These two processes can have a significant impact on the operational life of bearings and rotating machinery.

Excessive vibration is a major contributor to early machine failure. With shaft alignment and machinery balancing procedures in place, organizations are able to reduce that vibration and increase the life of their rotating machinery.

Research by the University of Tennessee's Maintenance and Reliability Center has shown that a 5-mil offset misalignment can reduce expected bearing life by as much as 50 percent in some cases.

Proper alignment is critical to machine life, and coupling wear or failure, bearing failures, bent rotors or crankshafts, and bearing housing damage are all common results of poor alignment. It also is known that loads on mechanical parts—*such as bearings, seals, and couplings*—decrease with improved alignment.

These reduced loads result in decreased noise and vibration, decreased operating temperatures, decreased wear on mechanical systems, and decreased downtime due to breakage.

Training is important

The consensus among several industry experts on the top priority for a maintenance manager setting up a new alignment program was to invest in training first.

"Make sure you implement an in-depth training program that not only addresses the use of the system but also the fundamentals of alignment, proper alignment practices, and soft foot," was the advice from Ludeca Inc., Miami, FL. "Make sure supervision or management is involved in the training as well, so they develop a better understanding of the problems faced by the millwrights in the field and the time required to do the job right."

"Think training, training, and more training," said Ron Sullivan of VibrAlign, Inc., Richmond, VA. "I would recommend that they get the initial start-up training that is typically offered and then schedule some additional training three months and then about nine months after the

program has started. This staged training will allow people to better absorb the material and implement it as they actually perform precision alignments."

Costs can be problem

The roadblocks faced by companies when deciding to invest in laser alignment systems are related to the costs involved, noted several industry experts. First, there is the cost of the expensive systems themselves. Plus, "the people who hold the purse strings do not understand the importance of providing the training, tools, time, and inspiration to the people doing this work," added John Piotrowski of Turvac Inc.

To justify the expense of an alignment system, experts advise selecting a critical piece of equipment and projecting its failure due to an alignment problem. Estimate the costs of unscheduled downtime, including lost production, spoiled product, repair costs, salaries for idle workers, and premium salaries for overtime maintenance. Add any costs for secondary damage to equipment during the failure. Take these figures to management to back up a request for an instrument to check alignment to prevent such incidents.

Balancing difficulties

Field balancing of equipment has its own difficulties. "The biggest problem is the correct identification of the source of vibration. Is it a bearing problem, assembly fault, or truly an unbalance? You need to find this out before you try to balance," cautioned one expert.

Companies are warned not to install a balance problem. An instructor with SKF Reliability Maintenance Institute, Hanover, PA, explained: "Establish realistic balancing tolerances (ounce inches or gram inches) for all new and rebuilt rotors (electric motors, pumps, fans, couplings, etc.) to be balanced in a low speed shop balancing machine. Communicate in writing with both OEM and repair shops concerning these balancing specs."

Programs save money

Sullivan cited one example of a company that saved money with an alignment system. "A customer had been replacing motors about every 4-5 weeks on a piece of equipment. This had been going on literally for years. After our training session with them on a precision alignment piece of equipment, they reported to us after about 8 weeks that they have not had any excessive vibrations nor any subsequent failures."

In another instance, a sugar mill saved $2400 per hour downtime with a laser pulley alignment tool by reducing the time to align a 10-belt drive on a sugar pulp press from 6 hours to 40 minutes. With 16 presses in the mill, annual savings (excluding labor) are projected at $204,672. **MT**