THE TEXTURE AND THE 4K/UHD WORKFLOW
HOW TO CONTROL THE SHARPNESS
FULL VERSION

A PRESENTATION FROM
THE IMAGO TECHNOLOGY COMMITTEE

V15 - 180908
PRESENTATION SUMMARY: FULL VERSION

THE TEXTURE AND THE 4K WORKFLOW

TEXTURE AND LOOK OF THE IMAGE, HOW TO CONTROL THE SHARPNESS.

CHAPTERS:

1 - CAMERA & SENSORS - REMINDER
2 - THE SHOOTING PARAMETERS - MONITORING
3 - THE TYPE OF LIGHTING FIXTURES
4 - CAMERA: SENSOR, OLPF AND MTF
5 - THE ROLE OF THE DETAILING SYSTEM IN CAMERA
6 - SHARPNESS & POSTPRODUCTION - MONITORING & SCREENING
7 - SHARPNESS & RELEASE - MONITORING & SCREENING
8 - CAMERA & LENSES - THE PARADOX
9 - TEXTURE CONTROL - WHICH TOOLS?
10 - EXAMPLE OF CONFUSION
11 - CONCLUSIONS
12 - ARRI TEXTURE TOOLS
13 - EXAMPLE: FILM ‘CARTAS DA GUERRA’
SPECIAL THANKS TO:

DAVID STUMP ASC

ROBERTO SCHAEFER ASC AIC
This presentation includes several slides shown at Camerimage 2017 during the:

ASC / IMAGO PANEL

The importance of Cinematographer’s Collaboration Beyond Borders
The panel comprised:

Louis Philippe Capelle, SBC
Rolf Coulanges, BVK
Joe Dunton, MBE BSC
Jacek Laskus, ASC, PSC
Stephen Lighthill, ASC
Jannicke Mikkelsen, FNF
Rachel Morrison, ASC
Steven Poster, ASC, ICG
Philippe Ros, AFC
Roberto Schaefer, ASC, AIC
WHY IS IT INTERESTING TO LINK THE TEXTURE TO THE UHD/4K WORKFLOW?

Of course the specificities and issues related to the texture exist also in a 2K workflow, but shooting in UHD/4K reveal in a most flagrant way some peculiarities as well as some difficulties encountered by filmmakers, cinematographers, colorists to name but a few when they intend to control the texture.
WHY IS IT INTERESTING TO LINK THE TEXTURE TO THE UHD/4K WORKFLOW?

In addition to highlighting some facts, this presentation intend to create a debate and to question both users and manufacturers.

The Imago Technology Committee launched:

IMAGO SURVEY REQUESTS TO MANUFACTURERS

https://www.umfrageonline.com/s/Manufacturers_request

Develops several topics described in this part.
SOME WORDS FOR TEXTURE

For science
- Definition
- Detailing

For perception
- Sharpness
- Accutance (Combination of detailing & Micro contrast)

**Definition:** number of pixels related to frame ratio. Ex: 4K, for Flat (1.85:1) = 3996 x 2160 pixels

**Resolution:** pixel density: number of pixels/square inch
SEMANTICAL ISSUES
SEMANTICAL ISSUES

Different words, different meanings

- Sharpness
- Over sharpness
- Sharpen
- Sharpening
- Detail Level
- Detailing
Different words, different meanings

- Detailing has different meanings for each manufacturer
CONTROL OF THE TEXTURE

What is at stake:

Conveying emotion & meaning
THE SHARPNESS AND THE 4K WORKFLOW

1 - CAMERA & SENSORS - REMINDER
For the sake of clarity and vulgarisation, the following tables intentionally exclude, among other things:

- The size of the sensor
- The number of photosites
- The number of photosites dedicated for the image
- The size of the photosites
- The photosite pitch
- The type of lenses
- The type of post-production
<table>
<thead>
<tr>
<th>Cameras</th>
<th>Number of photosites</th>
<th>Recording (resolution)</th>
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<tbody>
<tr>
<td>Sony F65</td>
<td>20 M</td>
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<td>8.2 M</td>
<td>4 K (Ultra HD)</td>
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<tr>
<td>Alexa XT (Raw Recording w/ Open gate)</td>
<td>7.5 M</td>
<td>3.4 K (Up-scaling to 4K)</td>
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Choosing F65 for wide shots and F55 for close shots is usually a good solution for the marriage.
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These cameras deliver all the same definition (resolution)

But they aren’t delivering the same texture and the same sharpness
QUALITY AND NUMBERS

• The number of pixels on a display or on a screen defines an HD, 2K, UHD or a 4K image without any information on the perception of sharpness.

