

SUGGESTED LIGHTING FOR VIRTUAL SETS for TOP QUALITY IMAGES



Lighting plays a major Role in VIRTUAL STUDIOS in order to get a TOP QUALITY IMAGE.

The following are our recommendation for the essential parameters to consider when lighting a Studio utilizing either a Blue or a Green Background and the Virtual Set Software:

- **High UNIFORMITY of LUMINANCE in the coloured BACKGROUND.**
Typically a Uniformity Coefficient Greater than 85 is recommended.
In case the luminance on the background, measured from the Camera View Point, is not adequately uniform and homogeneous, the Virtual Set Software will impose some adjustments to the picture, such as Hue and Saturation, that will result into some weird image, really not nice.
- **Use of Asymmetrical Cyclorama Lighting of the Coloured vertical walls in order to avoid coloured spill** over the main Actor or Anchor Man, especially if the coloured walls are taller than 3 m. Using Symmetrical SOFTLIGHTS to illuminate the Coloured Background is not advisable. In fact in order to obtain the appropriate uniformity with symmetrical lights, the lights have to be positioned

enough far from the wall, so that the main light axis reflection is quite strong on the subject, causing coloured spill.

- **Use of Accurate Single Shadows BACKLIGHTS**, in particular Energy efficient FRESNELS, in order to produce appropriate shadows on the coloured floor by the subject. This matter makes a big difference....if appropriate lights are used, the shadows projection on the floor result realistic.....if wrong lights are used, the subject will result almost “flying” within the virtual set.
- **Appropriate combination of HARD and SOFT Shadows FIXTURES for the Talent KEY and FILL Lighting.** This matter is valid for all different situations in Studio Lighting. The image quality is demanded for most of the TV Program recorded or produced in Studios.





The present document contains an analyses of the LIGHTING PARAMETERS required for a VIRTUAL STUDIO Lighting and a TECHNICAL DESIGN with the HIGHLIGHTS of the PERFORMANCES and FLEXIBILITY that can be obtained utilising the appropriate combination of equipment.



At the same time the solution offered is based on ENERGY EFFICIENT products and TECHNOLOGIES, in order to guarantee low running costs, no heat projection on the Talents and negligible warming of the studio, for reduced Air Conditioning requirements, with obvious advantages on the containment of running (variable) cost and minimised impact on the environment.

1. WALL & FLOOR LIGHTING:

In a Virtual Studio it is necessary to provide an even illumination of the walls and floor at a LUX level that depends from the digital system utilised.

Anyway it is advisable to have a LIGHTING SYSTEM that can provide from 0 to 400 lux with even incident light on the walls and floor, as these parameters will work with any available Virtual system in the market, specially if changing the lighting level on WALLS AND FLOOR is obtained by simply changing a CUE in a lighting console.

The lighting distribution, the type of lighting fixtures, their optics and the geometry of the lighting beams are important factors to obtain the most flexible and easy to use system, considering the possible complexities that the production situation may determine and to minimised coloured LIGHT SPILL on the Presenters (coloured light reflected from the wall).

The first important HIGHLIGHT and recommendation is to take appropriate care of the types of LIGHTING FIXTURES utilised to lit the walls.

In fact imagine the walls as being **BIG REFLECTIVE COLOURED PANELS**. Having this in mind it is very important to think at the **GEOMETRY** of the **LIGHTING SYSTEM**.

