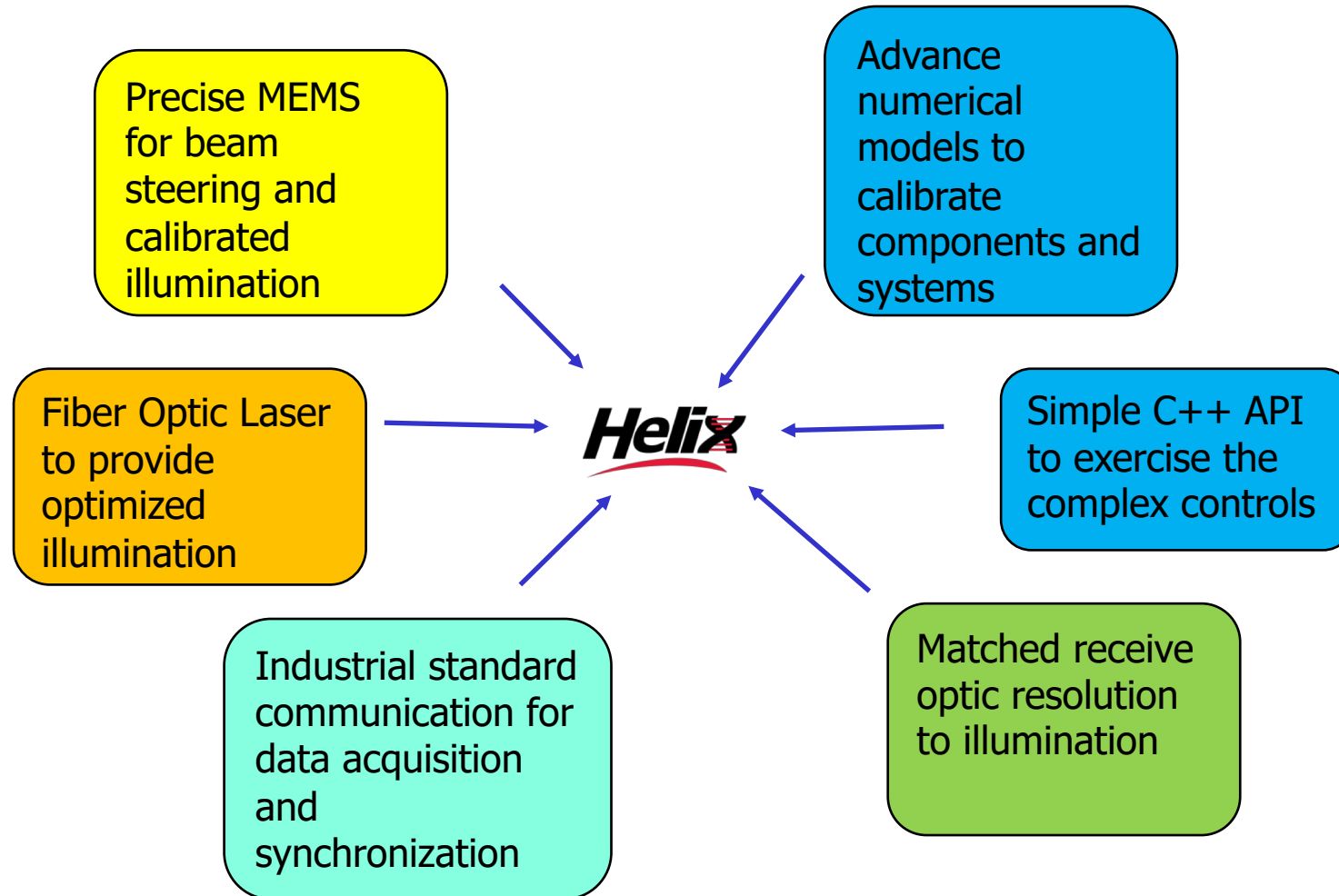


Helix Technologies



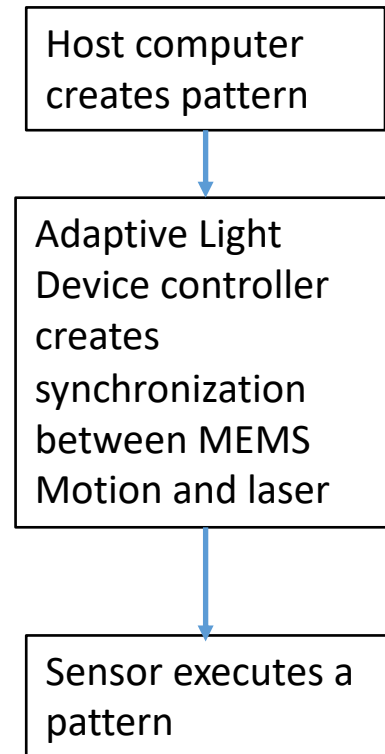
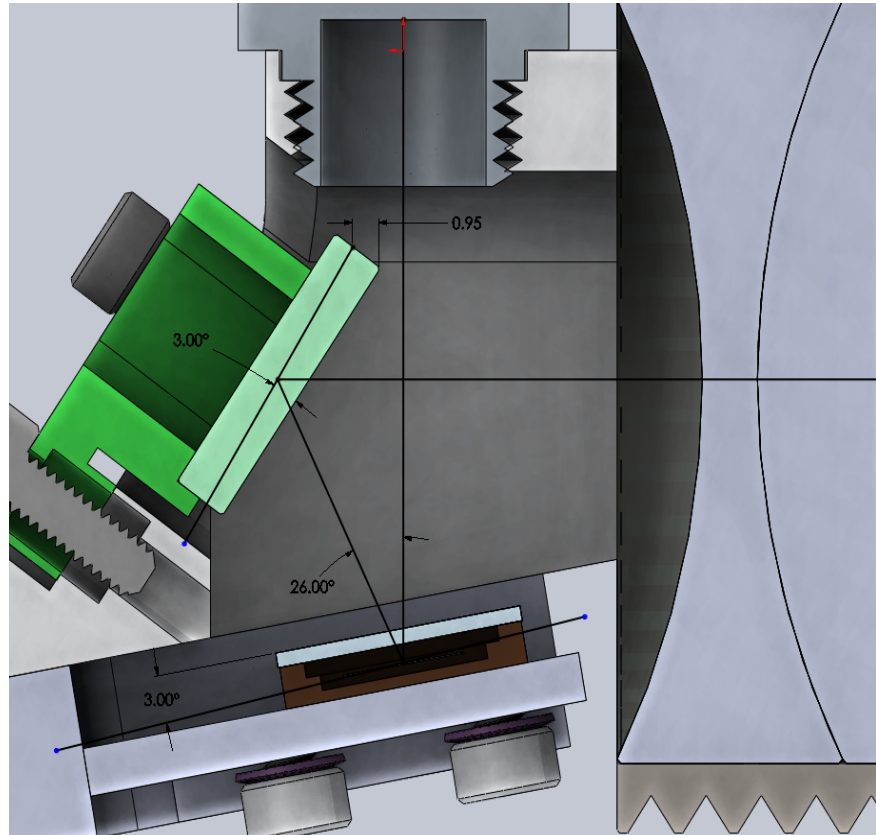


Key Technologies

- Calibrated Intelligent Illumination platform
 - Thermally compensated light source to obtain 1 mradians/Degree C
 - Calibrated light source that allows round trip mapping between part space to light source space, thus allowing CAD based light source programming
 - Capable of rendering patterns at 100,000 samples per second with line spacing up to 0.1 mm
- Fiber optic coupled laser with optics to obtain thin laser (<0.600 mm) at 800 mm distance
- MEMS
 - Application of MEMS last process
 - Application of MEMS/Driver matching to optimize best performance with high yield
- Gige Communication with multi-3D sensor synchronization
- Platform that supports multiple cameras with matched resolution

Intelligent Illumination

A programmable Micro-Electro Mechanical System (MEMS) mirror reflects light from a fiber optic coupled laser. A Fold mirror reflects a collimated beam path orthogonal to the incident beam and an expanding optic is used to increase projected volume. The MEMS scans at a speed of 100KHz and laser is turned on/off during a scan to provide intended pattern. Laser power is modulated during the scan to provide optimal dynamic range.



