



ASPEC

**GUIDANCE IN THE
PROVISION AND SAFE
OPERATION OF CAMERA CRANES**

Forward

With the ever increasing demand of producing a quality product within ever tighter time constraints, comes the obligation for both organisations and individuals alike to develop sound working practices to achieve this in a safe, professional and legal manner.

The Film & Broadcasting industry is not alone in this.

At the request and with the help of our members, we have attempted to produce a comprehensive document in an area that appears to have been overlooked. It attempts to set standards for health and safety that can be used by those who are required to supply, use or operate camera cranes.

We recognise that, due to the diversity of the industry, it is difficult to cover all sectors.

However we see this document as a starting point which, with the support of all concerned and with its every day use, will provide a recognised standard upon which we can continue to build and improve.

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Our sincere thanks also go to all others who contributed with constructive comment and suggestions.

HSE Support

The following is an extract of the Health & Safety Executive letter of support for this document and is published with their kind permission.

" HSE supports the new guidance on the safe use and operation of camera cranes, produced by ASPEC and commends this publication which fills a gap in the available literature. For the first time, the industry has a document which sets standards and defines the roles and responsibilities of those involved in the use of camera cranes. The guidance is a useful benchmark on which individual duty holders can build their own systems and procedures for operating camera cranes safely."

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GUIDANCE IN THE SAFE USE OF CRANES

INTRODUCTION

This guidance has been produced to support the safe operation of crane equipment within the broadcasting and film industry. Within its scope this guidance will attempt to draw out the key legal requirements from the:

- Health and Safety at Work Act 1974
- Management at work Regulations 1992
- Health and Safety (young Persons) Regulations 1997
- Provision and Use of Work Regulations 1998
- Lifting Operations and Lifting Equipment Regulations 1998
- Supply of Machinery (Safety) Regulations 1992 BS 7121,
- Safe Use of Cranes

It is not the intention of this guidance document to give legal interpretation but to provide best practice in the use of cranes within the broadcasting and film industry. Consultation with current legislation and approved codes of practice may still be required depending on the work being undertaken.

For the purpose of this document the term "Crane" covers any camera support equipment with a counter balance arm.

This guidance will cover the following five areas that affect the safe operation of cranes.

- **ROLES AND RESPONSIBILITIES**
- **CRANE EQUIPMENT**
- **STRENGTH AND STABILITY**
- **PLANNING THE USE OF CRANE EQUIPMENT**
- **CORRECT USE OF CRANE EQUIPMENT**

ROLES AND RESPONSIBILITIES RELATIONSHIPS

- Where there may not be a direct 'employment' relationship between the Technician operating the crane and the persons who control the use of the crane equipment. Where a Grip / technician operating the crane carries out work on a client's production with crane equipment provided by that person or a third party:

(a) Employers (whether individuals, partnerships or companies) have a Duty to ensure that crane equipment provided for their production team and the self-employed working for them complies with the detailed Regulations and industry best practice;

(b) Freelancers must comply with the same duties in respect of Crane equipment that they use in the studio or on location;

(c) Employers who have control of lifting equipment or its management or the way it is used also have duties as far as their control permits. For instance, those hiring out cranes may, in practice, have some control over the way the crane is used or maintained by their customers. Alternatively, employers may provide all crane equipment to others working on their premises and they clearly have some control over the equipment provided.

Note.

A competent Crane technician should attend a Crane at all times, supported by two grips.

The crane Hire Company must ensure that when a crane is hired out, physical evidence accompanies it, such as a copy of the last examination report (the Technician operating the crane should ensure that this evidence is available) and the Instruction manual / SWL / Serial identification No.

- Only competent technicians must operate cranes
- After assembly of a crane the Technician operating the crane should ensure that the crane is thoroughly examined before it is put into use to make sure it is safe to operate.
- All cranes must be checked on return from hire and any maintenance work signed off before re-hire.
- A formal handover certificate should be used to support this process.

The Crane Technician has the duty to operate the subsequent lifting operations in a safe manner. The Crane user (as an employer or a self-employed person) also has the duty to ensure that:

- The periodic thorough examinations are undertaken at the frequencies identified through risk assessment or an examination scheme if there is one.
- The Crane user may well come to an arrangement with the hirer under which the hirer carries out the thorough examinations but that does not alter the Crane user's duty to make sure these are carried out prior to use.
- Where a Production Company enters into a contract with a Crane hire company who will undertake the lifting operation on their behalf; i.e. the Hire Company provides the crane and the operator, the crane owner has the duty to ensure that the crane is properly maintained, examined and safe to use and that the crane operation is carried out safely.

A summary of the roles and responsibilities of parties involved in crane operation is detailed in appendix D.

CRANE EQUIPMENT SUITABILITY OF CRANE EQUIPMENT

When selecting lifting equipment you should always take account of principal ergonomic hazards associated with the technician whilst operating the crane. Crane design should take account of the size and shape of a technician operating the crane and should ensure that the crane is compatible with a person's dimensions:

- Operating positions / working heights / reach distances etc.
- Can the crane be adapted to accommodate the intended operator technician?
- Operation of the equipment should not place undue strain on the Technician operating the crane.
- Operator technicians should not be expected to exert undue force or stretch or reach beyond their normal strength or physical reach limitations to carry out tasks.

MEANS OF ACCESS

- You need to consider all parts of the crane equipment to which access may be required, regularly or irregularly, and to the people who need this access.
- If modifications are considered necessary in order to provide a permanent means of access to the lifting equipment, then these may affect the strength and stability of the equipment. You may therefore need to seek advice from the manufacturer or supplier before any modifications are made.

PROTECTION AGAINST SLIPS, TRIPS AND FALLS

This applies to those parts of the crane equipment where people may need to be present in order to operate, maintain, inspect and / or carry out repairs. The following applies:

- Where you are using crane equipment in locations where the accumulation of liquids, cables or dust may pose a risk of slipping / tripping, all practical preventative measures must be taken.
- Routine checks must be taken to ensure that effective control measures remain adequate.
- If there is a danger from falling persons or materials from a static platform, then guard rails and kick boards must be in place.
- Where edge protection cannot be provided or where operators are using mobile elevating work platforms then a suitable mounting and appropriate safety harness should be used.
(Safety assistance should be sought where needed)
- Situations where there is a potential fall of less than 2 m may also require edge protection to be provided, for example:

- (a) Where traffic route passes close to the edge of the crane equipment;
- (b) Where large numbers of people are present;
- (c) Where a person might fall onto a sharp or dangerous surface or material / substance; or
- (d) Where a person might fall into fast flowing or deep water.
- (e) For shooting, crane erection or maintenance then appropriate safety equipment must be used to prevent falls.