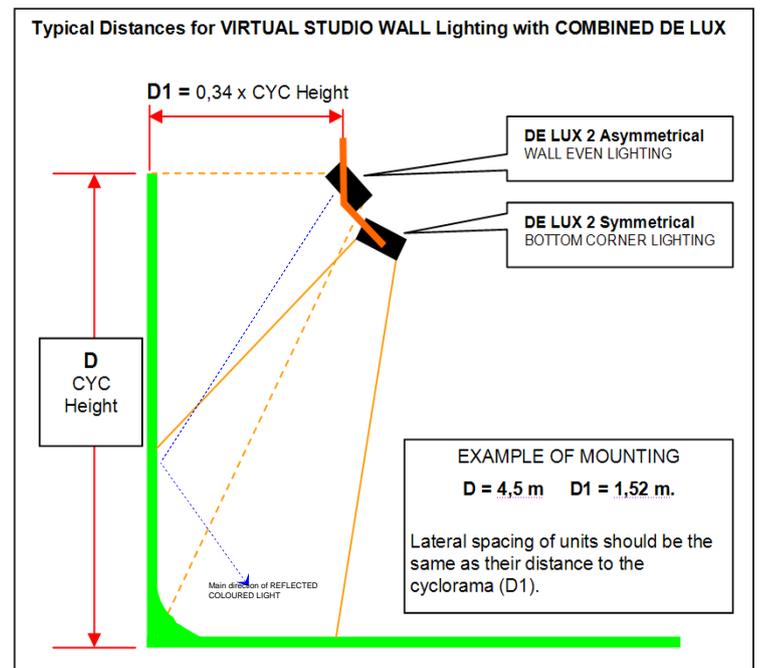
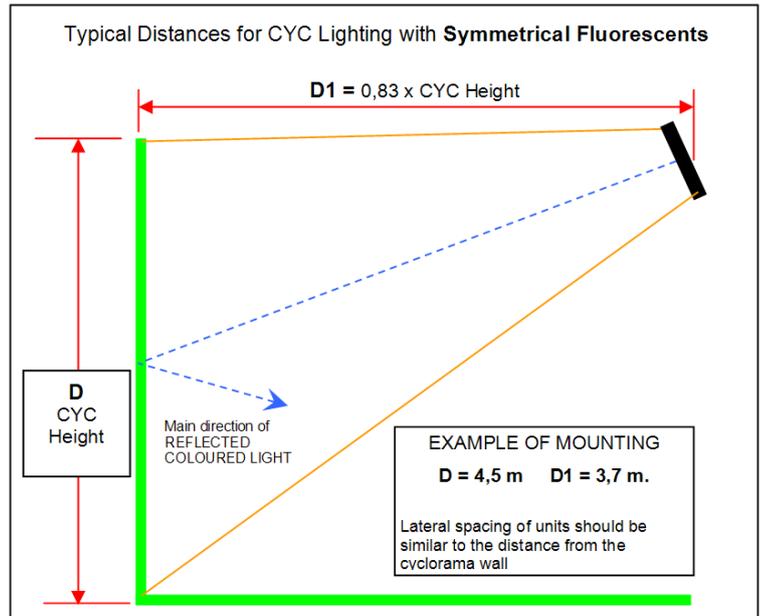
If usual Symmetrical floodlights or soft-lights are used, due to the fact that they will have to be located far from the walls in order to obtain the even distribution of light level between top and bottom, the reflected coloured light will travel in a direction which is the mirror image angle of the incident light on the wall, usually introducing the

problem of having to keep the Presenter far from the wall to avoid **COLOURED GLARE/SPILL** around his/her silhouette.

The best proved system to accomplish this is to use **asymmetrical fluorescent soft-lights for the walls, combined with symmetrical fluorescent soft-lights for the illumination of the infinity curve between the wall and the floor.**

The important point for the lighting system of the wall is to obtain an **EVEN ILLUMINATION** of the **BACKGROUND** with **MINIMUM COLOURED LIGHT REFLECTION**

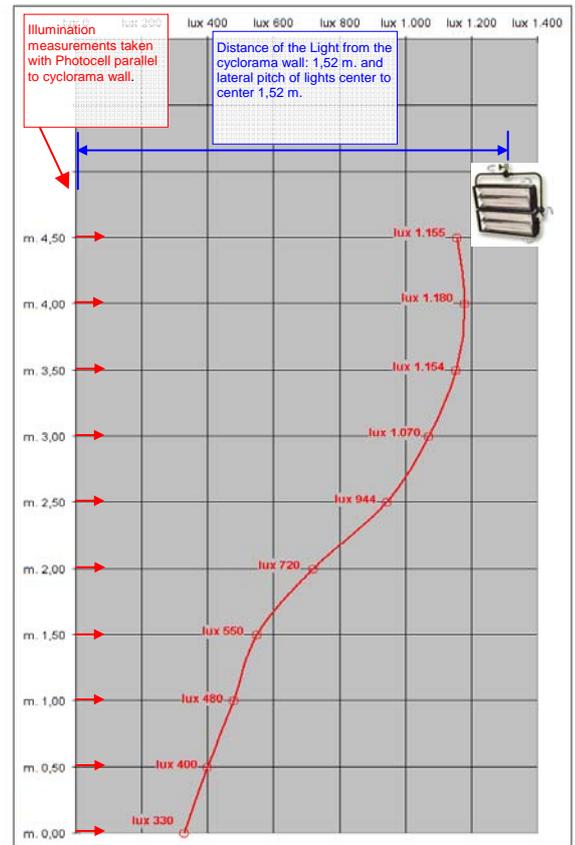
in the direction of the **PRESENTERS**. For this reason it is strongly recommended to utilise **ASYMMETRICAL LIGHTING FIXTURES** purposely designed for this application.



In particular the product recommended by DE SISTI is a combination of a TOP DE LUX 2 Asymmetrical and a BOTTOM DE LUX 2 Symmetrical, the two compartments are individually controllable by DMX (2 channels)...this system allows therefore to have the appropriate light distribution geometry for the even luminance reading from the camera.

At the same time the fact that the lighting emission can be controlled from 100% to 2% linearly and turned off (all by DMX) will allow the LIGHTING DESIGNER to set his preferred combination for the best performances of the DIGITAL SYSTEM and for the appropriate lighting level over the background, without having to be tighten or obliged to use a very high illumination, that obviously causes problems of coloured reflected light.

