CONTENT INFORMATION PACKAGE
Next Generation Cinema Technology Test Material

Version 2019-04-16

Table of Contents
Introduction ........................................................................................................................................ 2
Purpose ........................................................................................................................................ 2
Test Shoot Design ........................................................................................................................ 2
  Visual Design ............................................................................................................................. 3
  Cameras ..................................................................................................................................... 4
  MOCO System .......................................................................................................................... 4
  Performance ............................................................................................................................... 5
  Lighting .................................................................................................................................... 6
  Near-Set .................................................................................................................................... 7
  Post Production ......................................................................................................................... 7
  Color Correction ......................................................................................................................... 7
  ACES ........................................................................................................................................ 8
Summary ....................................................................................................................................... 8
Acknowledgements ..................................................................................................................... 8
About the Science and Technology Council .............................................................................. 8
Appendix ..................................................................................................................................... 9
End Notes .................................................................................................................................... 27
Introduction

Technical boundaries are shifting as pioneers pave the path to higher frame rate, higher resolution and high dynamic range advancements. Thus, the creative palette is expanding and with more options comes the underlying question, how will this trend shape the future of digital motion picture content creation? In order to understand how far we can go we need sufficient reference materials to manipulate and experiment with. Understanding the limits of these advances is necessary for motion picture professionals and manufacturers to make informed decisions about the way in which the image will be affected.

Purpose: Producing Suitable Material

The Science and Technology Council, recognizing the need for useful royalty-free motion picture test materials to support the industry’s exploration of technology-enabled next-generation cinematic experiences such as higher frame rates (HFR), high brightness (HB) and high dynamic range (HDR) displays, wider color gamut (WCG) and wider shutter angle, conducted a visual test shoot. The Science and Technology Council set out to clearly define the requirements for such test material to the point where a useful set of digital motion picture test materials could be designed, produced and distributed to the industry for research and academic use. Other test material may exist, but that material is not believed to be available to the industry on an unrestricted, royalty-free basis.

Test Shoot Design

Initial planning of this project began in early November 2013 by the Next Generation Cinema Technology working group (NGCT). The Academy of Motion Picture Arts and Sciences’ Science and Technology Council created this committee to support the exploration of producing suitable digital test material. The NGCT working group consisted of Academy Council members and staff, cinematographers and other industry experts. In the preceding months of discussions, the NGCT working group agreed on the best practice for generating digital test material. On March 13th 2014 the actual shoot took place on the fourth-floor common area of the Pickford Center for Motion Picture Study and was shot in one day by director Howard Lukk and director of photography David Stump, ASC along with a crew of motion picture professionals. The test shoot utilized two different cameras, a selected range of frame rates and resolution rates, composed as one single scene to be used for repeated passes [see Table 1].
Table #1

<table>
<thead>
<tr>
<th>Camera: ARRI Alexa Studio XT</th>
<th>Camera: Sony F65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame Rate</td>
<td>Resolution</td>
</tr>
<tr>
<td>24fps</td>
<td>2k</td>
</tr>
<tr>
<td>48fps</td>
<td>2k</td>
</tr>
<tr>
<td>60fps</td>
<td>2k</td>
</tr>
<tr>
<td>120fps</td>
<td>2k</td>
</tr>
</tbody>
</table>

VISUAL DESIGN

The visual elements of the test shoot were staged using selected objects with the intention of purposefully testing the limits of contrast, exposure, and panning speed judder. We aimed for a challenging shot that would encompass various reflective surfaces, saturated colors, and a mix of exterior and interior lighting [see Figure 1a and Figure 1b]. Furthermore, all the test parameters were contained into a single shot which was repeated in each pass using one camera per sequence mounted onto a motion control rig. It was important to maintain consistency through each pass so much discussion went on about achieving continuity for our production. The entire sequence of the visual test shoot was carefully planned out and a test day was organized to record sample footage to be used for review for the workflow analysis.

Figure 1a. Sculpture--life size lucite nude torso [highlight details], circular chafing dishes [specular highlights], small bright foil center pieces blowing in wind [motion or compression artifacts].
Figure 1b. Stained glass window [contrast ratio, highlight sky exposure], hanging neon sign. Exposure outside is considerably brighter. Daylight/Tungsten interior.

CAMERAS
For our production we shot with the ARRI Alexa Studio XT and the Sony F65. These two cameras were ultimately chosen based on the capabilities required for our test parameters, their common use within the industry and equipment availability. We wanted to capture uncompressed digital data and chose to shoot each camera in its optimal format (ARRI RAW & F65RAW). We used the same Leica Summilux-C 25mm prime lens with each camera.

MOCO SYSTEM
Both cameras were directly mounted onto the same motion control (MOCO) rig in order to maintain precise control needed to keep all shots consistent for analysis. By maintaining the precise control the visual distraction caused by variation in photography would be minimized. General Lift provided a JetRail Dolly motion control system along with the stereo head which was originally designed and used for filming THE HOBBIT. To control the rig, operators used Kuper Controls Motion Control PC. Operator Josh Cushner with assistants Rob Menapace and Jody Holdren carried out initial set-up, programming and oversight of the system. For our production we used three sections of 8ft track, which ran the length of the room [see Figure 2]. The motion control camera system was a simple set-up that moved in the same direction as the lead and came to rest when she did [see Figure 3].