OPERATOR PROTECTION

In certain circumstances some form of protection may be needed to protect personnel from risk associated with the location environment. Situations where protection would be necessary include where the operator of the crane is exposed to:

- Water, falling objects, pyrotechnics.
- The weather; e.g. lightning
- The possibility of being struck by vehicles
- Levels of noise/dust/smoke that could damage their health

The exact nature of any personnel protection will depend upon the nature of the hazards to which the personnel are exposed and the risks these hazards present. Those nominated as being responsible for providing any protection will need to consider:

- (a) The operator's visibility of the task.
- (b) The suitability of the protection being provided.
- (c) If the operation is taking place in a hot or cold environment.
- (d) Whether it is ergonomically suited to the operator.

EFFECTS OF HIGH WIND

Crane equipment used in open-air locations can potentially become unstable if used in high wind conditions. Where appropriate, the maximum wind speed in which the lifting equipment can be used should be provided. Measures therefore need to be in place to determine the wind speed and also reduce its effect.

- The weather forecasting services will provide a general idea of the expected wind conditions on a day-to-day basis for a particular area.
- Appendix C provides general guidance for the safe use of cranes in various wind speeds (the manufacturers instruction on wind speeds must be used where provided). If wind speeds exceed these guidance or manufacturers instructions then crane activities must cease
- The most common way of providing an instantaneous indication of the wind speed is to use a hand-held anemometer. However, this method may not give an accurate indication of the wind speed in the most exposed position.
- There may be some instances where the wind could also affect the stability of crane equipment used indoors. This could be the case where studio doors are opened allowing the wind to 'funnel' through a building. You therefore need to take the stability of lifting equipment into account if such situations could arise.
- Appendix A Hazard checklist for Crane Equipment provides further guidance to manufacturers and users of cranes.

STRENGTH AND STABILITY

ADEQUATE STRENGTH

The crane equipment should have adequate strength but you should pay particular attention to the mounting or fixing points.

- The mounting or fixing points do not include where the crane equipment is secured to another surface and also where parts of the crane equipment are fixed together, e.g. two jib sections of a crane.
- In addition to the downward and upward reaction force of the weight of the load, you should consider additional forces, e.g. any wind loading since this may place extra stresses on the crane equipment.
- Modifications to crane equipment may affect the wind loading.
- Careful consideration of the risks that may arise from such changes to the wind loading and the potential effect on the stability of the crane equipment.
- Dynamic loading from the rapid acceleration / deceleration of either the whole crane structure or the suspended load must be considered
- A competent person should ensure that the strength and stability of the crane equipment continues to be adequate for the tasks that the equipment is to be used for.
- For difficult or unusual lifts you may need to contact the supplier or manufacturer of the crane equipment to ensure that it is strong enough for the use of propose.
- Safe working load must be indicated on all cranes & crane accessories and these limits must be strictly adhered to.

SAFE WORKING LOADS (SWL)

A 'safe working load' (SWL) is a value or set of values based on the strength and / or stability of the equipment when lifting. A range of safe working loads can be specified for the same equipment when used in different configurations. The SWL is usually expressed in terms of the maximum load that the equipment may safely lift, as for cranes and lifting attachments.

- Where the safe working load (SWL) of a crane is not known then you must ensure that this equipment is not used until this value is determined. This may mean that you need to contact the manufacturer or supplier or alternatively arrange for the equipment to be thoroughly examined by a competent person.
- *For the purpose of a test only*, where a competent person requires the crane to be loaded beyond its SWL then this should only be done with certain precautions in place (*Refer to appendix F*). These include:
 - (a) Ensuring that the area around the crane is cleared;
 - (b) Making sure that only essential workers are retained to lift the load;
 - (c) Completing the test as efficiently as possible; and
 - (d) Ensuring that the test is carried out in an area where the consequences of failure are minimised.

ADEQUATE STABILITY

A number of factors can affect the stability of the crane. These include:

- (a) The strength of the ground or surface on which the crane equipment is positioned or located, e.g. spreader plates or sub-frames may be needed so they can safely support the weight of the equipment and the maximum load to be lifted;
- (b) Stability of the surface under load conditions, e.g. if the lifting equipment is too close to level changes the ground may slowly subside or collapse suddenly;
- (c) Cranes must only be operated in a level position;
- (d) The size and nature of the equipment/load (e.g. whether the load itself is unstable);
- (e) How the equipment/load is intended to be lifted; and
- (f) The maximum wind loading that may occur.

(g) Dynamic effects e.g. centre of gravity, fugal forces etc...

You can use various methods or combinations of methods to improve the stability of lifting equipment. These include:

(a) Designing a suitable sub-frame/tubular rigging on which to position the crane equipment. (The base must be able to demonstrate that it is adequate to support operating load of the crane);

(b) Using an anchorage system (must be approved by supplier / manufacturer before use);

(c) Using counterbalancing weights; and (d) Using recognised ballast, outriggers or stabilisers.

Where cranes are anchored to other work equipment or structures you should ensure that this equipment or structure could withstand the forces that the crane and its use will impose on them i.e. putting one crane onto another, tracking cars to achieve fast crane shots.

FLOATING VESSELS

- If the crane is situated on a floating vessel it will be effectively operating on a variable out-of-level base and thus subject to significantly different loading conditions than is the case on firm level ground.
- In addition, the distance between the water level and the deck of the floating vessel will vary as the lifting operation is carried out. Vessel should be fitted with inclinometer and competent body should determine maximum angle of heel for vessel / crane combination. Also position of crane on vessel will have an effect, i.e. a crane mounted in centre of vessel will be more stable than on side.
- Such lifting equipment will be subject to greater dynamic loading than when used on land. For example, for a crane there will be increased side loading on the jib and greater forces in the slewing mechanisms, brakes and clutches due to changes in inclination of the vessel.
- The crane must therefore be de-rated from its normal land-based duties. A competent person, based on the crane manufacturer's recommendations for floating duties, should determine the extent of such de-rating.

- If on occasions the camera needs to go under water, consideration must be given to the effects the buoyancy will have on ballast weight calculations.

CRANE EQUIPMENT USED ON TRACKS

Ground settlement can cause tracks to become misaligned and the running surface to become uneven. You should not allow such settlement to develop to the extent that the crane can become unstable or derailed in use.

- Only use track specified for the crane
- Track to be stored and maintained to manufacturer / supplier's recommendations
- Cranes over 2 metres must not be used on curve track.

MOBILE CRANE EQUIPMENT FITTED WITH PNEUMATIC TYRES

Solid tyres for mobile crane equipment is strongly recommended, however, where pneumatic tyres are being used the following must apply:

- Tyre pressures are checked before use and then on a regular basis
- Use an appropriate pressure gauge that can be calibrated to confirm that the pressures meet manufacturer / supplier's recommendations.
- Pneumatic tyres should have inner tubes
- Crane should be lowered to a safe position before checking tyre pressures in case valve jams or fails.