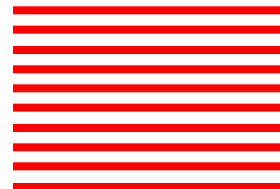
Intelligent Illumination

Configure the orientation and density of laser lines:

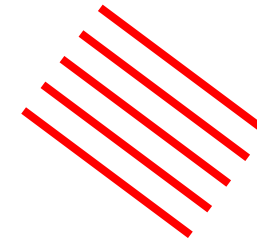
Vertical



Horizontal

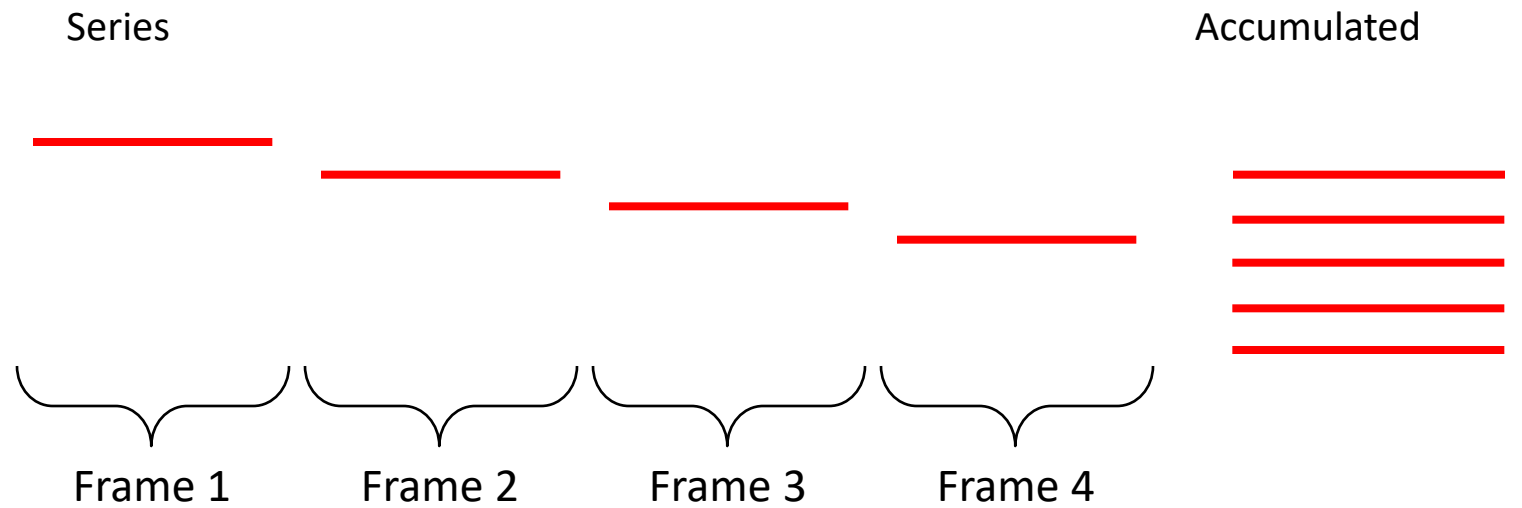


Oblique



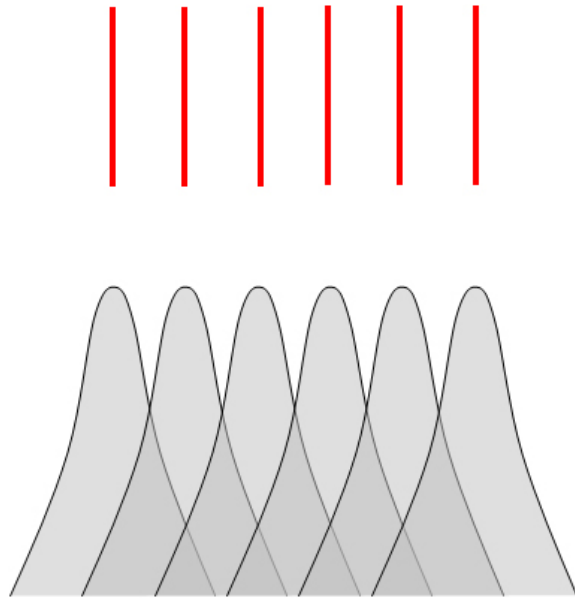
Intelligent Illumination

Configure the acquisition sequence: Allows optimal match of receive optics resolution with light source resolution