Figure 2. MOCO system & track.
PERFORMANCE
This MOCO system created a specific demand on the actress, Bianca Rusu ‘Goth Girl’, who needed to time her movements to a preprogrammed camera move for each take. An entire day of rehearsal was necessary to ensure her accuracy.

Figure 3. Blocking diagram by Leo Zahn. Staged at the Pickford Center for Motion Picture Study.
LIGHTING
Our approach to lighting the scene was based on mixing un-corrected 3200K tungsten units interior (inside the art gallery) with daylight mirrored, bounced and reflected from outside via large and small mirrors, reflectors and shiny boards [see figure 4]. Bright daylight streamed into the gallery interior through windows and doorways, in the form of pure fill and shafts of bright highlights directed at artwork. The modest lighting package contained more than a dozen PAR 16 100W narrow and JDR100W narrow beam units, a few 1K and 2K fresnels, and half a dozen Source Four Lekos as well as PAR 64 1K cans. Each MOCO pass had the same lighting package and there was no diffusion applied. However, the day exterior light offered a challenging obstacle to maintaining
lighting continuity as the shoot went from morning with hazy conditions to late afternoon with sunny conditions.

NEAR-SET
The footage captured by the ARRI Alexa Studio XT was recorded onto Codex Capture Packs and the Sony F65 used SR Memory cards. Once the media was filled, the raw footage was then cloned into the Codex Vault. Stephen Ceci, a consultant from Codex, used the Vault to archive the raw media to 2 external drives and to LTO 5 tapes (LTFS). In addition, dailies were created using the Codex Vault, which generated ProRes 422 HQ files with 3D LUT & Burn in for each take. Gray Marshall over saw the distribution of the archived materials and dailies to our post-production team.

POST PRODUCTION
The aim of our production was to generate professional looking test material for analysis. Therefore, our focus in post-production was to maintain continuity by performing technical grades that maintain consistency between shots. The Academy Color Encoding System (ACES) was used for management.

COLOR CORRECTION
The grading sessions took place at the Pickford Center for Motion Picture Study by colorist Lou Levinson using Baselight ONE color grading system. The Reference Rendering Transform (RRT) and P3D60 Output Device Transform (ODT) from ACES v1.0 were used to view the ACES files [see Figure 5]. The reference look was established for a cinema environment, using an NEC-800C digital cinema projector calibrated to P3 primaries and with the ACES white point at a luminance of 48 cd/m² (chromaticities: x=0.32168 y=0.33767). P3 high dynamic range grade and all Rec. 709 grades used the Dolby PRM-4200 Professional Reference Monitor calibrated to the corresponding setup. With the cinema master as a reference, trim passes were performed for a variety of other display setups, though not all of which have been made available. As stated earlier the intention of these trim passes was to give each take the same appearance but also utilize the brightness to show highlight details. The end results from our post-production process were files graded and ready to be made available.

Graded deliverables that were established and are available are:

<table>
<thead>
<tr>
<th>Display Primaries</th>
<th>Display Calibration White</th>
<th>Y (cd/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P3</td>
<td>ACES; x=0.32168 y=0.33767</td>
<td>48 &lt;reference grade&gt;</td>
</tr>
<tr>
<td>P3</td>
<td>ACES; x=0.32168 y=0.33767</td>
<td>100</td>
</tr>
<tr>
<td>P3</td>
<td>ACES; x=0.32168 y=0.33767</td>
<td>150</td>
</tr>
<tr>
<td>P3</td>
<td>ACES; x=0.32168 y=0.33767</td>
<td>200</td>
</tr>
<tr>
<td>P3</td>
<td>ACES; x=0.32168 y=0.33767</td>
<td>600</td>
</tr>
<tr>
<td>Rec. 709</td>
<td>D65; x=0.3127 y=0.329</td>
<td>100</td>
</tr>
<tr>
<td>Rec. 709</td>
<td>D65; x=0.3127 y=0.329</td>
<td>600</td>
</tr>
</tbody>
</table>
Figure 5. ACES Workflow for the Test Shoot

ACES
The Academy Color Encoding System (ACES) is the product of an industry-wide collaboration spear headed by the Science and Technology Council in response to the industry's growing concerns about digital preservation and the future needs of the world's most visionary filmmakers. ACES is a supporting tool for high-fidelity digital motion picture imagery that is paving the way for expanded creative choices, precisely controlled color management and archive-ready digital masters. For more information please visit [http://www.oscars.org/science-technology/council/projects/aces.html](http://www.oscars.org/science-technology/council/projects/aces.html).

Summary
This paper has discussed the reasons for which the Science and Technology Council sought to invest in creating royalty-free digital motion picture test materials and the intended use of them. Also described was the design and production process for capturing quality visual reference sources.

Acknowledgements
Special thanks to the many amazing people who contributed to this project. Please see the cast and crew list on page 25.

