

# ENVISION2018

## Zemax Conference Agenda

Monday, November 5



**Mark Nicholson**  
Chief Executive Officer  
Zemax



**Dan Hamann**  
Chief Revenue Officer  
Zemax



**Sanjay Gangadhara**  
Chief Technology Officer  
Zemax



**Matthew Sutton**  
Director of Product  
Zemax



**Waylin Wing**  
Optical Engineer  
LumenFlow Corp.



**Bob Householder**  
VP Business & Technical Development  
Access Optics



**Jennifer Michels**  
Optical Engineer  
Optimax



**Jeremy Huddleston**  
Optical Engineering Manager  
LightPath Technologies



**Mike Jones**  
Optical Designer  
Precision Optics



**Alissa Wilczynski**  
Global Engineering Services Manager  
Zemax

Zemax

7:00 am – 7:45 am		Welcome breakfast	
8:00 am – 8:20 am	Conference kick-off and welcome <b>Dan Hamman, Chief Revenue Officer, Zemax</b> Join us to get Envision 2018 off to a great start!		
8:20 am – 9:50 am	Gamechangers in optical design <b>Mark Nicholson, Chief Executive Officer, Zemax and Sanjay Gangadhara, Chief Technology Officer, Zemax</b> The industry is moving faster than ever—pressure to keep up is enormous. You must continue to evolve. You must stay ahead of it. You must change your own game. We're going to help you change the way you work, solving not just the problems you have today, but also those you will face tomorrow. Join Mark Nicholson and Sanjay Gangadhara for a joint presentation about the future of virtual prototyping, the nexus of optimization and tolerancing, and much more. Come join the discussion on next-generation design tools!		
10:00 am – 10:45 am	Looking forward: Zemax Virtual Prototyping <b>Matthew Sutton, Director of Product, Zemax</b> With the game changing constantly, what's ahead for Zemax? Find out what Zemax Virtual Prototyping is and how it will help you speed time to market, save costs and produce better results. Join us for a tour of what's ahead for Zemax products as we know them today and where we are taking them into the future.		
11:00 am – 11:45 am	Optical design of a compact DUV spectrometer for entry, descent, and landing applications <b>Waylin Wing, Optical Engineer, LumenFlow Corp.</b> Learn about the design of a compact deep ultraviolet (DUV) spectrometer which is a component of a recently awarded NASA grant, where the objective is to demonstrate feasibility of rugged and small spectrometers for DUV analysis of atmospheric properties during the entry, descent, and landing (EDL) phase of a mission for planetary landing craft.		
12:00 pm – 12:45 pm	<b>Lunch</b>		
		<b>Track 1</b>	<b>Track 2</b>
1:00 pm – 1:45 pm	What's ahead for OpticStudio <b>Thomas Pickering, OpticStudio Product Manager, Zemax</b> Learn about new, recently added features and updates in OpticStudio to take your optical design to the next level and improve your design workflow. Plus, get a sneak peek into features that are coming up soon!	Going the extra mile with Contrast Optimization: A practical comparison of micro-imaging system optimization <b>Bob Householder, VP Business &amp; Technical Development, Access Optics</b> With the introduction of the Contrast Optimization feature in 2017, imaging system designers have another option for targeting imaging quality. The new technique is not only an alternate to direct MTF optimization, speed and performance improvements are possible. The seminar will take a practical approach in the use of Contrast Optimization in the development of a micro imaging system as is commonly used in robotic surgery, general surgery and precision small-scale imaging in defense, industrial and commercial markets. A comparison will be made using other optimization methods and also look at results using an alternate lens design program.	
