With help from Autodesk Revit Architecture and Revit MEP, the whole process of coordination with the MEP consultants became much more efficient. It definitely led to fewer change requests during construction and more accurate as-built drawings at project's end. There was very little variance between what we designed and what was actually built.

—Simon Thompson
Director
Aedas Interiors, Singapore

High-standard, sustainable design.

Aedas Interiors uses Autodesk® BIM solutions to design one of Singapore's most environmentally friendly office spaces.

Image courtesy of Aedas Interiors.

Project Summary

With 90+ offices around the world and thousands of customers, Autodesk is a world leader in 3D design, engineering, and entertainment software. One of the company's fastest growing offices is located in Singapore, and has been an important strategic research and development hub for the past decade. "We expect to significantly increase our Singapore presence in the coming years," says Joe Chen, vice president of Corporate Real Estate Facilities, Travel, and Security (CREFTS) at Autodesk. To prepare for the planned growth, Autodesk recently initiated a search for additional office space. "We were running out of room in our existing building. Our goal was to find an adjacent property that would satisfy our need for more space, while also helping us to meet our sustainability initiatives." Within Autodesk, the CREFTS division was tasked with selecting the new location and overseeing design, construction, and operations.

The Building

CREFTS was chartered with two specific mandates in the search for new office space: reduce the company's carbon footprint and demonstrate the use of Autodesk® products in the design and construction of energy-efficient buildings that meet the highest sustainable design standards.

"At Autodesk, we are committed to reducing our overall carbon footprint," says Chen. "One of the ways we do that is by increasing the energy efficiency and sustainability of our facilities." Worldwide, more than 40 percent of all energy use is directly attributable to buildings. "Autodesk wants to be a model of a sustainable enterprise and a testing ground for our own workflows and solutions. We not only stand behind the products we champion, but use them to overcome the same challenges that our customers face in their businesses every day." After an extensive search, Autodesk selected the Solaris Building, a recently completed 15-story office building located in Singapore's One-North community. For help designing the interior space, Autodesk selected Aedas, a leading international design practice.

Autodesk®

Autodesk receives LEED Platinum™ Commercial Interiors certification—the first software company in Singapore to achieve this recognition.

In late 2009, Autodesk leased two-and-a-half stories and almost 56,000 square feet of unfinished office space in the new building, becoming one of its first tenants. "The Solaris building really fit the profile we were seeking," says Chen. "Not only is it architecturally interesting but, more importantly, the building recently received Green Mark Platinum certification from Singapore's Building and Construction Authority (BCA). That precisely aligned with our sustainability goals and gave us a tremendous opportunity to showcase what we could do with Autodesk products on the interior build-out."

The Team

With expertise in architecture, interior design, master planning, landscape, urban design, and building consultancy, Aedas was an excellent fit for the project. Autodesk selected Aedas for its base expertise in AutoCAD® software and its commitment to using Autodesk® Revit® Architecture software for Building Information Modeling (BIM) on a wide variety of project types, including interior build-outs.

Aedas first adopted Revit Architecture in 2007. In Singapore, the local architecture team has been using the software since 2009. Early successes with Revit Architecture, both in Singapore and on the company's projects throughout the world, led Aedas to explore new ways of using Autodesk BIM solutions. The Solaris project represented the company's first time using Revit Architecture from start to finish on the full scope of an interior design project.

The Challenge

Scheduling on the Solaris project was, of course, critical.

"We had 11 months from the initial design briefing to project handover to Autodesk," says Simon Thompson, director at Aedas Interiors, Singapore. Even more challenging were the project's dual sustainable design certification goals. "Autodesk wanted to use its own technology to design an interior space that achieves both BCA Green Mark Platinum and LEED Platinum™ Commercial Interiors (CI) certification."
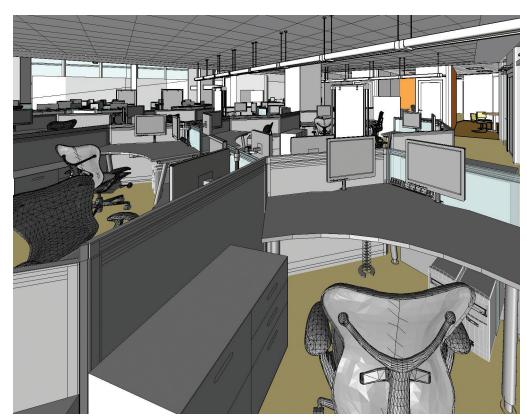
To receive a LEED Platinum CI certification, Aedas Interiors and its design partners needed to design an energy-efficient, healthy interior space filled with daylight and clean air, and constructed from regionally sourced, environmentally friendly materials. The Solaris building is the seventh LEED®-certified facility for Autodesk and the first software company in Singapore to receive dual certifications in Green Mark Platinum and LEED Platinum CI.

The Solution

With such ambitious goals, the design team had to consider numerous factors—including lighting design, regionally sourced construction materials, and layout—from the outset. "These critical factors cannot be relegated to afterthoughts when you're pursuing LEED Platinum CI and Green Mark certification," says Victor Chew, geo facilities manager at Autodesk for APAC.

To meet the project's environmental goals, Aedas Interiors employed a BIM design process, delivering a full scope of services, from design brief to handover. Aedas Interiors used Revit Architecture during the concept development stage and throughout the project when visualizing the real-world appearance and simulating the performance and cost of the interior build-out. "Revit Architecture was essential to clear communication between the designers, contractors, and Autodesk," says Thompson. "The software also helped us save time on redrawing and updating layout plans and drawings later in the project."

Conceptual image of Solaris building open office. Image courtesy of Aedas Interiors.

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Conceptual image of Solaris building open office. Image courtesy of Aedas Interiors.

