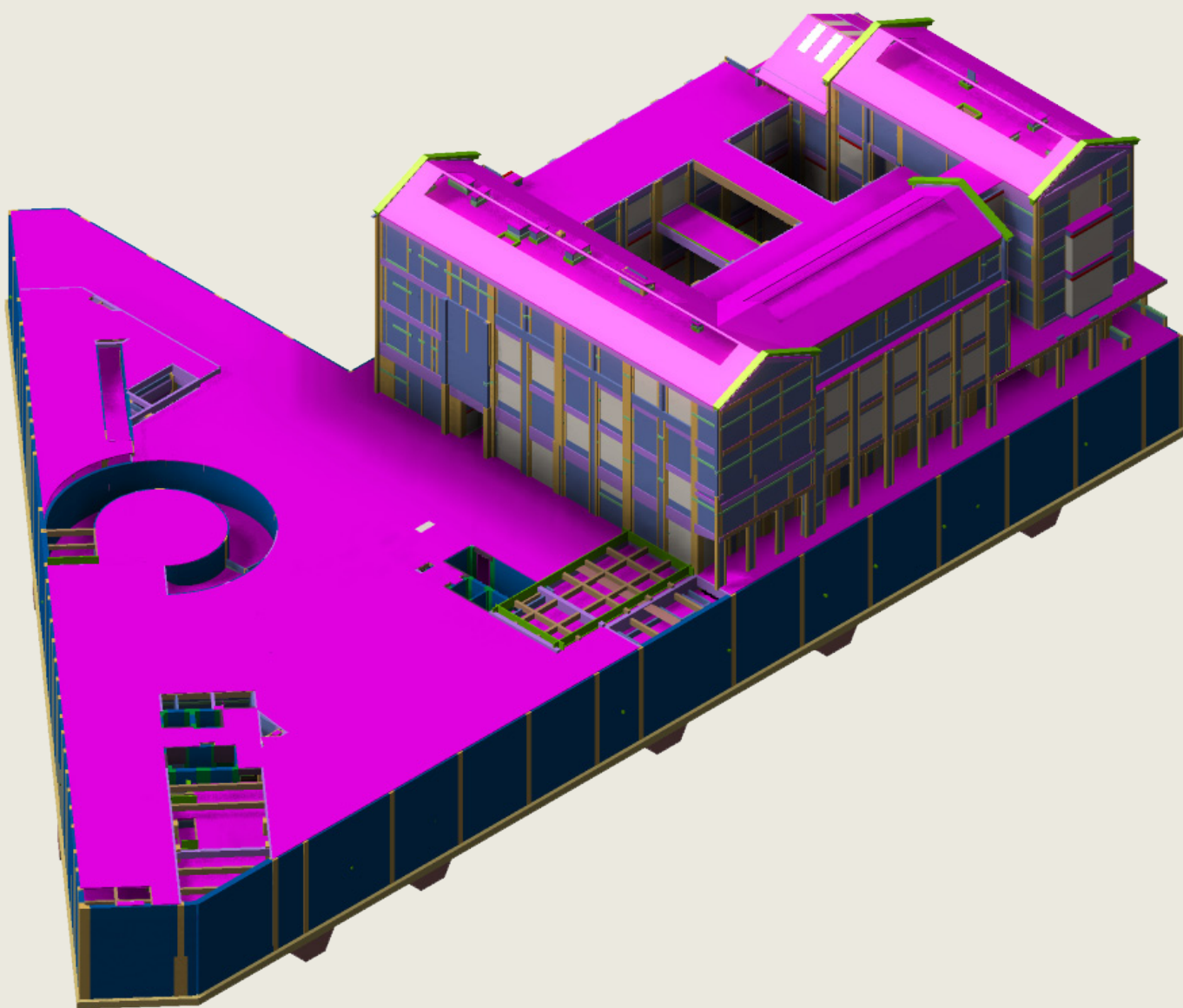# LUBANSOFT LEVERAGES SPATIAL SDKS TO BUILD WORLD-CLASS 3D BIM TOOLSUITE

Since 2001, Lubansoft has focused on research, development, and promotion of China's BIM technology, concentrating on construction-phase BIM technology projects, enterprise-level solution research, development, and services.

鲁班软件
Lubansoft | 建造BIM领航者

Lubansoft's enterprise-level building information management (BIM) system (Luban PDS) is an engineering basic-data platform that innovatively applies cutting-edge BIM technology to the entire process of project management for the construction industry. Lubansoft's BIM application clients are mobile ready, able to support mobile office requirements of the construction industry.

Lubansoft, founded in 2001, focuses on research, development and promotion of China's BIM technology. The company concentrates on construction-phase BIM technology projects, plus enterprise-level solution research and development and services.