PREVENTING OVERLOAD

- To prevent the risk of overturning and/or overloading arising from the use of a crane, strict compliance to design specification is required.
- Regular checks of wind speeds, ground conditions and/or supporting structures should be carried out prior to use to ensure fall operating stability
- Ensure manufacturer's safe working load is not exceeded.

POSITION AND INSTALLATION

As part of the planning requirements you will need to liaise with the grip to address:

- Installation or positioning to ensure that the risks of the equipment, or its load, of injuring people is minimised.
- The measures that you need to take to control the risks, which will depend upon the type of crane and where and how it is used.
- The dimensions of any access passageways or paths are sufficient so that any persons using them will not be put at risk from any crane operation.
- Any gap into which persons may enter, which may be reduced, for example, by a crane operating motion, should be at least 0.5 m and preferably never less than 0.6 m.
- You may need to cover such a passageway to help protect persons should the crane drop unexpectedly.

PREVENT A MOVEMENT IN UNCONTROLLED MANNER

This requirement aims to ensure that crane movements and loads are under control at all times to minimise risks to persons in the vicinity of the crane operation. The aim is to prevent uncontrolled free fall.

Various methods can be used to minimise the risk from the crane falling out of control. These include:

1. Unless detailed by manufacturer's instructions or a risk assessment, two grips and one crane technician should be in attendance when operating a crane. (One grip at each end of crane).
2. Safety equipment to ensure effective strapping and bonding of camera and heads
3. Lifting mechanisms with a high factor of safety or strength must be operated in line with manufacturers recommendations;
4. Safety gear;
5. Final check to be completed by the technician to cover:
 - Operating area .
 - Track / Mountings / sub-frames (Check for settling) .
 - Weights .
 - Strapping / Bonds
6. Crane equipment, which is designed for lifting persons, must be appropriately and clearly marked that it is for lifting persons.
7. The risk assessment carried out in line with the Management Regulations will help select lifting equipment and assess its suitability for particular tasks. To support this process, Appendix A Crane / Jib Hazard Check has been designed for guidance.

Note: Persons involved with Crane risk assessment must be able to demonstrate competence

PLANNING THE USE OF CRANE EQUIPMENT RISK ASSESSMENT

A risk assessment will identify the hazards and corresponding risks.

The degree of planning to control these risks will vary considerably and will depend upon the type of crane to be used and the complexity of the crane operation for which it will be used and the environment it will be used in. Consultation with the grip is critical in the planning process.

Proper planning of crane operations is a combination of two parts:

- (a)** Initial planning to ensure that a crane is provided which is suitable for the range of tasks that it will have to carry out; and
- (b)** Planning of individual crane operations so that they can be carried out safely with the crane provided.

The balance between the two parts of the planning process will also vary depending upon the crane and the particular crane operation.

INITIAL PLANNING

Initial planning must be considered at the first point of enquiry and should be encompassed within an organisation's hire / use procedures.

Factors you should consider when selecting crane equipment so that it is suitable for the proposed task include:

- (a)** The operational task
- (b)** Type of loads (person / camera / other)
- (c)** Restrictions (height, lateral movement etc.)
- (d)** How often the crane equipment will be used to carry out the task
- (e)** The environment in which the crane equipment will be used, and
- (f)** The personnel available to operate the crane and their knowledge, training and experience.

The competent person required to carry out the planning must be able to demonstrate that they have adequate knowledge and experience within broadcasting and film industry to carry out the planning requirement

For routine crane operations the planning of each individual crane operation will usually be a matter for the grip using the crane equipment. To support the planning process it is essential that the grip be involved in the location reconnaissance where applicable.

The grip carrying out this part of the planning exercise should have appropriate knowledge and expertise.

VISIBILITY

- If the technician is unable to maintain a clear view of the path of the load then the grips will assist. The grips will need to be in a safe position and either be in view of the responsible person or able to communicate effectively with them.
- The crane technician needs to use the same reliable means of effective communication. This could be by using hand signals, radios or telephones etc.
- Where hand signals are used they should be consistent with the code of signals in Schedule 1 of the Health and Safety (Safety Signs and Signals) Regulations 1996

ENVIRONMENT

- Various weather conditions could have an effect on the integrity of the equipment or expose persons to danger which may mean that the crane operations have to be stopped, e.g. excessive wind speed, poor visibility due to mist or fog, lightning, heavy rain, sea state etc.
- Other factors may produce unsafe conditions after the particular weather condition has finished, e.g. waterlogged and unstable ground following a period of heavy rain.
- You therefore need a system of work in place, which sets out what measures or action needs to be taken for particular weather conditions.
- Such systems of work need to recognise that additional measures may be needed to reinforce the stability of the crane or to reduce the safe working load so that the crane operations can be continued safely.

LOCATION

- You also need to ensure that you have adequate site access and egress for the crane equipment. You should also consider whether there would be sufficient space to safely position and install the equipment.

Correct use of crane equipment

OVERTURNING

- You should not use a crane unless it is of adequate strength and stability for the operation. This means that you need to ensure that those people who use the crane have sufficient knowledge to judge whether or not the equipment is likely to be over-stressed or made unstable while they are using it. This could arise, for example:
 - (a) When turning a crane with a raised load
 - (b) Persons riding the crane when re-positioning
 - (c) During excessive and uneven loading
 - (d) When using a crane to lift an unknown (and excessive) load, and when using a crane in excessively high winds or in locations where traffic could collide with it.
 - (e) Unknown ground conditions
- Crane equipment must not be operated whilst the technician or grips are under the influence of alcohol, certain medication (seek medical advice) or drugs.
- You need to ensure that the crane technician operating the equipment knows or can judge the risk associated with the designated task and avoid overloading the equipment.
- For crane equipment which travels in a raised position you will need to consider the layout, ground conditions and overhead obstacles of the studio/location to ensure that the possibility of it overturning or hitting an overhead obstruction are minimised.

PROXIMITY HAZARDS

You need measures that address the risks arising from proximity hazards. These measures need to take into account the crane equipment in use and the particular proximity hazard.

Proximity hazards that you will need to consider include:

- (a) Coming into contact with overhead structures, work structures' electrical energy sources
- (b) Level changes
- (c) Other operations in the vicinity
- (d) Low structures
- (e) Gradients
- (f) Scenery / support lines
- (g) Ground services such as cables
- (h) Change in ground conditions i.e. beaches, tide changes or causeways

The measures you need to take will depend upon the particular kind of crane and hazards.

