

Lighting roles – Virtual production competencies

This document lists the additional competencies (or skills and knowledge) required to incorporate virtual production technologies into different parts of the workflow within lighting departments. The competencies for the various lighting-related functions and departments are divided into four main areas of work, based on the existing structure of the National Occupational Standards:

1. Identifying equipment
2. Preparing and maintaining equipment
3. Operating, installing and programming equipment
4. Managing self and others

This document lists the skills and knowledge required to include virtual production in each of the above areas of work.

The grid below list the new or modified competencies needed in order to adopt virtual production within a project. These complement the wider competencies required within each of these functions to undertake more traditional projects, which are detailed in the full National Occupational Standards.

1. IDENTIFYING EQUIPMENT

Main function	Skills related to virtual production <i>You must be able to:</i>	Knowledge related to virtual production <i>You need to know and understand:</i>
Carry out recce* and confirm pre-production requirements	<ol style="list-style-type: none"> 1. Assess potential studios in terms of size, power, and appropriate lighting fixtures in conjunction with DOP and director 2. Check whether the LED wall is hung / suspended or floor stacked 3. Explore what LED screens are being utilised including their light output, colour temperature and pixel pitch and frame rate / frequency 4. discuss the need to pixel map or build digital twin lighting fixtures into your background environment 5. consider which playback servers are being used and how this might affect synchronisation with the lighting fixtures and the cameras 6. in conjunction with production manager, assess 	<ol style="list-style-type: none"> 1. virtual production process particularly if aiming to achieve final pixel on the volume 2. principles of volumetric lighting vs conventional lighting 3. the lighting design intended in order to see if the studio is appropriate 4. the importance of obtaining specialist advice 5. when and how to obtain specialist advice 6. the key factors in building up an assessment of the electrical implications and cost effectiveness of using particular studios vs locations 7. what to look for at VP studios to decide upon the necessary equipment and resources 8. the operational procedures to follow once the studio is chosen 9. how to conduct a risk assessment

	<p>suitability of studio based on budget</p> <ol style="list-style-type: none"> 7. explore total power available on site and whether there is a need to supplement this with generators 8. liaise with studio managers and LED technicians 	<ol style="list-style-type: none"> 10. the importance of ensuring the safety of all staff and equipment / resources 11. the current health and safety regulations affecting risk assessment for the production
<p>Assess and select lighting requirements for virtual production</p>	<ol style="list-style-type: none"> 1. wherever possible try and view the material to be screened prior to the pre light 2. determine what lighting fixtures are included within the basic studio package 3. determine whether you are obliged to hire from the studio or you can bring in third party 4. assess the need for supplementary lighting grid along with any plant (scissor lift or cranes) to install the fixtures 5. enquire if the LED volume is modular and how easily panels can be removed to allow the insertion of conventional hard lighting sources 6. assess size of lighting crew needed and take into consideration new roles for VP like virtual gaffer, lighting console operator 	<ol style="list-style-type: none"> 1. the importance of the early involvement of the lighting department in the production process specific to VP 2. the importance of liaising with art department and VAD early in the production process 3. the importance of preparing a schedule for the production in a sequence to ensure effective completion 4. how to build a relationship with VP studio managers and in-house electricians 5. the importance of briefing the Best Boy, crew and outside contractors in detail about the production and its unique requirements 6. the documentation required for lighting equipment contractors, cost control and for recording possible production scheduling problems 7. the importance of dealing with problems promptly and seeking agreement on variations 8. the importance of record keeping 9. how to keep records and prepare final documentation 10. differentiation between the specific crew roles of VP and those of conventional productions 11. when to engage and the implication of engaging outside contractors

*It is possible if there are other visualisations available a virtual recce may take place whereby the DOP and / or Gaffer will be sent a digital rendition of the sets to be viewed either on a laptop or potentially a 3D VR headset This allows for remote collaboration and reduced recce time

