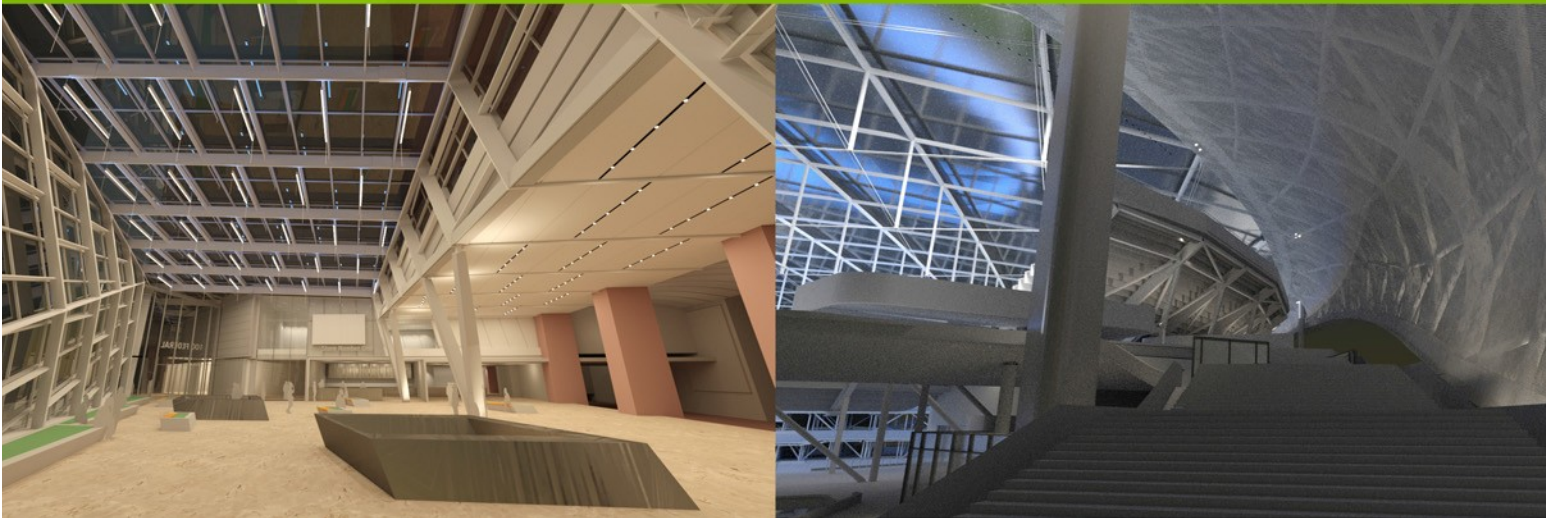# MAKING LIGHT WORK OF PHOTOREALISTIC LIGHTING DESIGN

NVIDIA® Iray® delivers fast, photometrically accurate results that enable rapid design iterations, increased project throughput, and expanded capabilities at Lam Partners.

NVIDIA

Replacing slow, block-by-block CPU-based rendering with iterative, physically-based GPU-based rendering gives designers the full picture they need to foster creative innovation.

AT A GLANCE

CUSTOMER PROFILE

Company: Lam Partners

Industry: Lighting Design

Location: Cambridge, MA

Size: 20 employees (16 design, 4 admin)

SUMMARY

> Innovative New England-based lighting design firm

> CPU-based renders were slow, potentially inaccurate, and required extensive prep work

> NVIDIA Iray GPU-accelerated rendering delivers photometrically accurate results extremely quickly

> Animation and other advanced features are expanding the firm's capabilities

Models are getting more and more complex over time, and we found ourselves having to put increasing amounts of effort into cleaning up the models to the point where we could render and calculate everything in a timely manner. We then had to wait while the scene rendered one small block at a time.

Dan Weissman
AIA, Assoc. IALD
Associate/Director of
Lam Labs

William Lam Associates was founded in Cambridge, MA in 1961, with a focus on integrating lighting with architecture and urban design. The company worked with many architects around the USA and abroad, developing innovative lighting solutions and integrated systems approaches for complex building design. The company name changed to Lam Partners (Lam) in 1990 with the addition of new partners. The firm has experienced considerable growth since 1995, working on increasingly complex projects and expanding design and technical capabilities.

CHALLENGE

The AEC industry is rapidly adopting digital design, modeling, analysis, and rendering tools. Lighting design entails importing a 3D model and then adding/manipulating lights. Natural lighting, colors, and shadows are also important considerations. Achieving the desired results requires real-world accuracy, white balance adjustment, and the capability to work with increasingly complex models.

