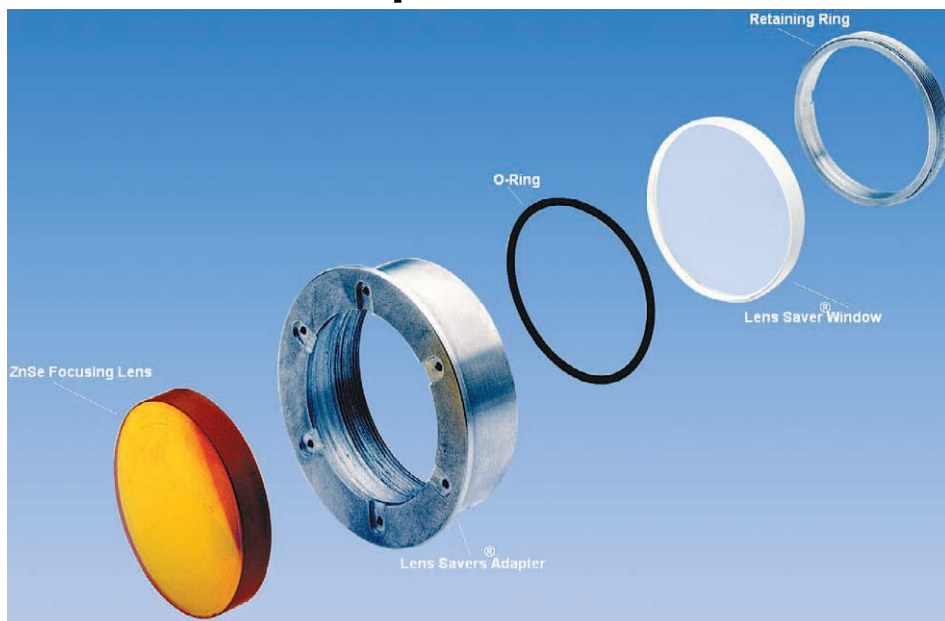


International Crystal Labs Describes Laser Optics Maintenance

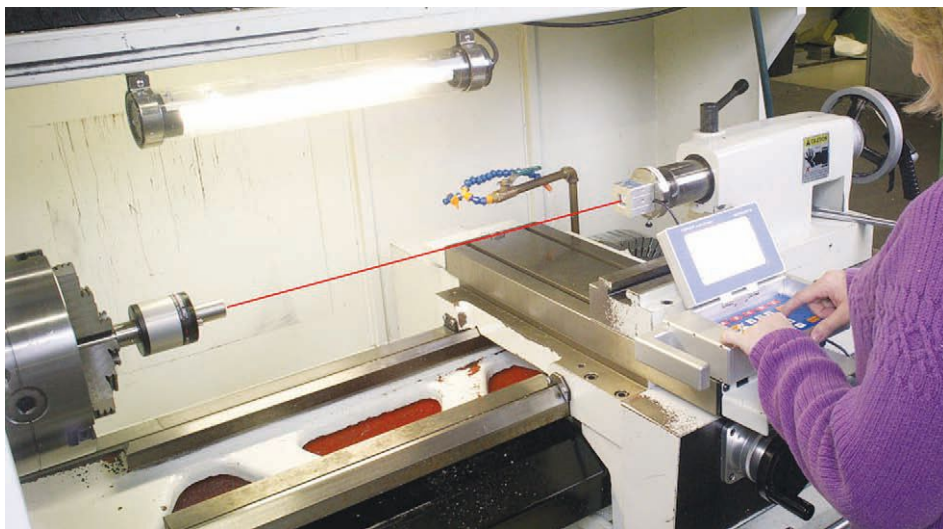


Sensitive laser optics are invariably found in vulnerable locations in industrial laser systems. These optics are pounded by spatter during normal use in cutting, marking or welding ("CMW") applications. In a CO₂ laser cutting system a lens focuses the laser beam on a substrate. These lenses are typically made from ZnSe and form the barrier between spatter generated in the cutting or marking process and the chain of sensitive and expensive optics that lead back to the resonator. Welding and some marking CO₂ lasers

use mirrors to focus the beam. The performance of a focusing lens is enhanced by an anti-reflective coating that increases the power transmitted through the lens and also prevents reflection back into the resonator. Mirrors are first surface coated to prevent absorption losses, so unlike a household mirror with a reflective second surface that is protected by glass, the mirror coating is directly exposed to ambient conditions bound to include spatter in the welding or marking

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Pinpoint Laser Offers Measuring and Alignment System



Pinpoint Laser Systems is offering its measuring and alignment system for lathes, turning equipment, spindles and related machinery. It is turnkey and ready to go right on the factory floor. Suitable applications include aligning lathes and turning centers, adjusting boring mills, aligning drive shafts, adjusting barfeeders and many other industrial applications.

