

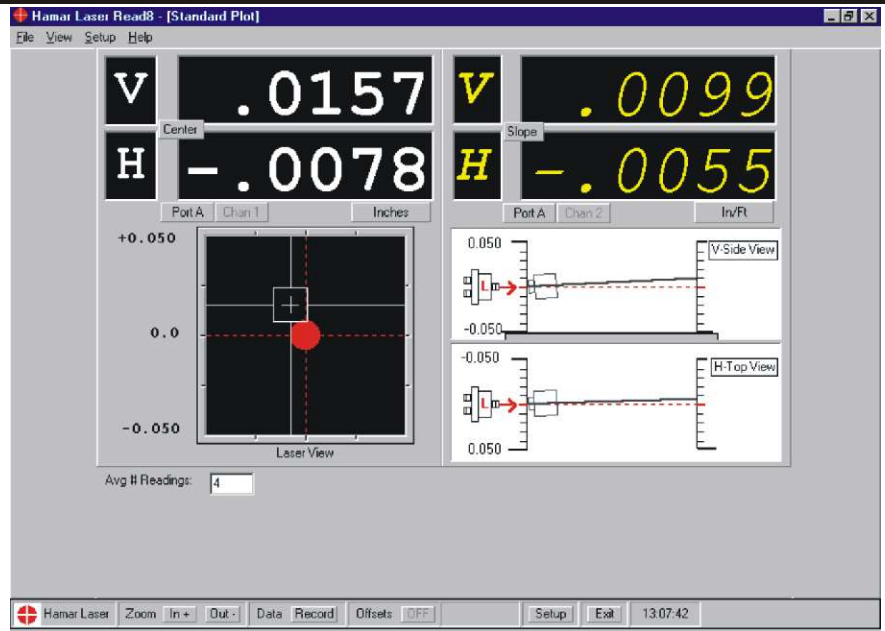
Read8 with Bore8

Multi-Function Alignment Software with Bore8 for aligning and measuring multiple Bores

*An alignment "toolbox" for
most alignment needs*

Hamar Laser's Read8 program provides a complete selection of alignment utilities to:

- Display laser-to-target readings for center and angle.
- Apply corrective offsets and perform remote buck-in to reduce alignment time.
- Plot straightness data on easy-to-read graphs.
- Collect, save and review alignment data.



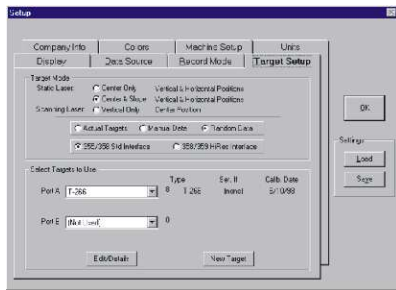
Program features include:

- **Live display**
The alignment graphics move with each adjustment, allowing the user to quickly correct misalignment errors.
- **Five types of graphic displays**
Depending on the laser and target setup, data can be displayed in five different graphic formats:
 - **Standard Plot**, which shows either two center readings for two different targets or center and slope readings for a single 4-axis target.
 - **Combined Plot**, which shows an end view of center and slope readings for a single 4-axis target.
 - **Spindle Plot**, which shows graphical views of spindle misalignment.
 - **Scan Plot**, which shows the vertical position for up to 4 single-axis targets.
 - **Bore Plot**, which measures and displays the alignment of multiple bores.
- **Offsets**
READ8 allows the user to develop or enter various offsets or error corrections. The offsets can be toggled on and off as required and include capabilities for Zero, Buck-in, Spindle, Manual Offset, Align Target, Align Laser, Virtual Center in Front and Virtual Center Behind.
- **Four data recording options**
 - **Air Noise**, a general purpose data logging utility that repeatedly takes samples and averages out effects of air turbulence on a reading.
 - **Repeat Mode**, which tests for the repeatability of results obtained with a specific fixture or hardware setup.
 - **S-Timer**, a highly flexible recording mode that records data at regular intervals to determine alignment changes, such as thermal growth, that occur over time.
 - **Quick Plot**, a fast recording mode that collects and plots straight-line alignment information. Data is plotted on a graph as it is taken. Designed to plot vertical (side view) and horizontal (top view) *centers*, Quick Plot is used for straight-line measurement, such as plotting the elevation of a way, measuring the vertical and horizontal position of a series of bores, or providing a profile of an extruder barrel or other cylinder.



