Safe use of excavators used as cranes study notes

Excavators were designed primarily for excavating and not lifting. Due to the complex nature of the construction industry they are being used more and more for carrying out small repetitive lifting duties on site. These study notes are designed to keep you informed of the basic requirements needed for you to carry out a lift with an excavator safely.

When an object is needed to be lifted on a site, the first consideration should be whether the excavator is the most appropriate type of machine to be used.

Before using a quick hitch for carrying out lifting duties you should make checks to the quick hitch such as, has it got a safe working load stamped on the lifting hook, is the quick hitch secure, are their any cracks or damage on the quick hitch and the condition of the lifting point.

If you want to lift more than one ton with an excavator then the excavator then becomes a crane, if you want to use it for lifting more than a ton then three essential requirements need to be in place.

1. The boom cylinders need to be fitted with check valves, these valves are fitted to the base of the rams and prevent the boom from dropping to the ground of there is a loss of hydraulic pressure or if a hose was to burst.

2. A duties chart telling you what load you can lift and at what distance in front of the tracks and over the sides of the tracks must be on a sticker in the cab of the machine.

3. An alarm system, commonly none as the RCI or LMI Rated Capacity Indicator or load movement indicator, this device helps provide the operator, within a specified tolerance, with warnings that the load is both approaching rated capacity and has exceeded rated capacity.

If the above requirements are in place then the excavator can be used as a crane. Please note that the manufacture determines the lifting/object handling capacity of the machine.

The slew radius for lifting is measured from the centre of the slew ring to the vertical line through the accessory attachment point.

Before moving with a load or carrying a load you should check The excavator is capable and within limits, travelling with a load is authorised at that site, the travel route is clear of overhead hazards, the travel route ground is suitable, the excavator is configured correctly, environmental conditions, i.e. wind, are suitable, sufficient help is available, all actions meet lift plan criteria etc.
When carrying out a lift you need to know the what makes up the gross weight you are lifting, this does not include the weight of the boom or the dipper arm, but what is on the end of the dipper such as **weight of the load itself, weight of the lifting accessories and weight of the bucket and/or quick hitch coupler (if not already accounted for in the lifting capacity chart).**

If given the task of carrying out a lift on site you need to make certain checks to the lifting accessories to make sure they are suitable, each strap chain, or shackle should be inspected every six months and tagged with a colour code for that particular six month period other things you should check for are **the accessories are serviceable, certificated, are correct for the load and able to support the load.**

Slings and chains should be checked before use for damage. if there are damaged they should not be used and damage should reported to the supervisor immediately. All slings and chains will be marked with their Safe Working Load. Each sling and chain differs for its Safe working Load, this can be because of the angle of the chain or the way it is slung, for example, Choke lift, straight lift, or basket lift. If in doubt check on the tag of the sling or chain

Before you attach any sling or lifting equipment to the excavator you must make sure you have isolated the excavator hydraulic controls if this is not done, **unplanned movement can cause injury such as the bucket or quick hitch hitting the slingers/signaller in the face.**

Lifting hooks should be checked to see that it is fitted with a working clip/latch to prevent the accessory from slipping out.

When you carry out a lift the machine must be on level ground if possible as the load charts on the cab window are only relevant if the machine is on firm level ground if not, **the (load to machine) radius increases when working downhill, possibly causing the machine to tip.**

Before carrying out a large lift you should carry out a lifting Plan – under the LOLER (Lifting operations & Lifting Equipment Regulations) lifts should be planned and supervised

The purpose of a lifting plan is **to show the details how the lifting operation must be carried out, and what equipment and resources are required.**

If you are attaching accessories to a quick-hitch coupler, two reasons why the coupler should be tilted in the downwards position (ram extended) are the accessory attachment point is near to the dipper/bucket pin-hole area
where the radius is calculated from and that fouling of the accessory on
the coupler could occur restricted movement and cause bending and
twisting.

Before lifting with a load you should always carry out a test lift, you should lift
the load just clear of the ground approximately 2 inches from the floor to see if
the sling can take the weight of the object you are lifting that the load is
secure and it does not slip sideways or along the load and cause instability. If
there is a problem, re-adjust the lifting equipment and start another test lift.
**Only you and the slingers are aloud in the lifting area.** If the load you are
lifting inadvertently or accidentally lands, The integrity (security) of the
lifting accessory to both the machine and the load must be checked
before continuing.

When slewing with a load it is always better to slew to the left than the right as
your view can be obscured by the boom, when slewing with a load you
should always look ahead of the load. If swinging with a load it can It
can cause an increase in radius and create instability causing the
machine to tip over.

The most dangerous or hazard area when lifting with an excavator is within
the working radius of the boom/dipper. You should always gain eye
contact with the driver before entering the working radius of an excavator, and
when carrying out a lift only the slingers/signaller should be in this area.

When carrying out lifts the safe lifting capacity is reduced when slewing the
load over the sides of the tracks or wheels. This is because the
counterweight effect/stability is reduced due to a shorter 'wheel/track
base.

Remember The safe working load (SWL) or working load limit (WLL) of a
multi-leg chain sling only applies ,when each leg is equally loaded and
each leg is within 90 degrees of the other.
Accessories must only be attached to manufacturers' approved lifting points if
this procedure is not followed many hazards can occur such as
Failure or damage can occur to the machine, accessory or load, the
accessory can detach from the machine, and regulations have not been
complied with.

If lifting, were possible the bucket should be removed, the bucket adds
additional weight to the gross weight to be lifted and can cause the
slings and chains to become obscured from view and entangled in the
bucket teeth.
If the machine's rated capacity/object handling capacity chart is not available for reference, then no loads are to be lifted and no other methods used to help calculate the rated capacity for the machine. Only the manufactures recommendations can be used. Long loads should be fitted with a swivelling shackle to help prevent the load from coming into contact with excavator.