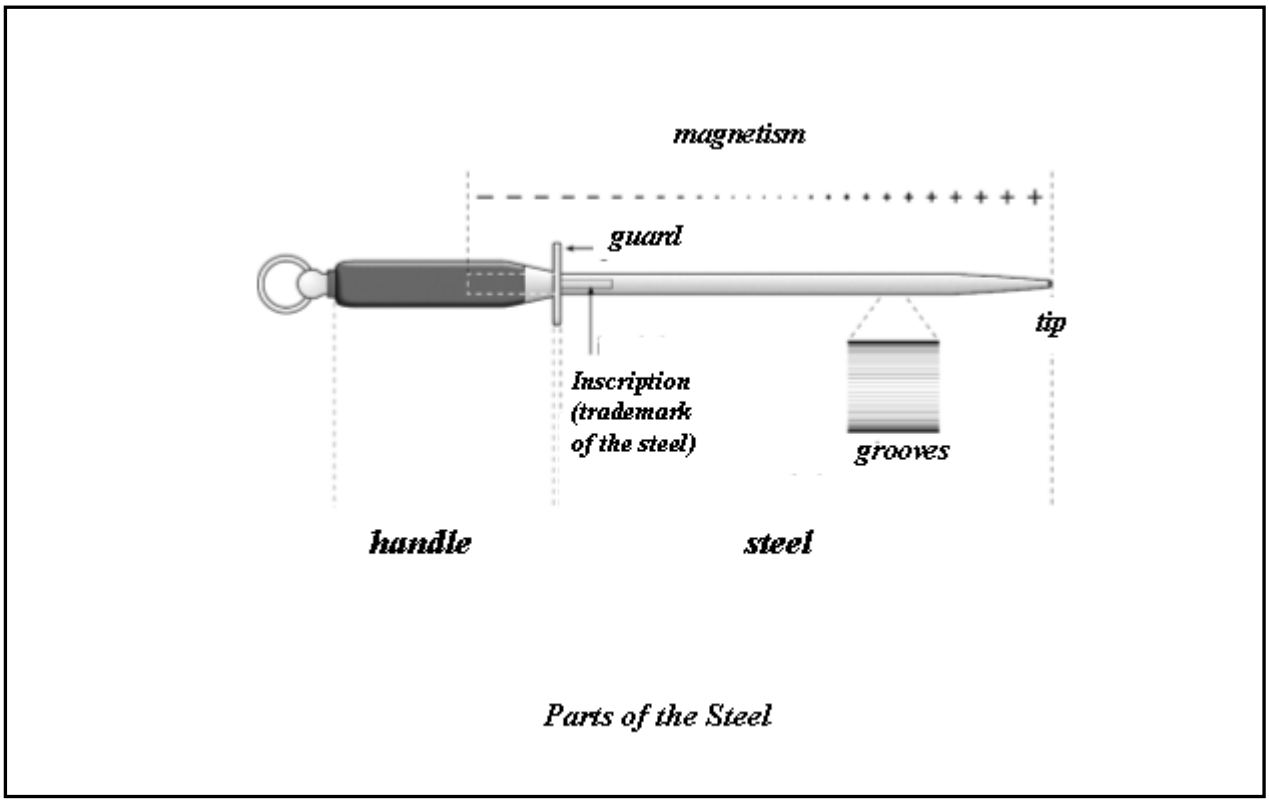
Section 7:
Knowing how to choose your tools

7.1 The steel and its characteristics

The steel's metal is harder than that of the knife in order to have an effect on the cutting edge during steeling.

The rod is slightly magnetized and the magnetizing force is concentrated at each end of the steel. The magnetization is noticeable primarily at the tip of the rod because the other end of the rod is inserted in the handle.

