

Unit V - Topic 1

HANDLING AND MAINTENANCE OF TOOLS AND CORE EQUIPMENT

Meat processing plants should supply personnel with the correct types of hand tools and basic equipment. Such tools and equipment must be subject to simple routine servicing and maintenance to be carried out by the personnel on a regular basis. This does not include the servicing of more sophisticated equipment which has to be undertaken by specialized technicians usually sourced through the equipment supplier.

Knives

Due to the multiple operations in the meat sector different types of knives are used for different purposes. There are knives for **bleeding**, **flaying** and **evisceration** of animals as well as for **deboning** of carcasses, **cutting** of meat and **slicing** of choice cuts and processed products. All these knives have very specific design features to support the operations they are made for (Fig. 387). Knives are also used for cutting of other raw materials and casings.

Knives used in meat operations should have basic safety features. The **handle** should be made of plastic material with non-slip surface and designed to allow a firm and safe grip. Plastic handles are also a hygienic requirement. The end of the handle is often slightly enlarged (handle knob) to prevent the knife from slipping out of the hand and the portion close to the blade should have a similar enlarged design to avoid the hand from slipping over onto the blade (see Fig. 386,387).

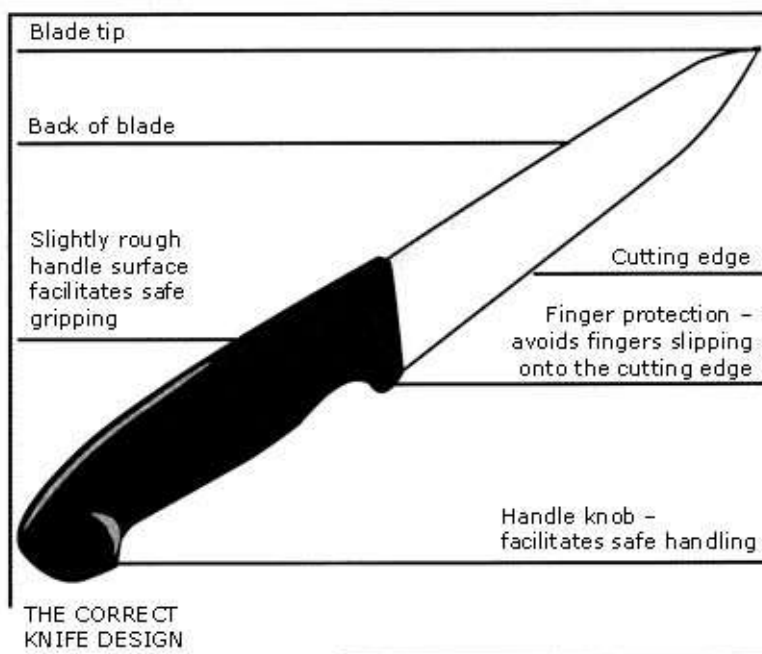
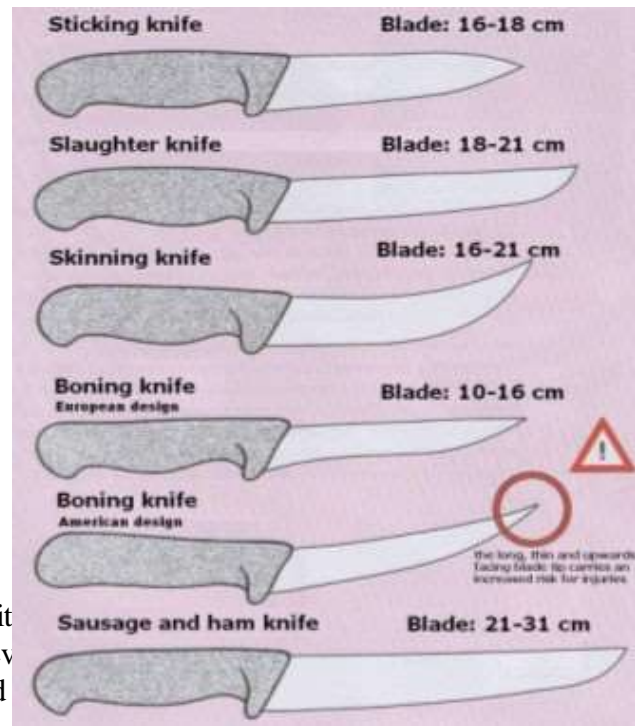