About the Science and Technology Council
The Academy's Science and Technology Council was created in 2003 in response to the explosion in digital motion picture technology, which continues to transform the production, post-production and exhibition of movies. The Council's activities are focused on industry-wide problem-solving and research projects, preserving the history of motion picture technology, and educating professionals and the public about the role of technology in moviemaking.
Appendix

VISUAL TEST SHOOT CAMERA SPECIFICATIONS ................................................................. 10
LENS SPECIFICATIONS ....................................................................................................... 10
TEST SHOOT INFORMATION ............................................................................................... 11
SLATE AND METADATA INFORMATION ........................................................................... 12
FILE SIZE OF RAW FILES CAPTURED ............................................................................. 13
REFERENCE TEST FRAME ................................................................................................. 14
TEST SHOOT SCRIPT ......................................................................................................... 15
GENERIC SCENE DESCRIPTION CATALOG ....................................................................... 16
NGCT BEHIND-THE-SCENES PHOTOS ............................................................................ 22
NGCT DCP WORKFLOW ...................................................................................................... 23
NGCT DELIVERABLES MATRIX ....................................................................................... 24
NGCT TEST SHOOT CREW AND ACTOR LIST ................................................................. 25
NGCT HIGH DYNAMIC RANGE TRIAL ............................................................................... 27
PRODUCT SPECIFICATION SHEET – BASELIGHT ONE .................................................. 28
PRODUCT SPECIFICATION SHEET – DOLBY PROFESSIONAL REFERENCE MONITOR
PRM-4200............................................................................................................................... 29
BIBLIOGRAPHY .................................................................................................................. 30
Visual Test Shoot Camera Specifications

<table>
<thead>
<tr>
<th>Camera</th>
<th>Sensor</th>
<th>Bit Depth</th>
<th>Recording Format</th>
<th>Recording System</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARRI Alexa Studio XT</td>
<td>35 Format ALEV III CMOS sensor w/dual gain architecture (dga) and Bayer pattern color filter array</td>
<td>12bit</td>
<td>ARRI Raw</td>
<td>Codex Capture Packs</td>
</tr>
<tr>
<td>Sony F65</td>
<td>Single sensor, 1-chip Super 35 mm type CMOS</td>
<td>16bit</td>
<td>F65RAW</td>
<td>SR-Memory</td>
</tr>
</tbody>
</table>

Lens Specifications

<table>
<thead>
<tr>
<th>Lens</th>
<th>Aperture</th>
<th>Close Focus</th>
<th>Focus Rotation</th>
<th>Iris Rotation</th>
<th>Length</th>
<th>Front Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leica Summilux-C 25mm</td>
<td>T1.4-T22 + fully closed</td>
<td>.31m /1'0&quot;</td>
<td>300°</td>
<td>180°</td>
<td>142mm /5.6&quot;</td>
<td>95mm /3.7&quot;</td>
</tr>
</tbody>
</table>
Test Shoot Information

<table>
<thead>
<tr>
<th>CAMERA</th>
<th>ROLL</th>
<th>TAKE</th>
<th>FRAME RATE</th>
<th>T STOP</th>
<th>EI</th>
<th>SHUTTER ANGLE</th>
<th>FILE NAME</th>
<th>FRAME RANGE</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARRI Alexa Studio XT</td>
<td>Roll C003</td>
<td>take 14</td>
<td>24fps</td>
<td>T 8½</td>
<td>EI800</td>
<td>180</td>
<td>C003C006</td>
<td>1888</td>
<td>ND Pancro .3</td>
</tr>
<tr>
<td>ARRI Alexa Studio XT</td>
<td>Roll C002</td>
<td>take 7</td>
<td>48fps</td>
<td>T 8¼</td>
<td>EI800</td>
<td>180</td>
<td>C002C007</td>
<td>3928</td>
<td></td>
</tr>
<tr>
<td>ARRI Alexa Studio XT</td>
<td>Roll C002</td>
<td>take 6</td>
<td>60fps</td>
<td>T 8½</td>
<td>EI800</td>
<td>180</td>
<td>C002C006</td>
<td>4807</td>
<td></td>
</tr>
<tr>
<td>ARRI Alexa Studio XT</td>
<td>Roll C002</td>
<td>take 4</td>
<td>120fps</td>
<td>T 5.6½</td>
<td>EI800</td>
<td>180</td>
<td>C002C004</td>
<td>9604</td>
<td></td>
</tr>
<tr>
<td>SONY F65</td>
<td>Roll B007</td>
<td>take 3</td>
<td>24fps</td>
<td>T 8</td>
<td>EI1000</td>
<td>180</td>
<td>B007C003</td>
<td>2047</td>
<td>mech shutter</td>
</tr>
<tr>
<td>SONY F65</td>
<td>Roll B007</td>
<td>take 5</td>
<td>48fps</td>
<td>T 8</td>
<td>EI1600</td>
<td>180</td>
<td>B007C006</td>
<td>4034</td>
<td>mech shutter</td>
</tr>
<tr>
<td>SONY F65</td>
<td>Roll B007</td>
<td>take 8</td>
<td>60fps</td>
<td>T 8</td>
<td>EI2000</td>
<td>180</td>
<td>B007C009</td>
<td>4878</td>
<td></td>
</tr>
<tr>
<td>SONY F65</td>
<td>Roll B008</td>
<td>take 15</td>
<td>120fps</td>
<td>T 8</td>
<td>EI4000</td>
<td>180</td>
<td>B008C003</td>
<td>9479</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: While the 2K (ARRI Alexa) shots varied the aperture and filtration to compensate for the varying frame rates in order to maintain consistent exposure, the 4K (Sony F65) takes were each intentionally shot with the same aperture and no filtration, varying the exposure as a function of frame rate (and resulting exposure time of each frame). Thus, for the 4K material, the 120-fps take is properly exposed, and the slower frame rates (and especially the 24-fps take) were overexposed and clip in the highlights.

