Optimizing the Radiance Workflow: In an Integrated Firm Environment

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Outline

- **Integration with Energy Modeling**
  Sacred Heart School - Atherton, CA

- **Integration with Sustainability**
  LEED Modeling Workflow

- **Integration with Architects**
  Canada College Kinesiology - Redwood City, CA

- **Storytelling with Lighting**
  K-8 School in CA

- **Local Surprise**
How do we integrate our work with the rest of our firm?
The Look of an Integrated Design Firm

- Sustainability Consulting
- Daylighting
- Building Envelope
- Modeling
- Mechanical Engineering
- Commissioning
- Electrical Engineering
- Electric Lighting Design
- BIM
Integration with Modeling
Sacred Heart School - Atherton, CA

Background
Visual and Thermal Comfort Optimization
South Facade Solar Control
Baseline - Unshaded
South Facade Solar Control - Visual Comfort
Baseline - Unshaded

Perspective View  Falsecolor Luminance Map - Surface Brightness  Plan Perspective - Daylight Illuminance Levels

Clear Sky, October - Noon

Overcast Sky, December - Noon

Radiance Workshop 2017
Integral Light Studio
South Facade Solar Control Options
Shading Options

**Exterior Automated Blinds**
- Glass: Solarban 70XL
- Blinds: Exterior Venetian
- Fixed Shading: none

**Fixed Exterior Slats**
- Glass: Solarban 70XL
- Shades: Interior Fabric
- Fixed Shading: Slats

**Fixed Horizontal Overhang**
- Glass: Solarban 70XL
- Shades: Interior Fabric
- Fixed Shading: Overhang
- Clerestory: Diffusing Film

**Electrochromic Glass**
- Glass: Electrochromic
- Blinds: none
- Fixed Shading: none
South Facade Solar Control Options - Visual Comfort Impact
Option 1: Exterior Automated Blinds

Perspective View

Falsecolor Luminance Map - Surface Brightness

Plan Perspective - Daylight Illuminance Levels

Clear Sky, October - Noon

Overcast Sky, December - Noon
South Facade Solar Control Options - Visual Comfort Impact

Option 2: Exterior Slats with Interior Automated Fabric Shades
South Facade Solar Control Options - Visual Comfort Impact
Option 3: Exterior Horizontal Overhang with Interior Automated Fabric Shades

Perspective View

Falsecolor Luminance Map - Surface Brightness

Plan Perspective - Daylight Illuminance Levels

Clear Sky, October - Noon

Overcast Sky, December - Noon
South Facade Solar Control Options - Visual Comfort Impact

Option 4: Electrochromic Glass

Perspective View

Falsecolor Luminance Map - Surface Brightness

Plan Perspective - Daylight Illuminance Levels

Clear Sky, October - Noon

Overcast Sky, December - Noon
South Facade Solar Control Options - Thermal Comfort Impact
Standard Effective Surface Temperatures at Peak / September 27, 2:00pm

Unshaded
Exterior Automated Blinds
Fixed Exterior Slats
Fixed Horizontal Overhangs
Electrochromic Glass

Degrees F
100 96 92 88 84 80 76 72 68
South Facade Solar Control Options - Thermal Comfort Impact
Predicted Mean Vote at Peak / September 27, 2:00pm
South Facade Solar Control Options
Facade Performance Summary

Capacity for daylighting
Visual comfort
Color quality
Thermal comfort
Peak load impacts

Unshaded
Exterior Automated Blinds
Fixed Exterior Slats
Fixed Horizontal Overhangs
Electrochromic Glass
Integration with Sustainability

Sustainability Consulting

Daylighting
How do I run LEED models while still maintaining usage of my computer?
Large LEED Model Workflow

Overview

1. Export .dwg
2. Clean!
3. LEED Prep
4. Export geometry/materials, .pts files
5. Run model!
6. Combine data for DIVA
7. Visualize!
Large LEED Model Workflow

1. Export .dwg
2. Clean!
3. LEED Prep
4. Export geometry/materials, .pts files
Large LEED Model Workflow

Batch File

```bash
C:\DIVA\temp\Project
```
Large LEED Model Workflow
Nodes and Data files

Nodes file - coordinates and normal

uv.dat file - space information/node groups
Large LEED Model Workflow

5. Run model.

- Rhinoceros
- DIVA for Rhino
- Radiance
Large LEED Model Workflow
.dat from Radiance
Large LEED Model Workflow

Data file that DIVA can read

- Location and nodes from .pts
- Illumination from Radiance .dat
- Node groups from uv.dat
Large LEED Model Workflow

6. Combine data for DIVA

7. Visualize!
Large LEED Model Workflow
Radiance back to DIVA

- All points location and direction data
- Illuminance Data
- Node Groups/Spaces
Large LEED Model Workflow
Data file that DIVA can read
Large LEED Model Workflow
Final Visualization
Integration with Architect/Lighting