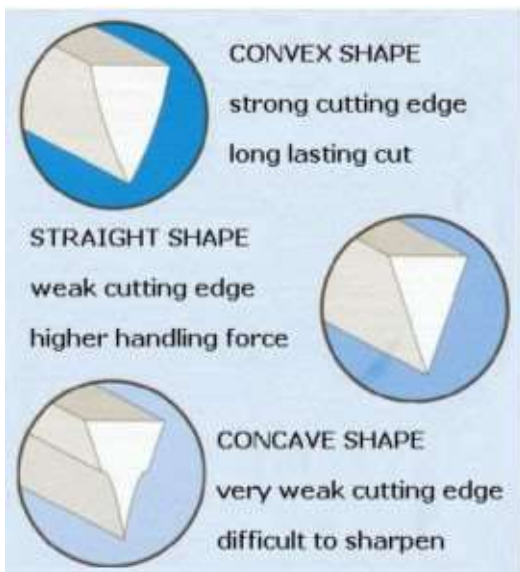
Fig. 386: The recommended knife design to facilitate safe handling and avoid injuries

It is of utmost importance that knives are handled with care to avoid injuries to workers and damages to the knife itself. When working with meat, knives must be **cleaned** frequently to eliminate the risk of cross-contamination. Knives must also be sharpened in a proper way to avoid unnecessary wear and **kept sharp** to reduce the potential for injuries. Working with a blunt knife requires more force and results in a higher risk of slipping off the meat or bone. It also leads to early fatigue and slower work speed.

The correct shape of the blade at the **cutting edge** is very important to facilitate a long-lasting sharpness and allow for easy **whetting** during operations. The recommended shape is a slightly convex cutting edge area as this ensures a firm structure and facilitates whetting (Fig. 388). Cutting edges showing straight or even concave shapes with an increased risk of small cracks and



Knife sharpening is a delicate process and requires a special device (Fig. 389). The knife sharpening machines (sand-paper abrasive belts,



sand-paper flap-wheels, rotating stones) should be air-ventilated or water-cooled and rotate at a moderate speed. Air ventilated sharpening often causes overheating of the blades, which increases the risk of cutting edge breakage.

During work operations, all knives should be whetted regularly using special **steels**. These steels are often called sharpening steel, but are in fact only for whetting (polishing of the knife edge). Care must be taken that only steels with safety handles (knob-type handle front for finger protection) are used.



Fig. 389: Knife sharpening machine with sand-paper flap-wheel for grinding (right) and whetting (left)
Right side: wet stone for sharpening
Below in front: polishing steel