(The exposure index [EI] on the F65 was set to compensate for this variation in frame rate and exposure time, but this setting does not actually alter the output of the sensor, merely the metadata attached to the frames for interpretation by downstream postprocessing. The result is that the limits of dynamic range [saturation point and noise floor] effectively shift with frame rate, reflecting that the 24-fps frames [with a shutter time of 1/48 s] received 2½ stops [5 times] more exposure than the 120-fps frames [with a shutter time of 1/240 s]. Also, although the 120-fps take was slated as having the EI set to 4000, the actual EI [per the metadata] was 3200, which is apparently the maximum possible on the camera.)
### Slate and Metadata Information

**24fps sequence: Slate Info ARRI Alexa Studio XT [example]**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TITLE</strong></td>
<td>The Academy NGCT Test</td>
</tr>
<tr>
<td><strong>DIRECTOR</strong></td>
<td>Howard Lukk</td>
</tr>
<tr>
<td><strong>DIRECTOR OF PHOTOGRAPHY</strong></td>
<td>David Stump, ASC</td>
</tr>
<tr>
<td><strong>FPS</strong></td>
<td>24</td>
</tr>
<tr>
<td><strong>RESOLUTION</strong></td>
<td>2k</td>
</tr>
<tr>
<td><strong>CAMERA</strong></td>
<td>ARRI Alexa Studio XT</td>
</tr>
<tr>
<td><strong>SHUTTER ANGLE</strong></td>
<td>180</td>
</tr>
<tr>
<td><strong>SHUTTER TYPE</strong></td>
<td>Electronic</td>
</tr>
<tr>
<td><strong>FILTER</strong></td>
<td>ND Panchro 0.3</td>
</tr>
<tr>
<td><strong>T-STOP</strong></td>
<td>T 8 1/3</td>
</tr>
<tr>
<td><strong>EI</strong></td>
<td>800</td>
</tr>
<tr>
<td><strong>ROLL</strong></td>
<td>C003</td>
</tr>
<tr>
<td><strong>TAKE</strong></td>
<td>14</td>
</tr>
</tbody>
</table>

**24fps sequence: Slate Info Sony F65 [example]**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TITLE</strong></td>
<td>The Academy NGCT Test</td>
</tr>
<tr>
<td><strong>DIRECTOR</strong></td>
<td>Howard Lukk</td>
</tr>
<tr>
<td><strong>DIRECTOR OF PHOTOGRAPHY</strong></td>
<td>David Stump, ASC</td>
</tr>
<tr>
<td><strong>FPS</strong></td>
<td>24</td>
</tr>
<tr>
<td><strong>RESOLUTION</strong></td>
<td>4k</td>
</tr>
<tr>
<td><strong>CAMERA</strong></td>
<td>Sony F65</td>
</tr>
<tr>
<td><strong>SHUTTER ANGLE</strong></td>
<td>180</td>
</tr>
<tr>
<td><strong>SHUTTER TYPE</strong></td>
<td>Mechanical</td>
</tr>
<tr>
<td><strong>FILTER</strong></td>
<td></td>
</tr>
<tr>
<td><strong>T-STOP</strong></td>
<td>T 8</td>
</tr>
<tr>
<td><strong>EI</strong></td>
<td>1000</td>
</tr>
<tr>
<td><strong>ROLL</strong></td>
<td>C003</td>
</tr>
<tr>
<td><strong>TAKE</strong></td>
<td>3</td>
</tr>
</tbody>
</table>

### Additional Metadata Info

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOCATION</strong></td>
<td>Pickford Center for Motion Picture Study, 4th floor</td>
</tr>
<tr>
<td><strong>DATE</strong></td>
<td>March 13, 2014</td>
</tr>
<tr>
<td><strong>SHOOT TIME</strong></td>
<td>Sony F65 12:35-1:30pm, Arri Alexa 2:20-4:15pm</td>
</tr>
<tr>
<td><strong>DIGITAL FILE NAME</strong></td>
<td>C003C006_140313_R4PZ.ari [example]</td>
</tr>
<tr>
<td><strong>FRAME COUNT</strong></td>
<td>[0205903-0209859] 3,956 [example]</td>
</tr>
<tr>
<td><strong>RUNTIME</strong></td>
<td>00:01:03:22</td>
</tr>
<tr>
<td><strong>MOCO RIG</strong></td>
<td>JetRail Dolly Motion Control System with stereo head</td>
</tr>
<tr>
<td><strong>LENS</strong></td>
<td>Leica Summilux-C 25mm prime</td>
</tr>
</tbody>
</table>
### File Size of Raw Files Captured