In addition to providing Luban PDS, the company also developed a number of specialized client applications for use in creating 3D BIM models, calculating workloads, visualization, etc. Lubansoft's model and calculation applications, such as, Luban Architecture, Luban Steel, etc., and the majority of the company's calculation series products were based on AutoCAD. However, due to AutoCAD's limitation in 3D modeling and visualization, the company now uses Spatial's 3D ACIS Modeler for 3D BIM model creation, Boolean operations, volume calculations, and other geometric operations, integrated with Spatial's HOOPS Visualize for display of complex models.

To aid users in performing search and analysis through their client applications, Lubansoft defined a lightweight 3D BIM model. For 3D models from third-party BIM software (e.g., Revit, Tekla, etc.), the company also developed corresponding plug-ins to convert these BIM models to this new lightweight model format.

CHALLENGES BEING CONFRONTED

Modeling Kernel

Early on, Luban Architecture used the 3D modeling function built into AutoCAD; however, AutoCAD's strength is as a 2D drawing platform, and not as a 3D modeling engine. Because the 3D modeling kernel in AutoCAD is neither robust or full-featured, it impacted both the performance of Luban Architecture as well as resulted in a number of Boolean operation failures. The lack of features plus operational failures impacted the accuracy of calculations as well as the stability of the program. Therefore, a more stable, full-featured 3D modeling kernel was urgently required to replace the AutoCAD 3D modeling engine to raise the stability of the software and improve the accuracy of calculation.

Visualization

The flagship product of Lubansoft was built on a foundation of the AutoCAD kernel. Along with limited 3D modeling capabilities, AutoCAD's abilities in 3D visualization are also very limited. For example, displaying a relatively complex 3D BIM model, such as a 20-floor building, resulted sluggish performance. This lack of ability to effectively display complex 3D BIM models placed Lubansoft at a competitive disadvantage.

As customers' demands increased, Lubansoft needed to develop a platform independent of any third-party design software to manage the data of the 3D BIM models and the related functions. This platform needed to be able to efficiently display complex 3D BIM models and efficiently perform such operations as package filtering, scene roaming, cutting plane, and animation.

Lightweight Models and Mobile Platform Support

Throughout the construction, operational, and maintenance
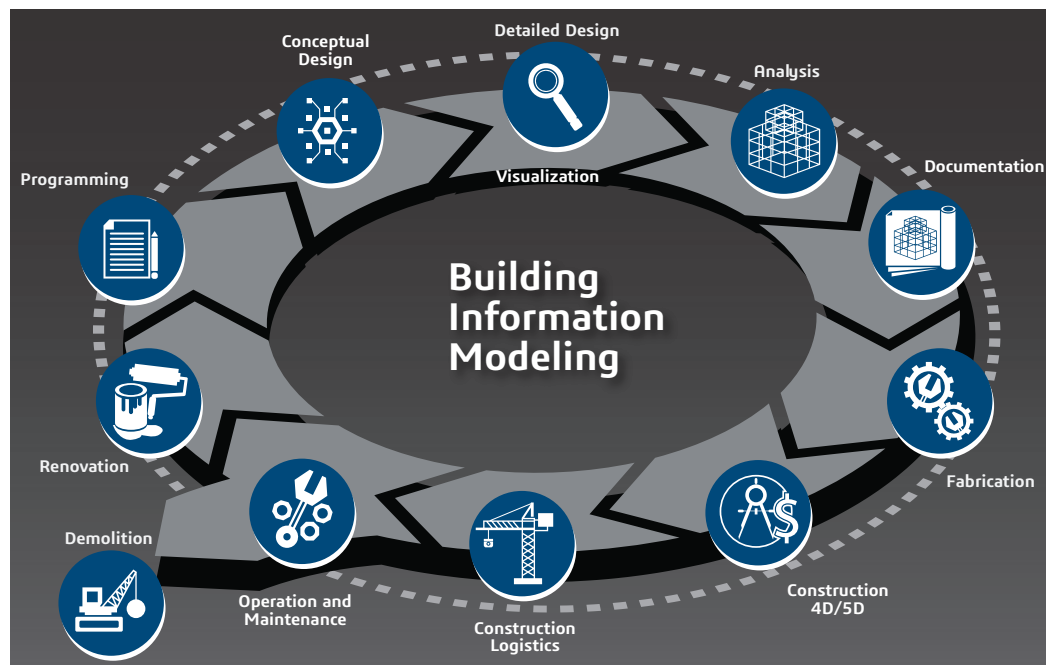
phases, it is necessary for engineers to be able to interact with 3D BIM models, but many of the involved contractors may not have the resources to acquire a complete suite of BIM design software. Therefore, customers need to be able to open the 3D BIM models produced by various design suites (e.g., Revit, Tekla, etc., or Luban calculation software) to carry out lightweight processing. More complex operations can be conducted in an integrated 3D BIM system platform.

In addition, users at construction sites need access to BIM data on a cell phone or tablet. Lubansoft must support the ability to browse and search 3D BIM models on mobile platforms.