For the products offered are available lamps choices, such as 3200 or 5600 °K and CRI of either 85 (RGB-three phosphors lamps) or bigger than 92 (penta phosphors or Studio Line = OSRAM).



Combined DE LUX 220W (2 x 2 x 55W)

Variable Asymmetrical Fixture for Virtual Set & Chroma Key Lighting

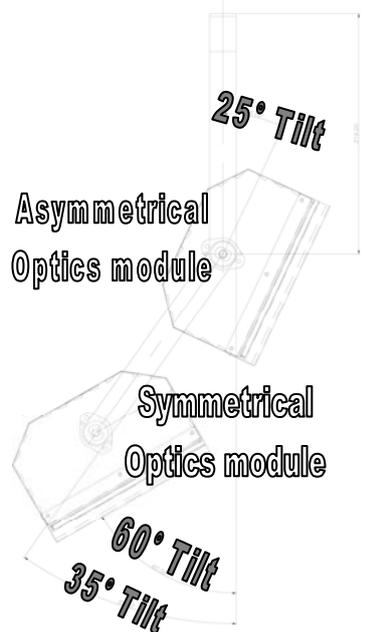
DE LUX 2
Asymmetrical



DE LUX 2
Symmetrical



Typical Tilt Angles on Combined DE LUX





The COMBINED DE LUX, with its Adjustable Asymmetric Beam and the fact that it is really providing the uniform Luminance distribution over the coloured Cyclorama Wall, is effectively introducing Flexibility and Quality within the VIRTUAL SET Concept with:

- Flexibility to Adjust the Uniformity over the Cyc wall, independently from the fixing points and the Cyc Walls Height.
- Stip Lighting of the coloured wall, for main coloured reflection OUT OF AXIS with the Talent and Camera View.
- Individual dimming ability through DMX of Top and Bottom compartments, to modulate the uniformity of luminance and the level of contrast with KEY, FILL & BACKLIGHTS.
- Contained cost and extremely ENERGY SAVING Approach, if compared to other High Quality Methods of Cyclorama Lighting.
- Complete ability to mix and complement LED lighting.

2. PRODUCTION LIGHTING (for Talent or Presenters):

In combination and harmony with the background and floor even lighting, a flexible yet performative system shall be available to provide the proper Lighting to the Talent or the Presenters.

Such a system shall allow a significant Distinction in Lighting Level from the background lighting, in fact it is IDEAL to have the ability of Having the FRONT, and BACKLIGHTS with the ability to produce a double lighting level on the Talent than the BACKGROUND ones. In Syntheses if the BACKGROUND incident light level can reach 400 Lux, the PRODUCTION LIGHTS shall be able to reach 800 Lux on the Subject.

An extreme importance shall be given again to the choice of the lighting sources types and the ability to easily position them in the space, because it is necessary to provide the appropriate results on the Talents Lighting, in such a way that they have the appropriate texture, eye's glitter, dept and tri-dimensional look, specially in consideration that many camera images are CLOSE UPS and that the background digital image will look extremely sharp on the video.

In fact an improper lighting of the Talents will result in a TV image with a nice, brilliant digital background image and poorly perception of the Talents, with flat-dark look and several imperfections.

It has also to be considered that the Talents shall be moving within certain areas and therefore the lighting composition shall take care of this aspect, not only in terms of the types

of lighting instruments, but also with an appropriate HANGING SYSTEM to properly position the sources.

3. SUGGESTED SOLUTION FOR TALENTS MODELLING LIGHTING:

When an Infrared Tracking system for the CAMERAS is utilised in a VIRTUAL STUDIO, it is impossible to use Tungsten Fixture, that may interfere with the TRACKING SYSTEM due to their intense emission of Infrared.

Plus in general the LED Technology is so effective within the De Sisti Range that our recommendations of TECHNICAL SOLUTIONS are based exclusively on COLD LIGHTING SOURCES, with no emission of INFRA RED power and obviously no problem for the IR tracking camera system.

