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What is the role of the laser when using XR20-W?

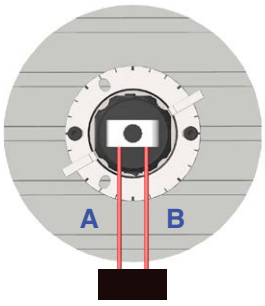
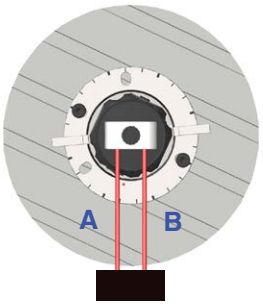
Overview

The laser has multiple roles when used with an XR20-W. These can be summarised as:

1. A non contact reference
2. Measuring positional error
3. Distinguishing when a reading can be taken.

Laser roles

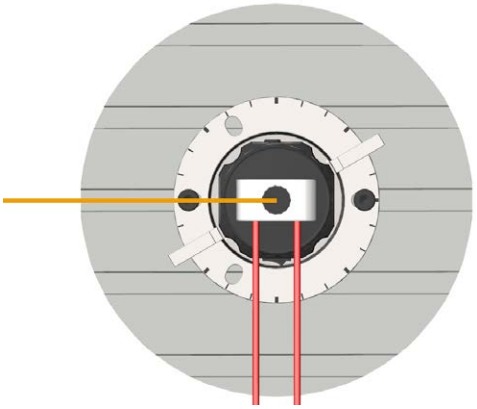
1. **Providing a non contact reference that allows the unit to counter rotate machine movement.** This provides a reference that has no mechanical friction which reduces mechanical hysteresis. The method uses the same principle as angular interferometry to measure the change in angle.

1.	2.
	
At the initial stage of the measurement the lengths of beams A and B are used as a datum.	Once the machine has moved, the error is calculated through the change in length of beams A and B.

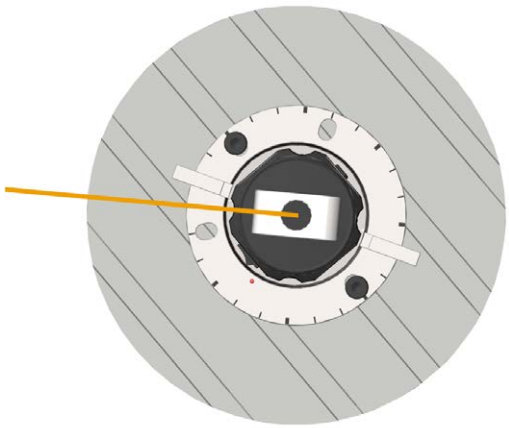
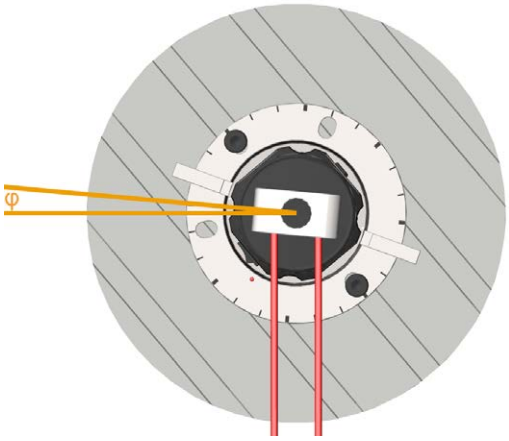
2. **Measuring positional error using the optic on the top of the XR20-W.**

   Positional error occurs when a machine rotates and the optics counter rotate by the same amount*. The difference between the position of the optics and the machine is the error in the machine. The error is measured using interferometry through the optics located on top of the XR20-W. The change in length of the two beams is detected by the laser and the measured error is calculated.

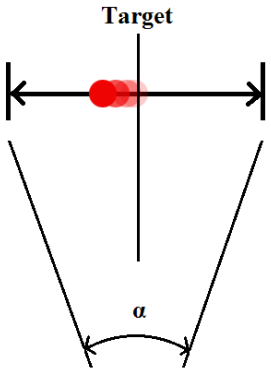
   ** This assumes that there are no errors from the XR20-W.*

Before machine movement. Optics are perpendicular to laser beams.	

Application note

During machine movement. The optics do not remain perpendicular to the laser beams during motion, due to positional error.	
After machine movement. The laser measures angular inclination, φ, from the optics.	

3. **Monitoring machine movement to distinguish when the machine is stationary and capable of recording a position.** Due to machine vibration and other environmental factors the setup will never remain perfectly stationary. The laser monitors when the machine has reached its target position by recording when the system is within angle α. It also recognises when the machine is 'stationary' by monitoring the laser readings until they have become stable.



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