• The lack of standardization and real characteristics leads to several difficulties regarding the perfect understanding of what the quality of a 4K image means.
THE SHARPNESS AND THE 4K WORKFLOW

2 - THE SHOOTING PARAMETERS
THE SHOOTING PARAMETERS

Structure of the skin

Type of Lenses

Type of cameras

Aperture

Camera
- Type of sensor
- Recording file types specificities
- Setting (Gamma/Sharpness/OLPF…)
- Noise reduction
2 - THE SHOOTING PARAMETERS

Structure of the skin  Type of make-up  Type of Lenses  Type of cameras

Aperture
2 - THE SHOOTING PARAMETERS

- Structure of the skin
- Type of make-up
- Costume(s)
- Type of Lenses
- Type of cameras
- Aperture
Type of lighting

Structure of the skin
Type of make-up Costumes
Type of lighting fixtures
Type of Lenses Aperture
Type of cameras

THE SHOOTING PARAMETERS
Before choosing glass filters the choice of lighting fixtures and diffusion remains essential.
2 - THE SHOOTING PARAMETERS

Structure of the skin
Type of make-up Costumes

Type of lighting fixtures

Type of Lenses

Aperture

Type of cameras

See chapter 3
THE TYPE OF LIGHTING FIXTURES
2 - THE SHOOTING PARAMETERS

- Structure of the skin
- Type of make-up
- Type of lighting fixtures
- Type of Lenses
- Type of cameras
The perception of sharpness depend also on the structures and colors of the backgrounds and foreground.

It also depends on the results of the depth of field on these backgrounds and foregrounds.
2 - THE SHOOTING PARAMETERS

- Structure of the skin
- Type of make-up
- Type of lighting fixtures
- Type of Lenses
- Type of cameras

EVF - Type of viewfinder

Lens

Aperture

Costumes
2 - THE SHOOTING PARAMETERS

The quality of the internal deBayer lead to different perception of texture.
2 - THE SHOOTING PARAMETERS

Glass filtering
Front filter

Onboard deBayer

Structure of the skin
Type of make-up Costumes
Type of lighting fixtures
Type of Lenses Aperture
Type of cameras
2 - THE SHOOTING PARAMETERS

Glass filtering
Front filters

Onboard deBayer

Structure of the skin  Type of make-up Costumes  Type of lighting fixtures  Type of Lenses Aperture  Type of cameras
Different strategies of glass filtering on set have been used since the early days of the digital era......
2 - THE SHOOTING PARAMETERS

- Structure of the skin
- Type of make-up
- Type of lighting fixtures
- Type of Lenses
- Type of cameras

But with varying degrees of success
Question:
Can we easily choose glass filtering with an EVF?
Answer:
We can't, we don't see much...
**2 - THE SHOOTING PARAMETERS: GLASS FILTERING AND VFX**

**Question:** Can we easily use glass filtering when we are shooting with VFX?

**Answer:** VFX department don’t allow the use of glass filtering…
Using a 4K monitor can lead to additional expenses for the whole shoot. It is best used during the tests to choose the glass filters and to check the texture.
Using a 4K monitor can lead to additional expenses for the whole shoot. It is best used during the tests to choose the glass filters and to check the texture.
2 - THE SHOOTING PARAMETERS

Parameters

- Camera - type of sensor*
  ✓ Recording file types specificities
  ✓ Setting (Gamma/sharpness/OLPF…)
  ✓ Noise reduction
- Lens & Aperture
- Glass filtering

- Type of lighting
- Lighting fixtures - type/diffusion
- Texture of the skin / Make-up
- Costume
- Density of atmosphere: particles/fog/dust…
- Set design/Background/Foreground

*In this presentation, we only focus on CMOS cameras. Different sensors: different textures.
2 - THE SHOOTING PARAMETERS

TOO MANY PARAMETERS!
Without reference displays or professional screenings, deciding about a level of sharpness is quite impossible.
THE SHARPNESS AND THE 4K WORKFLOW

3 - THE TYPE OF LIGHTING FIXTURES
Since the arrival of digital cameras many manufacturers have designed systems to soften the lights. Due to the oversharpness?