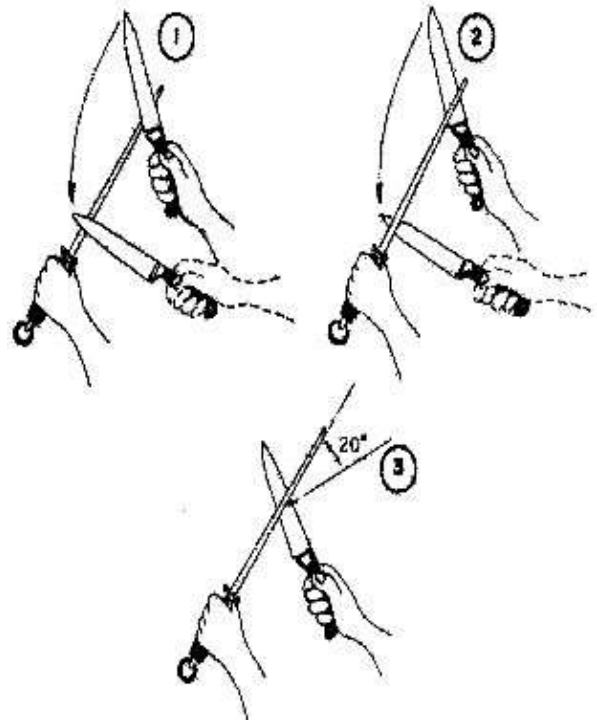


Fig. 390: Sequence during knife polishing with steel

During **knife whetting** (Fig. 390), the steel is firmly gripped with one hand and the other hand holds the knife. The hand with the steel remains static. Starting from close to the grip of the knife (1), the blade is moved down along the steel from the steel's tip towards the handle. During this movement the edge slides in its full length over the steel. This move is performed several times on both sides of the steel (2), thus polishing both sides of the edge of the knife (3).

Knives must be kept clean and dry and should also be **stored safely** and visible to avoid accidental injuries to workers (Fig. 391).

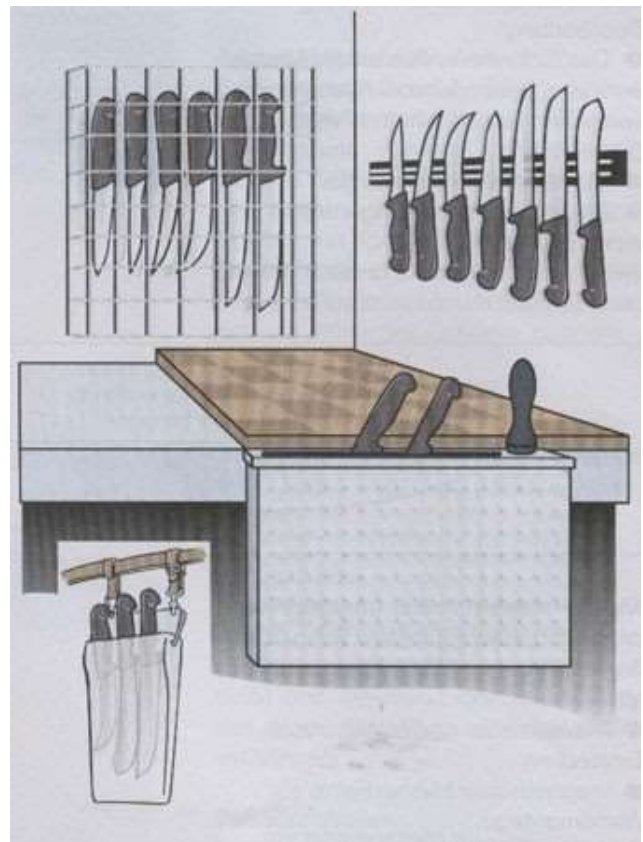
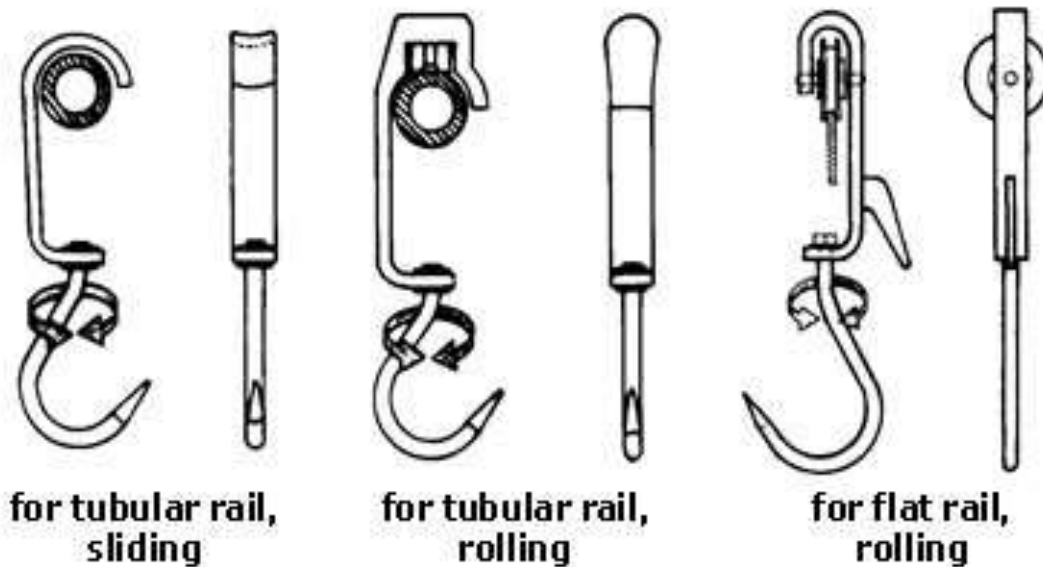


