

Laser Alignment Using the AMS 2140

- Step-by-step procedure guides the user through the process
- Integral Bluetooth® radio makes alignment faster and safer
- Sweep mode simplifies measurement – start anywhere, stop anywhere
- Partial sweep calculates misalignment with as little as 45° of shaft rotation
- Live display provides real-time feedback during machine moves for both horizontal and vertical corrections
- Easy reporting of pre- and post-alignment condition in AMS Machinery Manager software



Introduction

In manufacturing environments, maintenance teams are pressured to get machines repaired and back into service as quickly as possible. But the job isn't complete without precision alignment.

Machinery health management, including proper shaft alignment, helps maximize the reliability and availability of production assets – extending machine life in some cases from months to years. Maintenance and reliability personnel can review predictive diagnostics and analyze machinery

health data in AMS Machinery Manager, then schedule field maintenance and alignment. Using Emerson's new alignment application for the AMS 2140, maintenance personnel are easily guided through the alignment process in less time than ever before. Little training is required to quickly achieve precision results.

Emerson's laser shaft alignment solution includes the alignment application for the AMS 2140 Machinery Health Analyzer as well as the AMS 8240 sensALIGN™ high-precision laser shaft alignment fixtures. Together, these pieces comprise a complete alignment system that gets the job done quickly and accurately.

Easy Shaft Alignment

Above all, the alignment application for the AMS 2140 is easy to use. The system interface guides the user through a simple three-step process. During the machine move, the user can watch the change in alignment in real-time on the display. For added power and convenience, the live display can be used during both horizontal and vertical moves, and the laser fixtures can be placed at any angle. Instant feedback on the alignment status is provided via an intuitive bulls-eye graphic. It also handles tough situations like bolt-bound machines by providing alternate solutions at the touch of button. When the job is complete, upload the results to AMS Machinery Manager to document before-and-after condition and generate reports.



The graphical user interface and wireless communication coupled with the advanced live move option make the alignment process simple and intuitive.

Wireless Alignment for Convenience and Safety

The AMS 8240 sensALIGN laser fixtures feature built-in Bluetooth operation for true wireless operation without compromising on reliability — indoors or outdoors! The portable AMS 2140 communicates with laser fixtures up to 15.25 m (50 feet) allowing the user to view real-time changes during the soft foot check and live machine moves.

Easy Alignment-Fixture Aiming

On-board intelligence in the alignment detector and laser greatly simplifies initial laser adjustment. Four green LEDs signal that the laser beam is hitting the center of the detector. With these features, long jackshafts are quick work while rough alignment and problems caused by large thermal growth are virtually eliminated.

Guided User Interface

A graphical interface guides the user quickly through the alignment process in three easy steps: (1) enter dimensions, (2) measure misalignment, and (3) move machine. For ultimate convenience, the advanced live machine move can be performed with the laser fixtures at any angle, providing a simple graphical representation of the alignment in real time. A color-coded bulls-eye target informs the user about the alignment status: red=way out, yellow=close, green=within tolerance. In addition, a star appears when excellent alignment has been achieved.

Accurate Results

The laser fixtures use a high-speed angle sensor in each head to allow a faster shaft rotation with highly accurate results. Excellent data resolution is created by an intelligent high-definition measurement mode that collects and processes hundreds of measurement across the sweep angle. Built-in anti-backlash processing also helps to eliminate error introduced by inconsistent shaft rotation. Measurements are automatically recorded by the laser fixtures and retrieved using Bluetooth communications. There is no need to start or stop the shaft at specified locations. The interface continuously informs the user of measurement quality.

Flexible and Efficient Alignment Modes of Operation

Multiple alignment modes are available to address any shaft alignment task:

- **Auto Sweep** is the easiest method and recommended for virtually all coupled alignments. Simply mount the laser fixtures and rotate the shaft. Start wherever. Stop wherever. While a full rotation is ideal, this method can provide accurate results with as little as 1/8 turn of the shaft – or 45° of rotation. This is particularly useful when obstructions make it impossible to rotate the shaft freely.
- **Manual Sweep** operates similar to Auto Sweep; however, the user manually initiates each measurement. This method may be preferred for alignment of uncoupled or non-rotational alignments.
- **Pass mode** is used when the right and left shafts are rotated independently. The laser fixtures will automatically acquire a reading each time the laser passes over the detector head. This provides a simple solution for otherwise difficult alignment tasks such as uncoupled machines or non-rotational shafts.
- **4-Point Auto** automatically collects readings when the fixtures are located at the key clock positions (12 o'clock, 3 o'clock, 6 o'clock and 9 o'clock). The alignment solution is calculated from these values.
- **4-Point Manual** operates similar to 4-point Auto; however, the user manually initiates the measurement at each clock position.