The LED, even with different levels of qualities, and the diffusion systems became quite ubiquitous.
Initiated by cinematographer, John-Christian Rosenlund, an LED test was launched on August 30th, 2016 in cooperation between the FNF (Norwegian Society of Cinematographers) and the NRK (Norwegian Broadcasting Corporation)

https://www.led-light-test.com
https://www.led-light-test.com/the-idea-behind
VISUAL SHARPNESS AND LED

THE IDEA BEHIND THE TEST

• How does the camera chip react on LED - compare to natural light sources?
• Are there any color differences in a RAW file that comes from an LED source versus natural light sources such as Daylight or Tungsten?
• Does the limited color spectrum in the LED give the human skin a kind of «plastic / digital» looking surface in post production?
VISUAL SHARPNESS AND LED

Close up of the difference in contrast, color depth from some selected high quality LED lights (Identical lens camera and workflow).
VISUAL SHARPNESS AND LED

WHICH TOOLS TO MEASURE THE QUALITY?

For the precision measurement the TLCI (Television Lighting Consistency Index, TLCI-2012) was used instead of the CRI (Colour Rendering Index). Because, “the way the CRI is computed may in extreme cases return negative CRI values, something that is totally without meaning”.
VISUAL SHARPNESS AND LED

SOME IMPORTANT CONCLUSION:

After blind-testing several of the most popular LED fixtures:
The worst LED, low on TLCI and lack of the "In-between» colors, gave a kind of plastic feeling on skin tones - impression of *visually* - less sharp, as if something were missing.
3 - THE TYPE OF LIGHTING FIXTURES

LOSS OF TOOLS TO CREATE DRAMA

CARBON ARCS

TUNGSTEN
3 - THE TYPE OF LIGHTING FIXTURES

LOSS OF TOOLS TO CREATE DRAMA

CARBON ARCS

TUNGSTEN
The plans of the EU are to restrict the use of tungsten halo lights also in theater and film use.

https://www.ald.org.uk/resources/savetungsten
3 - THE TYPE OF LIGHTING FIXTURES

LOSS OF TOOLS TO CREATE DRAMA

“Cat People” - Director: Jacques Tourneur
Cinematographer: Nicholas Musuraca ASC

“Road to Perdition” - Director: Sam Mendes
Cinematographer: Conrad L. Hall ASC
RISKS

- Lack of fixtures to create nice shadows
- Uniformity of lighting
QUESTIONS:

• Do all new LED tools combined with medium range file recording systems or even raw files fit with the minimum of quality expected by filmmakers?

• Do we still have the means to create easily, drama with the lighting fixtures?
THE SHARPNESS AND THE 4K WORKFLOW

4 - CAMERA: SENSOR, OLPF AND MTF
Parameters

- Camera - type of sensor
  - Recording format specificities
  - Setting (Gamma/sharpness/OLPF…)
  - Noise reduction
- Lens & Aperture
- Glass filtering

- Type of lighting
- Lighting fixtures - type/diffusion
- Texture of the skin / Make-up
- Costume
- Density of atmosphere: particles/fog/dust…
- Set design/Background/Foreground
THE ROLE OF THE SENSOR

Lens

Bayer pattern / sensor

Camera

4 - CAMERA: SENSOR, OLPF AND MTF
THE DEBAYER PROCESS

Sensor
Bayer pattern

DeBayer

Customized algorithmic process

Pixels generated by interpolation

RGB OUTPUT

X Millions of photosites

Y Millions of pixels

DeBayer means the same thing than Demozaicking
THE DEBAYER PROCESS

Sensor
Bayer pattern

There are no pixels on a sensor but photosites

x Photosites

Display device

y Pixels

4 - CAMERA: SENSOR, OLPF AND MTF
THE ROLE OF THE SENSOR

Anisotropic

Isotropic
THE ROLE OF THE SENSOR

A marriage between two very different worlds

Anisotropic

Isotropic
THE ROLE OF THE SENSOR
The pitch between the photosites create a lack of information to reproduce the image
THE ROLE OF THE SENSOR

Fixed pattern vs oscillating pattern

The Delta Penelope

Joe Dunton MBE, BSC & Jean-Pierre Beauviala
THE ROLE OF THE OLPF

OLPF: Optical Low-Pass Filter): blurs to keep away from aliasing
THE ROLE OF THE OLPF

Aliased

Anti-Aliased
THE ROLE OF THE OLPF

Minimal aliasing

Courtesy of RED
THE ROLE OF THE OLPF

Strong aliasing

Courtesy of RED
THE ROLE OF THE MTF
MTF ?