<table>
<thead>
<tr>
<th>CLIP</th>
<th>SIZE</th>
<th>CLIP</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C002C001</td>
<td>78.46 GB</td>
<td>B007C001</td>
<td>21.7 GB</td>
</tr>
<tr>
<td>C002C002</td>
<td>71.9 GB</td>
<td>B007C002</td>
<td>22.3 GB</td>
</tr>
<tr>
<td>C002C003</td>
<td>78.6 GB</td>
<td>B007C003</td>
<td>21.5 GB</td>
</tr>
<tr>
<td>C002C004</td>
<td>70.2 GB</td>
<td>B007C004</td>
<td>25.6 GB</td>
</tr>
<tr>
<td>C002C005</td>
<td>43.5 GB</td>
<td>B007C005</td>
<td>26.3 GB</td>
</tr>
<tr>
<td>C002C006</td>
<td>34.6 GB</td>
<td>B007C006</td>
<td>42.4 GB</td>
</tr>
<tr>
<td>C002C007</td>
<td>28.4 GB</td>
<td>B007C007</td>
<td>45 GB</td>
</tr>
<tr>
<td>C002C008</td>
<td>26.8 GB</td>
<td>B007C008</td>
<td>612.2 MB</td>
</tr>
<tr>
<td>C002C009</td>
<td>1.2 GB</td>
<td>B007C009</td>
<td>51.2 GB</td>
</tr>
<tr>
<td>C003C001</td>
<td>22.2 GB</td>
<td>B007C010</td>
<td>21.8 GB</td>
</tr>
<tr>
<td>C003C002</td>
<td>20.8 GB</td>
<td>B007C011</td>
<td>25.4 GB</td>
</tr>
<tr>
<td>C003C003</td>
<td>17.9 GB</td>
<td>B007C012</td>
<td>25.6 GB</td>
</tr>
<tr>
<td>C003C004</td>
<td>18.1 GB</td>
<td>B008C001</td>
<td>30.2 GB</td>
</tr>
<tr>
<td>C003C005</td>
<td>5.1 GB</td>
<td>B008C002</td>
<td>29.7 GB</td>
</tr>
<tr>
<td>C003C006</td>
<td>32.2 GB</td>
<td>B008C003</td>
<td>49.5 GB</td>
</tr>
<tr>
<td>C003C007</td>
<td>14.3 GB</td>
<td>B008C004</td>
<td>18.3 GB</td>
</tr>
<tr>
<td>C003C008</td>
<td>47 GB</td>
<td>B008C005</td>
<td>50.2 GB</td>
</tr>
<tr>
<td>C003C009</td>
<td>62.3 GB</td>
<td>B008C006</td>
<td>54.2 GB</td>
</tr>
<tr>
<td>C003C010</td>
<td>124.6 GB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C003C011</td>
<td>35.2 GB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reference Test Frame

At the beginning of each clip and following the electronic slate, there is a frame (fig 1.) containing a shot of the Macbeth (X-Rite) ColorChecker Color Rendition Chart and a custom designed three-dimensional globe with a 99% reflectance characteristic for white reference and a center black void for black reference.

Information about the Macbeth ColorChecker is readily available online.

Figure 1. Special reference frame included on each clip.
Test Shoot Script

THE AFFAIR written by Randal Kleiser and Dave Stump

I/E. ART GALLERY - DAY 1

On a brightly day lit EXTERIOR TERRACE, well dressed art aficionados mingle, chat, sip Chardonnay and eat cheese.

The CAMERA DOLLIES and PANS into the INTERIOR of the Art Gallery to tour a richly cluttered collection of foreground *objets d’art*, including brightly colored backlit glass sculptures, flower arrangements and wildly colored photographs and paintings.

As we TRACK through the mixture of art and gallery patrons, a very pretty young ‘Goth’ Girl server dressed in black, with brightly colored hair, decorated with tattoos and piercings, hands out drinks and snacks to the crowd.

She stops and checks the time as if she is awaiting an appointment. She asks the Manager at the bar if she has finished her duties and he gestures that she is free to leave.

CAMERA CONTINUES TO MOVE LATERALLY BACK THROUGH THE SCENE with lots of foreground details, objects SWEEPING CLOSE PAST CAMERA.

Our ‘Goth’ Girl hands off her tray and we follow her as she exits the far end of the Gallery into the bright noon day sunlight and exits the scene.

CUT
## Scene Description

Opening frame: Enter Goth Girl, seen from a window crossing in and serves couple one.  
**EXT./INT/EXT ART GALLERY DAY**

## Camera Motion

| Camera Motion | Set to position 1 |

## Visual Description

- Sculpture--life size acrylic lucite female nude torso [highlight details]
- Circular chafing dishes [specular highlights]
- Small bright foil center pieces blowing in wind [motion or compression artifacts]
- Translucent sculptures bottom lit
- Framed wall art
- Plastic fruit

