DAYLIGHT MODELING

Finding the optimal use of daylight for comfort, sustainability and profitability

Good natural light is key to creating projects that tenants love. A successfully daylit building has visually and thermally comfortable spaces that are pleasing to occupants and aligned with the intended program. Daylight can also be used as a passive strategy for saving energy. In a space correctly designed for daylight, users can turn off electric lights, reducing the building's environmental footprint and operating costs.

However, allowing natural light into a space also means allowing the heat of solar gains. Great views command great prices—but sometimes cause equally great headaches for operations. A careful balance must be struck between the positive contributions of daylight and the negative effects of overheating, discomfort and visual glare.

Our service

Working within your criteria and goals, we use computer modeling to find a design path that balances the positive and negative attributes of daylight. We can also pair daylight modeling with complementary studies of energy use, thermal comfort and glare. As world-leading experts on weather, we understand the full range of climate factors that will affect daylight and energy use in your building. This combined, holistic analysis produces optimal results.

We have the breadth and bandwidth to bring clarity to large early design decisions. We have the computing capabilities and experience to evaluate concepts quickly, allowing design teams to see the impacts of various options clearly. As an independent consultant, we serve as an advocate for the best information, apart from any preferred design.

We'll help you answer questions like the following:

- How can we get more natural light into this space?
- How can we use the site's natural advantages best?
- Will we have too much light/glare/heat?
- Why do our employees have to keep their blinds closed?

We answer such questions quantitatively. But then we go beyond numbers to present solutions that are thoughtfully integrated with your greater project narrative.

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RWDI is a valuable partner to clients seeking to...

Explore Innovations

- Achieve award-caliber designs for innovative lighting and passive energy management

Create Opportunities

- Make the best use of a site's natural advantages
- Develop class A office spaces for higher revenue

Meet Challenges

- Manage (or mitigate) thermal and glare effects in new (or existing) construction
- Manage the performance & operational costs that come with great views

Fulfill Expectations

- Document expected daylight performance for green certification programs (LEED, WELL, etc.)

How we work

Good daylight design depends on many influences: architectural shape and orientation, sky conditions, surrounding buildings and landscape, interior design and finishes, the evolving use of the space and the resulting requirements and expectations of the occupants. We consider all these factors in our analyses.

We use tools that demonstrate the impacts of design choices in real time. They also let us dive deeper into solidified design concepts, showing which spaces receive what levels and quality of light. These analyses can drive better decisions earlier, reducing rework at later design and construction stages.

Our work can influence design immediately because our daylight simulation tools quickly plug into 3-D architectural models. Among our tools are Sefaira, IES VE, DIVA for Rhino, Radiance and our in-house ray-tracing software, Eclipse. These tools trace the sun's rays and how they are influenced by the materials they meet in the urban environment. We use these custom tools to provide bespoke simulation solutions and results when needed.

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In developing models and recommendations, we draw on years of experience modeling complex geometries and materials, as well as our unparalleled weather and climate expertise.

We constantly evolve our practice to identify and refine the most useful metrics in interpreting daylight performance. Climate-based metrics (CBM)—such as useful daylight illuminance (UDI), daylight autonomy (DA), and spatial and continuous daylight autonomy (sDA, cDA)—consider the performance of a space over an entire year, under changing sky conditions. This approach provides a wider perspective on performance than looking at snapshots taken at chosen hours, possibly under unrealistic sky conditions. Advanced daylight statistics, such as CBM, allow designers to easily and visually interpret large data sets of calculated illuminance levels. Such statistics are now required for achieving LEED daylight credits and WELL certification.

CBM metrics can also highlight periods and spaces that receive uncomfortable levels of natural light. For these situations, glare studies are often desirable. We simulate luminance levels, working from the occupants' perspective, and assess the likelihood of undesirable glare effects. We can also test mitigation measures from the same perspective. Our goal is to avoid the least desirable design choice: relying on occupants to close blinds. We strive to create robust daylight designs that work with little maintenance and occupant intervention.