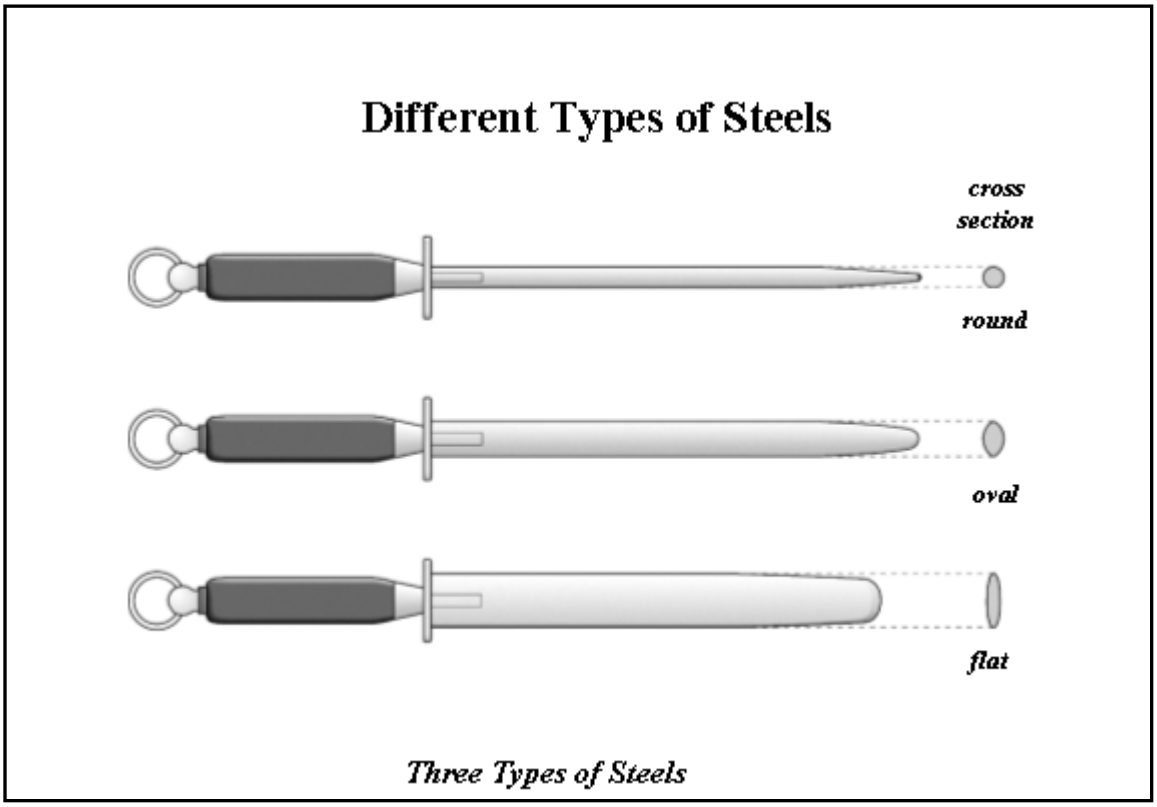
T-3.3.1



Parts of the Steel

7.2 Choosing a steel

T-9.2.2



Three Types of Steels

Roughness (grooves) :

Steels are made with different surfaces, from very rough to completely polished. This feature is very important for workers: A rough steel produces very different results on a cutting edge from that produced by a polished steel. The smoothness of the steel is discussed later in this chapter.

***Shape* :**

Steels come in many shapes. Whether round, oval or flat, they perform the same function. A worker's choice will reflect personal preference, but apprentices are advised to start with a round steel.

Length

Some models are shorter than others. They may be a better choice at workstations where workers carry the steel at their waist. The length also determines the weight of the steel. Generally, it is better to carry a lighter steel.

Magnetization:

All steels are magnetized. Magnetization serves to attract the metal dust that is released due to friction between the knife blade and the steel. The magnetizing force helps users feel the blade's edge face fully pressed against the steel. The magnetizing force is also an excellent indication of the pressure that must be applied when moving the blade up and down the steel. That pressure should not exceed the magnetizing force.