Advanced Applications

- **Foot Pre-Check** is available to locate and correct a soft foot condition on the machine.
- **Thermal Growth** targets can be entered to incorporate off-sets for the hot running conditions. If targets are not available from the machine manufacturer, they can be estimated by thermal profiling.
- **Averaging** mode can be easily activated to deal with high vibration areas and for those machines where rotation is difficult to control.
- **Vertical Align** is available for the alignment of vertically mounted machines.
- **Straightness** can be used to verify that a shaft is straight (or crowned – if applicable).

Easy Archiving and Reporting

The AMS Machinery Manager software streamlines job documentation automatically generating reports on both alignment and balancing tasks. The comparison between the “as found” and “as left” condition is displayed both graphically and in tabular form. Job configurations can be stored for re-use at a later time.

Time-Saving Alignment Fixtures

Emerson’s Laser-Shaft Alignment Kit includes everything required for most horizontal and vertical shaft alignment. It features the sensALIGN laser shaft alignment fixtures (P/N AMS 8240) along with rechargeable batteries and charger, tape measure, cleaning cloth, standard mounting bracket and chains to fit shaft and coupling diameters from approximately 5/8” to 8” (15 mm to 200 mm) along with an assortment of mounting posts.

Optional brackets round out the system for special applications:

- **Extra-thin Brackets** (P/N A8400B1) use a slip-nut design to mount in as little as a 5/16” (8 mm) gap for tight spaces. It mounts on shafts up to approximately 6 ¼” (160 mm) in diameter.
- **Compact Magnetic Brackets** (P/N A8400B2) offer instant set-up by mounting directly to the face of the coupling – extremely stable, yet easy to adjust.
- **Magnetic Sliding Brackets** (P/N A8400B3) were developed for machines with rotors that are large, heavy, or difficult to turn, such as cement kilns, rock crushers, gearboxes, and hammer mills. It slides around the coupling flange or shaft end. Appropriate for shafts with a diameter of 3 1/8” (80 mm) or larger. Use on one or both coupling sides.
- **Magnetic Bolt Hole Brackets** (P/N A8400B4) were designed for very large couplings. In this case, the laser is fired through one of the coupling bolt holes directly to the sensor fixed on the other side. No radial clearance is required. These brackets mount onto any ferromagnetic surface and are extremely stable, yet easy to adjust.

Laser Shaft Alignment Specifications

| Laser Head Specifications | |
|-------------------------------------|---|
| CPU and Memory | ARM Cortex™ M3 and 2GB Flash memory. |
| Environmental Protection | IP 65 (dustproof and water jet resistant), shockproof. |
| Relative Humidity | 10% to 90% |
| Ambient Light Protection | Optical and active electronic digital compensation. |
| Operating Temperature | -10°C to 50°C (14°F to 122°F) |
| Measurement Resolution | 1 μm |
| Measurement Error | < 1.0% |
| Inclinometer Resolution | 0.1° |
| Inclinometer Error | ± 0.25% full scale |
| External Interface | Integrated Bluetooth® Class 1 wireless communication. |
| LED Indicators | 4 x LED for laser adjustment, 2 LEDs for Bluetooth® communication and battery status. |
| Operating Time | 12 hours continuous use. |
| Power Supply | Lithium Polymer rechargeable battery. 3.7 V / 1.6 Ah / 6 Wh. |
| Dimensions | Approx. 103 x 84 x 60 mm (4.1 x 3.3 x 2.4") |
| Weight | Approx. 310 g (10.9 oz) |
| Detector Head Specifications | |
| Type | InGaAlP semiconductor laser. |
| Beam Divergence | 0.3 mrad |
| Environmental Protection | IP 65 (dustproof and water jet resistant), shockproof. |
| Relative Humidity | 10% to 90% |
| Beam Power | < 1mW |
| Wavelength (Typical) | 635 nm (red, highly visible) |
| Safety Class And Precautions | Class 2, IEC 60825-1:2007. Do not stare into laser beam. |
| Operating Temperature | -10°C to 50°C (14°F to 122°F) |
| Inclinometer Resolution | 0.1° |
| Inclinometer Error | ± 0.25% full scale |
| LED Indicator | 2 LEDs for battery status and laser transmission. |
| Operating Time | 70 hours continuous use |
| Power Supply | Lithium Polymer rechargeable battery. 3.7 V / 1.6 Ah / 6 Wh. |
| Dimensions | Approx. 103 x 84 x 60 mm (4.1 x 3.3 x 2.4") |
| Weight | Approx. 330 g (11.6 oz) |

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