MODULATION  TRANSFER  FUNCTION %
MTF - Only for lenses?

MODULATION  TRANSFER  FUNCTION %

Courtesy of David Stump ASC
MTF - For camera

MODULATION  TRANSFER  FUNCTION  %
MTF - For the workflow

MODULATION
TRANSFER
FUNCTION %
THE SHARPNESS AND THE 4K WORKFLOW

5 - THE ROLE OF THE DETAILING SYSTEM IN CAMERA
5 - THE ROLE OF THE DETAILING PROCESS IN CAMERA

MTF: Modulation Transfer Function
Due to the OLPF (among other parameters), there is an important need to increase the sharpening/detailing setting, internally for a codec or in post for raw materials. This is the role of the detailing system.
Who is in charge to control the level of sharpness?

Engineers?
Cinematographers?
Colorists?
TWO IMPORTANT CHARACTERISTICS OF DETAILING

• The detail level of an image is always easy to increase in post.

• But it’s always very difficult and expensive to lower the detail level in post.
FIRST CONCLUSIONS

- DETAIL PARAMETERS ARE DEFINED BY SKILLED ENGINEERS
- BUT DO THESE PARAMETERS FIT WITH ALL THE AESTHETIC WISHES OF FILMMAKERS?
FIRST CONCLUSIONS

CONTROLLING THE LEVEL OF DETAIL IS A KEY PARAMETER IN THE PROCESS OF THE IMAGE TEXTURE
THE SHARPNESS AND THE 4K WORKFLOW

6 - SHARPNESS & POST-PRODUCTION
Same question if we are shooting in Raw:

How can we choose a lens if we don’t have access to this detailing process?
6 - SHARPNESS & POST-PRODUCTION

Parameters (w/o parameters of viewing distance)

- Type of recording
- DeBayer
  - Onboard
  - Post-production
  - Sharpness control
- Gamma encoding/Color mapping

- Grading
  - Sharpness modifications
    - "Refocus"/"Defocus"
    - Noise reduction
    - Texture creation - Grain (size/speed)
- HDR
- HFR (time resolution)

Deliverables
- 4K DCP
- 2K DCP
- UHD BROADCAST MASTER
- HD BROADCAST MASTER
6 - SHARPNESS & POST-PRODUCTION

Parameters (w/o parameters of viewing distance)

TOO MANY PARAMETERS!
The sharpness (detail) control embedded in the deBayer process in post is not given by all manufacturers. Example: Sony
**6 - SHARPNESS & POST-PRODUCTION**

**PROS & CONS**

**GLASS FILTERING**
- Low cost
- Limitations:
  - Permanent alteration
  - Affects whole image
  - Issues when travelling from wide shot to close-up or vice versa.

**DIGITAL FILTERING**
- Infinite range of possibilities (area base filtering, luminance & hue)
- High costs
- Time consuming

**SHOOTING & POST-PRODUCTION**

- Grading/Finishing
HDR, HFR AND TEXTURE

• High Dynamic Range and High Frame Rate are influencing the perception of texture.

• No serious studies have been done on these new topics.
THE SHARPNESS AND THE 4K WORKFLOW

7 - SHARPNESS & RELEASE
Parameters (w/o parameters of viewing distance)

SCREENING projectors (DCI)
- Resolution
- Speed - HFR
- Type of projector (Laser)
- Sharpness decision by manufacturers
- HDR/Color space

EMMISIVE SCREENING - LED No standard

BROADCASTING
- Different types of transportation/compression
- Resolution
- Speed - HFR
- Types of displays
- HDR/Color space
- All parameters possible (Gamma, Cine Style, Sharpness, etc)

Deliverables
- 4K DCP
- 2K DCP
- UHD BROADCAST MASTER
- HD BROADCAST MASTER

Wild West!
7 - SHARPNESS & RELEASE

SIZES & PERCEPTIONS

SHOOTING

POST-PRODUCTION

Grading session

4K/UHD Display

BROADCASTING - VOD

UHD TV

Home cinema

THEATER RELEASE
• Different steps

• Different sizes of screens

• Different environments

• Different perceptions
The texture and specifically the sharpness have to be checked through a simulation of the final release. For theater release only a large screen can give the level of sharpness.

4K screening or UHD large displays are changing our perceptions as spectator, they change cinematographers and postproducers and colourists methodologies.
THE SHARPNESS AND THE 4K WORKFLOW

8 - CAMERA & LENSES: THE PARADOX
Nowadays, choosing a set of lenses often becomes the most important phase of tests.