Fig. 391: Options for storing knives

Hooks used in the meat sector

In general, two types of hooks are essential for smooth operations in the meat sector. Slaughterhouse or **carcass hooks** are used for moving and hanging of carcasses. Their design depends on the type of rails (tubular, flat bar) installed. These heavy duty hooks are for sliding or moving on rollers along the rails and have a rotating lower hook part.

SLAUGHTERHOUSE HOOKS



MEAT SHOP HOOKS



Fig. 392: Various hook designs used in slaughterhouses and meat shops

The **meat shop hooks** are used for hanging meat pieces or sausages. To avoid injuries during handling, the upper end of those hooks is always kept flat. A flat lower end is also used for sausage hooks, while meat hooks display a sharp tip which facilitates the penetration into the meat piece to be suspended.

Grinders and grinder plates and knives

Meat grinders are indispensable equipment in the meat processing industry and are part of practically every meat processing line. Meat processors must be familiar with this type of equipment (see page 18).

Installation:

Care must be taken that grinders are **positioned** properly. Most grinders have adjustable rubber feet. This allows the horizontal levelling and avoids transfer of vibration from the machine to the table (small models) and floor (industrial grinders). The initial **electrical connection** to the power supply line should be done with an empty housing (auger / feeding worm and cutting set removed) for safety reasons. Industrial size meat grinders are usually driven by three-phase motors and the direction of rotation must be checked. When viewed from the front, the feeding worm must rotate counter-clockwise. The cutting set is attached to the feeding worm with the cutting edges of the star knives facing counter-clockwise. Before starting the machine for the first time, all parts must be thoroughly cleaned and dried. A useful option often used by meat processors, is to run some clean fat through the system to make sure that remains of grease are removed from the housing and the cutting set.

Operations:

Apart from the need for frequent cleaning (see page 379), the cutting system of grinders has to be **assembled** and **dismantled** at various times per shift or day to be adjusted to the desired particle size. Care must be taken of the following:

- The grinder plates must be frequently checked for any damage to the surface, as a clear cut is only possible when the grinder plates are kept smooth. If damage such as grooves or scratches appear, the grinder plates must be planed (reground) immediately.



Fig. 393: Cutting sets in meat grinders, assembled on feeding worm (auger) Left: UNGER five-piece cutting set Right: ENTERPRISE two-piece cutting set

- The star-knives (cutters) must also be kept sharp. Cutters are usually sharpened at the cutting edges. In systems with replaceable blades these blades are not sharpened but replaced regularly.
- Grooved grinder plates and blunt star-knives result in poor cutting (mashed ground meats).
- Parts from different cutting sets must not be mounted together, as they might be made of materials of different hardness. This can result in grooved grinder plates or damaged star-knives.
- The cutting assembly must never be over-tightened to avoid excessive friction heat and undesirable heat transfer to the meat.
- A grinder should never run empty as this will damage the knives and blades.

In industrial-size grinders, the electrical motor and driveshaft are connected via V-shaped belts. These belts usually require little servicing. Care must only be taken that the belts are kept at the correct tension. If the belts are not sufficiently tightened they show increased wear, excessively tightened belts lead to increased power consumption and could cause damage to the motor or driveshaft.



Fig. 394: Feeding auger housing: Critical areas for cleaning are the throat (a) in the housing and the connection point of feeding worm and drive shaft



**SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)
Coimbatore.**