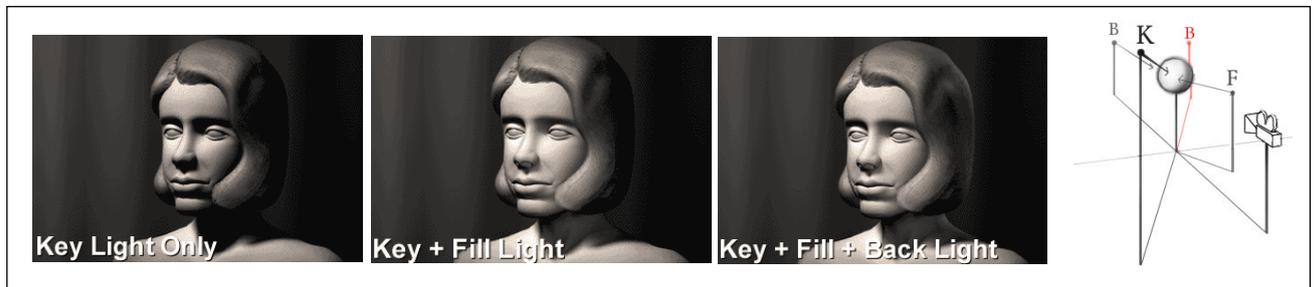
At the same time it is essential to be able to utilise Modelling Lights to accomplish the appropriate look of the Presenter immersed in a bright digital image, with the important aspect of caring of its depth, texture, contour and 3 DIMENSIONAL look when shown on the VIDEO.

To better explain the reason for DE SISTI to offer both LED FRESNELS and LED SOFTLIGHTS, it is made in this document a short recall of the THEORY for modelling and three dimensional aspect Lighting Technique, that also CLEARLY INDUCES the FACT that using only SOFTLIGHT in all directions, at equalized level cannot satisfy the requirements.



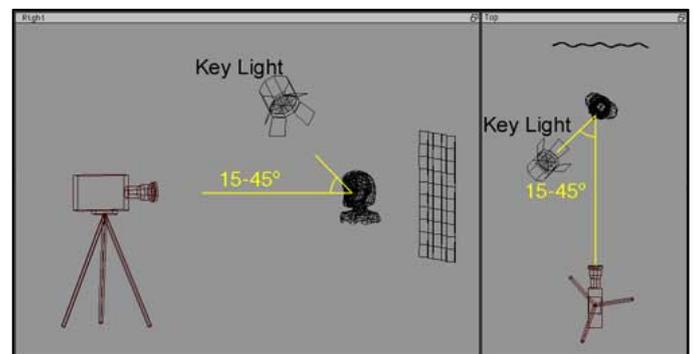
BASIC THEORY FOR MODELLING LIGHT:

Three lights: the **Key Light**, **Fill Light**, and **Rim Light** (also called Back Light), are adjusted to achieve the classic THREE DIMENSIONAL lighting scheme called **three-point lighting**.

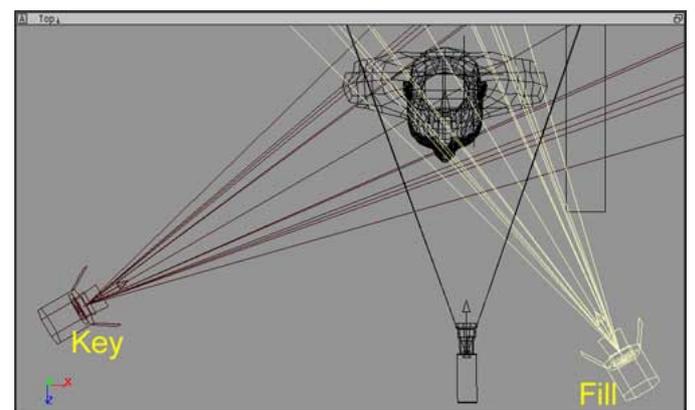


Here's how to set the LIGHTS up in your Studio:

1. Key Light. The *Key Light* creates the subject's main illumination, and defines the most visible lighting and shadows. Your Key Light represents the dominant light source, such as the sun, a window, or ceiling light - although the Key does not have to be positioned exactly at this source. From the top view, offset the Key Light 15 to 45 degrees to the side (to the left or right) of the camera. From a side view, raise the Key Light above the camera, so that it hits your subject from about 15 to 45 degrees higher than the camera angle. The key light is brighter than any other light illuminating the front of the subject, is the main shadow-caster in your scene, and casts the darkest shadows. Specular highlights are triggered by the Key Light.