The combination of camera and lenses became a new challenge.

The 4K workflow highlights the flavour of the lenses in a more obvious way than the 2K one.
CONTROL OF THE TEXTURE

LENSES MANUFACTURERS STRATEGIES

• Lens manufacturers are working hard on the control of sharpness, bokeh and texture, but more easily, thanks to mathematics and algorithms.
The new larger sensors (Red, Arri, Sony, Canon) as well as the new lenses (Leica, Zeiss, Arri, Panavision) for these new cameras should lead to new strategies to control the unwanted oversharpeness
CONTROL OF THE TEXTURE

LENSES MANUFACTURERS STRATEGIES

• “Clever” lenses - Cooke /i
• “Clever” lenses - Arri/Zeiss LDS
• “Clever” lenses - Panavision
• “Clever” lenses - Zeiss eXtended Data
VINTAGE LENSES AND DIGITAL CAMERAS

A COMPLEX STORY
Many cinematographers are often using vintage lenses to create a look, but more often, it is for lowering the crisp look of several cameras.

Question: Are we creating a look or are we fighting against the machine, or both?
Question: Are we sure that we know all the parameters of texture given by the camera?
Question:
How can we choose a lens if we don’t have access to this detailing parameter?
THE SHARPNESS AND THE 4K WORKFLOW

9 - TEXTURE CONTROL - WHICH TOOLS?
An interesting step for the texture has been given by SONY several years ago to create gamma encoding.

The CVP FILE EDITOR customized Gamma curve.

The gamma encoding plays an important role in the perception of sharpness.
EXAMPLES: SONY

New parameters?

Not really, the first HD ENG cameras starting with the Sony F900 provided through the PAINT MENU a lot of control on the perception of sharpness.
A first step already given by camera manufacturers:

- On some codecs:
  - ✓ ARRI on Mini and Amira with ProRes, see chapter 12
  - ✓ SONY with XAVC, but with limitations to lower the details
A first step already given by camera manufacturers:

- On RAW footage in post:
  Access to control of sharpness during deBayer with: ARRI, RED, PANAVISION, CANON, PANASONIC
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES:

Some post tools:

- BASELIGHT:
  THE NEW TEXTURE EQUALISER OPERATOR

- DAVINCI:
  RESOLVE FX FACE REFINEMENT
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: BASELIGHT  TEXTURE EQUALISATION

FREQUENCY-BASED SOFTENING/SHARPENING
The new Texture Equaliser operator divides the image into a set of spatial frequency bands. Each frequency band has a separate Gain control. Each Gain control scales the signal in its frequency band. This can be used to smooth or enhance textures such as flesh tones in each band. The default 1.0 setting gives no scaling. The threshold setting puts a soft limit on the gain. Sharp features such as edges have a large component in each band. We do not usually want to change the gain on these features. The default setting allows us to change our textures, without changing the sharp features too much.
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN: ALL RESET

- Gain 1:1: 1.000
- Gain 2:1: 1.000
- Gain 4:1: 1.000
- Gain 8:1: 1.000
- Gain 16:1: 1.000
- Gain 32:1: 1.000
- Threshold: 0.100

Threshold: 0.100
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 1.1

Gain 1:1: 1.500
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 1.1

Gain 1:1: 2.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000

Threshold: 1.000
9 - Texture Control
Which tools?

**Baselight**
In post

The new Texture Equaliser Operator

**Gain 1.1**

- Gain 1:1: 0.500
- Gain 2:1: 1.000
- Gain 4:1: 1.000
- Gain 8:1: 1.000
- Gain 16:1: 1.000
- Gain 32:1: 1.000
- Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

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Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000

BASELIGHT IN POST

GAIN 1.1

Gain 1:1: 0.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000

THE NEW TEXTURE EQUALISER OPERATOR
9 - TEXTURE CONTROL
WHICH TOOLS?

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 2.1

Gain 1:1: 1.000
Gain 2:1: 1.500
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN  2.1

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Gain 32:1: 1.000
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Gain 2:1: 0.500
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000

GAIN   2.1

THE NEW TEXTURE EQUALISER OPERATOR

9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 2.1

Gain 1:1: 1.000
Gain 2:1: 0.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - Texture Control
Which tools?

