

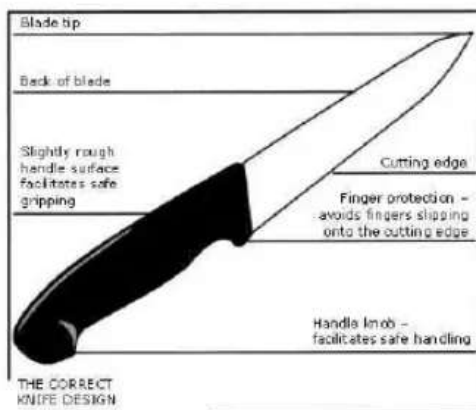
HANDLING AND MAINTENANCE OF TOOLS AND CORE EQUIPMENT

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.

Knives

Different types of knives used for different purposes 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.

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.



The recommended knife design to facilitate safe handling and avoid injuries

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.

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 smooth cutting through meat and sausages. Cutting edges showing straight or even concave shapes result in very thin blade edges with an increased risk of small cracks and also require more handling force by workers.

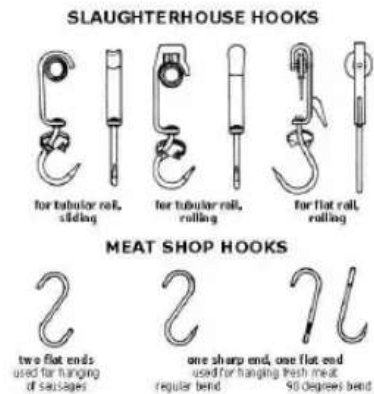
Knife sharpening is a delicate process and requires a special device. The knife sharpening machines (sand-paper abrasive belts, sand-paper flap-wheels, rotating stones) should be air-ventilated or water-cooled and rotate at a moderate speed.

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.

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

Hooks used in the meat sector

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.



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

Apart from the need for frequent cleaning, 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.
- The star-knives (cutters) must also be kept sharp. Cutters are usually sharpened at the cutting edges.
- 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.

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.

The use of a high-pressure water cleaner is discouraged here, as this could damage the rubber seal in which the driveshaft pin rotates. After cleaning, the barrel should be dried properly, also to avoid metal corrosion.

Bowl cutter

The operator has to make sure that the knives are installed in the right position and securely tightened. Bigger bowl cutters (**floor models**) need to be positioned with the rim of the bowl levelled horizontally, using the adjustable rubber-feet. Care must be taken that the knife head rotates freely in the bowl and cover (always rotate one initial round by hand) and all knives have a sufficient but not too wide clearance (1-2 mm) from the bowl. After a few rounds at slow speed, the knives must be tightened again firmly. To avoid unnecessary vibrations from the knife head, bowl cutter knives should be balanced (equilibrated).

The tension of the **drive belt** should also be checked. A correct tension is achieved when the belt can be manually pressed down between its two fixations only as far as the thickness of the belt itself. A weak tension of the belt will cause premature wear and insufficient drive force. If the belt tension is too strong, it can cause damage to shaft and bearings.

Care must be taken that no metal or other hard materials accidentally find their way into the bowl cutter. It is advisable to frequently check all bolts, nuts and screws, especially around the cover. The **cut-out safety switch** must be checked regularly to ensure that the knife shaft brake stops the machine immediately if the cover is erroneously opened during operations. The **built-in thermometer** should also be frequently checked as it could get damaged by vibrations.

All lubrication points (grease nipples) have to be greased following the instructions given by the equipment manufacturer and oil changing intervals must be observed.

The *spaces* between the knives must be properly cleaned to remove all residues of batter mixes. A brush with long handle should be used to avoid injuries. A critical spot for cleaning is the **narrow gap** between the rotating bowl and the housing of the knife shaft as well as the paddle on the bowl cover. The knife head should be dismantled regularly for proper cleaning (once a week) and reassembled following the instructions given before.

When high pressure cleaners are used, direct contact of the water jet with the switches must be avoided.