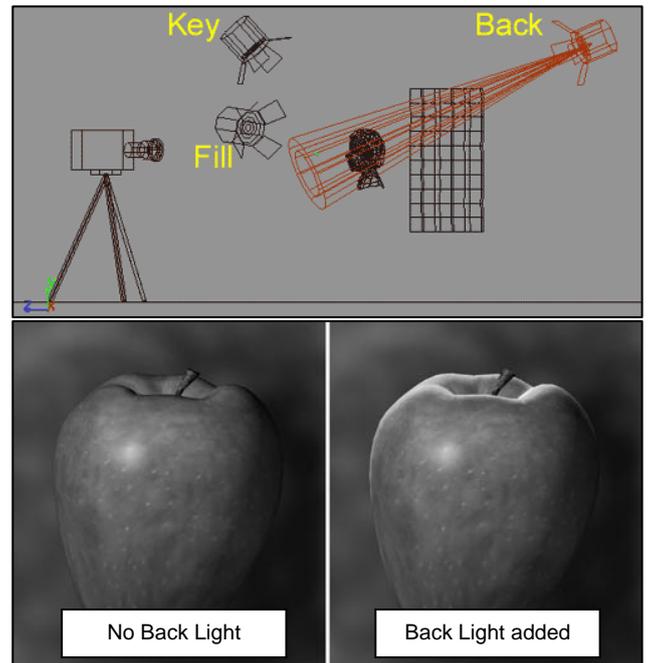
2. Fill Light(s). The *Fill Light* softens and extends the illumination provided by the key light, and makes more of the subject visible. Fill Light can simulate light from the sky (other than the sun), secondary light sources such as table lamps, or reflected and bounced light in your scene. From the top view, a Fill Light should come from a generally opposite angle than the Key - if the Key is on the left, the Fill should be on the right - but don't make all of your lighting 100% symmetrical! The Fill can be raised to the subject's height, but should be lower than the Key. At most, Fill Lights can be about half as bright as your Key (a Key-to-Fill ratio of 2:1). For more shadowy environments, use only 1/8th the Key's brightness (a Key-to-Fill ratio of 8:1). If multiple Fills overlap, their sum still shouldn't compete with the Key. Shadows from a Fill Light shall be very, very Soft.



3. Rim Light (Back Light). The *Rim Light* (also called Back Light) creates a bright line around the edge of the object, to help visually separate the object from the background.

From the top view, add a spot light, and position it behind your subject, opposite from the camera. From the right view, position the Back Light above your subject.

Adjust the Rim Light until it gives you a clear, bright outline that highlights the top or side edge for your subject. Rim Lights can be as bright as necessary to achieve the glints you want around the hair or sides of your subject. A Rim Light usually needs to cast shadows. It is suggested that a Rim light beam is enough controllable to be contained within the main subject being lit, so that it creates a rim of light around the top or side of it, without affecting the background.



That's it. Three-Point Lighting can be a simple starting-point for lighting just about any subject. In a more complex scene, there are other types of lights used as well: Practical Lights, Bounce Lights, Kickers, and Specular Lights, which serve other visual functions.

The vocabulary of describing lights by their visual function is something you can apply in any scene. However, even when you use Key, Fill, and Rim lights, don't think of three-point lighting as an excuse to light by formula, or to make every scene look the same.

You should begin each scene by looking at what is motivated, by which kinds of light would really be in that particular scene. There is usually some direction from which the light is brightest, and that is where the Key light should come from. If the object is back-lit, then there may be a rim, in other cases there isn't one. It is observing the actual colors, tones, contrast, and direction of real light that actually informs how to create a professional Video image with a three dimensional look.

If you are trying to create believable lighting that fits with each unique situation, there's no shortcut to skip studying the motivations and qualities of real lights that would occur in a particular scene.

TYPICAL LIGHTING FIXTURES TO SERVE THE SCOPE:

SPOT LIGHTS – MODELLING LIGHT:

a directional Lights source that produces Sharp Falloff (Shadows have edges). The Hard lights normally can be controlled in their FLOOD position by a front Barndoor, to prevent light from striking unwanted areas. The Most Popular product utilised for this purpose are the FRESNELS, that due to their variable beam between typically 10 to 60° Beam Angle and the ability to shape the beam by the barndoor are a preferred tool for many lighting specialists to be used as Key or backlights, plus benefit of several accessories that really extend their popularity in the Studio lighting.

The DE SISTI Led FRESNELS



LED FRESNEL SUPER SERIES

NEW GENERATION WITH HIGHER OUTPUT AND ENHANCED CRI

The De Sisti LED Fresnel SUPER SERIES is a new range of Fresnel spotlights that utilizes an increased wattage to the high power Chip on Board (COB) LED Array in combination with increased design efficiency to the De Sisti internationally patented optical system. The Super Series has light output increases up to 50% in Tungsten CCT and 72% in Daylight CCT while maintaining the greater than 90 CRI, chromacity performances and equivalent focus range of the Standard Series.

MAIN FEATURES

- // Continuous Light Output at any dimming level (no flicker at any camera speed): the LED ARRAY are supplied with DC current at any dimming level (no PWM)
- // Same Photometric and Geometrical Light Beam performances as on Standard Fresnel (single shadows, appropriate focusing and barndoor control).
- // CRI and TLCI Higher than 90 and Stable Colour Point Emission (no CCT SHIFT)
- // Automatic Thermal Stabilisation of the LED Temperature, Complete silent operation
- // Interchangeable accessories with the conventional De Sisti Range of Tungsten and HMI's