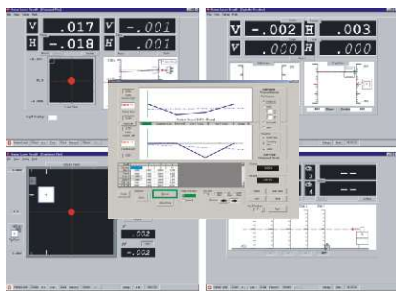
Program Features

Read8 with Bore8 Alignment Software



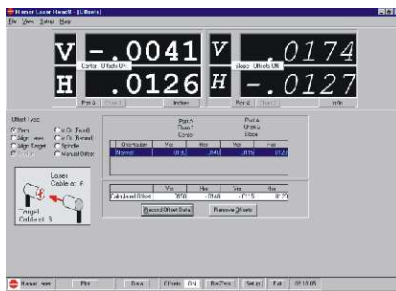
COMPREHENSIVE SETUP

The READ8 Setup screen provides tabs corresponding to each feature of the program. All program settings, including company information, machine setup, units of measure, display options, data source, target setup and data recording methods are specified from this screen. The Setup screen is always accessible while running the program so that new options may be easily selected. Setup options may be saved to a file or loaded from a previously saved file.



FIVE LIVE PLOT DISPLAYS

Data can be displayed in five methods, depending on the equipment used. For a single, 4-axis target, **Standard Plot** provides two center readings for two different targets or center and slope readings for a single, 4-axis target. **Combined Plot** provides an end view of center and slope readings for a single 4-axis target. When performing a spindle alignment, **Spindle Plot** shows a graphical view of spindle misalignment from either side of the spindle setup. When using scanning targets, **Scan Plot** displays the vertical position for up to four targets. **Bore Plot** measures and displays the alignment of multiple bores. The data can be viewed using the end bores, specific bores by number, the laser or a "best fit" line as reference.



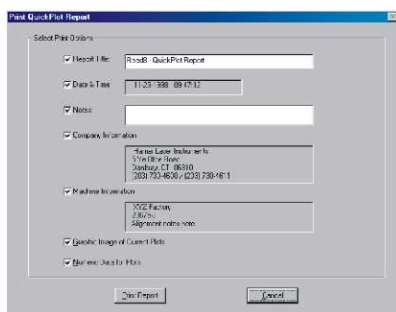
EIGHT OFFSET UTILITIES FOR CORRECTING MOUNTING ERRORS

Read8 provides eight different ways to develop offsets or corrections for laser and target mounting errors, which are subtracted from the raw target data to provide a more accurate reading. Uses for offsets include mounting error correction, buck-in process assistance, and laser mounting-stud setup. Offsets may be toggled on or off to view either raw data or corrected readings.



FOUR DATA RECORDING MODES

Read8 provides four utilities to record data. **Air Noise** averages out the effects of air turbulence (noise) on a reading, and provides statistical data on each reading. **Repeat Mode** tests the repeatability of results obtained with a specific fixture or hardware setup. **STimer** (Statistical Timer) records readings at regular intervals to determine changes such as thermal growth that occur over time. All data and standard deviations recorded with these utilities can be saved, printed, or imported into a Microsoft® Excel spreadsheet. **Quick Plot** plots recorded data on a customizable graph. It is designed to plot vertical and horizontal *centers* and is used for straight-line measurement, such as plotting the elevation of a way, measuring the vertical and horizontal position of a series of bores or providing a profile of an extruder barrel or other cylinder. Quick Plot data can be saved to a file and a Quick Plot report can be printed.



GENERATE AND ANALYZE ALIGNMENT REPORTS

Create and save a report from any recorded data. Depending on the recording mode used, data can also be imported into an Excel spreadsheet for further analysis. Quick Plot reporting includes numeric data and a graphic representation of the actual plot.