Photo of Solaris building reception area. Image courtesy of Aedas Interiors.

In addition to Autodesk Revit Architecture, Aedas Interiors and its design partners used a variety of complementary Autodesk products, many of which are now part of Autodesk® Building Design Suite Premium. These products include Autodesk® Revit® MEP software for building systems design, Autodesk® 3ds Max® Design software for producing high-quality renderings, and AutoCAD for layout plans, design, and documentation. In addition, for document, model, and data management, the project team relied on Autodesk® Buzzsaw® web-based collaboration service, a component of what Autodesk now calls Autodesk® BIM 360. "At first we used an FTP site for file sharing, but quickly realized that Buzzsaw is the better system," says Thompson.

For help planning the new space, Autodesk and Aedas Interiors turned to DEGW, a strategic business consultancy that specializes in enhancing organizational performance through optimizing the design of physical places for the functional needs of the people who will use them. Early in the project, DEGW conducted numerous surveys, time-utilization studies, and focus groups with local Autodesk employees.

"We combined the results of that research with our green design goals to design a very functional and sustainable facility," says Stephen Fukuhara, senior director of Projects and Operations at Autodesk.

Improve Project Understanding
Throughout the design process, Aedas Interiors regularly used the 3D model to help project stakeholders better understand the proposed space. "Traditional designs are two dimensional, like a piece of paper," says Thompson. "Not everyone thinks two-dimensionally."

By utilizing an intelligent, model-based design process, Thompson believes that his clients were better able to understand the designed interior space. "The model gave everyone a better sense of the shape and atmosphere that the completed office would have."

"Revit Architecture helped us visualize the interior space," says Chew. That capability helped Aedas Interiors win faster client approval for a decision, made late in the design process, to lower the height of the workstation walls by nearly half a meter. With help from Revit Architecture, Aedas Interiors created a fly-through animation that helped Autodesk managers quickly visualize the space and sign off on the proposed changes. "That would not have happened as swiftly if Aedas had used flat, 2D drawings," adds Chew.

For the creation of realistic renderings of the interior spaces, Aedas turned to outside consultants skilled in the use of 3ds Max Design software. "We gave them the full 3D model," says Thompson. Before adopting Revit Architecture, Aedas typically supplied visualization consultants with 2D plans and elevations that required high levels of skill—and considerable time—to correctly interpret. "Something would usually be misinterpreted, requiring us to go back and forth until we got it right."

Using Revit Architecture and adopting a model-based design approach with an intelligent model streamlined the process. This approach is both more efficient and more accurate. "On the Solaris project, the visualization consultant immediately understood what we were trying to do," says Thompson. "There was no need to interpret anything. The renderings were consistent with the design throughout

all stages of the project. It enabled the client to see minor modifications in 3D at every stage of the decision-making process."

Improve Collaboration
By adopting a BIM process, and with significant help from Revit Architecture, Aedas Interiors also improved collaboration with the project's mechanical, electrical, and plumbing (MEP) engineering consultants. "This was their first time using Revit MEP software to plan air ductwork and electrical layout on an interiors project," says Thompson. One of the biggest issues they faced on the Solaris project was integrating the building's MEP systems into the interior space and reducing variances between plans and what is actually being built—often a significant problem on interior build-outs.

"Due to Greenmark requirements, many areas of the interior did not have ceilings," says Thompson. "This made it important to understand where the air ducts ran and how they interacted with the workspaces below. With help from Autodesk Revit MEP, we immediately saw the real-world impact of the designs and made better decisions about where to cover or expose the ductwork. Using traditional tools, that would have been very difficult. BIM definitely helped us reduce clashes with building services."

The MEP consultants also used Autodesk® Green Building Studio® web-based energy analysis software on the project.

"With help from Autodesk Revit Architecture and Revit MEP, the whole process of coordination with the MEP consultants became much more efficient," says Thompson. "It definitely led to fewer change requests during construction and more accurate as-built drawings at project's end. There was very little variance between what we designed and what was actually built."

A Greener, More Efficient Office

Aedas Interiors also used Revit Architecture to calculate cubic space and floor-to-ceiling heights, both required components for Green Mark certification. "It was quick and made submitting documents much more efficient," says Thompson.

Although high-performance design and energy efficiency are its primary strategies, Autodesk recently purchased Asian Renewable Energy Certificates (RECs) from 3Degrees. Required by many environmental certification processes, these RECs will help Autodesk offset 100 percent or more of its energy usage in the new office space, while supporting renewable energy investment in the region.

The Result

In early 2012, the new facility achieved BCA Green Mark Platinum certification and LEED Platinum CI certification.

Aedas Interiors delivered a final, 3D model of the completed facility—a full set of digital as-built drawings. "The local team and leadership are very happy with the new office and with the work that Aedas performed," says Fukuhara. "It really helped that they were able to virtually walk through the space and participate in the design process before it was

built." The completed facility is a place where the employees can work more collaboratively and enjoy coming to work.

Expanding Opportunity

Autodesk is using the Solaris project as a learning opportunity for future interiors projects using BIM. "In three months, and then again at nine, we'll conduct additional surveys to make sure that the new space is actually helping to improve employee productivity and collaboration," says Fukuhara. "It's an iterative process that will help us take that information and implement it into the next project."

Aedas Interiors plans to continue using Autodesk BIM solutions. "BIM use is growing globally," says

Thompson. "Aedas Interiors is committed to improving and expanding the use of the BIM process and the Revit product family throughout the company. They are instrumental to improving multidiscipline collaboration and coordination on a wide variety of projects, including interior build-outs."

For more information, visit **www.autodesk.com/ BIM**, **www.autodesk.com/revitarchitecture**, and **www.autodesk.com/revitmep**.

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