Insight 360 Success Story

COMPANY

U.S. Air Force Academy

LOCATION

Colorado Springs, United States

SOFTWARE

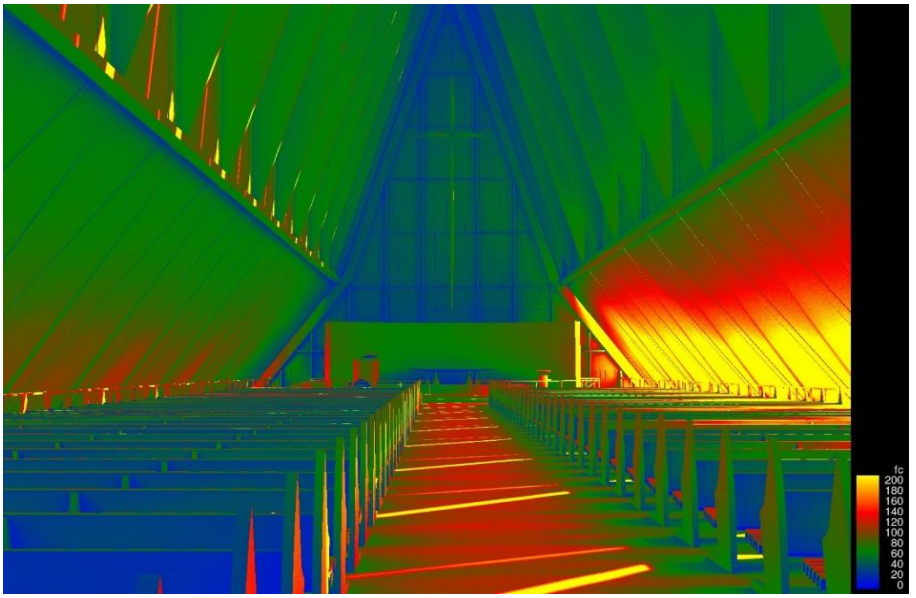
Autodesk® Insight 360™
Autodesk® Revit®

WEBSITE

www.usafa.af.mil

Energy savings for a modern masterpiece

The U.S. Air Force Academy prioritize retrofit opportunities using Insight 360 energy and daylighting performance analysis



BIM-integrated whole building energy and daylighting analysis allowed the team to understand potential performance.

Introduction

Dedicated in 1963, the Cadet Chapel at the United States Air Force Academy (USAFA) is a Modernist architectural gem and one of Colorado's most photographed landmarks. Unfortunately, half a century of exposure to the elements will take its toll on any building. The chapel is riddled with leaks and cracks, the result, according to the USAFA, is $400,000 in maintenance every year, and upwards of $9 million in repairs to date.

To determine what repairs might help reduce energy costs the most, a team of Autodesk consultants created a virtual as-built model of the chapel. Using Revit as a platform for an intelligent model enabled the team to leverage Insight 360's whole building energy and daylighting analysis workflows to suggest cost effective improvements for the chapel based on actual operational conditions.

Whole Building Energy Analysis

Early in the Revit modeling process, a conceptual mass representation of the chapel was created and an Insight 360 energy analysis was conducted to understand what renovation improvements would yield the greatest energy savings. It was suggested that upgrading the existing (and minimal) wall insulation could potentially lead to an operational energy savings of approximately $1 million.

As the model detail progressed, so did the energy analysis sophistication. As more information about the building was uncovered, that detail was built into the Revit model, such as material thermal properties. The automatic creation of the Energy Analytical Model (EAM) from Revit allowed the team to seamlessly translate the complex architectural geometry into a valid analytical model ready for simulation.

Daylighting Analysis

Insight 360 lighting analysis was used to provide visual representation of light level distribution throughout the chapel. By adding the actual material properties of the stained glass, such as visible transmittance and glass color, the team was able to create sophisticated and accurate illuminance renderings fast.

Illuminance maps were automatically created at the work plane for in context visualization. Additionally, 3D views were rendered and time and date settings were replicated to compare actual chapel photographs with rendered lighting levels.

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