- High Power and Enhanced CRI (Chromaticity Rendering Index) LED FRESNELS:
The full range of FRESNELS (international patent N° WO 2013/024501 A1) is now available with a much higher Output (more than 50% in full flood than the previous version) and with a CRI bigger than 90 in both the Tungsten and the Daylight Balanced CCT versions.
The Tungsten Balanced CCT versions have been successfully verified with Professional Cameramen in TV Studio in order to be combined with conventional Filament Lamp Fixtures.
The new Daylight versions are rated at 5.600°K with the CRI greater than 90 and are matching other types of available sources in the market such as HMIs and Daylight Fluorescents.
- Increased Light output from previous models:
 - The former 40W is now 55W (37% increase in power) & a Light Output Increase of 40% more than the previous version in full flood, but with a wider Beam angle.
 - The former 90W is now 110W (22% increase in power) & a Light Output Increase of 56% than the previous version in full flood at the same Beam Angle.
 - The former 120W is now 150W (25% increase in power) & a Light Output Increase of 56% than the previous version in full flood at the same Beam Angle.

It is evident the exceptional increase in efficiency characterizing the new range of LED FRESNEL. With the following unique features:

- high Light output and appropriate Fresnel type Beam (full Barndoor, proper shadows, smooth field)
- High CRI, greater than 90
- super smooth DMX dimming from 100% to 0%
- Full DC Output and Flicker Free operation at any Shutter or Frame/Picture per second speed,
- Completely silent operation

the DE SISTI LED FRESNELS set a new standard for the Professional Lighting Industry choice for a HIGH QUALITY, HIGH EFFICIENCY and ENERGY SAVING White sources.

SOFT LIGHTS:

The projected Shadows are extremely soft.

Many different products are available to produce Soft light, the major application is for FILL LIGHT, but often they could also be used as SOFT KEY LIGHT.



LED SOFTLIGHT SERIES

OUR TECHNOLOGY ADVANCEMENT IN LED LIGHTING

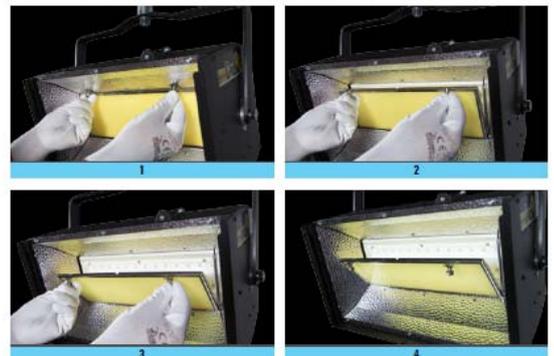


The De Sisti **LED Softlight SERIES** is a new range of LED Softlights utilizing the Remote Phosphor technology (CRI bigger than 90) with a LED color mixing chamber within the instrument to produce a smooth, even, soft beam projection, with very diffused shadow. The optical system eliminates any pixel effect which is created by all Panel type lights. The LED Softlight is ideal for multiple camera set ups and is available with various honeycomb control screens and intensifier options for extra control. All of the electronics are integrated within the fixture and feature DC DMX dimming control from 0 to 100% with zero flicker even with high speed cameras.

MAIN FEATURES

- // Super High CRI using interchangeable Remote Phosphors Technology (switching between Tungsten or Daylight Balanced CCT)
- // Continuous Light Output at any dimming level (no flicker at any camera speed): the LED are supplied with DC current at any dimming level (no PWM)
- // Shadow-less White Light Projection, with or without accessories
- // Contained Size, reduced weight and exceptional efficiency for energy savings and lit Talent comfort
- // Automatic Thermal Stabilisation of the LED Temperature and complete silent operation

INTERCHANGEABLE REMOTE PHOSPHORS PANEL TUNGSTEN OR DAYLIGHT BALANCED CCT



POLE OPERATED VERSION (SOFT LED 2 AND SOFT LED 4)



with an exceptionally COLOR RENDERING INDEX (CRI) higher than 95 and a light output matching an almost twice the power Fluorescent fixture, this innovative Remote Phosphors LED Luminaire Range is the real answer to the Lighting Designers looking for:

- a controlled Beam White Source, ideal for multiple camera use in the studio, with more effective control of the beam projection and effective Honeycombs
- producing SOFT SHADOWS,
- with a beautiful EVEN DISTRIBUTION and a real quality projection with precise reference white.
- NO PIXEL EFFECT from the LED (which is a problem from many other Brand's LED PANELS in the market).
- Contained Size, reduced weight and exceptional efficiency for energy savings and lit Talent comfort.
- Choice of Manual or Pole operation, the full dimming is through DMX and the LEDs are supplied with DC throughout the 0 to 100% dimming range, for a full FLICKER FREE operation and super smooth cross fades.