Sausage stuffer

Hydraulic sausage stuffers must be placed on an even floor. Before the machine is connected, the power supply with correct voltage (V), frequency (Hz) and power (kVA) must be confirmed. The oil level in the hydraulic tank should be controlled to avoid dry-running of the oil pump and ensure sufficient oil pressure development. In 3-phase (380 V) powered stuffers, it must be confirmed that the piston shaft is moving in the right direction. The piston must be mounted straight to allow smooth vertical movements in both an upward and downward direction. Strictly avoided should be dropping the funnels on the floor to ensure that they fit neatly onto the outlet opening and maintain their smooth surface as scratches can lead to damaged casings.

Cleaning:

The funnels must be cleaned with a special brush. A simple method for cleaning the funnels is to first push a compacted wet piece of paper towel through the funnel

to remove meat materials or sausage batter from inside.

Cooking vat

When cooking vats are not used, stagnant water must be avoided by keeping the water outlet open. In gas and oil fired vats, burner elements and ignition flames must be frequently checked and cleaned. Most cooking vats are equipped with a thermostat, which needs to be monitored to confirm its readings. During cooking the sensor of the thermostat must be completely covered by water to avoid damage and wrong temperature reading. Cooking vats should never be heated up without a sufficiently high water level to avoid damage to the stainless steel shell.

Band saw

After being positioned at its designated place and levelled, the band saw must be assembled carefully. The body door is opened and the band saw blade is pushed over the two wheels with the cutting teeth facing the door opening and fitted into the guide. Care must be taken that the band saw blade rotates in the right direction, with the blade moving downwards at the exposed portion. During cutting operations, the material to be cut must always be moved on the table by using the safety cutting handle.

Smokehouse

The **smoke sticks** and **ceiling of the smokehouse** must be kept free of tar to avoid unwanted tar-spots on the smoked products. The built-in exhaust opening, often equipped with a blower, must be cleaned frequently to avoid tar dripping onto the products.

Equipment for personnel

Protective clothing– To avoid contamination of workplaces, materials and products from street clothes, workers have to wear clean protective clothing. Either one-piece overalls or two piece sets are recommended as they cover the complete body. In some workplaces only overcoats are used with the disadvantage that the trousers/skirt is not covered.

Head gear– Human hair on equipment, materials and products must be avoided. Caps and/or hairnets are used to cover and contain hair.

Gloves – In meat processing, staff are encouraged to wear latex gloves to avoid direct contact of materials and products with hands. This is of special importance during packaging, when also mouth protection is recommended to avoid contamination of fresh and processed products.

Gum (rubber) or plastic boots– These boots are used to protect staff in meat operations from moisture. The sole design facilitates a firm grip on slippery surfaces. For easy detection of dirt, boots are usually white.

Plastic aprons – This type of apron is used to protect workers and their working clothes from moisture, meat and fat. Plastic aprons should be long enough to overlap the boots, thus allowing

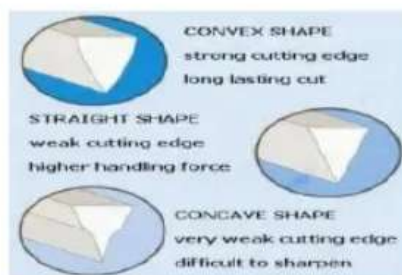
splash water to rinse off.

Appliances for safety reasons:

Safety aprons – Almost 50% of all injuries in meat operations are caused by knives. Most of these occur during deboning when the knife is moved towards the body. To avoid such injuries, special safety aprons should be used, covering the front of the body. Safety aprons can consist of a tight mesh of stainless steel rings or overlapping aluminium chips. To avoid unnecessary meat and fat settlements in the mesh, the safety apron is worn under a plastic apron.

Safety gloves – To avoid injuries to the hand handling the meat material during deboning and cutting, a safety glove is highly recommended for this hand. These gloves are made of a tight mesh of small stainless steel rings and should be chosen long enough to also cover the wrist. To avoid unnecessary meat and fat residues in the mesh, the glove can be covered with a latex glove.

Safety helmets – In workplaces where there is a risk of objects falling, staff are encouraged to wear safety helmets made of firm plastic. Helmets are strongly recommended at slaughter lines, below overhead rails and in storerooms with high shelves.



The correct cutting edge shape