BASELIGHT  IN POST

The new Texture Equaliser Operator

Gain 4.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.500
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 4.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 2.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 4.1

Gain 1:1:  1.000
Gain 2:1:  1.000
Gain 4:1:  0.500
Gain 8:1:  1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 4.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 0.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 8.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.500
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 2.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000

GAIN 8.1

BaseLight

The new Texture Equaliser Operator

9 - Texture Control
Which tools?
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 8.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 0.500
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT
IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 8.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 0.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 1.000
### BASELIGHT

**THE NEW TEXTURE EQUALISER OPERATOR**

**GAIN 16.1**

<table>
<thead>
<tr>
<th>Gain</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>1.000</td>
</tr>
<tr>
<td>2:1</td>
<td>1.000</td>
</tr>
<tr>
<td>4:1</td>
<td>1.000</td>
</tr>
<tr>
<td>8:1</td>
<td>1.000</td>
</tr>
<tr>
<td>16:1</td>
<td>1.500</td>
</tr>
<tr>
<td>32:1</td>
<td>1.000</td>
</tr>
<tr>
<td>Threshold</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 2.000
Gain 32:1: 1.000
Threshold: 1.000

GAIN 16.1

THE NEW TEXTURE EQUALISER OPERATOR

9 - TEXTURE CONTROL WHICH TOOLS?

BASELIGHT IN POST
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT
IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 16.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 0.500
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT
IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN  16.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 0.000
Gain 32:1: 1.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 32.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: **1.500**
Threshold: 1.000
Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 2.000
Threshold: 1.000

GAIN 32.1

THE NEW TEXTURE EQUALISER OPERATOR
9 - TEXTURE CONTROL WHICH TOOLS?

BASELIGHT IN POST

THE NEW TEXTURE EQUALISER OPERATOR

GAIN 32.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 0.500
Threshold: 1.000
THE NEW TEXTURE EQUALISER OPERATOR

GAIN 32.1

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 0.000
Threshold: 1.000
9 - TEXTURE CONTROL
WHICH TOOLS?

THE NEW TEXTURE EQUALISER OPERATOR

FINAL SETTINGS

Gain 1:1: 1.258
Gain 2:1: 0.863
Gain 4:1: 0.740
Gain 8:1: 0.650
Gain 16:1: 0.621
Gain 32:1: 1.042
Threshold: 0.027
BASELIGHT
THE NEW TEXTURE EQUALISER OPERATOR

GAIN: ALL RESET

Gain 1:1: 1.000
Gain 2:1: 1.000
Gain 4:1: 1.000
Gain 8:1: 1.000
Gain 16:1: 1.000
Gain 32:1: 1.000
Threshold: 0.100

9 - TEXTURE CONTROL
WHICH TOOLS?
TEXTURE CONTROL - WHICH TOOLS?

EXEMPLARY: BASELIGHT

The new Texture Equaliser operator 2/2

Example: If we reduce the Gain on the 2:1, 4:1 and 8:1 bands, this will smooth skin tones, but preserve the texture of the pores and other fine detail. Increasing the Gain on the 16:1 band may restore some of the shadow modelling. Use a mask to restrict the filter to the face we wish to smooth.

You can download a free version to test it: Prelight, Option Free License.

https://www.filmlight.ltd.uk/store/

Creating your project: Please choose FilmLight T-Log as preset to start correctly.

Tutorial on the Texture Equaliser Operator:

https://vimeo.com/232314309
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT

With the courtesy of Erwan Le Cloirec
Post-production instructor/Founder of yakyakyak

http://yakyakyak.fr/

https://www.youtube.com/watch?v=2YUHLRYHR50
9 - Texture Control - Which Tools?

Examples: DaVinci Resolve FX Face Refinement

Automatic Detection
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
EXAMPLES: **DAVINCI RESOLVE FX FACE REFINEMENT**
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
EXAMPLES: **DAVINCI RESOLVE FX FACE REFINEMENT**

**9 - TEXTURE CONTROL - WHICH TOOLS?**
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
9 - TEXTURE CONTROL - WHICH TOOLS?