2:00 pm – 2:45 pm	Using the Cost Estimator in OpticStudio <b>Jennifer Michels, Optical Engineer, Optimax</b> As an OpticStudio user, you have direct access to a unique tool from Optimax: The Estimator. The Estimator empowers the optical designer by generating cost estimates as design forms and tolerances are explored. Jennifer Michels, an optical engineer at Optimax, will provide a step by step demonstration in OpticStudio, setting up lenses with spherical, aspherical, and plano surfaces, and submitting for cost estimates. Simple options for forwarding your finalized lens for a quote from the Optimax Sales team will be covered.	How mechanical engineers are using LensMechanix <b>Isis Peguero, LensMechanix Product Manager, Zemax</b> In this session, you'll learn about the five ways that mechanical engineers packaging optical systems in CAD are using LensMechanix. Find out how this enhanced process leads to faster time to market and lower costs. You will also get the opportunity to learn where the LensMechanix team plans to expand capabilities in the future and what that means for you.	
3:00 pm – 3:45 pm	Addressing and simplifying STOP <b>Sanjay Gangadhara, Chief Technology Officer, Zemax</b> Analyzing the Structural Thermal Optical Performance (STOP) of an optical product can be challenging. In this session we'll review common roadblocks, share thoughts on how to simplify the STOP process, and discuss the tools Zemax is currently developing to make STOP analysis easier and more accurate in the future.	How to properly analyze designs that violate standard approximations for low-cost imaging applications <b>Jeremy Huddleston, Optical Engineering Manager, LightPath Technologies</b> A review of novel techniques and lessons learned for evaluating compact, low-cost IR imaging lenses. These lenses are particularly challenging to design due to stringent limitations on cost, size, available materials and number of elements. As a consequence, the necessary performance trade-offs often lead to unexpected but significant inaccuracies for standard calculations of imaging design metrics, such as EFL, f/#, FOV, MTF, distortion, relative illumination, and even achromatic and athermal analysis. Design examples will be used for lenses currently on the market, including patent-published details of the original Lepton lens inside the successful FLIR ONE thermal imager for cell phones – a design that broke conventions and began the trend towards thermal imaging in consumer applications.	
4:00 pm – 4:45 pm	Design and tolerancing of a 6-channel SWIR Cassegrain system for Australia National University <b>Mike Jones, Optical Designer, Precision Optics</b> This session will detail the optical design of a 500mm f/6 corrected Cassegrain with a 4° FOV, and the partitioning of that FOV into four or six separate channels, with identical relay lenses that reduce the focal ratio to f/2 in each channel. The relays are achromatized across the 1.16-1.7µm (J,H) infrared bands. Merit function techniques were developed to create a curved focal surface with its center of curvature at the Cassegrain exit pupil, allowing all relays to be operated as though on axis. While attending this session, you will increase your knowledge of relay design and merit function techniques, as well as learn layout and performance plots, tolerancing, and design of auxiliary null optics for figuring the hyperboloidal primary mirror.	Tools for effective heads-up display design and analysis <b>Alissa Wilczynski, Global Engineering Services Manager, Zemax</b> How do you effectively use OpticStudio to design and analyze the performances of a Heads-Up Display? Learn how to use tools like the NSC Sag Map, the Full-Field Aberration, the Reverse Elements Tools and many others in this informative session.	
6:30 pm – 9:00 pm	<b>Cocktail reception and dinner</b>		