This Microgage system is designed to provide information on runout, centerline offset, parallelism, concentricity and other useful parameters that can guide machinery back to optimal

alignment. This Pinpoint lathe and spindle alignment system is designed to be simple and quick to use with a round laser that is secured into a chuck or attached to the end of a shaft or spindle. A dual-axis receiver is placed on the tailstock, tool holder or another piece of equipment that can receive the laser beam. As the laser and the receiver move relative to each other, the digital display provides a precise reading of the alignment and machine's characteristics.

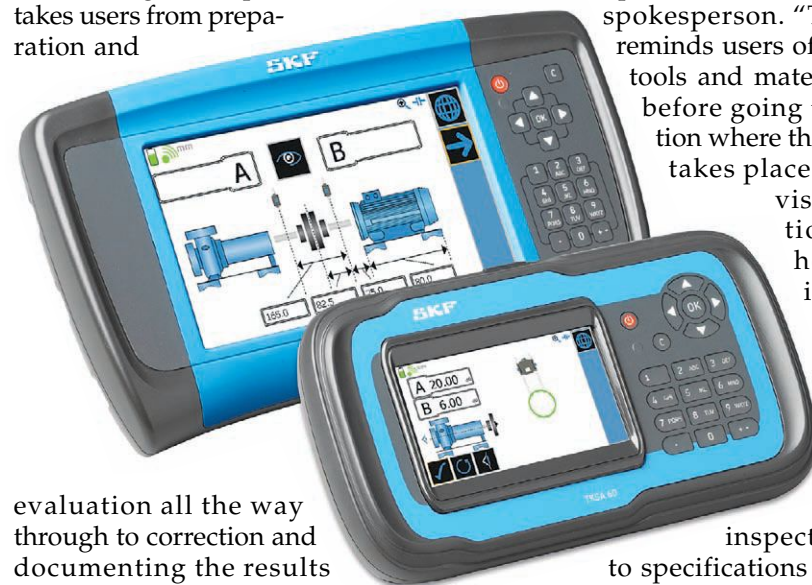
This new Microgage Spindle
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SKF Introduces Shaft Alignment Systems

SKF has introduced its TKSA 60 and TKSA 80 Shaft Alignment systems. Designed for both novices and experienced users, the new SKF Shaft Alignment systems provide a complete built-in alignment process that takes users from preparation and

complete spectrum of alignment needs for rotating machinery.

"The SKF TKSA 60 is designed for individuals with fundamental alignment knowledge but without extensive experience," said a company spokesperson. "The system reminds users of the correct tools and materials to use before going to the location where the alignment takes place. A built-in



visual inspection process helps users identify oil levels, leakages and wear indications. It also helps users compare inspection results to specifications and prioritize corrective actions. Both the TKSA 60 and 80 provide a color screen for detailed graphics and a measuring distance of up to 10 meters.

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inspection results to specifications and prioritize corrective actions. Both the TKSA 60 and 80 provide a color screen for detailed graphics and a measuring distance of up to 10 meters.

"A more advanced unit, the
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Machine Maintenance
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TRUMPF Introduces TruTool TSC 100 Slat Cleaner



In addition to removing mild steel and aluminum slag, TRUMPF's new TruTool TSC 100 is designed to remove stubborn stainless steel slag. Now available in North America, the TruTool TSC 100 can be used on flatbed laser machines with an output of up to 7 kilowatts and removes slag from the

sides of the slats as well as in spaces between and right up to the pallet frame, the company said.

"The modified design of the new tool is a major factor in its high quality cleaning results and efficiency," said a company spokesperson. "Powerful
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International Crystal Labs Describes Laser Optics Maintenance

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environment. Proper cleaning will extend the life of CO₂ laser lens and mirrors and also of YAG optics.

Spatter build up on a ZnSe focusing lens or a mirror causes the quality of the cutting, marking or welding that the laser is performing to deteriorate over time. Performance degradation in laser optics is caused to some extent by light scattering, but most of it results from heat buildup as the optic absorbs more energy because of contamination. As heat builds up in the optic it distorts in shape, thereby altering the focus and power is lost from absorption. There is a progressive degradation of weld, cut and marking quality. As the quality of CMW degrades the point is reached where spatter damage to the laser optic is so severe that it must be replaced due to the power loss and focus distortion. If the optics are not timely replaced there can be severe consequences. ZnSe lenses, for example, can melt or explode from absorbing too much heat, consequently annihilating the protective barrier between spatter and the rest of the optics in the system leading

back to the resonator and resulting in a catastrophic chain reaction failure mode that causes many thousands of dollars of damage and takes days if not weeks of downtime to repair.

Laser optics should be cleaned using a solvent applied with either lens tissue or a special cloth provided in a polishing kit by an optics supplier. The optics must be cleaned delicately, not scrubbed, as aggressive cleaning will ruin the AR coating (which is invisible to the naked eye) on a lens or window and the first surface coating on a mirror. The same technique applies YAG windows, Zones lenses and mirrors. At International Crystal Laboratories we prefer heptane for cleaning because it is safer than acetone and the vapors are easier to tolerate, but acetone can also be used on some optics. Both acetone and heptanes are readily available from laboratory supply houses such as Aldrich, Alfa Aesar and Fisher. Optical cleaning kits are available for many optics dealers, but the composition of these kits varies considerably from one dealer to the next. Although most OEMs recommend the use of lens

tissue to clean optics, the author's personal experience is that lens tissue is useless on the shop floor and that laser techs have much better success cleaning optics using an appropriate micro fiber cloth stretched tightly over a flat glass substrate and a hand held air blower.

