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OpticsBuilder™ | eGUIDE

Shining a light on the pivotal role of CAD time in driving manufacturability

Discover how improving the CAD workflow can help you produce optical designs more effectively and eliminate hidden costs along the way

There's a common perception that CAD time is an inexpensive commodity. Because the hourly rate for CAD users is typically lower than that of optical designers — especially when the work is outsourced — it's considered acceptable for the CAD workflow to require a fair amount of manual effort and rework. Many of us haven't really questioned whether this is an acceptable tradeoff or examined how the status quo may be hindering success.

At Zemax, we've discovered that the inefficient use of CAD time often results in considerable budget overruns, extended schedules, frustration, and even unauthorized access to proprietary intellectual property. It doesn't have to be this way.

After several years of analyzing the typical CAD design workflow through consultation with numerous customers, we've pinpointed several ways in which automating and streamlining processes can shave tens to hundreds of hours off the workflow and significantly reduce errors. In this eGuide, we explore common roadblocks to CAD design efficiency and how OpticsBuilder can help you bypass them.

Identifying the hidden costs of CAD time

The factors that tax your bottom line aren't always visible costs like labor and materials. Sometimes it's simply that activities take too long, are error-prone, and create continual interruptions for team members. Process inefficiencies can cost dearly in terms of productivity, delays, and even data security.

We use the term "CAD time" to refer to all the costs associated with and activities performed by mechanical engineers, CAD drafters, or anyone else working on optomechanical packaging in a CAD environment.

Here are the typical elements of CAD time, both visible and hidden.

Visible costs

- Budgeted project hours @ the hourly rate for CAD users and optical designers.

Hidden costs

Extra hours due to:

- **Redundant work** that occurs when the optical designer has to prep a template file for handoff to the CAD user and then when the CAD user has to recreate a lens geometry from scratch.
- **Errors** that result from manual entry and the need to make educated guesses because of a lack of complete information.
- **Multiple iterations** of prototypes and optomechanical packaging that need to be generated in order to assess whether housing works appropriately and whether designs can be manufactured as desired.
- **Repeated interruptions** while the optical designer and CAD user engage in numerous, often unplanned conversations to clarify specifications, evaluate designs, and check performance.

Security breaches due to:

- **Reliance on** unstructured communications channels like email, chat apps or hand-written notes to share proprietary design information results in inconsistencies and errors.

Understanding the workflow bottlenecks that result in hidden costs

Wasted time is wasted money.
Every inefficiency in CAD design processes — every task that takes longer than it should — costs money, wastes time, and increases risk.

Frequent need for back-and-forth communication among team members

The amount of conversation required to get an optical design appropriately transferred into the CAD environment can be extremely costly. Because design files don't contain complete information, CAD users have to ask optical engineers to clarify specifications or answer questions, over and over, whenever a CAD user needs to import, analyze, or export a design.

In addition, many CAD users lack a way to check how their designs impact the performance of their optical systems. As a result, they have to continually check in with optical engineers to ensure their assemblies don't degrade optical performance and do meet manufacturing specifications. Often there is optical data stored in the optical engineer's head that needs to be added to the drawing. This means there is a great deal of back-and-forth communication about stray light and beam clipping to ensure the packaging has not added defects to the design.

Manual, often repetitive work processes, which lead to errors

Whether it's outsourced or done in-house, a good portion of CAD work is manual and tedious. Most problematic is that CAD users typically have to create lens geometries from scratch. As a result, details can get lost, overlooked, or misunderstood. If errors go undetected long enough, complete product reworks may be required. In addition, creating good drawings can be just as time-consuming, tedious, and rife with errors.

Miscommunication from lax and unsecure communication channels

Common methods for handing optical designs to CAD users can put the intellectual property contained within them at risk of exposure. Many times design files are exported into lengthy template files or handwritten notes to instruct the CAD users on the design parameters. They are shared over email, chat, and phone calls, often requiring additional back-and-forth to get all of the details understood. Any process that repeatedly shares easily readable, private information over common channels poses security risks. The most common threat is not usually a sophisticated hack to gain access but instead something as slight as an email address typed incorrectly.

What's the remedy for hidden costs?

The right software tools can simplify some of the burdensome aspects of optical design, resulting in a more efficient, cost-saving CAD workflow. Here are some capabilities to look for:

- **Automation** to get rid of some manual tasks and thereby reduce errors.
- **Streamlined processes** to avoid redundancies, speed up timelines, and give people more time to innovate.
- **Optimized communications,** in which team members can give their colleagues all the pertinent information they need to work effectively — and securely — and without the need for repeated communications.

Calculating the true cost of CAD time

As we've seen, inefficient processes can be expensive and waste considerable time and effort throughout the CAD workflow. What unnecessary costs might be occurring on your team? What would it be worth for you to get control of them? How might that improve your outcomes? Let us walk you through our personalized analysis and ROI calculation.

BOOK YOUR CONSULTATION

How OpticsBuilder can help you eliminate hidden costs and increase efficiency

OpticsBuilder enables CAD users and optical engineers to speed their processes and increase accuracy by providing the tools needed to build, analyze, and share their work more efficiently and effectively.

Automate manual, tedious tasks to wipe out errors and speed timelines

One of the costliest inefficiencies in the optical design workflow is the time required to accurately convert optical designs into CAD to build virtual prototypes. This manual work is avoided in OpticsBuilder, which flawlessly converts OpticStudio designs into native CAD elements. Optical fidelity is maintained by loading the entire design, including lens materials, positions, sources, wavelengths, and detectors.

Time and money simply evaporate when rework is needed. The biggest challenges are often caused by errors early in the design process — anything from a mechanical component causing light to scatter in unexpected ways, to a slight error in creating the exact lens geometries that degraded the entire optical system.

With OpticsBuilder, CAD users can start designing their packaging faster and avoid errors by using mathematically driven optical geometry instead of creating optical components from scratch. CAD users can use exact lens and stray light data to analyze and optimize optomechanical housings.

OpticsBuilder also streamlines error-prone workflows by enabling CAD users to quickly generate and share ISO-compliant optical manufacturing drawings with a push of a button through an automatic design export tool. This process can take place in mere seconds where previously it took hours of manual work.

Include complete design analytics in design files to improve security and accuracy

OpticsBuilder allows an optical engineer to send everything needed for handoff to the optical product design team in a single file. At the same time, OpticsBuilder reduces the possibility of human error and keeps everything pertinent to the design in one place. Further, CAD users don't have to waste time by repeatedly asking for clarification.

Save considerable time by eliminating the need for repeated, unnecessary conversations between team members

The flawless conversion of an optical design from OpticStudio — with all pertinent information included — removes the need for much upfront discussion between the CAD user and optical engineer.

Beyond that, because the optical engineer is typically the only one who can analyze the design, the CAD user is often faced with checking in multiple time throughout the CAD design process. This creates multiple interruptions, wastes valuable engineer time and builds frustration for everyone involved. OpticsBuilder addresses this with an industry-exclusive optomechanical packaging analysis tool that shows CAD users how their assemblies impact the optical performance, enabling them to spot size changes, beam clipping, and image contamination inside their CAD software. In other words, they can build the entire design, check its performance, and provide the completed project to the optical engineer for final review, reducing the schedule for a typical workflow by weeks.

Find out if OpticsBuilder is right for your optics team

In a world of accelerating timelines and shrinking budgets, managers must look for the hidden costs driving their projects out of line. No part of the process can be ignored. OpticsBuilder can eliminate many of these roadblocks and get you on track.

Want to see how it might work for you? Request your personalized ROI analysis today.

GET AN ROI ANALYSIS

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