EXAMPLES: DAVINCI RESOLVE FX FACE REFINEMENT
The facial recognition works pretty well even when the subject passes behind another actor or an object.
THE SHARPNESS AND THE 4K WORKFLOW

10 - EXAMPLE OF CONFUSION
NETFLIX Requirements
10 - EXAMPLE OF CONFUSION

Requirements

Confusion between photosites and pixels

Cameras like RED Weapon or Sony F65 are at the same level of a C300 MKII or an URSA

Alexa (Open gate) is not mentioned

Lenses aren’t mentioned
THE SHARPNESS AND THE 4K WORKFLOW

11 - CONCLUSIONS
REMINDER: PARAMETERS - DETAILING SYSTEM - LENSES

- All these parameters, previously described - quite complex - gave cinematographers a control of the texture of the image.
- Many filmmakers and cinematographers are fighting against a feeling of over sharpness when they use a 4K workflow.
- The combination of camera and lenses is a key parameter to control the texture.
- The combination of “sharp” cameras and soft lenses or vintage ones often gives interesting results but without a controllable approach.
REMINDER: PARAMETERS - DETAILING SYSTEM - LENSES

- Due to the OLPF (among other parameters), there is an important need to increase the sharpening/detailing setting, internally for a codec or in post for raw materials. This is the role of the detailing system’’

- Do we know what level of detail is used in a camera or in post?

- Who is deciding about this level?

- Engineers, colorists or/and cinematographers?

- Do we need similar controls available in the former HD cameras?
• Or could new algorithms create other ways to deal with the static pattern of the digital image (Similar to Arri detailing parameters or Filmlight texture equaliser)?
• Some manufacturers have opened these controls in their cameras, like Arri in the Alexa Mini & the Amira. Arri gives its factory level of sharpness and a way to compare the different values to increase or reduce the detailing parameters. See slides 163 to 168: ARRI TEXTURE TOOLS
• The choice of the lighting fixtures is important in the general process of texture
REMINDER: PARAMETERS - DETAILING SYSTEM - POST

- When shooting in RAW the detailing control is not always available in post after the deBayer process
- It can lead to expensive and time consuming texture control during the grading session
The role of sharpness through the detailing system is a key point in the control of the texture.

Choosing a lens without access of detailing control on the camera or in post is leading to some important limitations or confusions.

If cinematographers don’t have these parameters reachable, they often have to fight against the machine.
• Cinematographers/colorists always find strategies to deal with oversharpness, but at what price?

• Theoretically, we have all the means to improve the creative aspects of the cinematographers craft

• We just need to have, from manufacturers, some more open doors, including the detailing parameters
THE SHARPNESS AND THE 4K WORKFLOW

12 - ARRI TEXTURE TOOLS
ANOTHER IMPORTANT STEP GIVEN BY ARRI

- A real access to control of sharpness on ProRes (Alexa Mini, Amira)
- Comparison tests allowing to judge the quality of a camera regarding sharpness
EXAMPLE: ARRI
An important meeting at Arri in 2015

Following slides

WORKSHOP AT ARRI MUNICH:
HOW TO CONTROL THE TEXTURE OF THE DIGITAL IMAGE

Special Thanks to Harald Brendel (Arri - Principal Engineer Image Science), and his team of engineers
EXAMPLE: ARRI

An important meeting at Arri in 2015

Following slides

WORKSHOP AT ARRI MUNICH:

Imago website:

EXAMPLE: ARRI

CONTROL OF SHARPNESS

In post for 4K Raw

by channel R, G, B

External process.
ADA5-SW deBayer

CONTROL OF SHARPNESS

In post for 4K Raw

by channel R, G, B
**12 - ARRI TEXTURE TOOLS: SHARPNESS**

**EXAMPLE: ARRI**

**IN CAMERA**

**CONTROL OF SHARPNESS**

2 parameters: image sharpness & image detail

**ALEXA MINI & AMIRA**

Only when setting the Recording/Sensor format to: **S16, 3.2K, 4K UHD or 4:3 2.8K**, not **1080p or 2K**.

**Sharpness** controls the amplification of micro contrast in the image, **Detail** controls the smallest detail that is reproduced by the filter.
With the minimum of Detail

The noise is due to the zoom in the image, but we can see the difference on the structure of the sharpness.
Medium settings of Detail

The picture number 5 is the default in the camera, this is the level we are accustomed to find on an Alexa camera. Settings in the ARC (ARRIRAW Converter) are F=100 S=100
With the maximum of Detail

ARRI TEXTURE TOOLS: SHARPNESS
ARRI SCALER PARAMETER FEMALE FACE

Sharpness

F200 - S000  F200 - S100  F200 - S200
From the minimum of Sharpness and Detail to the maximum

The picture number 5 is the default in the camera,

Aleka Mini & Amira

ARRI Texture Tools: Sharpness
EXAMPLE: ARRI

CONTROL OF NOISE REDUCTION

In camera for ProRes - The noise reduction parameter plays also a role

ALEXA LF, ALEXA SXT, ALEXA MINI & AMIRA

ALEXA LF: OFF/ON

ALEXA SXT: OFF/ON

ALEXA MINI: OFF/ON

AMIRA: OFF/ON/STRONG

ARRI TEXTURE TOOLS: NOISE REDUCTION

Report on the meeting at ARRI Munich July 13th 2015
The photos below come from zoom in screen captures.