2. PREPARING AND MAINTAINING EQUIPMENT

Main function	Skills related to virtual production <i>You must be able to:</i>	Knowledge related to virtual production <i>You need to know and understand:</i>
<p>Prepare and use equipment to modify and manipulate lighting</p>	<ol style="list-style-type: none"> 1. ensure that all conventional lighting fixtures accurately reflect the output of the LED screens in terms of colour temperature and scene brightness 2. ensure there is no spill light from conventional fixtures hitting the LED screen as this causes contrast issues 3. dependent on scene content decide whether to match foreground lighting to LED or visa versa 4. continually monitor CRI with spectrum meter 	<ol style="list-style-type: none"> 1. the way conventional lighting fixtures impact on an LED screen and studio 2. the importance of dynamic risk assessment 3. how to carry out dynamic risk assessment 4. the types of lighting effects available, when to use them, and the methods of achieving them 5. the characteristics of fire-retardant filters, relevant regulations in use for these and how these affect their use 6. how to identify faults or problems with lighting equipment, and how to resolve them 7. how to produce hard shadows and soft shadows using flags 8. how to secure and position frames under different conditions with due regard to the safety of yourself and others 9. safe methods of fixing or supporting stands, and who to contact for assistance 10. what to do in the event of equipment failure 11. the importance of minimal disruption to the production when replacing faulty equipment

3. OPERATING, INSTALLING AND PROGRAMMING EQUIPMENT

Main function	Skills related to virtual production <i>You must be able to:</i>	Knowledge related to virtual production <i>You need to know and understand:</i>
<p>Position and secure fixtures while applying safety considerations</p> <p><i>Safety considerations remain as much of a priority when positioning and securing lighting fixtures for virtual production as for traditional lighting approaches, and also regardless of the shoot location and equipment used. Lighting teams now therefore need to consider these tasks in relation to their use of the LED wall in parallel with other foreground lighting equipment.</i></p>	<ol style="list-style-type: none"> 1. accurately calculate the weight and load capacity of all the equipment specified 2. select and use grip hardware for fine positioning of lighting systems 3. ensure that the personal protective equipment selected for use meets safety requirement for working at heights 4. ensure lighting stands or equipment are positioned in accordance with the lighting rig plan 5. secure and tie off lamps using correct knots 6. request permission from the appropriate person and / or organization to fix accessories and refinements to buildings 7. mark areas of work to the building and to other users in your team 8. inform the production team and all relevant people what action they must take, when particular caution is needed in the rigging area 	<ol style="list-style-type: none"> 1. the detail of the risk assessment findings to ensure safe installation of lighting equipment 2. how to attach lighting equipment loads safely with the use of mounting or suspension equipment 3. the load capacity of lighting grip hardware and stands 4. how the capacity of load bearing lighting grip equipment changes with its orientation 5. how to operate and move lighting stands or equipment on all different types of terrain 6. how to ensure that the centre of gravity of any support system is in a position to prevent accidents 7. how to work from a lighting rig plan or from the verbal instructions of the person responsible for the lighting 8. the reasons for and implications of regulations relating to the use of lighting and mounting equipment 9. the reasons for implications of regulations relating to lifting operations and lifting equipment 10. the importance of checking personal protective equipment before use when working at height 11. the health and safety regulations covering safe working practices at height 12. the different range and applications of industry-standard knots 13. the importance of informing the production team and relevant people of the precautions to take when in the rigging areas

<p>Provide lighting to meet the desired effect</p> <p><i>Virtual production foreground lighting considerations are identical to those on a conventional sets in terms of creativity and safety, but lighting teams now need to consider these tasks alongside use of the LED wall in the background to create a combined lighting effect.</i></p>	<ol style="list-style-type: none"> 1. check that all light sources perform accurately within their design limits 2. confirm that connectors and lighting systems are identified with numbered labels to ensure consistent connection and control 3. follow instruction to alter the light source in terms of setting, colour temperature, beam angle, and flag or reflector setting 4. confirm that the required filters are in place and are producing the desired result 5. use accessories to control the light source to meet the desired effect 6. use lighting systems or ballast controls to meet the desired effect 7. apply lighting effects to the production from specialised equipment, in a safe and controlled environment 8. establish consistent filtering and correction for lighting 9. communicate with colleagues when production requirements are unachievable 10. unify colour temperature of mixed light sources when required 	<ol style="list-style-type: none"> 1. the different types of light measuring equipment available, and their uses 2. how light levels can affect the mood of the production 3. how your working practices affect other departments 4. the different lighting systems and their use to meet the desired effect 5. the types of ancillary equipment available including, barn doors, dimmer shutters, gobos, flags, stipple boards, filters, diffusion; and the criteria for their safe use 6. how to produce a range of effects using different luminaires, ancillary equipment and techniques 7. how the different light sources, diffusion materials, and filters or reflectors used produce the desired results 8. the different lighting plans in common use, and how to interpret them 9. colour correction techniques and how their application affects the outcome 10. the uses of hard and soft sources and how to control them 11. when and why to use reflected light 12. the different types of lighting systems and sources, and how to get the best performance from them 13. how to use par lenses to shape the light beam to meet the desired effect
<p>Programme and operate lighting consoles</p> <p><i>Lighting consoles are very commonly used in VP and are often linked directly to real-time engines and playback servers</i></p>	<ol style="list-style-type: none"> 1. check whether the studio package included a lighting console and if that console meets your specific production requirement 2. decide how your light will communicate with the desk (DMX, DALI, IP) 3. explore the option of using iPad/tablet based controls to enable your Gaffer or Virtual Gaffer to operate the lights from beside camera 	<ol style="list-style-type: none"> 1. how lighting consoles integrate with real-time engines 2. pixel mapping and its effect on light output what backup procedures to employ 3. the operation of different types of console to produce different types of effect 4. the effects and safe use of strobe lighting 5. how to interpret the pictorial requirements of the production by dynamic choices of lighting balance