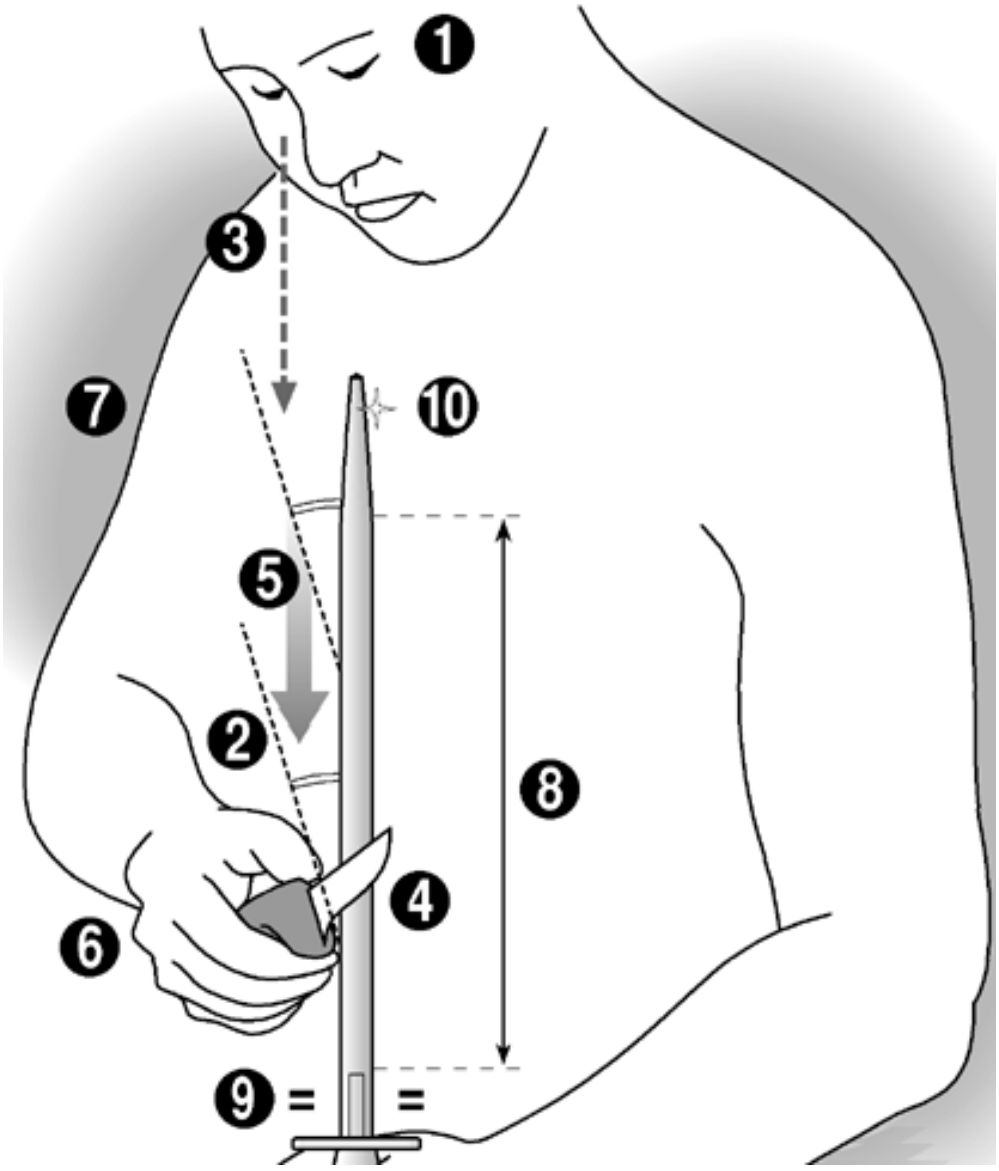
***Material*:**

Many types of metal are used to make steels: steel, tungsten, diamond powder, and so on. Most steels are coated with a thin layer of chromium to protect them against rust.

7.3 Advantages and disadvantages of smooth vs. rough steels

A smooth steel is used to straighten a cutting edge. The smoother the steel, the smoother the cutting edge will be. We have learned that a smoother cutting edge will cut better and drag less in meat. A rough steel leaves tiny notches and grooves on the cutting edge that are detrimental, especially for cutting in fresh meat. Experts in slaughterhouses look for the smoothest steel (polished, without grooves), used on well-sharpened knives. This allows them to minimize the effort required for cutting. However, the function of the steel is then limited to steeling (a polished steel can also smooth, but only to a certain point). A knife with a bent or damaged edge must be returned immediately for sharpening.

Section 8
Review of the basic steeling principles T-7.2.2



Review of the basic steeling principles

1) Steeling requires great **concentration** given the necessary visual attention, tactile perception and coordination.
2) The angle of the blade on the steel must equal the bevel angle. As their feel for this develops, workers will improve their ability to **feel the bevel surface** on the steel.