SOLUTIONS

Modeling Kernel

Given the shortcomings of AutoCAD as a 3D modeling kernel, Lubansoft's development team replaced the AutoCAD 3D modeling kernel with 3D ACIS Modeler. For over 30 years, 3D ACIS Modeler has led the 3D modeling kernel market, providing powerful modeling capabilities that meet the needs of the BIM industry. By moving to an industry-proven solution with more

The 3D ACIS Modeler also provides fast and accurate volume calculation — an essential function in the construction industry. In addition, many operations within the 3D ACIS Modeler are failsafe, meaning that even if there is an error during a certain operation, the user can automatically fall back to the previous state without fear of damaging the original model or restarting their process, improving the robustness of the application.

The 3D ACIS Modeler's support for multithreading enables Lubansoft applications to carry out operations such as creation of different layers or Boolean operations rapidly. By also integrating the CGM Polyhedra Modeler, Lubansoft can also simultaneously process polyhedral geometry along with precise representations via an integrated API interface.

Visualization

Driven by the limited visualization capabilities of the existing solution, Lubansoft incorporated HOOPS Visualize in the Luban PDS system platform and the related Lubansoft applications that need to browse 3D BIM models.

HOOPS Visualize is a portable and complete graphic development package with the most powerful functions in the industry and is used in creating or enhancing 2D/3D applications. HOOPS Visualize can help developers use an advanced graphic API to accelerate high-performance 3D applications geared to desktop, cloud, or mobile applications.

The powerful large-model visualization function of HOOPS Visualize is particularly well suited to the visualization of complex 3D BIM models. HOOPS Visualize has also provided a variety of high-level visual functions, such as shadowing, graining, transparency, Gooch rendering, and other graphic effects based on coloration — developers only need to add these functions to an application to increase the value of their products.

> "Lubansoft is a specialized construction BIM software and service provider. Through our decade-long cooperation with Spatial, Lubansoft can take advantage of the world's leading 3D modeling kernel and graphics platform and, thereby, be able to devote our research and development energies to the creation of higher value-added specialized applications. Using Spatial's SDKs has raised the competitiveness of our products, accelerated the pace of software development and shortened our time to market."
>
> Dr. YANG Bao Ming
> Lubansoft CEO

than two million seats worldwide, Lubansoft's applications can now achieve a significant improvement in their stability and performance, while benefiting from the robustness gained through thousands of use cases.

The BIM industries need access to stable and reliable Boolean operations. The Boolean functions within the 3D ACIS Modeler support a wide range of Boolean operators. For the most complex Boolean operations, the 3D ACIS Modeler has a powerful incremental Boolean capability. This incremental routine has access to powerful model inspection and repair functions, and thus it can effectively test and fix errors caused by modeling issues, raising the success rate and efficiency of follow-up Boolean operations.

Lightweight Models and Mobile Platform Support

The development team at Lubansoft used the HOOPS Visualize Stream module to define its own lightweight 3D BIM model format. This proprietary model format is used throughout Lubansoft's BIM system platform and its various desktop and mobile clients and enables lightweight processing of 3D models.

In addition, HOOPS Visualize for Mobile brings the powerful 3D model display capabilities of HOOPS Visualize to mobile platforms, allowing the Lubansoft development team in quickly developing mobile clients on both iOS and Android platforms.

RESULTS

Simplifying Product Development; Shortening Time to Market

By licensing the 3D ACIS Modeler and HOOPS Visualize components from Spatial, Lubansoft has greatly simplified its development work, reduced the resource needs, and effectively shortened the delivery time for its applications. Lubansoft is now able to complete the development of a new applications in as quickly as six months.

Raising Product Competitiveness

Standardizing on the ACIS modeling kernel has resulted in the increased stability and performance of the calculation products and has raised the accuracy of calculations. Irrespective of whether on a PC or a mobile platform, Lubansoft can smoothly and flexibly process the 3D BIM models of large scenes, improving the accessibility of their products to their customers.

Broadening the Product Line

The limitations of the original modeling engine not only limited the performance of Lubansoft products, but the breadth of the product line as well. Previously, Lubansoft's core products were chiefly civil engineering calculators and steel reinforcing bar calculation products. Now the company has developed a complete BIM system platform with a dozen specialized applications. The new capabilities that Spatial toolkits provide has allowed Lubansoft to develop products that cover over one hundred application points, extending over every stage of a construction project.

Increased Customer Satisfaction

The new Luban BIM system based on the 3D ACIS Modeler, CGM Polyhedra, and HOOPS Visualize can now support a wider range of customer applications, be available on a wide range of platforms, and offer greater stability and performance. This increases performance, and functionality has greatly increased Lubansoft's customer satisfaction.

CONCLUSION

By incorporating 3D software toolkits from Spatial into their BIM software suite, Lubansoft has been able to raise design quality, reduce design errors, and obtain and analyze workload cost data, supporting the entire process of construction, operation, and maintenance. This increased quality of the 3D BIM models ensures the timely completion of construction projects, at a guaranteed quality level and within budget for their customers. Moreover, the Spatial toolkits have allowed Lubansoft to build platform that enables collaboration from the office to the job site, be it on a desktop, tablet, or mobile phone.

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