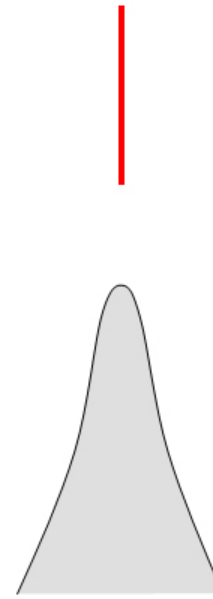
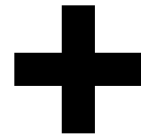


Intelligent Illumination

Configure the acquisition sequence:

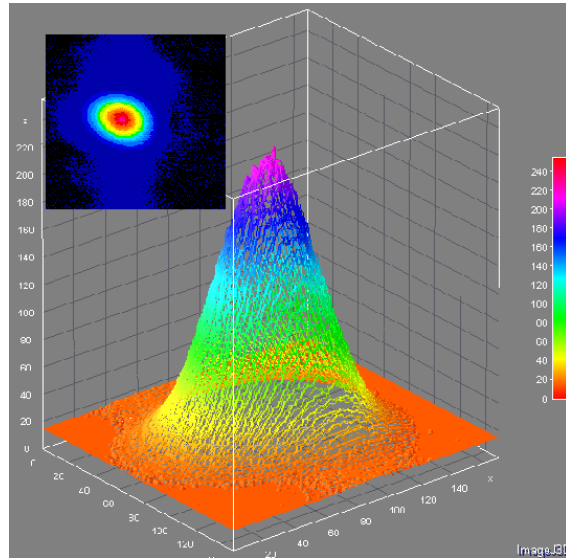


Laser line density

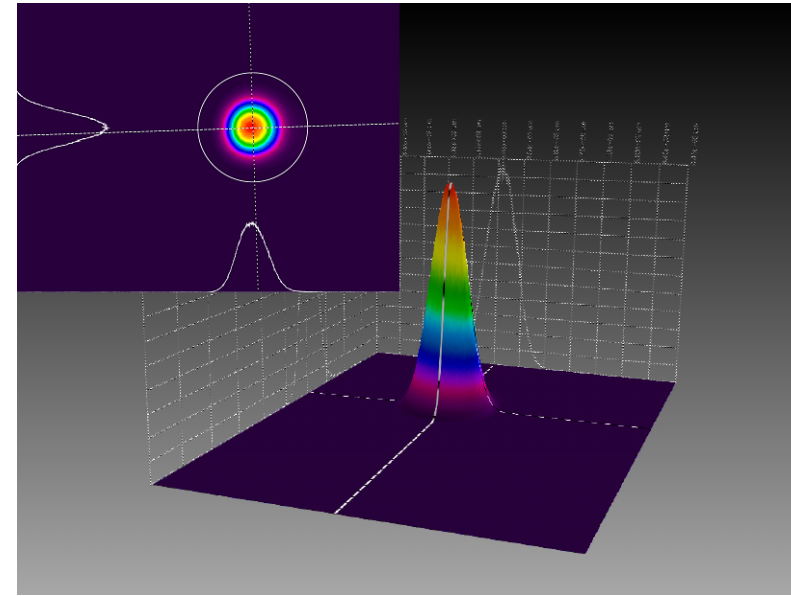


Certainty of line resolution

Laser Spot



Standard Diode Spot Laser

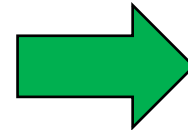
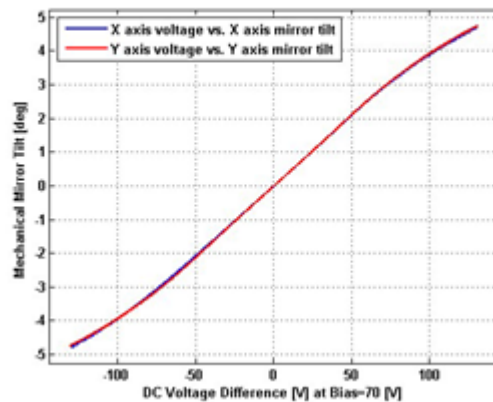


Helix Fiber Optic Spot Laser

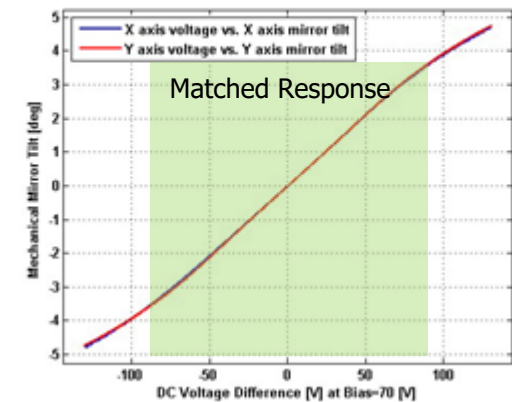
MEMS innovations

- MEMS last process along with wavelength matched windows
 - Reduces reflow thermal gradients on MEMS optics during MEMS driver circuit board build process, increases yield by 20-30% by keeping MEMS integration under clean room environment
 - Changes to radius of curvature of MEMS optical surface(> 8 meters) due to temperature gradients is significantly reduced
 - Enables testing of MEMS driver PCB without loss of expensive MEMS
- MEMS matching provides driver circuit matching with known MEMS characteristic to provide linear matched sets, provides an uptick in yield(~ 15%) and easy characterization