<p><i>It would be unusual not to employ a console desk within an LED volume environment</i></p>	<ol style="list-style-type: none"> 4. consider how to control out of sight lighting operations 5. request and line up vision monitoring when required 6. inform the person responsible for the design of the lighting of any equipment failure or fault which might affect the action or shooting 7. adjust individual channels to satisfy production requirements 8. identify and resolve problems and production constraints 9. maintain communication with production staff 	<ol style="list-style-type: none"> 6. the health and safety requirements, and how they affect the programming, operation, and working practices of different types of console 7. how a musical performance may affect the operation of the console and any subsequent lighting changes 8. how to identify any problems or production constraints, and how to resolve these 9. the different types of communication systems available to production 10. the procedures for video monitor operation 11. in television productions, the relationship with vision control, and with the lighting director 12. different options for automating lighting fixtures 13. how DMX is used to control lighting and effects equipment 14. the architecture, principles and limitations of DMX systems 15. how to use DMX peripheral equipment 16. the importance of record keeping for re-shoot continuity
<p>Start up and close down electrical generators</p>	<ol style="list-style-type: none"> 1. ascertain who is responsible for the start up and close down of electrical generators including meter readings, this may be a studio responsibility or could be the responsibility of your genny op, nonetheless the below standard protocols remain relevant 2. if you bring your own generator, ensure its positioning and cabling do not contravene any fire or HSE regulations 3. level the generator when it is necessary to do so 4. carry out pre-start tests on the cable distribution system with regard to polarity and earthing in accordance with the latest edition of the relevant 	<ol style="list-style-type: none"> 1. whose responsibility is to start up and close down electrical generators 2. the importance of accurate meter reading to reflect the production usage and its effect on the budget 3. health and safety legislation, electrical safety standards and approved codes of practice relating to the operation of the generators 4. how to start up, monitor while its running and close down the generator 5. the importance of monitoring for potential hazards 6. the importance of operating the generator in a level position and checking the generator fluid levels on a daily basis 7. the maximum loading of sub circuits and distribution boxes

	<p>electrical safety standards and approved codes of practice</p> <ol style="list-style-type: none"> 5. start the generator and ensure the controls and systems function according to manufacturer's instructions, prior to electrical energisation 6. monitor the generator throughout its use in terms of its functioning, balance, loading, fuel and fluid levels 7. recognize at the earliest stage when a generator is showing signs of faults i.e. pulsing, strain, smoking 8. follow the relevant safety procedures to shut down the generator safely and efficiently 9. monitor all users of the generators for loading and safe practices 10. ensure all tools and equipment are secure and safe for their continued operation 	<ol style="list-style-type: none"> 8. how to identify and rectify hazards relevant to cable routing 9. how to check the correct functioning of all power distribution equipment in use 10. the environmental legislation affecting the use and storage of generators 11. the importance of monitoring all users of the generator 12. the importance of ensuring all tools and equipment are secure and safe for continued use
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Further considerations:

- **Installing wiring for practicals and equipment** – As with any location shoot, virtual production will often require practical lamps in foreground so lighting teams will now need to consider installation of practicals and equipment considering interaction with the LED wall or green screen.

4. MANAGING SELF AND OTHERS

- **Coordinating lighting production liaison** – It is likely that conventional lighting crew sizes will be reduced when shooting on an LED volume, because much of the overall illumination is provided by the screen itself. When considering lighting crew size, bear in mind the new roles of virtual gaffer, LED technician and lighting console operator. One of the main considerations is to ensure the crew are always aware of the limitation of the screen in terms of moisture, atmospheric and manoeuvrability.
- **Managing the health and safety of lighting crews** – This remains equally critical with virtual production as it is for traditional productions