## Comments

Exposure outside is considerably brighter. Daylight interior

## Start Time

0:00 seconds
<table>
<thead>
<tr>
<th>Scene Description</th>
<th>Goth Girl begins cross to 2nd couple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera Motion</td>
<td>Follows server to couple #2, PAN Right</td>
</tr>
<tr>
<td>Visual Description</td>
<td>• Hanging multicolor mobile art [high contrast]</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>0:12 seconds</td>
</tr>
<tr>
<td>Scene Description</td>
<td>Goth Girl starts to come down stage and crosses inside the building to serve lady dressed in sari. Goth Girl stops to talk to lady in sari</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Camera Motion</td>
<td>Follows server coming in. Motion control used truck right. Two shot profile. Motion Stop for exchange</td>
</tr>
</tbody>
</table>
| Visual Description | - Neon sign on the ground  
- Vibrant poster  
- Orange sari [texture]  
- Multicolor Glass vases under lit |
<p>| Comments           | Bright exterior day light to low light interior. |
| Time               | 0:25 seconds |</p>
<table>
<thead>
<tr>
<th>Scene Description</th>
<th>Goth Girl starts towards the bar. Goth Girl stops at bar and speaks to bartender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera Motion</td>
<td>Motion control track right [lateral motion stress test] Motion Stop for exchange. Two shot profile</td>
</tr>
</tbody>
</table>
| Visual Description| • Hanging Neon sign  
|                   | • Sculpture--life size acrylic lucite male nude torso [highlight details]  
|                   | • Daylights through blinds  
|                   | • Stain glass window [contrast ratio, highlight sky exposure]  
|                   | • Wine glass [specular highlights]  
|                   | • Goth Girl's neck tattoo  
<p>|                   | • Goth Girl's blue streak hair |
| Comments          | Hitch error: Issue with the dolly track, causes bump in shooting |
| Time              | 0:35 seconds |</p>
<table>
<thead>
<tr>
<th>Scene Description</th>
<th>Goth Girl crosses back out through the building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera Motion</td>
<td>The action is happening closer to the camera. Motion control truck left. Pan left to follow the server.</td>
</tr>
<tr>
<td>Visual Description</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>0:43 seconds</td>
</tr>
<tr>
<td>Scene Description</td>
<td>Goth Girl crosses back out through the building and exits</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Camera Motion</td>
<td>The action is happening closer to the camera. Motion</td>
</tr>
<tr>
<td></td>
<td>control truck left. Pan left to follow the server and</td>
</tr>
<tr>
<td></td>
<td>back to position one.</td>
</tr>
<tr>
<td>Visual Description</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>End Scene</td>
<td>1:04</td>
</tr>
</tbody>
</table>
NGCT Behind-the-scenes photos
Location 4th Floor of the Pickford Center for Motion Picture Study
NGCT DCP Workflow
[Version_3 Aug. 20th 2014]
<table>
<thead>
<tr>
<th>Resolution/Frame Rate</th>
<th>DCI P3 48 cd/m²</th>
<th>DCI P3 100 cd/m²</th>
<th>DCI P3 150 cd/m²</th>
<th>DCI P3 200 cd/m²</th>
<th>DCI P3 600 cd/m²</th>
<th>Rec. 709 100 cd/m²</th>
<th>Rec. 709 600 cd/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2k @ 24fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>2k @ 48fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>2k @ 60fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>2k @ 120fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>4k @ 24fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>4k @ 48fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>4k @ 60fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>4k @ 120fps</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>
NGCT Test Shoot Crew & Actor List

<table>
<thead>
<tr>
<th>Crew</th>
<th>First Name</th>
<th>Last Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writer</td>
<td>Randall</td>
<td>Kleiser</td>
</tr>
<tr>
<td>Producer</td>
<td>Ralph</td>
<td>Winter</td>
</tr>
<tr>
<td>Executive Producer</td>
<td>Garrett</td>
<td>Smith</td>
</tr>
<tr>
<td>Director</td>
<td>Howard</td>
<td>Lukk</td>
</tr>
<tr>
<td>Managing Director Sci-Tech Council</td>
<td>Andy</td>
<td>Maltz</td>
</tr>
<tr>
<td>Assoc Dir Sci-Tech Council</td>
<td>Michael</td>
<td>Sterling</td>
</tr>
<tr>
<td>Archivist Sci-Tech Council</td>
<td>Norma</td>
<td>Vega</td>
</tr>
<tr>
<td>Unit Production Manager</td>
<td>Matt</td>
<td>Spiegel</td>
</tr>
<tr>
<td>1st AD</td>
<td>Adam</td>
<td>Martin</td>
</tr>
<tr>
<td>Director of Photography</td>
<td>Dave</td>
<td>Stump</td>
</tr>
<tr>
<td>Camera Operator</td>
<td>Leo</td>
<td>Zahn</td>
</tr>
<tr>
<td>1st AC</td>
<td>Jim</td>
<td>Thibo</td>
</tr>
<tr>
<td>1st AC</td>
<td>Loie</td>
<td>Russell</td>
</tr>
<tr>
<td>2nd AC</td>
<td>Tim</td>
<td>Kang</td>
</tr>
<tr>
<td>Support Technologist</td>
<td>Joe</td>
<td>di Gennaro</td>
</tr>
<tr>
<td>Behind-the-scenes Camera</td>
<td>Stephen</td>
<td>Lighthill</td>
</tr>
<tr>
<td>Production Consultant</td>
<td>Loren</td>
<td>Nielsen</td>
</tr>
<tr>
<td>Production Coordinator</td>
<td>Christel</td>
<td>Cornilsen</td>
</tr>
<tr>
<td>Alexa Tech Support</td>
<td>Stephan</td>
<td>Ukas Bradley</td>
</tr>
<tr>
<td>F65 Tech Support</td>
<td>Dan</td>
<td>Perry</td>
</tr>
<tr>
<td>F65 Tech Support 2</td>
<td>Michael</td>
<td>Kovacevich</td>
</tr>
<tr>
<td>3D Rig Support</td>
<td>Steve</td>
<td>Schklair</td>
</tr>
<tr>
<td>3D Rig Support Tech 2</td>
<td>Matt</td>
<td>Battaglia</td>
</tr>
<tr>
<td>3D Rig Support Tech 3</td>
<td>Bettina</td>
<td>Martin</td>
</tr>
<tr>
<td>3D RigTech/3D Utility</td>
<td>Barclay</td>
<td>Roach</td>
</tr>
<tr>
<td>Motion Control Op 1</td>
<td>Rob</td>
<td>Menapace</td>
</tr>
<tr>
<td>Motion Control Op 2</td>
<td>Paul</td>
<td>Maples</td>
</tr>
<tr>
<td>Motion Control Op 3</td>
<td>Josh</td>
<td>Cushner</td>
</tr>
<tr>
<td>DIT/Post Supv</td>
<td>Gray</td>
<td>Marshall</td>
</tr>
<tr>
<td>Codex Support</td>
<td>JD</td>
<td>Vandenberghe</td>
</tr>
<tr>
<td>Codex Support</td>
<td>Stephen</td>
<td>Ceci</td>
</tr>
<tr>
<td>Chief Lighting Tech</td>
<td>Michael</td>
<td>Off</td>
</tr>
<tr>
<td>Asst. Chief Lighting Tech</td>
<td>Chris</td>
<td>Sarge Lewis</td>
</tr>
<tr>
<td>Set Lighting Technician</td>
<td>Cris</td>
<td>Super Borgnine</td>
</tr>
<tr>
<td>Key Grip</td>
<td>Tom</td>
<td>Browne</td>
</tr>
<tr>
<td>Best Boy/Grip</td>
<td>Taylor</td>
<td>Vohs</td>
</tr>
<tr>
<td>Additional Best Boy/Grip</td>
<td>Max</td>
<td>Foster</td>
</tr>
</tbody>
</table>
## NGCT Test Shoot Crew & Actor List