"We normally use Autodesk Lightscape and Lighting Analysts, Inc.'s AGi32 for renderings and lighting analysis," said Dan Weissman, Associate and Director of Lam Labs. "Models are getting more and more complex over time, and we found ourselves having to put increasing amounts of effort into cleaning up the models to the point where we could render and calculate everything in a timely manner. We then had to wait while the scene rendered one small block at a time."

"Being able to iterate through different designs is key to finding the ideal solution for a project," agreed Jack Risser, Designer at Lam. "We're also getting more projects that involve dynamic lighting displays, such as LEDs that change color over time. Being able to see how the entire project will look at every stage is crucial to a successful design. Animating these changes is an even bigger help, because it allows us to see what happens during the transitions."
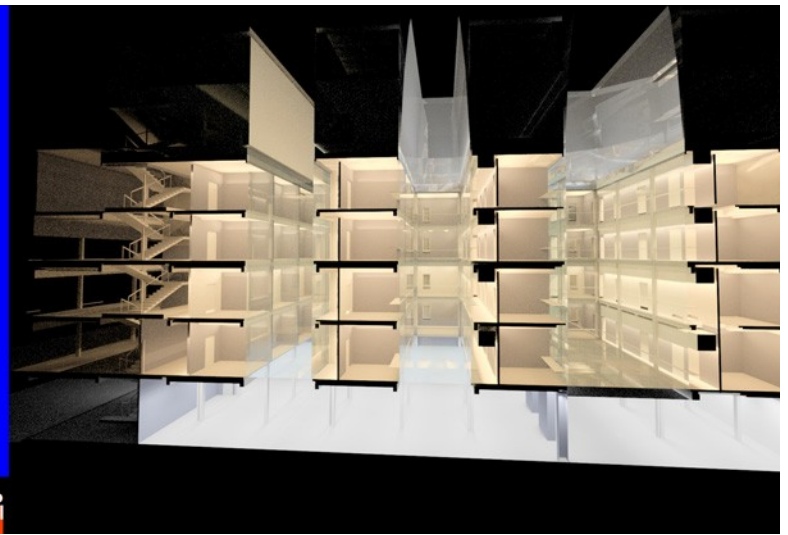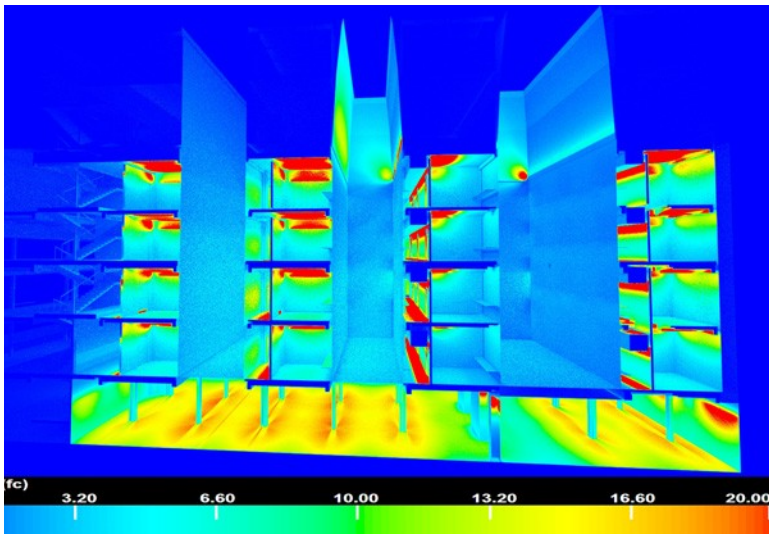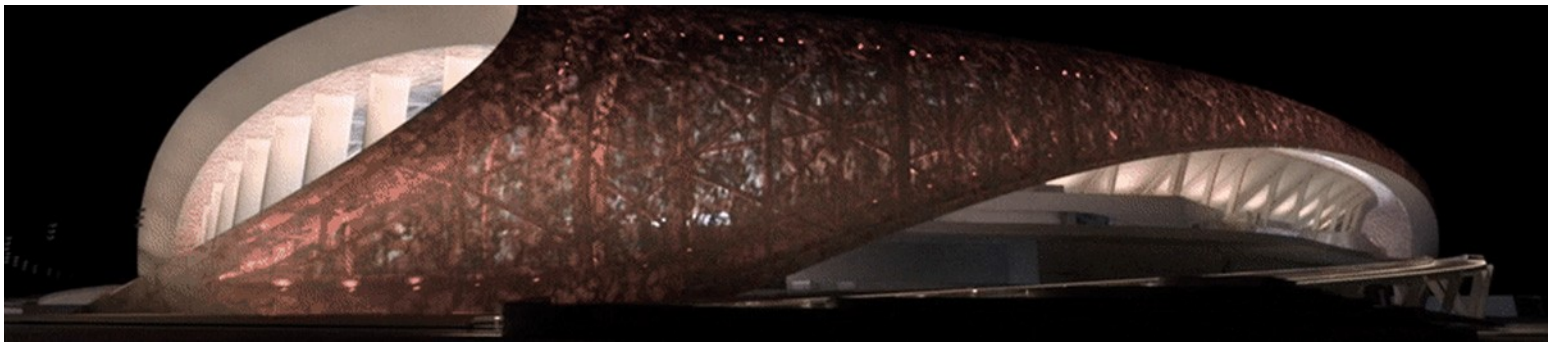
5 REASONS FOR NVIDIA IRAY