DERATING

- Although a safe working load may be marked on a piece of crane equipment, it may be necessary to reduce this value to take into account where and how the equipment is being used.
- This is often referred to as 'de-rating'. You therefore need to ensure that those involved in crane operations know when this may be necessary and that those undertaking the de-rating have sufficient competence. e.g. on boats, man riding, tracking vehicles.

LIFTING OF PERSONS

Ideally you should provide lifting equipment designed specifically for the purpose to lift people. Adequate precautions should be taken. These include:

- The safe working load for the equipment and accessories should be reduced (derated) by a suitable amount (such as 50%) to provide an appropriate factor of safety. Your competent person should be able to provide advice.
- Where the distances between the person being lifted and the person controlling the lifting operation are short then verbal communication may be adequate.
- Where the distances involved mean that the people involved cannot hear each other then you will need to provide the person being lifted reliable means of communication. This could be based on a system of hand signals, a radio or telephone.
- Certain cranes used for man riding should incorporate a number of safety features to prevent free fall (Seek guidance from the manufacturer).

PRE USE CHECK

You need to ensure that people who use crane equipment have received appropriate training, information and instruction so that they can carry out pre-use checks on the lifting equipment. (Appendix B refers)

- The Crane Technician or Grip are the best placed to identify faults or damage to equipment.

The purpose of these pre-use checks is to identify faulty equipment and initiate corrective actions where appropriate.

- The crane technicians operating the crane equipment should act as the first line of defence in identifying any faults or damage. Such checks should be carried out:
 - (a) Before the crane is used by the technician during each working day
 - (b) At the beginning of each shift.
- The aim of such checks is to pick up faults due to day-to-day wear and tear and malfunction of safety-related equipment. If any defects are found the technician must report the defect or, if competent to do so, take appropriate action to rectify it.
- Persons carrying out the checks must be able to identify damage to crane and crane accessories / equipment.

CONTINUING INTEGRITY

- You are required to maintain the crane equipment in an efficient state, in efficient working order and good repair.
- You need to ensure that lifting accessories / equipment are suitably stored away after use so that they are not damaged. This requires the provision of suitable storage facilities such as a storage rack or container.

COMPETENT PERSON (THOROUGH EXAMINATIONS)

A competent person can be defined as having the balance of both theoretical and practical knowledge which they will require to carryout a required task safely and to a required standard

It is essential that the competent person be sufficiently independent and impartial to allow objective decisions to be made.

This does not mean that competent persons must necessarily be employed from an external company. If employers and others within their own organisations have the necessary competence then they can use it. However, if they do, they must ensure that their 'in-house' examiners have the genuine authority and independence to ensure that examinations are properly carried out and that the necessary recommendations arising from them are made without fear or favour.

THOROUGH EXAMINATION / TESTING

Thorough examination may be needed at several points during the life of a crane: on initial use or following installation; periodically during its life and following certain exceptional circumstances. Before you use any item of lifting equipment for the first time, unless you have received physical evidence that a thorough examination has been carried out which shows that it is safe to use, it must be thoroughly examined by a competent person. Due to the frequent proximity of crane equipment around third parties and the public, camera crane equipment should be examined at 6 monthly intervals.

Appendix F. provides appropriate examination and testing guidance in line with current legal requirements.

APPENDIX A - CRANE HAZARD CHECKLIST

DEFINITIONS

Work Equipment:

Machine, appliance, apparatus, tool assembly of components which are arranged so the function is as a whole.

Use:

Any activity involving work equipment and includes starting, stopping, and programming, repairing, modifying, maintaining, servicing and cleaning.

Thorough Examination:

Examination by a competent person including testing the nature and extent of, which are appropriate for the purpose, described in the statutory regulations.

Inspection:

Visual or more rigorous inspection by a competent person as is appropriate. It also includes testing the nature and extent for the purpose.

Lifting Equipment:

Work equipment for lifting or lowering loads and includes its attachments used for anchoring / fixing / supporting.

Lifting Operation:

An operation concerned with the lifting or lowering of a load.

Load:

Includes a person.

Accessory for Lifting:

Work equipment for attaching loads to machinery for lifting.

Examination Scheme:

A suitable scheme drawn up by a competent person for such thorough examinations of equipment at such intervals as may be appropriate for the purpose described in the regulations.

Competent Person:

A competent person can be defined as having the balance of both theoretical and practical knowledge which they will require to carryout a required task safely and to a determined standard.

Name of item of work equipment:

Serial / Plant Number

REQUIREMENT

Suitability

Is the crane suitable by design construction?

Is the crane suitable for studio environment?

Is it suitable for production-location requirements?

Are wheels of a solid type construction?

Maintenance (Agree schedule 6 Month Period)

Is the crane maintained in an efficient state (Health and Safety not productivity), in efficient working order and good repair?

Date of last statutory inspection and test? (Test Number)

What are the manufacturers' maintenance requirements?

Are there records of maintenance?

Is the maintenance log kept?

Maintenance Operations

NB. Maintenance of all cranes must be done in house by qualified technicians and signed off by appointed Supervisor.

Has the crane been constructed or adapted to undertake maintenance operations without risk to health and safety?

Motorised Shafts

Is the crane fitted with a means to prevent it seizing?

Is lubricant undertaken to prevent seizure?

Inspection

Is someone appointed at location to inspect the crane before use?

Could the crane jeopardise safety?

Who maintains the inspection records?

Are they up to date?

Thorough Examination and Inspection

Has the crane/jib been thoroughly examined before being put into service for the first time?

Has the crane/jib been examined prior to use after assembly at the onsite location?

Reports and Defects

Does the person making a thorough examination:

- Notify forthwith any defects.
- As soon as they make the report in writing
- Notify of any defects, which could become a danger to persons, in writing.

N.B. crane / jib must not be put into service before the defects identified have been correctly rectified.

Keeping Information

Are records kept for a minimum of 2 Years?

Specific Risks

Does a competent person operate the crane?

Are specific risks clearly identified, i.e. over head structures etc?

Information & Instruction

Are supervisors and users of the crane provided with adequate health and safety information and instruction?

Is an instruction manual provided? (Is it current and up to date?)

Training

Have assemblers and users of the crane received adequate health and safety training?

Has a Training needs analysis been undertaken?

Are training records maintained?

Are they kept up to date?

Are personnel made aware of the risks?

Are personnel made aware of the precautions?

Crane Inspection Tag

Agree Check list (Grip)

REQUIREMENT

Conformity with community Requirements

NB. *Work equipment provided after 31st December 1992 Must conform to relevant legislation, which implements EU Directives (CE marking etc.).*

Is the crane "CE" marked?

Has a declaration certificate been issued with the crane?

Does the crane appear to be in fact safe?

Specify and residual risks remaining.