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## Zemax Conference Agenda

Tuesday, November 6



**Thomas Pickering**  
OpticStudio Product Manager  
Zemax



**Craig Unick**  
Senior Optical Designer  
Keo Scientific



**Paul Colbourne**  
Director, Optical Switching Technology  
Advanced Research, Lumentum



**Isis Peguero**  
LensMechanix Product Manager  
Zemax



**Sanjay Gangadhara**  
Chief Technology Officer  
Zemax



**Cheng Sun**  
Associate Professor  
Northwestern University



**Malcolm Panthaki**  
VP of Analysis Solutions  
Aras Corp.



**Alissa Wilczynski**  
Global Engineering Services Manager  
Zemax



**Kyle Johnston**  
Research and Development  
Optical Engineer, Luminart



**Mark Nicholson**  
Chief Executive Officer  
Zemax

# Zemax

## Track 1

## Track 2

7:00 am – 7:45 am

### Breakfast

8:00 am – 8:45 am

#### What's ahead for OpticStudio

**Thomas Pickering, OpticStudio Product Manager, Zemax**

Learn about new, recently added features and updates in OpticStudio to take your optical design to the next level and improve your design workflow. Plus, get a sneak peek into features that are coming up soon!

#### Incorporating commercial photographic lenses into your optical system designs

**Craig Unick, Senior Optical Designer, Keo Scientific**

Proof of concept experiments and home-made instruments have served a broad community of researchers well. In many cases, off-the-shelf lenses from Canon, Nikon, Fujinon, and others, are used where a high-resolution flat image with accurate color registration is required. But, newer generations of instruments require better performance, which can only be achieved via thorough optical design. OpticStudio provides the framework to model these optical systems, but finding the information on the actual lens prescriptions can be challenging. During this session, you will learn the background on instrumentation designed using camera lenses and the patents of commercial photography lenses. The talk will culminate with an example of how to implement a lens prescription from a patent in OpticStudio, verifying that the performance of the lens prescription matches the real-life lens.

9:00 am – 9:45 am

#### Gaussian beam calculations compatible with general astigmatism

**Paul Colbourne, Director, Optical Switching Technology Advanced Research, Lumentum**

Most calculations of Gaussian beam properties, such as beam size and waist position, assume "simple astigmatism," in which the beam and all cylinder lenses are aligned with the x-y axes, so if a system doesn't meet this condition, the results re invalid. Even if an optical system does not have intentionally rotated elements, astigmatism caused by off-axis incidence on optical elements can create a state of "general astigmatism." This causes calculations which assume simple astigmatism to give incorrect results. During this session, learn a new methodology that has been developed for calculating Gaussian beam properties using rays, which is compatible with general astigmatism, so you can achieve accurate results with no restrictions on the orientation of optical elements.

#### How mechanical engineers are using LensMechanix

**Isis Peguero, LensMechanix Product Manager, Zemax**

In this session, you'll learn about the five ways that mechanical engineers packaging optical systems in CAD are using LensMechanix. Find out how this enhanced process leads to faster time to market and lower costs. You will also get the opportunity to learn where the LensMechanix team plans to expand capabilities in the future and what that means for you.

10:00 am – 10:45 am

#### Addressing and simplifying STOP

**Sanjay Gangadhara, Chief Technology Officer, Zemax**

Analyzing the Structural Thermal Optical Performance (STOP) of an optical product can be challenging. In this session we'll review common roadblocks, share thoughts on how to simplify the STOP process, and discuss the tools Zemax is currently developing to make STOP analysis easier and more accurate in the future.

#### High-speed 3D printing customized imaging lenses

**Cheng Sun, Associate Professor, Northwestern University**

While being proven to be a powerful tool in fabricating sophisticated 3D structures, translating AM technologies to provide economically viable solutions for practical applications still faces a main barrier. The serial nature of the additive building processes results in the inherent speed-accuracy trade-off, which seriously limits the scalability and efficiency of manufacturing functional devices requiring precise control of the fine features. During my presentation, I will discuss our recent work in developing 3D printing process for rapid fabrication of imaging lenses with the goal of increasing the fabricating speed without compromising the dimensional accuracy and surface finish of the products. I will also demonstrate the potential of this method to rapidly prototype optical components or systems based on 3D printing.

11:00 am – 11:45 am

#### Rapid, automated STOP analysis using the Comet Workspace

**Malcolm Panthaki, VP of Analysis Solutions, Aras Corp.**

Analyzing the Structural Thermal Optical Performance (STOP) of an optical system is a complex, multidisciplinary, manual, and inefficient process that is prone to human error. In this session, we will review how optical system design teams at NASA have used the Comet Workspace to rapidly perform STOP analyses, including parametric, what-if trade studies of their system designs. The presentation will compare the efficiency and robustness of this automated process compared to the prior manual process.