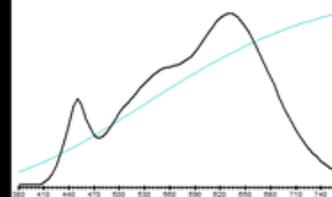
COLORIMETRY DATA (EBU – TLCI System)

Soft 2 hor 3m cono 8-3-2014 : CCT = P3235 (+0.5)
TLCI-2012 : 97 (P3235)



Television Lighting Consistency Index-2012

Sector	Lightness	Chroma	Hue
R	0	0	0
R/Y	0	0	0
Y	0	0	0
Y/G	0	0	0
G	0	0	0
G/C	0	0	+
C	0	0	+
C/B	0	0	0
B	0	-	-
B/M	0	0	+
M	0	0	+
M/R	0	0	+



BEAM CONTROL & SOFT SHADOWS WITH ANY ACCESSORY UTILIZED



OTHER TYPES OF EFFICIENCY LIGHTS available for special requirements:

LEDKO LED ELLIPSOIDAL (PROFILE) SPOTS



The LEDKO is a 120W LED PROFILE SPOT and it is available in the above 4 versions

MOVING LIGHTS:

A vast range of top quality products is available for Spot/Zoom optics, Wash and Beam types motorized effects.



LED LIGHTING



4. LIGHTING SUSPENSIONS SYSTEM - SUGGESTED SOLUTION:

Due to the nature of production the design suggested by De Sisti is a very flexible Track & Beam Grid, with integrated MAINS & DMX distribution, allowing to position every type of lighting fixture everywhere in the production area and allowing every fixture to be located at any height, for a perfect PORTRAIGHT LIGHTING of the journalists, in order to provide a TOP QUALITY image and allow the LIGHTING DESIGNER any possible solution or repositioning of the Lighting at their needs.

All of this is accomplished at contained cost, without any limitation of accessibility to the hardware.

Nevertheless it is RECOMMENDED to equip the STUDIO with a D RAIL TRACK and BEAM SYSTEM as shown in the following PLANT VIEW and utilise BRACKABLE POLE OPERATED TROLLEYS & MINI SPIDER PANTOGRAPHES, in order to be able to move the lights in position from the Studio Floor, without the need to have a ladder in the Studio, that can damage the floor and that is anyway introducing a time consuming operation in case a light re-adjustment is required.

For the same reason we are providing Pole operated Lights on the Technical offer.

The D RAIL with BUILT IN MAINS & DMX DISTRIBUTION system is introducing a contained cost, but we truly believe it is also introducing significant advantages in terms of

- RAPIDITY of OPERATION
- NO NEED TO AIM THE LIGHTS WITH LADDERS (unless for Maintenance reasons)
- MORE FREEDOM FOR THE LIGHTING DESIGNER to EXPRESS HIS CREATIVITY due to the easier possibility to position the LIGHTING POINTS.
- BETTER IMAGE RESULTS due to the above.
- SAFE FIXING OF THE LIGHTING INSTRUMENTS
- A FULL COVERAGE OF MAINS & DMX CONNECTIONS ON THE PRODUCTION AREA

D Rail with Built In
Mains & DMX Distribution



The **MINI SPIDER**, is a unique stable support for the Lighting fixture.

The special Shape of the Scissor Arms provide additional stability to the moving part of the pantograph, yet the fact that they are built in a special structural fiber material make this pantograph the lightest weight in the industry (the Self weight of a 4 m. net extension **MINI SPIDER**, for 6 m. hanging heights, complete with Mains and DMX Load circuits is only 13,5 kg. including all connection cables and sockets/plugs).

The following **HIGHLIGHTS** are representing the innovation introduced by the **MINI SPIDER**:

1. A stable support at any height of the lighting fixture.
2. A special cable management to keep electrical conductor within the scissor arms structure and avoid stress on cables without severe bending radius.
3. An extremely contained Self Weight of 13,5 kg. (to minimize loading the Studio ceiling).
4. Compact height when fully closed to maximize the use of the Studio height.
5. Ability to lift 30 kg. net, that can carry the majority of lighting fixtures for studio use.
6. Built In Mains and DMX Distribution on the moving part.
7. Compatible with the all **D RAIL** Range for full flexibility of positioning the Lighting Fixture.



The **MINI SPIDER** is the product that makes the Pole Operated positioning of your studio **LIGHTS** affordable in costs and provide the best flexibility to the lighting system.

Energy efficiency is also about being able to optimally locate your lighting fixtures to obtain the best picture.