Dangerous parts of Crane

Have measures been taken to prevent access to dangerous parts of the crane / jib?

Have the following measures been taken, so far as is practicable:

- Fixed guards .
- Other guards .
- Information / instruction / training / supervision

Are the guards and protection devices of good construction, sound material and adequate strength?

Specific Crane Hazards Have appropriate measures been taken to prevent the following hazards:

- Falling! overturning .
- Collapse .
- Electrocution

Crane Controls & Control Systems

Has the crane been provided with one or more readily accessible start / stop controls?

Are the controls easily and clearly identifiable and visible?

Are the controls positioned correctly? (*e.g. in a position that the operator can establish that no one is in a hazardous area before operating a control device*).

Are the interlocking devices suitable and appropriate to the level of risk?

Are all sources of energy switched off after stopping the crane?

How are allowances made for crane failures, faults, etc.?

REQUIREMENT

Isolation of Crane from Sources of Energy

Has the crane been provided, where appropriate, with identifiable and readily accessible means of isolation?

Stability

Has the crane been stabilised where necessary by acceptable means?

Lighting

Is there suitable lighting supplied for rigging and de-rigging crane equipment?

Persons carried on cranes

Are adequate features incorporated in the crane to reduce risk to persons being lifted / carried?

Have measures been taken to prevent crushing / trapping?

Can personnel fall from crane?

Remote Controlled Crane

Will the crane mechanism automatically stop if it leaves its control range? (e.g. telescopic boom)

Is there a risk of crushing or impact?

Reports

Is there a system of notification of defects?

Is there a system of notification of any inspection and test?

Records

Are records of all thorough inspections / examinations kept for 5 years?

Strength & Stability of Crane

Is the crane / jib suitable for lifting on location loads?

Position and Assembly of Crane

Have measures been taken to prevent the crane / jib striking other personnel / third parties?

REQUIREMENT

Marking of Lifting Equipment

Are cranes clearly marked with the safe working Load (SWL)?

Is configuration information i.e. extent of limitation of use marked on the crane?

Does the SWL apply to different configurations?

Has the crane / jib been examined prior to use after assembly at the site location?

What defects / hazards can arise from use in potentially hostile environments? (e.g. created special effects)

Organisation of Lifting Operations

Is every lift operation involving the crane / jib:

- Properly planned by a competent person?
- Appropriately supervised?
- Carried out in a safe manner?

Additional Information

Operating: Perimeters

1. Wind factor

2. Maximum extension i.e. operating radius / safe working limits

Date of assessment:

Person carried out assessment:

Location:

Approved by:

Date:

Date of assessment Review:

NB

Please contact your Department head or Supervisor for this information

Appendix B Guide to Crane operator training

Introduction

To enable cranes to be operated safely and in line with legal requirements, training plays an important part in establishing crane technician / operator competence. Training alone will not ensure technician / operator competence; suitable experience and supervision all play their part. It is, however, critical that the technician / operator undergoes continuous Training and Development to ensure that best practice will be implemented in crane use and that bad practices are eliminated. This guidance document should be used, in conjunction with current legal and industry best practice, to help employers meet their legal and moral obligations.

The following criteria are detailed to enable employers to assess current levels of competence within their existing workforce and support future crane technician/ operator development.

Trainers Requirements Training Standards

Trainers involved in crane operator training must have the following requirements:

- Skilled in training / instruction techniques to recognised level
Qualified assessors D32/33
- Have recognised experience in Film / Broadcasting crane operation
- Have sufficient depth of knowledge to relate their training to film / broadcasting environments
- These requirements can be met by a combination of trainers

Training Environment

The training environment must be controlled and be located off-the-job to prevent interruptions. On the job development may be required for crane operator assessment.

Training facilities should include the following:

- Sufficient space and crane equipment
- Classroom facilities for theoretical work
- Training equipment
- Food & Drink facilities

Training

The training should cover the critical areas for crane operation and safety. It should involve both theoretical and practical learning, which will require to be evaluated through assessment. Listed below are specific risk areas where crane operators will require training input:

CRANE PREPARATION

1. Ability to assist in undertaking risk assessment.
2. Carry out visual check and inspection of crane components.
3. Ensure appropriate test certificates for electrical (PAT Test) /mechanical (SWL)/critical components are in order.
4. Carry out reporting defects procedure ensuring remedial work is carried out.
5. Prepare crane components for handling and transport.










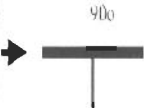

LOADING / UNLOADING

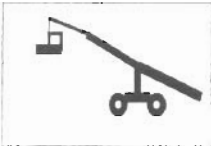
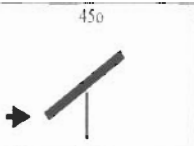



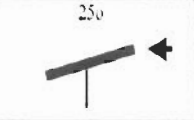

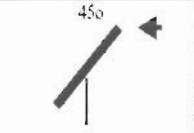
1. Use of mechanical aids for lifting heavy loads
2. Banking of reversing vehicles
3. Correct use of truck hoists / other mechanical lifting aids
4. Securing crane equipment for travel
Unloading crane equipment at studio / location

(APPENDIX C)

EFFECTS OF HIGH WIND TESTS CAMERA CRANES

The following measurements were obtained by exposing a camera crane to the forces produced from a wind machine within a studio environment. It is the intention of this document to illustrate the effects wind forces can have on camera cranes and provide general guidance for safe operation in windy conditions. This document does not replace the specific guidance of the manufacturer's instruction manual, which should be consulted when operating crane equipment in windy conditions and considered within a risk assessment.

		20 mph 32 km/hr Unsteady
		28 mph 45 km/hr Unsteady
		28 mph 45 km/hr Unsteady
		25 mph 40 km/hr Unsteady
		30 mph 48 km/hr Unsteady
 IS THE END OF THE ARM WHERE THE WIND WAS DIRECTED		

		30 mph 48 km/hr Unsteady
		30 mph 48 km/hr Unsteady
		25 mph 40 km/hr Unsteady
		30 mph 45 km/hr Unsteady

← IS THE END OF THE ARM WHERE THE WIND WAS DIRECTED

Beaufort Scale	Wind speed		Sailor's description
	Km/hr	Mph	
0	Below 1	Below 1	Calm
1	1-5	1-3	Light air
2	6-11	4-7	Light breeze
3	12-19	8-12	Gentle breeze
4	20-28	13-18	Moderate breeze
5	29-38	19-24	Fresh breeze
6	39-49	25-31	Strong breeze
7	50-61	32-38	Moderate gale
8	62-74	39-49	Fresh gale
9	75-88	47-54	Strong gale
10	89-102	55-63	Whole gale
11	103-117	64-75	Storm
12	Above 117	Above 75	Hurricane

Appendix D - Roles & Responsibilities

Client to ensure:

Suitability of crane equipment

- Conformance with essential health and safety requirements i.e. "CE" marking under The Provision and Use of Work Equipment Regulations 1998 Regulation 10.
- Crane and crane equipment has the required examinations and tests.
- Ensure adequate attention has been given to the suitability of crane with regards to tasks to undertaken and work environment.