<table>
<thead>
<tr>
<th>Crew</th>
<th>First Name</th>
<th>Last Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport/Driver/Swing</td>
<td>Oswald OZ</td>
<td>Colunga</td>
</tr>
<tr>
<td>Production Designer</td>
<td>Bill</td>
<td>Creber</td>
</tr>
<tr>
<td>Production Designer</td>
<td>John</td>
<td>Muto</td>
</tr>
<tr>
<td>Set Decorator</td>
<td>Cloudia</td>
<td>Rebar</td>
</tr>
<tr>
<td>Set Dresser 1</td>
<td>Daniel</td>
<td>Gaughn</td>
</tr>
<tr>
<td>Set Dresser 2</td>
<td>Chris</td>
<td>Coulier</td>
</tr>
<tr>
<td>Set Dresser 3</td>
<td>Christine</td>
<td>Nelson</td>
</tr>
<tr>
<td>Set Dresser 4</td>
<td>Jason</td>
<td>Bennett</td>
</tr>
<tr>
<td>Set Dresser 5</td>
<td>Tatiana</td>
<td>Lopez</td>
</tr>
<tr>
<td>Wardrobe/Costume Stylist</td>
<td>Cynthia</td>
<td>Dixon</td>
</tr>
<tr>
<td>Head Makeup Artist</td>
<td>Leonard</td>
<td>Engelman</td>
</tr>
<tr>
<td>Hair Stylist</td>
<td>Kath</td>
<td>Blondell</td>
</tr>
<tr>
<td>Makeup Asst</td>
<td>Carole</td>
<td>Fontaine</td>
</tr>
<tr>
<td>Catering</td>
<td>Chef Robert</td>
<td>Catering</td>
</tr>
<tr>
<td>Production Assistant 1</td>
<td>Martin</td>
<td>Flores</td>
</tr>
<tr>
<td>A.M.P.A.S. Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Assistant 2</td>
<td>Brian</td>
<td>Bell</td>
</tr>
<tr>
<td>A.M.P.A.S. Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Assistant 3</td>
<td>Ricardo</td>
<td>Rodriguez</td>
</tr>
<tr>
<td>A.M.P.A.S. Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Assistant 4</td>
<td>Brinton</td>
<td>Smith</td>
</tr>
<tr>
<td>A.M.P.A.S. Staff</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BEHIND THE SCENES

<table>
<thead>
<tr>
<th>BTS Camera</th>
<th>Dru</th>
<th>Mungai</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTS Camera</td>
<td>Matthew</td>
<td>Nauser</td>
</tr>
<tr>
<td>BTS Camera</td>
<td>Jean-Paul</td>
<td>Bonneau</td>
</tr>
<tr>
<td>BTS Camera</td>
<td>Dan</td>
<td>Marks</td>
</tr>
<tr>
<td>BTS Camera</td>
<td>Vadim</td>
<td>Aynbinder</td>
</tr>
</tbody>
</table>

### TALENT

<table>
<thead>
<tr>
<th>Role</th>
<th>First</th>
<th>Last</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Actress</td>
<td>Goth Girl</td>
<td>Bianca</td>
</tr>
<tr>
<td>Lead Actor</td>
<td>Boyfriend</td>
<td>Justice</td>
</tr>
<tr>
<td>Supporting actor</td>
<td>Wife</td>
<td>Chelsea</td>
</tr>
<tr>
<td>Supporting actor</td>
<td>Gallery Manager</td>
<td>Joseph</td>
</tr>
<tr>
<td>Background actor</td>
<td>Art Gallery Patron</td>
<td>Rachel</td>
</tr>
<tr>
<td>Background actor</td>
<td>Art Gallery Patron</td>
<td>Brian</td>
</tr>
<tr>
<td>Background actor</td>
<td>Art Gallery Patron</td>
<td>Kimia</td>
</tr>
</tbody>
</table>
NGCT High Dynamic Range trial

An additional component of our production involved capturing high dynamic range footage by using a matched pair of Sony F65 cameras mounted onto a 3-D rig [see Figure 1]. For our set-up we had camera A pointed vertically and shooting off a 50/50 semi silvered mirror while camera B was pointed horizontally shooting directly through the mirror. Camera A captured the normal exposure and camera B was used to capture highlight details by using a Formatt IR ND 1.8 filter (6 stop difference). The use of this particular filter was determined after discovery that the reflective surface of the 50/50 mirror was attenuating the IR wavelengths, which would have had a negative impact upon color rendering between the two images. To mechanically align our stereo pair we used the 3ality Stereo Image Processor (SIP) system. However, during post-production a temporal shift between the images was discovered. This anomaly is attributed to a lack of synchronization between the shutters of the two cameras (having nothing to do with genlock). Although much was learned from this trial we intend to repeat this experiment at a later date.