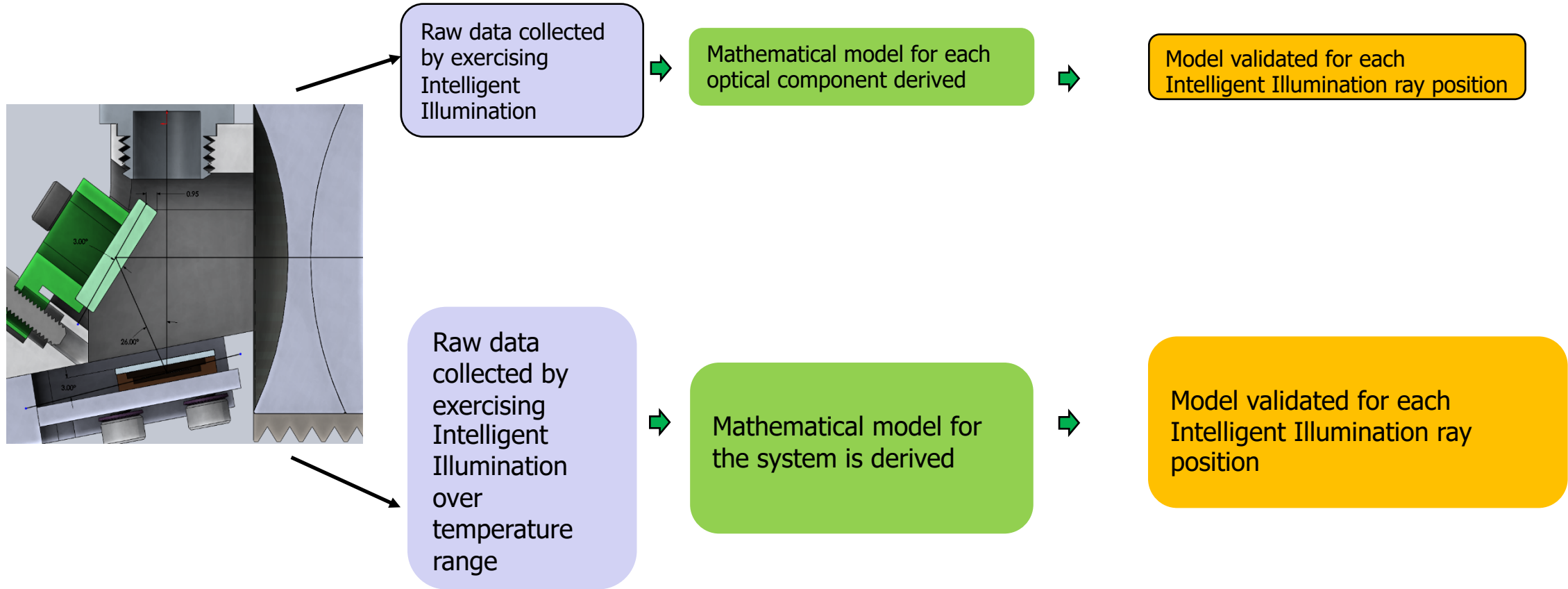
Voltage vs. Angle - Individual Axes



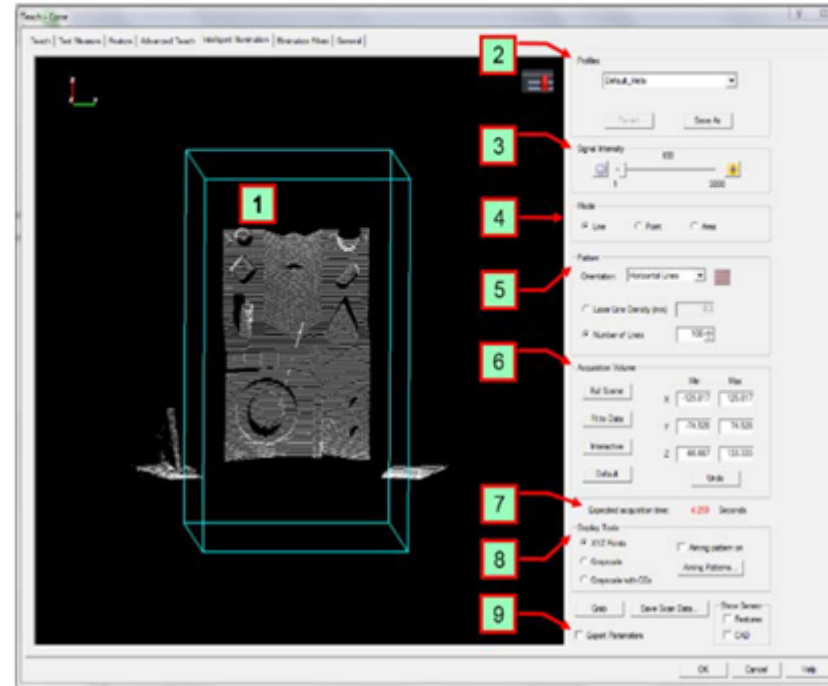
Voltage vs. Angle - Individual Axes



Calibrated Light Source



Light Source in CAD space



Number	Description
1	3D View Window
2	Profile
3	Signal Intensity
4	Mode
5	Pattern
6	Acquisition Volume
7	Expected acquisition time
8	Display Tools
9	Show Sensor

Photonics + Electronics+ IOT architecture = Helix Sensor Platform

- On board sensor intelligence that persists
 - Light source calibration
 - Sensor orientation detection
 - Thermal compensation
- Software and Firmware architecture that supports
 - Multiple sensor network
 - Automated discovery
 - Industrial standard Giga Bit Ethernet communication
 - Measurement queue
 - Multiple sensor synchronization

All technologies put together to provide Integrated factory floor 3D solutions



Smart3D Scanner

Standalone, high-dynamic range 3D Scanner



Inline Gauging

Small footprint, thermally compensated factory floor 3D feature extraction sensor



Wheel Alignment

Small footprint, thermally compensated factory floor precise 3D alignment measurement Sensor (< 2 arc minutes accuracy)