Safe Position and installation

- Risk assessment is in place and has considered position, installation and third parties.
- Provide location information to support risk assessment to grip and Rental Company.
- Competent person (Grip) has been appointed to co-ordinate and ensure correct set-up of crane.
- Adequate resources have been provided.

Safe use

- Competent grip is appointed for supervision of crane operations.
- That two grips are in attendance during crane operations.
- That a competent person is operating the crane.
- Risk assessment is in place for safe use.

Appendix D - Roles & Responsibilities

Crane Hire Company to ensure:

Suitability of crane equipment

- Conformance with essential health and safety requirements i.e. "CE" marking under The Provision and Use of Work equipment Regulations 1998 Regulation 10.
- Ensure cranes comply with the requirements of Provision of Use and Work Equipment Regulations 1998 & Lifting Operations and Lifting Equipment Regulations 1998 (Refer to appendix A).
- Ensure that all required tests and examinations have been carried out. (Refer to appendix F).
- A suitable maintenance system is in place.
- A system for monitoring and recording defects whilst in use. Suitable manual/instructions are available.

Safe Position and installation

- Appropriate instructions or manual have been provided for safe set-up.
- That competent grips and technicians are used to set up the crane.

Safe use

- Crane equipment is only hired to competent grip and crane technician.
- That crane equipment will only be issued where a risk assessment is in place.
- Instructions / Manual have been made available to users.

Appendix D - Roles & Responsibilities

Grip to ensure:

Suitability of crane equipment

- A check is made prior to use to ensure that they are satisfied that the correct crane has been selected, all tests and examinations have been carried out and correct manual / instructions are available.

Safe Position and installation

- Risk assessment has been carried out covering position and installation.
- Sub-frames / temporary supports are competent to support crane and operations.
- Crane is positioned / installed in line with manufacturers / supplier's instructions.
- Consider exposure to wind conditions (Refer to appendix C).

Safe use

- Two grips are in attendance during crane operation.
- Competent crane technician is being used
- Requirements from risk assessment have been briefed to team and are being implemented.
- Adequate supervision is in place.

Crane Operator to ensure:

Suitability of crane equipment

- Technician's safety check has been completed prior to use
- / re-use.
- Safety related defects recorded and reported.
- Not to operate crane with any defects.

Safe Position and installation

- Cranes position and installation is checked prior to use / re-use.
- Crane is not to be used if position / installation is unsafe.

Safe use

- All crane operation is being carried out in line with Industry best practice/instruction manual (Refer to appendix E).
- Crane is secure when not in use.

Appendix E - Crane Operator / Technician Guidance

General Guidance

Risk Assessment

A risk assessment must be in place before crane operation. The risk assessment should consider the following: .

- Operating limits of Crane (Overhead services)
- Access / egress to and from location/studio
- Studio / location hazards
- Overall weight limits / load requirements
- Ground conditions / temporary platforms / stability of crane dolly tracks
- Passenger requirements (i.e. seat belts)
- Use of remote camera heads instead of passengers where practical
- Remote operation
- Grip and operator / technician experience
- Assembly / set-up
- Time/resource requirements

Assembly / Set-up

Instruction Manual supplied by hirer should accompany the crane.

Assembly / set-up instructions should ensure the following:

- Safe working Load
- Correct assembly sequence
- Duties of the crane in all operating configurations
- Pre use / in use tests, examinations and check requirements (refer to appendix F)
- Correct handling of heavy parts
- Stability of crane during assembly
- Correct base dimensions and levelling of crane
- Recommended counter weight system
- Security of suspended crane items
- Isolation and security of crane when not in use
- Correct electrical installation
- Correct guarding / signing of hazardous parts / movements

Consult manufacturer / hirer regarding configurations that are not explicitly specified in the instruction manual (i.e. working of floating platforms).

ASSEMBLY

1. Assess area for safe operation of crane
2. Prepare ground for stability and protect against crane arm striking overhead obstacles
3. Correct assembly of track, ensuring stability
4. Assemble crane in line with manufacturer's instructions
5. Ensuring stability of crane during assembly
6. Manual handling best practices
7. Bonding techniques
8. Levelling a crane
9. Crane operator must be competent, having a good working knowledge in constructing temporary platforms
10. Correct electrical set-up of crane
11. Securing area from damage

CONFORMANCE CHECKS

1. Carry out conformance check
2. Use of crane tag system to control safe use of crane
3. Reporting and actioning defects

USE

1. Knowledge of crane operator's duties (Appendix E Refers)
2. Maintaining safe operating area
3. Awareness of studio / location hazards
4. Securing procedures when not in use
5. Operating with passengers

Dismantling

1. Preparing area for dismantling
2. Correct sequence and tools
3. Ensuring stability during dismantling
4. Complete post use check

Operation

An operator of crane equipment must be able to demonstrate competence in the use of crane equipment. Listed below are the key duties that should be undertaken by a crane operator / technician before, during and after use:

- Crane operator / technician must be a minimum age of 18 years or older.
- Must not operate crane equipment under the influence of alcohol or drugs. (This can also mean some types of medication).

- Check crane before use and report any defects that cannot be dealt with. **DO NOT OPERATE AN UNSAFE CRANE.**
Crane safe tag to be used.
- Assemble crane strictly to manufacturer's instructions; this should be checked prior to use.
- The crane must be level and correctly balanced. (Temporary platforms and track must be capable to support the crane in all operating configurations).
- Weights must be secured within a bucket or to a weight carrier.
- Cameras on remote heads should be securely fastened (cable ties) to head.
- Ensure safe operating area of crane is sufficiently protected to prevent damage or harm to third parties. (Special consideration must be given to avoid overhead structures / electrical services.
- Where avoidance cannot be implemented, then barriers should be established 6 metres from the overhead electric line(s) to prevent contact.)
- Ensure safe operating area is maintained during crane operation (Grip responsibility).
- Passengers when stepping on or off ride-on crane must be under the strict control of the grip (passengers must be made aware that uncontrolled movement off the crane can cause rapid elevation of arm).
- Safety belts must be used when carrying passengers.
- Do not operate a crane in extreme wind conditions (Appendix C refers) or where there is a chance of being struck by lightning.
- Properly maintain the crane and safety equipment at all time in line with manufacturer's instructions (Consider also environmental conditions).
- De-weight the ride-on crane and secure when not in use and left unattended. Show red crane safety tag to prohibit use.
- Strap remote cranes securely with a safety bond, in horizontal position, when left unattended
- Always re-check the crane equipment before use after being left unattended to ensure no damage has occurred.
- When dismantling, crane weights should be removed before persons step off ride-on cranes or remote heads are removed
- When dismantling telescopic cranes, strap securely in horizontal and shortest arm position before removing counterweights and remote head.
- Never set-up or dismantle any crane on track.