A significant proportion of YAG laser systems incorporate means to use protective disposable windows to protect the other optics in the system. YAG lasers can use AR coated BK-7 or fused silica windows as spatter shields. CO₂ laser optics can also be protected with disposable alkali halide windows such as Potassium Chloride (KCl) or Sodium Chloride (NaCl) Lens Savers windows. CO₂ laser cutting applications normally employ high pressure assist gases such as nitrogen (which keeps the cut in a stainless steel substrate from turning blue) and oxygen (which enhances the cut of mild steel) and which blow off excess metal slag from the kerf of the cut. In these applications, the protective window must operate in a neutral pressure environment to prevent it from breaking. The mounting system for pro-

tective windows must also allow air circulation between the window and the lens to eliminate heat buildup that may distort laser focus (US Patents 5,898,522 and 6,270,222). Protective windows generally cost less than 10% of the price of the optic that they are designed to protect and they are intended to be disposable, but they can be cleaned in the same manner as other laser optics to extend their useful lives.

Employing good optics maintenance techniques richly rewards laser shops. Optics replacement costs can drop 10 to 20% from proper and timely cleaning and by as much as 70% when use of protective windows is coupled with an optics cleaning maintenance program.

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Servotech Offers Spindle Repair

In an industry aimed at maximizing productivity, manufacturers will always want to get the most out of their equipment. The spindle is no exception. Spindle motors are the workhorse of any manufacturing facility, found in all applications, operating in harsh conditions for long hours. Because of their vital role, when a single spindle motor goes down, it is not unusual for entire production lines to come to a halt. Having a contingency plan in place is crucial to getting your operation back up and running. With many companies reporting a lack of skilled workers, completing an in-house repair has become an unlikely option. In addition, due to economic down turn, purchasing a spare motor has also become less common. Likewise, purchasing a new motor may not only be cost prohibitive, but also unmanageable. Some spindle

motor replacements are currently at twenty-week lead times. For all of these reasons, repair is an important asset to any business, big or small.

Spindles must be repaired with two major considerations in mind. Electrical components are the first, which specifically pertain to the feedback device and the windings. The second major aspect is mechanical. High speed feedback devices need to be operating properly. The greater speeds and forces acting on a spindle mean greater consequences for a sensor failure. The most common form of feedback found on spindles are magnetic proximity sensors. These are analogue devices that rely on magnetic wheels to generate electric wave forms to very specific voltages. It is crucial that the circuitry of the sensor be in good condition and properly defended from



Refurbished spindle motor from Servotech.

moving parts. Tantamount to the sensor, the magnetic wheel must retain its magnetism which can easily be ruined if it is struck or heated to excess.

Successful repair of a spindle starts and ends with being able to safely remove a sensor and reinstall it properly so that it will run again when it has been rebuilt. It is also important to maintain the integrity of the windings, which may even need to be wound depending on how badly the spindle has failed. Coolant is a powerful substance that aids in the machining process but if it gets inside a motor it will corrode the soft copper windings.

Equally as critical to a successful repair are the mechanical considerations that go into spindle repair. High speed motors are intrinsically more delicate, have tighter tolerances, require high speed bearings, precision balanced rotors and a good sealing strategy. Standard bearings can stand up against dirt and moderate amounts of contamination in a way high speed bearings cannot. Ultimately the goal of repair is to bolster a motor's resilience to the conditions that caused the failure. High current alarms can be addressed by upgraded bearings, high speed grease and different seals which

TRUMPF Introduces TruTool TSC 100 Slat Cleaner

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roughing and finishing rollers were previously used to break up the slag. Now the slats are thoroughly scraped by two powerful, toothed cleaning tools running in parallel. The TruTool TSC 100 is able to remove any material that the laser can cut.

"The new slat cleaner can be used by one person to clean a standard size pallet of 5 x 10 ft. in about 30 minutes.



The tool is easy to use; the operator places it on any area of the support slats and turns it on. Two vertical rows of toothed tools press onto the slat and move forward through the slats, scraping the slag off each slat with a smooth forward motion. Placed on the slats from above, the cleaning rollers open and move back downward. During this process, the TruTool TSC 100 is simply propelled forward as it cleans.

"Another benefit of the new tool from TRUMPF is that it is able to clean selectively; it can be used on any specific area and then removed.

This feature is especially useful when the laser produces smaller parts and only one area of the support slats is getting clogged with slag.

"The TruTool TSC 100, like other models of the TSC family, can be used during production, and it makes the work of flatbed laser machine operators considerably easier as well as cost effective. Up until a few years ago, cleaning slats required hammers and chisels and many hours to complete. Alternatively, machine operators immediately replaced heavily slagged slats, an expensive undertaking that is now a thing of the past."

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