3) **Gaze** should be fixed on the angle at which the blade touches the steel in order to ensure that the **angle remains the same** throughout steeling.

4) The knife is pressed gently against the steel, **without applying pressure**, in order to avoid damaging the cutting edge. The **steel** is kept **stable**.

5) **While moving the knife** on the steel, **from the heel to the point of the blade**, the angle and pressure must remain consistent.

6) One hand **grips the knife gently**, so as not to apply too much pressure, and the **wrist remains straight** while the blade is moved on the steel. Holding the wrist in this way favours consistency in movement and ensures a proper angle.

7) The shoulder and elbow direct the movement of the blade on the steel. Shoulder and elbow remain **relaxed and move with ease**. This activity should be done **slowly** to allow for better control of movement.

8) As the blade is drawn along the steel, **both ends of the steel are to be avoided**. Since the tip of the steel is cone-shaped, the position of the blade must adjust to maintain contact with the surface of the bevel on the steel. Furthermore, the point is more likely to have marks. **Inscriptions engraved on the other end of the rod, near the handle, can damage the cutting edge**.

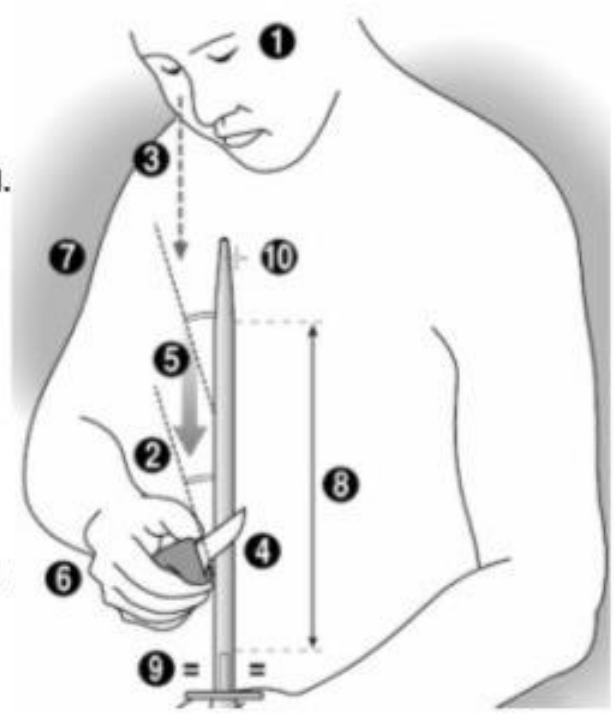
9) The same principles apply as the blade is drawn on the other side of the steel. Alternate, one stroke on each side, with an **equal number of strokes on each side** to ensure that the cutting edge is centred properly. Two or three strokes on each side should suffice.

10) Knife and steel must be clean. **The knife must be washed prior to each steeling. For effective steeling, metal-on-metal contact is needed, without any grease or meat particles.**

T-7.2.1

The Basic Principles of Steeling

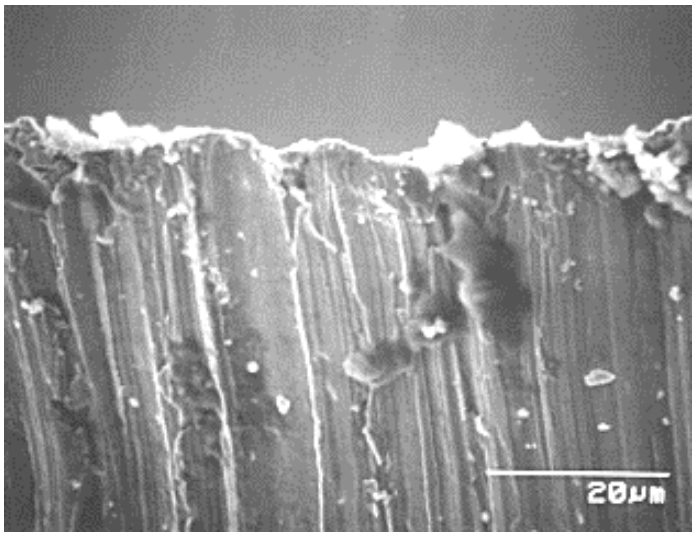
1. Great concentration : visual attention, tactile perception, and coordination of movements.
2. The angle supporting the blade on the steel is the same as the angle of the bevel.
3. Watch the support angle of the blade.
4. The blade is supported on the steel without applying pressure. The steel is kept very stable.
5. While moving the knife, the angle and the pressure are kept constant.
6. The hand holds the knife lightly and the wrist is kept very straight.
7. The shoulder and the elbow make slow, easy movements.
8. The ends of the steel are avoided.
9. Alternate, one stroke at a time on each side, the same number of strokes on each side.
10. The knife and the steel are clean.



