



Ansys + Nordson TEST & INSPECTION

“As part of sensor development, I created an alignment method for the projector that linearizes focus (Opt. Eng. 61(11), 2022). The method worked great, but I was concerned that experimental iteration would not necessarily guarantee that I was using the optimum input variable settings unless a substantial amount of time was invested. Thus, I decided to simulate the full range of potential variables using Zemax to provide the ray tracing and Matlab to manage the data flow and graph the results. With this trade space analysis, I was able to determine the variable settings that maximized depth of field and minimized focus position error (Opt. Eng. 62(2), 2022). I have since applied the simulation approach to a new sensor and determined the variable settings before the sensor was even built.”

— **Matthew Jungwirth** / SPIE Fellow, Nordson TEST & INSPECTION

/ Ansys OpticStudio Reduces Design Time, Helping Nordson TEST & INSPECTION Bring Products to Market Faster

CyberOptics is a leading global developer and manufacturer of high-precision 3D sensing technology solutions. The CyberOptics portfolio of industry-leading, high-precision inspection and metrology sensors and systems, is now part of Nordson Corporation's TEST & INSPECTION divisions. Nordson TEST & INSPECTION used the Ansys Zemax DDE server to simulate optical performance from Matlab. As part of sensor development, Nordson TEST & INSPECTION created an alignment method for the projector that linearizes focus (Opt. Eng. 61(11), 2022). The method worked great, but they weren't done yet.

/ Challenges

- Concerned that experimental iteration would not guarantee that they were using the optimum input variable settings unless a substantial amount of time was invested.
- Design time versus tolerancing time was about 50/50.

/ Ansys Products Used

- Ansys Zemax OpticStudio

/ Engineering Solution

Ansys Zemax OpticStudio is widely used in optics and photonics to design and optimize optical systems, such as lenses, mirrors, and other optical components. By utilizing high-yield optimization techniques in OpticStudio, optical designers can create designs that are robust against manufacturing variations, leading to higher production yields of optical components and systems that meet performance specifications. This is especially crucial in industries like precision optics and photonics, where the tolerances are often tight, and high yield is essential to cost-effective production.

Nordson TEST & INSPECTION decided to simulate the full range of potential variables using Zemax to provide the ray tracing and Matlab to manage the data flow and graph the results. With this trade space analysis, Nordson TEST & INSPECTION determined the variable settings that maximized depth of field and minimized focus position error (Opt. Eng. 62(2), 2022). They have since applied the simulation approach to a new sensor and determined the variable settings before the sensor was even built.

/ Benefits

- By incorporating high-yield optimization into their design process, tolerancing time has been cut down and the total split is now about 75/25.
- Nordson TEST & INSPECTION estimates that the simulation method saved about a week of their time, and it will save another week for each new sensor.
- OpticStudio is used throughout the organization as the optical scientists have been trained on Zemax.



Figure 1. The SLI system under test. The single projector/camera combination examined is labeled.

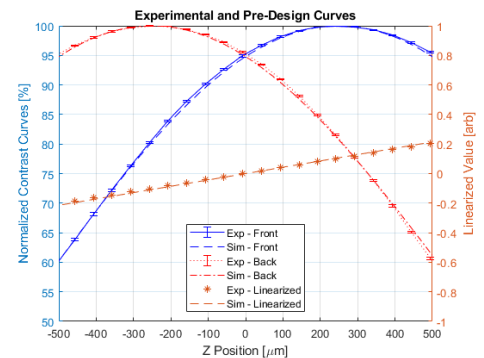


Figure 2. Comparison of experimental and simulation results. Labels – 'Exp' = experimental curve, 'Sim' simulation curve, and the error bars are normalized contrast values of $\pm 2\sigma$ from four experimental trials.

Trade Space Analysis - Linearized Slope

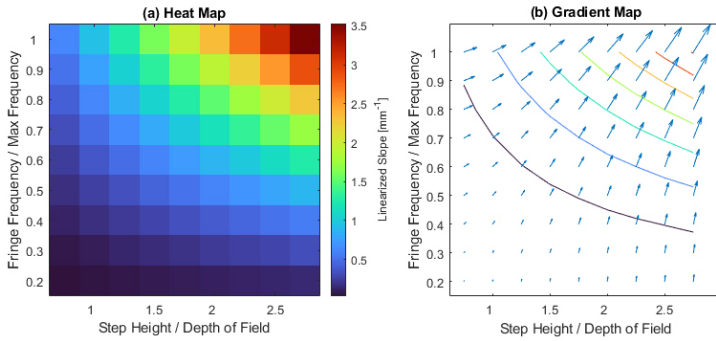


Figure 3. Results from the simulated trade space analysis for linearized slopes.

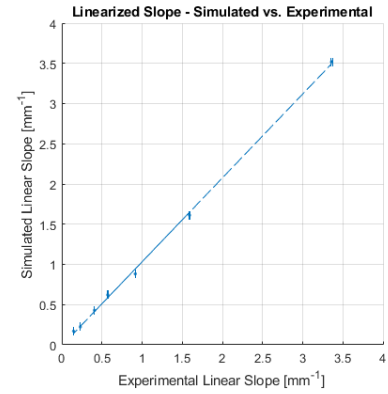


Figure 4. Comparison of simulated and experimental results for linearized slope. The error bars are experimental slopes of $\pm 2\sigma$ from four experimental trials.

/ Company Description

About Nordson TEST & INSPECTION

The Nordson TEST & INSPECTION portfolio of industry-leading, high-precision inspection and metrology sensors and systems, is now part of Nordson Corporation's Test & Inspection Division. Nordson TEST & INSPECTION offers its SMT & Semiconductor customers a robust product portfolio, including Acoustic, Optical and both Manual and Automated X-ray Inspection systems, X-ray Component Counting systems and Semiconductor measurement sensors. Nordson TEST & INSPECTION is uniquely positioned to serve its customers with best-in-class precision technologies, passionate sales and support teams, global reach, and unmatched consultative applications expertise.

About Nordson

Nordson Corporation (Nasdaq: NDSN) is an innovative precision technology company that leverages a scalable growth framework through an entrepreneurial, division-led organization to deliver top tier growth with leading margins and returns. The Company's direct sales model and applications expertise serves global customers through a wide variety of critical applications. Its diverse end market exposure includes consumer non-durable, medical, electronics and industrial end markets. Founded in 1954 and headquartered in Westlake, Ohio, the Company has operations and support offices in over 35 countries.

ANSYS, Inc.
Southpointe
2600 Ansys Drive
Canonsburg, PA 15317
U.S.A.
724-746-3304
ansysinfo@ansys.com

When visionary companies need to know how their world-changing ideas will perform, they close the gap between design and reality with Ansys simulation. For more than 50 years, Ansys software has enabled innovators across industries to push boundaries by using the predictive power of simulation. From sustainable transportation to advanced semiconductors, from satellite systems to life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.

Ansys and any and all ANSYS, Inc. brand, product, service and feature names, logos and slogans are registered trademarks or trademarks of ANSYS, Inc. or its subsidiaries in the United States or other countries. All other brand, product, service and feature names or trademarks are the property of their respective owners.

Visit www.ansys.com for more information.

©2024 ANSYS, Inc. All rights reserved.