UTILIZING WAVEFRONT API SOFTWARE IN WAVEFRONT MEASUREMENT AND SOFTWARE DESIGN

Ryan Hefner, *Manufacturing Engineer, Lumetrics, Inc.*

Abstract—Lumetrics has applied the Shack-Hartmann sensor to a range of Wavefront measurement applications. These sensors are ideal for analyzing optics-related products and materials, laser beams, and surface measurements. While Shack-Hartmann technology may be widely adopted in the metrology industry, Lumetrics has applied the technology in unique ways and added industry-leading hardware and software features to our systems that offer significant advantages over other methods.

I. INTRODUCTION

LUMETRICS has offered various solutions utilizing the Shack-Hartmann wavefront sensor for years further building upon its portfolio with new offerings in the metrology field.

Software has always been an integral part to utilizing Wavefront sensors but until now a fully usable and easy to learn API layer product has been a missing aspect. Lumetrics is proud to provide cutting edge software and hardware to advance development of the wavefront measurements.

Figure 1: CLAS 2D Wavefront Sensor

A new and improved software re-design has been underway at Lumetrics for its Wavefront product line. One result is the development of a 100% customizable and usable API layer for any and all Wavefront programming needs. This allows users to create applications that use data from a Shack-Hartmann sensor, such as:

-Wavefront profile
-Beam power
-Deviation angles
-Raw and processed images
-Centroid locations
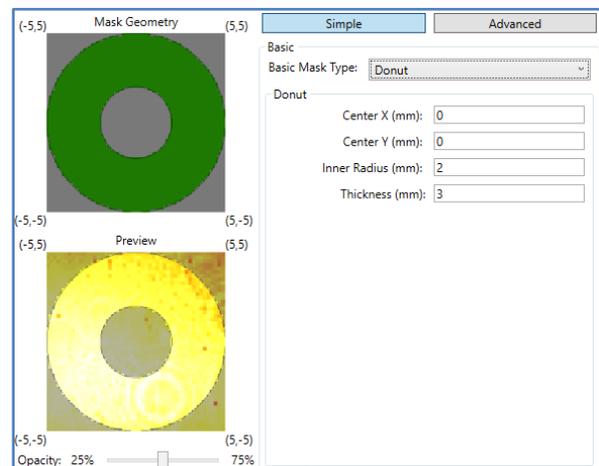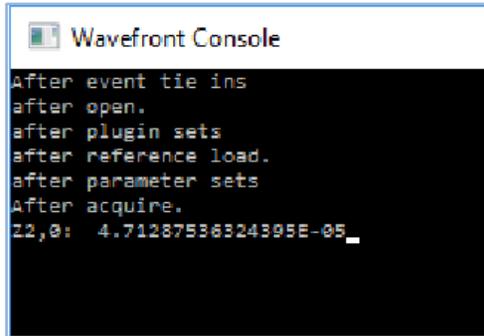-Focal spots sizes (2nd moments)

Figure 2: Masking done through the Wavefront API

The Lumetrics Wavefront API layer also comes with the following advantages:

-Easy and effective Wavefront data collection
-Data output without needing a GUI (Figure3)
-Complete control of Wavefront data collection and analysis process paths

Figure 3: Console application allowing for Wavefront data output

II. BACKWARDS COMPATIBILITY

The Lumetrics Wavefront API layer allows for backwards compatibility for any previous CLAS-XP user. CLAS-XP legacy files can be loaded into the API for an easy transfer from an old setup to a new setup utilizing the API layer. All reference files and Wavefront data files can be utilized without any issue.

Developers can easily pick and choose a stopping point when it comes to data collection. With no bloat and being more customizable than ever, the Lumetrics Wavefront API layer allows for complete control of Wavefront path calculations. Lumetrics Wavefront API layer is compatible with multiple programming languages including:
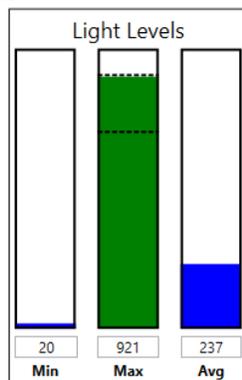
-.NET
-MATLAB
-LabVIEW
-Python

Figure 4: Light Levels Form using Lumetrics Wavefront API Layer

III. REAL-WORLD APPLICATIONS

The data gathered by the Lumetrics Wavefront API layer has many practical applications. One of those being with a recent customer, IRIS AO. From IRIS AO:

"We integrated our IRIS AO Engine Workbench with the Lumetrics Shack-Hartmann Wavefront sensor using their API to create a simple simulated closed loop controlled telecom free space communication channel. In practice, such a channel could form a low BER link between data centers or increase the efficiency of data transmissions to drones." -Carl Kempf, Iris AO

Figure 5: IRIS AO Uses Lumetrics WaveFront API to
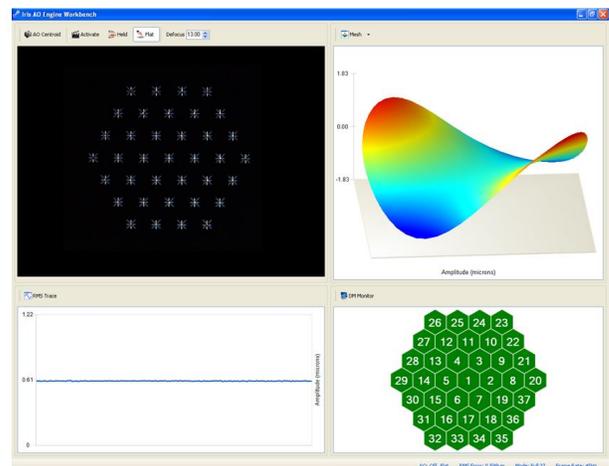
create custom in-house application

IV. CONCLUSION

The Lumetrics Wavefront API Layer is a powerful tool for Wavefront data collection. It can effectively record Wavefronts, power, deviation angles, raw images, filtered images, centroids, second moments and many more. The API layer can be easily and quickly integrated into existing systems, as the case study above shows. Utilizing the API can lead to process improvement and increased critical yield.

Lumetrics' computer engineers can quickly answer any questions pertaining to software communication with the Lumetrics Wavefront API layer or usage with it in any custom application or needs our customers may have.

Contact Lumetrics for additional information
Email: sales@lumetrics.com or engineering@lumetrics.com