Figure 1. Diagram and photograph showing High Dynamic Range Test Shoot set-up using semi silvered mirror and Sony F65 cameras. Camera A captured normal exposure. Camera B captured highlight details.
## Product Specification Sheet

### Baselight ONE

<table>
<thead>
<tr>
<th><strong>Baselight grading software</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Simultaneous grade layers</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Simultaneous shapes (windows)</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Simultaneous key layers</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Plugin support</td>
<td>OFX™</td>
</tr>
<tr>
<td>Colour management</td>
<td>Truelight (integrated)</td>
</tr>
<tr>
<td>Colour space handling</td>
<td>Linear, log, video</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Storage</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>28TB or 56 TB (optional)</td>
</tr>
<tr>
<td>RAID protection</td>
<td>RAID 6</td>
</tr>
<tr>
<td>I/O bandwidth</td>
<td>500MB/s</td>
</tr>
<tr>
<td>Caching</td>
<td>Automatic, intelligent</td>
</tr>
<tr>
<td>Disk management</td>
<td>Auto optimise/defragment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>User interface</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UI display</td>
<td>Up to 2048x1536</td>
</tr>
<tr>
<td>Control surface</td>
<td>Blackboard 2ONE</td>
</tr>
<tr>
<td></td>
<td>Also supports Avid Artist Color and Tangent Wave and Element panels</td>
</tr>
<tr>
<td>Connectivity</td>
<td>GigE, USB, IEEE1394</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Media handling</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame size</td>
<td>640x480 to 4096x3112</td>
</tr>
<tr>
<td>Input &amp; output file formats</td>
<td>dpx, cin, tga, tiff, mx, quicktime, video</td>
</tr>
<tr>
<td>Playback frame rate</td>
<td>23.98 to 60fps</td>
</tr>
<tr>
<td>EDL support</td>
<td>CMX 3600, FLE, AAF, XML, CDL, ALE</td>
</tr>
<tr>
<td>Connectivity</td>
<td>GigE, 10GigE (optional), SAN fibre channel (optional)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Grading display</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>DVI, VGA (optional SDI monitoring)</td>
</tr>
<tr>
<td>Resolution</td>
<td>Up to 2048x1536</td>
</tr>
<tr>
<td>Frame rate</td>
<td>23.98p~60i</td>
</tr>
<tr>
<td>Truelight</td>
<td>Built-in</td>
</tr>
<tr>
<td>Synchronisation</td>
<td>DVI (internal), SDI (external)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Video</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingest</td>
<td>HD SDI (10-bit), single/dual link, HD/SD</td>
</tr>
<tr>
<td>Playout</td>
<td>HD SDI (10-bit), single/dual link, HD/SD</td>
</tr>
<tr>
<td>Formats</td>
<td>720x486~2048x1080</td>
</tr>
<tr>
<td>Frame rate</td>
<td>23.98p~60i (psf supported)</td>
</tr>
<tr>
<td>Sampling</td>
<td>422, 444, YCrCb/RGB</td>
</tr>
<tr>
<td>Machine control</td>
<td>RS242 9-pin I/O</td>
</tr>
<tr>
<td>Synchronisation</td>
<td>Internal/external</td>
</tr>
<tr>
<td>Software control</td>
<td>Embedded in main app &amp; external app</td>
</tr>
</tbody>
</table>
Product Specification Sheet
Dolby Professional Reference Monitor PRM-4200

LCD Panel
Size: 42 inches diagonal Resolution: 1920 × 1080 pixels Refresh Rate: 120 Hz Viewing Angle: 90° horizontal; 45° left and right from center

Maximum Luminance
CRT Reference mode: 120 cd/m² Dynamic Reference mode: 600 cd/m² Adjustable from 48 cd/m² to 600 cd/m²

Primaries/Gamut
Rec. 709, SMPTE C, EBU, P3, Custom

Operation Modes
CRT Reference Mode, DYN Mode, LCD Emulation, PDP Emulation, Custom 1 Emulation, Custom 2 Emulation

White Point
D54, D60, D65, D93, Digital Cinema, Custom

Gamma
2.2, 2.4, 2.6, Custom

Video Interfaces

Video Scanning Formats
ITU-R BT.601, SMPTE 293M, ITU-R BT.1358, SMPTE 274M, SMPTE RP211

Video Inputs
Two input connectors, with support for 1.5G and 3G SDI, single and dual link

Video Outputs
Two output connectors, with support for 1.5G and 3G SDI, single and dual link

Line Voltage Compatibility
85–260 VAC, 50–60 Hz

Monitor Dimensions
Width: 1008mm (40 inches) Height: 677mm (26 inches) Depth (body): 329 mm (13 inches)

Weight
Weight: 68 kg (150 lbs)
Bibliography