APPENDIX F

EXAMINATION & TESTING GUIDANCE

1. SCOPE
2. INTRODUCTION
3. ORDER REQUIREMENTS
4. QUALIFICATIONS
5. RECORDS
6. ACCEPTANCE STANDARDS

1. SCOPE

This appendix provides guidance on the methods for the periodic inspection and testing of camera cranes to ensure continued integrity and safety.

This document is not intended to define the tests required before a crane is first taken into use or after alteration or repair which may affect the stability or strength of the crane. Tests under these circumstances should be defined in the manufacturing, alteration or repair plan approved by the design authority.

2. INTRODUCTION

The varying designs of camera cranes preclude detailed specification of the tests required for every crane. The designer / manufacturer is aware of where the crane is likely to be subject to fatigue or deterioration and the properties of the materials used. The designer / manufacturer's recommendations regarding inspection for each component of the crane should be followed. These guidelines describe tests that can be applied in order to meet the designer / manufacturer's recommendations.

3. ORDER REQUIREMENTS

When ordering examinations to be carried out, the persons in control of the crane should ensure that the examiner has the following information:

- a)** Any designer/manufacturer's requirements and specifications.
- b)** Details of any accidents, damage, repairs or alterations carried out on the crane.
- c)** Copies of previous examination results and examination dates.
- d)** Any other relevant information the examiner requires.

4. RELATED DOCUMENTS

The methods and technique detailed in this document are based on those given in the following Standards:

BS7121: Part 2:1991 Safe use of cranes Part 2. Inspection, testing and examination.

BS EN 571-1 (1997) Non-Destructive Testing - Penetrant Testing - General Principles

BS M39 (1972) Penetrant Inspection of Aerospace Materials and Components

BS M34 : 1970 Method of preparation and use of radiographic techniques

BS EN 444: 1994 Non-destructive testing - General principles for radiographic examination of metallic materials by X-and Gamma rays.

BS EN 1435:1997 Non-destructive testing - Radiographic examination of welded joints.

BS EN 1290:1998 Non-destructive examination of welds.
Magnetic particle examination of welds.

BS 6072:1981 (1986) Method for magnetic particle flaw detection.

BS 6208:1990 Method for ultrasonic testing of ferritic steel castings including quality levels.

BS EN 583-1:1999 Non-destructive testing. Ultrasonic examination. General principles

BS EN 1714:1998 Non-destructive examination of welded joints.
Ultrasonic examination of welded joints.

pr. EN 1711 Draft European (CEN) standard - Non-destructive examination of welds - Eddy current examination of welds by complex plane analysis.

BS EN 473:1993 General Principles for Qualification and Certification of NDT Personnel.

SNT-TC-IA Training and Certification of Non -destructive Testing Personnel.

4.1 TERMS AND DEFINITIONS

The following definitions shall apply for the purposes of this document:

Design Authority

Authority on the design and construction of the crane,
eg the manufacturer.

5. QUALIFICATIONS

5.1 PERSONNEL QUALIFICATIONS

Personnel carrying out testing to this document should be trained and certified for the methods being used at the appropriate level as detailed below in accordance with EN 473 or ASTM document SNT - TC-IA.

5.2 OPERATOR AUTHORISATIONS

Operators qualified to level 1 can be authorised to apply established techniques to particular components. Operators qualified to level 1 are not authorised to apply acceptance standards (sentence components or flaws).

Operators qualified to level 2 can be authorised to establish specific techniques for particular components as well as inspecting and sentencing to established techniques and acceptance standards.

5.3 MEDICAL REQUIREMENTS

All operators should have passed an eyesight test by a suitably qualified medical practitioner within the 12 months preceding the inspection. They should be certified as able to read Jaeger No. 1 letters or equivalent at a distance of not less than 30cm. They should also be certified as able to distinguish between and differentiate contrast in the colours used in non-destructive testing.

5.4 TEST ORGANISATION

Where test organizations are used, the crane operator should assure himself of the competence of the organisation.

The following international bodies are approved by their respective governments for accreditation of test organizations:

COUNTRY	ACCREDITATION BODY
Europe	
Austria	BmWA
Belgium	BELTEST
Czech Republic	CAI
Denmark	DANAK
Finland	FINAS
France	COFRAC
Germany	DAP
Germany	DA Tech
Germany	DEKIZ
Germany	DACH
Ireland	NAB
Italy	SINAL
Netherlands	RvA
Norway	NA
Portugal	IPQ
Spain	ENAC
Sweden	SWEDAC
Switzerland	SAS
UK	UKAS (formerly NAMAS)
Outside Europe	
Australia	NATA
Hong Kong	HOKLAS
New Zealand	IANZ
South Africa	SANAS

6 METHODS

6.1 VISUAL EXAMINATION

Unless otherwise specified by the design authority, the following items should be inspected in all relevant accessible areas:

Excessive wear
Physical damage
Integrity of protective coatings.

6.2 OVERLOAD (PROOF) TESTING

Overload testing involves loading a crane beyond the safe working load in order to prove its ability to withstand the stresses generated at the time of test. While this test is necessary before a crane is first brought into service or after alteration or repair which may affect the strength of the crane, regular overload testing may hasten fatigue failure and is not recommended. Should an overload test be required the following points should be checked:

- a) Overload testing should not be carried out before the visual examination has been completed and the crane has been confirmed as safe for further testing.
- b) As the crane is to be overloaded safety precautions should assume that the crane would fail. It is particularly important that the requirements of the main Code of Practice regarding safety and stability are followed in order to ensure the safety of the inspector and people in the vicinity.
- c) Overloads at the head end should not be allowed to be raised more than 200mm above the ground. Before the crane is loaded a platform should be constructed no more than 200mm under the counterweight bucket strong enough to receive the bucket and weights should the crane fail at that end.
- d) Retesting of individual components should be avoided. A plan should be made prior to the test such that all relevant configurations are tested with the minimum number of retests on components common to more than one configuration.

The weights used for the loading should be certified as accurate
Within + / -1%.

The weights and counterweights should be securely fastened before the head is lifted from the ground.

6.3 ASSESSMENT OF STRAIGHTNESS AND TWIST

These tests should be carried out with the crane in its longest configuration using visual alignment, straight edges and levels. .