5. STUDIO SIZES, ASPECT RATIO & CYCLORAMA DIMENSIONING

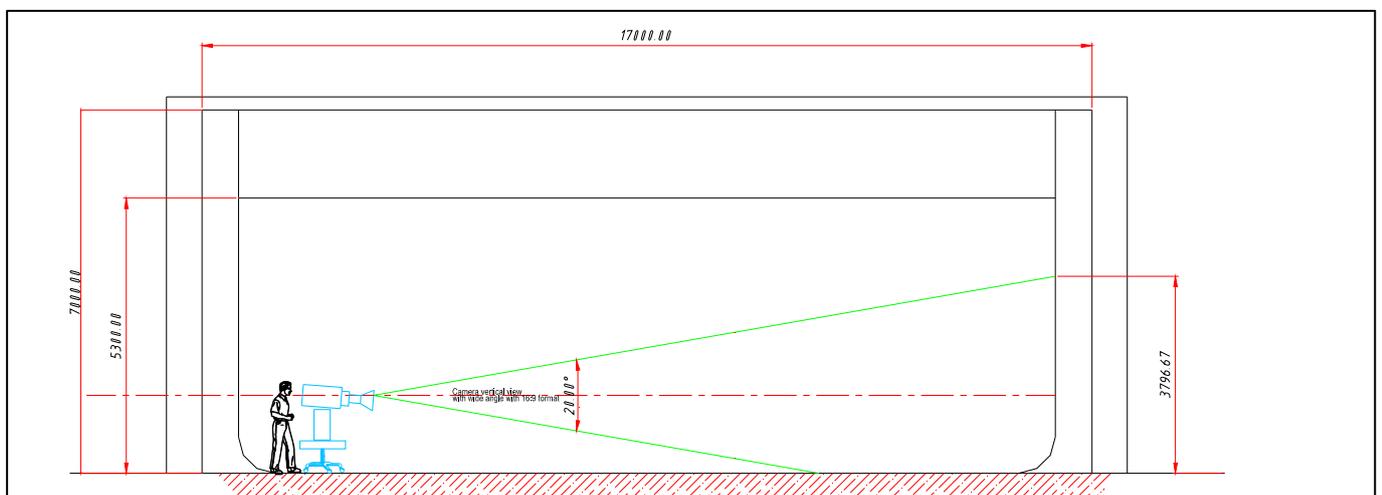
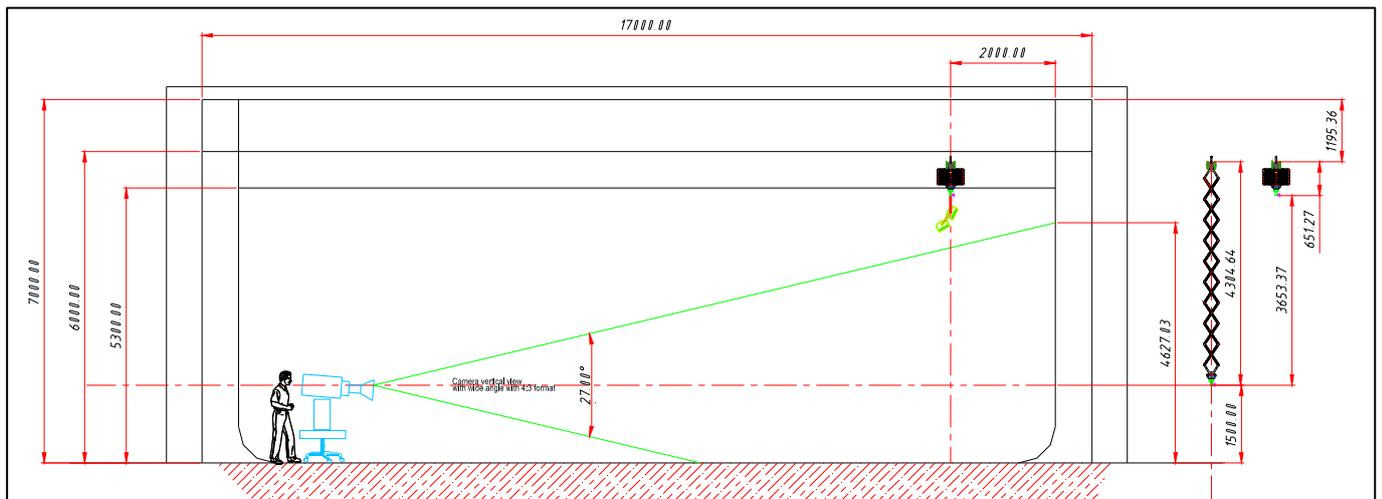
It is evident that the ASPECT RATIO of the Camera is a basic design parameter that influences the ratio between the studio walls length and the clear Cyclorama height, influencing therefore the required Studio Height and the choice of Rigging technique.

The illustration here shows the net CYCLORAMA or CLEAR SET Height calculated for the specific Studio Sizes.

It is always recommendable to verify the required dimensions considering both the 4:3 and the 16:9 CAMERA aspect ratios, in order to provide the Studio with the Flexibility to work with either the SD or HD Standards.

In the VIRTUAL STUDIO analysed here, the Minimum net HEIGHT of the CYC WALL, required for a LARGE CAMERA SHOT is

Height of 4,7 m. with a 4:3 ratio and
Height of 3,8 m. with a 16:9 ratio.



6. SUGGESTED LAYOUT