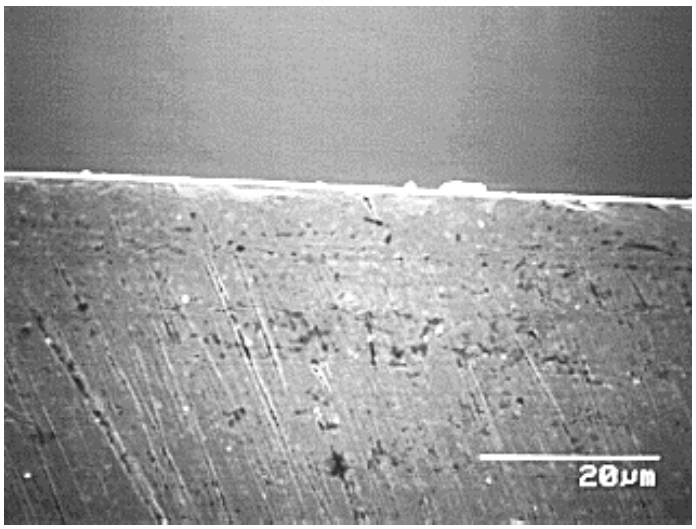
By way of conclusion:

Here are two photos taken with an electron microscope (enlarged 1500 X). The first shows a brand-new knife and the second shows a knife prepared by an expert-worker. Manufacturers may not always know the needs of knife users and thus the knowledge developed by users is very important. T-9.1.2

Brand-new knife:



Knife sharpened by an expert-worker:



GLOSSARY

STEEL, to

- The action of re-centering the cutting edge on the bevel, using a steel
- To sharpen (a knife) with a steel [The Canadian Oxford Dictionary]

SHARPEN, to

- The action of removing a thin layer of metal so as to re-shape a knife's bevel and cutting edge
- To make or become sharp [The Canadian Oxford Dictionary]

BEVEL

- The part of the blade that is worked during sharpening

CUTTING EDGE

- The thinnest, outermost part of the edge face that tends to dull, or bend to one side or the other

BURR

- A rough edge left on cut or punched metal, paper, etc. [The Canadian Oxford Dictionary]

ACUTE BEVEL ANGLE

- A bevel angle which is small, narrow, sharp

OBTUSE BEVEL ANGLE

- A bevel angle which is angle is larger, wider, more obtuse

SMOOTH

- Said of a knife whose bevel and cutting edge are very smooth and from which the burr (left by sharpening) has been removed. A smooth knife slides easily through meat.

ROUGH

- For experts, this word is synonymous with unpolished and tugging. However, in the interest of differentiating various knife conditions, we will make a distinction between "rough," which we will define here and "unpolished", which we will define next.
- Said of a knife that is rough due to sharpening. A rough knife does not slide through meat as easily. It tugs more.
- It is possible to measure the roughness of the bevel when it is caused by grooves. However, it can also be caused by a burr.

UNPOLISHED

- A knife is unpolished when bluntness is felt on one side of the knife during steeling. This also means that the cutting edge is slightly off-centre (bent).

CHIPS or **NICKS**

- Small indentations in the cutting edge

BENT

- Condition of the cutting edge has towards one side of the blade. The term "bent" is used mainly when the condition can be felt with one's fingernail (something catches on the edge of the bevel)

CRUSHED

- Said of a cutting edge **c**ompletely folded over, producing a blunt edge

ROUND

- Condition where the cutting edge **o**f the knife is worn due to use