



Shaft and Belt Alignment Level 1

Laser alignment is an essential component of a viable maintenance strategy for rotating machines. In isolation each strategy can help to reduce unexpected machine failure, but taken together they form the hub of a proactive maintenance strategy that will not only identify incipient problems but allows extending machine operating life considerably.

This 2 day course provides the basic information and guidelines to implement quality shaft alignment for standard rotating machine systems.

Shaft and belt alignment courses are primarily designed for technical professionals who work with **rotating machinery**. Because misalignment is responsible for over 50% of all rotating equipment failures, these courses are essential for anyone tasked with ensuring machine reliability and reducing energy costs.

The target audience generally falls into three main categories:

1. Technical & Maintenance Personnel

These are the individuals "on the tools" who perform the physical adjustments.

- **Millwrights & Mechanical Technicians:** Those who install, maintain, and repair industrial motors, pumps, fans, and conveyors.
- **Maintenance Fitters:** Professionals responsible for the precision fitting of machine components.
- **Condition Monitoring Technicians:** Staff who use vibration analysis or thermography and need to know how to fix the misalignment issues they detect.
- **Apprentices & Junior Engineers:** Entry-level staff looking to specialize in reliability-centered maintenance.

2. Engineering & Supervisory Staff

These individuals oversee the work or design the maintenance systems.

- **Mechanical Engineers:** To understand the physics of "thermal growth" and "pipe strain" that affect how machines should be aligned during operation.

- **Maintenance Supervisors/Managers:** To learn how to verify the quality of work performed by contractors or staff and to understand the ROI of precision alignment.
- **Reliability Engineers:** Focus on extending asset life and reducing the "Mean Time Between Failures" (MTBF).

3. Industry-Specific Specialists

- **Marine & Offshore Engineers:** For aligning propulsion shafts, turbines, and large compressors in harsh environments.
- **Automotive Specialists:** Specifically for belt and pulley alignment in engine systems or industrial manufacturing lines.
- **Energy & Utilities Staff:** Technicians working on large-scale power generation equipment (generators, gearboxes).

What is shaft alignment

- A definition
- Machine catenary
- Operation above critical speed

Belt Drive Training System

- Learners will use different components to practice hands-on skills, such as using a dial indicator in maintenance, as well as the alignment and tensioning of fractional horsepower belts, multiple conventional V-belts, belt drives with variable-speed sheaves, and positive drive belts.

Expressing alignment

- Alignment parameters
- Angularity, gap and offset
- Short flexible couplings
 - Spacer shafts

How precise should alignment be?

- Alignment tolerances

Troubleshooting

- Coupling strain and shaft deflection

Causes of machine breakdown

- Couplings and misalignment
 - Bearings
 - Seal wear
- Machine vibration

Course Outline

Alignment methods and practice

- Machine installation guidelines
- Measurement and correction of soft foot

Alignment by Eyesight

Alignment by Dial indicator

- Trial and error method
- Rim and face method
- Reverse indicator method
- Indicator bracket sag

Alignment by Laser

- Basic operation requirements

Laser alignment case study

- Laser alignment cuts energy costs
- Laser alignment improves pump reliability
- Laser alignment improves bearing & seal life
- Laser alignment reduces vibration alarms

Thermal expansion of machines

- Thermal growth calculations

- Symptoms of misalignment

PUB-10-0029-03-Shaft Alignment Level 1

For more information, visit:

training.assetmatrixenergy.com