Noise reduction: OFF  Noise reduction: ON  Noise reduction: STRONG
ARRI TEXTURE TOOLS

On the Alexa SXT and LF for ProRes recording you get Noise reduction on/off, and no sharpness/details controls.
THE SHARPNESS AND THE 4K WORKFLOW

13 - EXAMPLE: FILM ‘CARTAS DA GUERRA’
Focal website - Imago Website

Technical and artistic references from Focal about DPC II seminar


Courtesy of Pierre Aghte director of the Focal Foundation
Imago Website with the courtesy of FOCAL

Example: Cinematographers Strategies to deal with oversharpness

FILM

“CARTAS DA GUERRA”
Film

“CARTAS DA GUERRA”

Director: Ivo M. Ferreira

Producer/Editor/Workflow designer: Sandro Aguilar

Cinematographer: João Ribeiro (AIP)

Colorist/Post-production adviser: Paulo Americo da Silva
Camera: SONY ALPHA 7S customized by João Ribeiro - Cinematographer & Ricardo Simões - First AC

João Ribeiro:

"Camera: Sony A7s, (imposed by the production) it was the first time I film with a “photo camera”.

I was really scare, so what I pass to my crew was:

“we have to do a film where nobody can say we use this type camera”

“The fact that is not heavy, you have to be very educated with that, and tend not to put it everywhere, but just in the correct place for each shot”
Post-production customized by Producer/Editor/Workflow designer: Sandro Aguilaré
& Colorist/Post-production adviser: Paulo Americo da Silva

**Disadvantage:**

- The 8-bit 4:2:0 h264 recording format is certainly not the best format to deal with the highest aesthetic demands

However, Paulo Americo used the lack of color information as an asset for this black and white film.
Zoom into the image in black and white without film grain
Zoom into the image in black and white with film grain which literally fill the lack of information in the image (low-level of bit allocation)
Special thanks to:

Lars Beyer - Cinematographer DFF
Louis Philippe Capelle - Cinematographer SBC
Rolf Coulanges - Cinematographer BVK
Joe Dunton - Cinematographer MBE, BSC
Anders Holck - Cinematographer DFF
Ron Johanson - Cinematographer OAM ACS
Kommer Kleijn - Cinematographer SBC
Alex Linden - Cinematographer FSF
Jannicke Mikkelsen - FNF Vr Film Director/ Cinematographer MA
João Ribeiro - Cinematographer AIP
John Christian Rosenlund - Cinematographer FNF
Mick van Rossum - Cinematographer NSC
Roberto Schaefer - Cinematographer ASC AIC
Dave Stump - Cinematographer ASC
Special thanks to:

Luc Bara - Technical Product Manager - Panasonic
Harald Brendel - Principal Engineer Image Science - Arri
Laurent Desbrueres - Senior colorist
Thomas Eberschveiler - Workflow Consultant - Filmlight GMBH
Erwan Le Cloirec - Post-production instructor/Founder of yakyakyak
Richard Lewis - Chief engineer Cinematography & 4K Application Specialist - Sony
Jean-Yves Martin - Product Specialist Broadcast & Cinema – Sony
Benoit Mercier - National Sales Manager - Canon
Andy Minuth - Colour - Workflow Specialist / Colorist - Filmlight GMBH
Christian Mourier - Engineer - Consultimage
Fabien Pisano - Sales Head South Europe - Sony
Dr. Tamara Seybold - Digital Imaging Scientist - Arri
Marc Shipman-Mueller - Product Manager Cameras & Lenses - Arri
Daniele Siragusano - Image engineer - Filmlight LTD
Special thanks to:

Ron Johanson - Cinematographer OAM, ACS
   National President
   Australian Cinematographers Society
   For the checking of grammar & English!

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Presentation initiated and designed by:
   Philippe Ros Cinematographer AFC
   with the help of all my colleagues acknowledged in the last three slides
Philippe Ros is co-chairman of the Imago Technology Committee with Mick van Rossum Cinematographer NSC