Electric Lighting Design

Daylighting

Architect
How do we further architect’s knowledge about the building they are designing?
Canada College Kinesiology Building
North Facing Perspective
Canada College Kinesiology Building
North Facing Perspective
Canada College Kinesiology Building
North Facing Perspective - Cut Through Second Floor
Canada College Kinesiology Building
Second Floor Plan
Daylighting Conditions / Clear, Sunny Sky
September 21, 12:00pm, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map,
Surface Brightness
Daylighting Conditions / Clear, Sunny Sky
September 21, 1:00pm, Second Floor West Fitness Room
Daylighting Conditions / Clear, Sunny Sky
September 21, 2:00pm, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map, Surface Brightness

cd/m²

7080 3550 1780 890 450 220 110 55 30 15
Daylighting Conditions / Clear, Sunny Sky
September 21, 3:00pm, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map, Surface Brightness
Daylighting Conditions / Clear, Sunny Sky
September 21, 4:00pm, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map,
Surface Brightness
Daylighting Conditions / Clear, Sunny Sky
September 21, 5:00pm, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map, Surface Brightness

08.23.2017 Radiance Workshop 2017

Integral Light Studio
Daylighting Conditions / Clear, Sunny Sky / Electric Lighting On
September 21, 5:00pm, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map, Surface Brightness

08.23.2017 Radiance Workshop 2017

Integral Light Studio
Daylighting Conditions / Clear, Sunny Sky / Electric Lighting On
September 21, Dusk, Second Floor West Fitness Room

With No Shading
With Automatic Fabric Shades

Perspective View

Falsecolor Luminance Map, Surface Brightness
Daylighting Conditions / Clear Sky / Electric Lighting on September 21, Night, Second Floor West Fitness Room

With No Shading

With Automatic Fabric Shades

Falsecolor Luminance Map, Surface Brightness
Shade Material Comparison
Shade Fabrics Tested
MechoShade EcoVeil

White, 1% Openness
Visible Light Transmission - 22%
Diffuse Reflectivity (color) - 70%

Silver Birch, 1% Openness
Visible Light Transmission - 11%
Diffuse Reflectivity (color) - 60%

Grey, 1% Openness
Visible Light Transmission - 1.5%
Diffuse Reflectivity (color) - 30%

Shadow Grey, 1% Openness
Visible Light Transmission - 0.9%
Diffuse Reflectivity (color) - 10%
Daylighting Conditions / Clear, Sunny Sky
September 21, 4:00pm
West facing View from Treadmill
White

Perspective View

Falsecolor Luminance Map, Surface Brightness
Daylighting Conditions / Clear, Sunny Sky
September 21, 4:00pm
West facing View from Treadmill
Silver Birch

Perspective View
Falsecolor Luminance Map, Surface Brightness
Daylighting Conditions / Clear, Sunny Sky
September 21, 4:00pm
West facing View from Treadmill
Grey

Perspective View

Falsecolor Luminance Map, Surface Brightness
Daylighting Conditions / Clear, Sunny Sky
September 21, 4:00pm
West facing View from Treadmill
Shadow Grey

Perspective View

Falsecolor Luminance Map, Surface Brightness
Shade Cloth Comparison

3D360 View for VR

Open YouTube,
Search “Integral Group Shade Cloth”

https://youtu.be/3oJ6iDfnUg8
Shade Cloth Comparison
3D360 View for VR
Integration with Lighting

- Electric Lighting Design
- Daylighting
- Architect
How can we use Radiance to tell a story with Electric Lighting?
Elementary School in California

Interior View

Screen backlight
Elementary School in California
Interior View

Display lighting
Elementary School in California
Interior View

Downlighting
Elementary School in California

Interior View

Decorative Pendants
Elementary School in California

Interior View

Adjustable downlights
Elementary School in California

Interior View
Elementary School in California
Exterior View
Elementary School in California

Exterior View

Downlights in vestibule
Elementary School in California
Exterior View
Elementary School in California
Exterior View

Interior lights – screen
Elementary School in California
Exterior View
Elementary School in California
Exterior View

Decorative Pendants
Elementary School in California
Exterior View

Column Lights
Elementary School in California
Exterior View

Step Lights
Elementary School in California
Exterior View
Local Surprise
Multnomah County Courthouse - Portland, OR
MULTNOMAH COUNTY COURTHOUSE - PORTLAND, OR
Multnomah County Courthouse - Portland, OR
Multnomah County Courthouse - Portland, OR

Guardian SN 70/37 on Ultra Clear  PPG Solarban 72 on Starphire

Guardian SN 70/37 on UltraClear  PPG Solarban 72 on Starphire
Multnomah County Courthouse - Portland, OR

Guardian SN 68 on Ultraclear  Guardian SN 70/37 on Extra Clear  Guardian SN 70/37 on Ultraclear

PPG Solarban 72 on Starphire  PPG Solarban 72 on Starphire  PPG Solarban 72 on Starphire
Multnomah County Courthouse - Portland, OR

PPG Solarban 72 on Starphire

- VLT: 0.71
- SHGC: 0.30
- Front Face Reflection: 0.13

Guardian Super Neutral 70/37 on Extra Clear

- VLT: 0.70
- SHGC: 0.37
- Front Face Reflection: 0.12

Blue Wavelengths
Guardian Solarban 72
Multnomah County Courthouse - Portland, OR

PPG Solarban 72 on Starphire

Guardian SN 70/37 on Ultraclear
Multnomah County Courthouse - Portland, OR

PPG Solarban 72 on Starphire
Multnomah County Courthouse - Portland, OR

Guardian SN 70/37 on Ultraclear
Multnomah County Courthouse - Portland, OR

PPG Solarban 72 on Starphire

Guardian SN 70/37 on Ultraclear
Multnomah County Courthouse - Portland, OR
Thank You!

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