The design authority's data regarding acceptable straightness or twist should be consulted.

Where possible the straightness should be checked along each edge.

An even slight curve can be expected on less rigid cranes, often curving upwards towards the head end when unloaded to allow for a change in shape when loaded. Sudden changes in the straightness should be investigated as a degree of buckling may be indicated.

The level of the boom in the transverse direction should be tested along the length in order to determine the level at the camera platform and any twist present.

6.4 CRACK DETECTION

Original manufacturing flaws should have been assessed prior to service in accordance with design authority recommendations. The following methods may be used to inspect for flaws that have developed or extended during service, such as fatigue cracks under paint films, which could be difficult to find by visual inspection alone.

6.4.1 Radiography

Radiography is a very effective way of investigating the internal structure of materials. It is not always the most effective method of detecting cracks, but there may be situations where methods are impractical.

Radiography can be the only method of inspecting components that are inaccessible to other test methods. In these situations the radiographic techniques employed should be in accordance with EN 444 Class B or international equivalent, and consideration should be given to increasing the number of angles the radiographs are taken at beyond the specified minimum requirements.

6.4.2 Ultrasonic Testing

Where crack orientations are relatively predictable and the component geometry permits, ultrasonic testing can be an effective method for detecting cracks. It is particularly suitable for detecting large transverse cracks in solid cylindrical components such as fulcrum pins without removing them from the crane, though the shape or location of steps or tapers in the profile could interfere with this. Particular surfaces (in the case of inspecting fulcrum pins the end faces) must be accessible. There can be difficulties using ultrasonic testing to examine thin sections, areas with badly adhering coatings or rough surfaces. This method requires the test operator to be more highly skilled. Ultrasonic testing should be carried out in accordance with EN 583-1 or international equivalent.

6.4.3 Liquid Penetrant Testing

Liquid penetrant testing is an effective form of crack detection when the test material is nonporous, the test surface is not coated and any possible cracks have no contamination. It must be noted that should liquid paint enter an existing crack it would be extremely difficult to remove and unlikely to be detected by subsequent liquid penetrant tests.

Liquid penetrant testing should be carried out in accordance with EN 571-1 or international equivalent.

6.4.4 Magnetic Particle Testing

While limited to ferromagnetic materials with any surface coatings less than 50 um thick, when properly applied this form of testing is very***** effective at detecting surface and near-surface cracks. The surface to be tested must be visible and accessible.

Magnetic particle testing should be carried out in accordance with EN 1290, BS 6072:1981(1986) or international equivalent.

6.4.5 Eddy Current Testing

Eddy current testing can be carried out on electrically conductive test surfaces that are coated and can find sub-surface flaws. The method is relatively slow, often using a test area no more than 3mm diameter, and requires the test operator to be more highly skilled. For practical reasons, tests may be limited to areas where cracks are more likely to be propagated. The surface to be tested must be accessible.

National or international standards are not yet available for manual eddy current testing. EN1711 is currently being prepared.

7. RECORDS

7.1 TECHNIQUES

Tests and examinations should be carried out following detailed written instructions. These instructions should be prepared in accordance with an appropriate national or international standard procedure where these are available. Where such standards are not available a competent independent authority should approve the instructions. The instructions should include specification of the parameters that require recording at the time of examination. The instructions should be available for scrutiny by an enforcing officer on request.

7.2 TEST PARAMETERS

If the parameters are not unambiguously defined in the written instruction or as the appropriate standard requires, all the parameters affecting the test or examination shall be recorded. These records should accompany the examination report.

7.3 RESULTS

The results of any examinations or tests should be presented in a report, which should include:

- a) The organisation carrying out the test / examination
- b) The report identity and issue status.
- c) The type of crane examined.
- d) The principal construction materials of the crane.
- e) The identity of the crane.
- f) The types of examinations / tests carried out.
- g) The test / examination procedure(s) used.
- h) The test / examination instruction(s) used.
- i) The results of the test/examination(s).
- j) The disposition of the crane on account of the acceptance standard.
- k) The test / examination date(s).
- l) The name and qualification(s) of the person responsible for the test / examinations(s).

8. ACCEPTANCE STANDARD

The acceptance standard should be as specified by the design authority. Where no acceptance standard is specified the following conditions should be considered unacceptable:

- a) Any cracks or crack-like flaws.
- b) Any damage causing local dents or deformation larger than 1 mm
- c) Any visible lack of straightness not an attribute of the design.
- d) Any twisting of the camera platform beyond the available corrections or beyond $+ / - 5^{\circ}$ relative to the fulcrum of the boom. Where no correction for twist can be made the maximum twist of the camera platform should be $+ / - 2^{\circ}$ relative to the fulcrum of the boom.

Appendix .F.

Overhead Power Lines

Guidance Note GS6 is the 'bible' for work near overhead power lines. It describes the hierarchy of measures to be adopted and specifies the use of bunting and barriers and other techniques to keep plant away from the conductors. This GN should be the frnt port of call for the flm makers, I suggest.

In terms of safe approach distances, we have produced some guidance for activities such as tree cutting/felling/pruning and removing/installing street furniture (such as lighting columns) in which a 'vicinity zone' is defined - there are other zones defined in this guidance, but the most Important is the vicinity zone.

The general principle is that if there is a foreseeability that the vicinity zone will be breached during the work then work should not continue unless the conductors have been isolated or an equally effective method of preventing direct contact has been taken. The vicinity zone for different voltages are set out in the following table.

Nominal System Voltage (kV)	Minimum distance for Vicinity Zone (Metrers)	Minimum
Exceeding 1 kV but not exceeding 11 kV	1	1
Exceeding 11 kV but not exceeding 33 kV	2	2
Exceeding 33 kV but not exceeding 66 kV 3	2.5	2.5
Exceeding 66 kV but not exceeding 132 kV 3.5	3	3
Exceeding 132 kV but not exceeding 275 kV 4	3.5	3.5
	4	4

9. Platforms.

If it is necessary to build a rostrum for a crane, it is essential that it is built to a size that offers a safe working space for the grips and crane technician especially at the back and sides of the crane.

9A

(It is advisable that) Platforms for:

Super Techno 15 should be no smaller than 11' x 11' with a minimum load of 1250 kgs.

Technocrane (20') should be no smaller than 14' x 14' with a minimum load of 1850 kgs.

Super Technocrane (30') should be no smaller than 20' x 16' with a minimum load of 2250 kgs.

Super Techno 50 swinging 3600 should be no smaller than 32' x 32' with a minimum load of 3500 kgs.

Super Techno 50 swinging 1800 should be no smaller than 32' x 24'
(Minimum load is calculated on weight of crane plus 3 people (300 kgs.) + load inertia + safety margin).

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