1   GPU-based rendering is much faster than CPU-based rendering.

2   Iteratively rendering an entire scene lets designers see results very quickly and either proceed or stop to make adjustments.

3   Photometrically accurate rendering ensures that reality will match the renderings.

4   Speed and quality are speeding up iterations and project throughput.

5   Animation and other advanced features are expanding the firm's capabilities.

SOLUTION

"If it's a radiosity based tool, we've probably tried it at one time or another," explained Weissman. "For example, we use Rhinoceros3D by Robert McNeel and Assoc. extensively, because it includes powerful modeling functions and plays well with many other 3D packages. We've tried the Flamingo and Radiance plug-ins for Rhinoceros, mental ray, and more. We've even experimented with the Unreal engine and other gaming engines, but these are not photometrically accurate and lack lighting analysis tools."

Weissman and Risser learned about NVIDIA® Iray® in early 2015, while working with Autodesk 3ds Max 2015 as part of their ongoing search for newer and better tools. One of the first things they noticed was the rendering: instead of rendering one small block at a time, Iray iteratively renders the entire scene at once. Designers can quickly see the initial results of their work and then choose to stop the render and make an adjustment, or keep going and see the realism and detail increase.

"Much of what we do doesn't require crisp images to see the effects," explained Weissman. "Thus, being able to see the ray tracing in near real time is hugely valuable to us. We have run numerous tests comparing Iray to AGi32, and our confidence has grown to where we are about to release our first projects that were designed using Iray. This will give us the final real-world test results we need."

RESULTS

Lam generally receives client files in Autodesk Revit format. These models are imported into Rhinoceros for geometry checks and building additional geometry, such as light fixtures or architectural details. From there, the model is brought into 3ds Max, and designers start loading lights and other luminous surfaces for rendering in Iray. Photometric mode is used most often to visualize scenes with photometrically accurate lighting. If the design needs changing, the designer simply models new lights into Rhino, comes back into 3ds Max, and tries again. The goal is to complete a first study of the project and quickly generate several design scenarios.

"We worked with Justin Brown, one of our Associate Principals and our IT Manager, to help us build a new server to accelerate rendering even more," said Weissman. "He builds about 80% of the computers we use, and he jumped on this project. We now have a machine with four high-end, water-cooled NVIDIA GPUs in our server room for people who need serious rendering horsepower. We're also investing in upgrading our workstation GPUs."

One of the most demanding projects Lam is working on is a multi-billion dollar sports stadium which contains 30,000 light fixtures that are all pointed in different directions. Iray accurately simulates this design with no loss in performance. It also supports the use of IFL files to animate changing effects or varying lighting throughout the day, which allows the designers to see how the finished product will look at any given time and what the transitions will look like as they happen.

"The performance boost is amazing," Risser concluded. "We can spend anywhere from an hour to a couple of days going from concept to finished project, depending on the size of the project. Iray's ease of use is a game-changer for us. We can often generate multiple iterations per hour, compared to waiting all day or more for an AGi32 render that doesn't turn out nearly as well. Moreover, the firm is receiving a growing number of projects that involve dynamic media displays and other complex scenarios. Take the stadium project, for example: no other rendering technology can simulate a design of this size with immediate, interactive feedback. Iray churned through the render with no issues."

"We can be working on anywhere from 40 to 100 projects at once, and this kind of speed and accuracy multiplied across those projects adds up to huge time and cost savings, not to mention better results for our clients. Having Iray has already won us business, and we anticipate that this will only continue."

Going forward, Lam plans to continue adopting Iray technology across the firm. Lam is also working closely with NVIDIA developers to add new features and functionality, which will continue driving usability, performance, and results.

To learn more about NVIDIA Quadro VCA, visit: **www.nvidia.com/Iray**

JOIN US ONLINE

blogs.nvidia.com

youtube.com/NVIDIADeveloper

twitter.com/nvidia

facebook.com/NVIDIA

linkedin.com/company/nvidia