#### Tools for effective heads-up display design and analysis

**Alissa Wilczynski, Global Engineering Services Manager, Zemax**

How do you effectively use OpticStudio to design and analyze the performances of a Heads-Up Display? Learn how to use tools like the NSC Sag Map, the Full-Field Aberration, the Reverse Elements Tools and many others in this informative session.

12:00 pm – 12:45 pm

### Lunch

1:00 pm – 1:45 pm

#### Fireside chat

Join us for a panel of Zemax users as they discuss the future of optical engineering.

2:00 pm – 2:45 pm

#### The technical training, tools, and team supporting you

**Alissa Wilczynski, Global Engineering Services Manager, Zemax**

Get an introduction to all of the resources in the Zemax customer support organization available to help users of OpticStudio and LensMechanix. Learn how Zemax Support is growing to incorporate more customer feedback, better respond to customer needs, and work to build long-lasting relationships.

3:00 pm – 3:45 pm

#### Collaborating on the OpticStudio roadmap

**Matthew Sutton, Director of Product, Zemax**

Put on your thinking cap on and get ready to collaborate on the future of OpticStudio. In this interactive session, attendees will be asked to contribute ideas to the OpticStudio product roadmap through fun collaboration and group brainstorming activities.

4:00 pm – 4:45 pm

#### Building a model for analyzing light transport through the human skull

**Kyle Johnston, Research and Development Optical Engineer, Luminart**

What will happen when a significant amount of light is injected into a maxillary sinus? How will this light interact with the nearby ocular tissues? What techniques can be used to answer these questions? In this session you'll learn how Luminart Labs built a non-sequential ray trace model for an anatomically correct portion of the facial region of the human skull, including both soft and hard tissues. You'll see how the model was configured and how the simulations were conducted to support the investigation.

4:45 pm – 5:00 pm

#### Locknote: Reflections

**Mark Nicholson, Chief Executive Officer, Zemax**

Join us for reflections on two days of learning, growing, and envisioning as a community. Mark will share his key takeaways and set the stage for the final day of workshops.

# ENVISION2018

Zemax Conference Agenda

Wednesday, November 7



Erin Elliott  
Principal Optical Engineer  
Zemax



Thomas Pickering  
OpticStudio Product Manager  
Zemax



Isis Peguero  
LensMechanix Product Manager  
Zemax

Zemax

## Workshops

7:00 am – 7:45 am

### Breakfast

8:00 am – 9:30 am

#### Lidar: Developing low-cost systems for autonomous vehicles

Erin Elliott, Principal Optical Engineer, Zemax

For driverless cars to see mainstream adoption, engineers must solve critical lidar design challenges—including improving the detection range and field of view, ensuring adaptability to environmental factors, and ensuring safety. This workshop will cover:

- Tools available to quickly try and identify new solutions
- How to incorporate manufacturing and assembly limits into design constraints to ensure manufacturability and production efficiency
- Simulating the impact of the mechanical design on the optical system performance

9:45 am – 11:30 am

#### How to catch and mitigate lens glare prior to manufacture

Isis Peguero, LensMechanix Product Manager, Zemax and Thomas Pickering, OpticStudio Product Manager, Zemax

OpticStudio and LensMechanix give optical and mechanical engineers the tools that they need to work more efficiently. In this workshop, you will learn how to implement both software packages into your workflow to eliminate beam clipping and ghost images prior to manufacturing. We will demonstrate how you can easily start a design in OpticStudio, validate the housing in LensMechanix, and send the system back to OpticStudio for final validation.

11:45 am – 1:00 pm

### Lunch

1:00 pm – 2:45 pm

#### Hologram modeling overview and application to augmented reality systems

Erin Elliott, Principal Optical Engineer, Zemax

Weight and size are important considerations for wearable augmented reality systems, and holograms are a great way to maintain compactness in a system. In this workshop, we will:

- Review the theory behind holograms
- Introduce several options for modeling holograms in OpticStudio and discuss their capabilities and limitations
- Examine a hologram-coupled waveguide currently available on the market
- Create a model of the hologram waveguide and visualize the results

### End of conference