Choosing an Inverted Microscope for Steel Inclusion Rating

Be it in the materials or life sciences, choosing a microscope that suits your needs is of the utmost importance. That is why the professional microscopist must weigh the advantages and limitations of the different tools at his disposal. One of the most widely used tools of the trade is the optical microscope.

Optical microscopes use visible light and a system of lenses to magnify images of small samples. They also come in two basic configurations: the upright microscopes and the inverted microscopes.

Upright microscopes offer a number of advantages for applications in the materials sciences such as the ease with which the operators can change the objectives and their flexibility with illumination techniques. The operators can also see the whole specimen area and easily manipulate the samples being observed.

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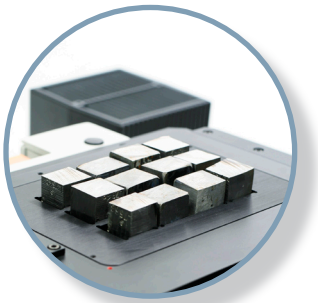
However, one disadvantage is the accurate leveling needed to align the surface of a specimen perpendicularly to the optical axis of the microscopes. Though in most cases a simple hand-press can be used, this can be time-consuming if the operator has large numbers of specimens to study, however it might be the only solution depending on the polishing equipment available.



As the name suggests, inverted microscopes have their light source, condenser, objectives and turret below the stage pointing up. This configuration allows specimens to rest their flat, polished surface against the stage, perpendicular to the axis of the microscope.

Inverted microscopes have an optical system which is basically the same as that with the uprights, although it has a longer light-path. They accept the same range of documentation devices, but they are designed to examine specimens from the underside.

Inverted microscopes with a motorized stage can handle specimens held by special fixtures or mounted devices. One such special fixture is a Magnetic Stage Plate (shown on photograph). With the possibility of loading up to 24 un-mounted samples, the Magnetic Stage Plate improves efficiency by holding the samples in place thus preventing skewing during stage movements. Being that the samples are always placed in the exact same position on the stage plate, operators do not need to adjust the stage each time a specimen is changed.

Most metallurgical and materials testing laboratories use inverted microscopes to study samples that are ground and polished on one face, the advantage being that there's no need to embed the objects in a mounting medium. A sample is simply placed face down on the, such as in the study of inclusion ratings on large batches of un-mounted samples.

Both the upright and inverted microscopes serve well in image analysis. Both allow for identical contrast-enhancing and illumination techniques. Both offer the same optical quality. Choosing the right one depends on the needs and techniques of the laboratory.