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REVISED TECHNICAL SPECIFICATION OF METALLURGICAL MICROSCOPE

High Resolution Upright Metallurgical microscope with high resolution color CCD camera, high resolution frame grabber card , Image analysis software, PC, and color printer. The detail specification is given below:

Specification for Trinocular Upright Metallurgical Microscope

It should have co-axial coarse and fine focus controls with one fine focus extension knob. Manual controlled nosepiece: Quintuple revolving for BF observation. Observation tube: Wide field trinocular tube with interpupillary distance adjustment and constant focus and beam splitter positions. The system should have reflector for bright field, reflector for dark field, rotable polarizer for incident light and 360^0 rotatable analyzer slider for reflected illumination tube.

Incident light illuminator for reflected light BF, dark field, polarizing and observation with centreable 'Iris Aperture' and field diaphragm (adjustable In/ out). Filter slots for attachment of filters. Slots for polarizer and analyzer sliders. Single lever switchover for BF/DF observation. Motorized mechanical stage (minimum size 100mm*100mm).

Optical System:

Infinity corrected optical system, Incident light filters (daylight, grey and panachromatic green filters), Polarizer slider and analyser slider for reflected illumination tube, High resolution plan Achromatic flat field universal objective set: 5x/BD, 10x/BD, 20x/BD, 40x/BD or 50x/BD, 100x/BD.

Specification for high resolution digital camera

Single chip high resolution scientific grade, digital camera with interface cable and standard software for connecting to a PC with image resolution of minimum 5 megapixels with provision for at least 4 different selectable resolutions. It should have the binning function and the ability to preview display images to be acquired in two different sizes. Can measure: Average, spot and variable point metering modes for proper exposure calculations (measuring area should be capable to be moved freely in the image). Image format: BMP, TIFF, JPEG, PICT, AVI.

Exposure time: Minimum (80 μs) and maximum (2 s or higher). Image transfer range: Maximum 3 sec at maximum resolution. Image capture time must be less than 3 sec. Frame transfer rate: Minimum 20 frames/ sec or better (at image size 1560*1024), Any standard PC interface for power supply and data transfer.

Image Analysis Software

Image processing and analysis software for quantifying and evaluating the microscopic images. The software should be able to perform the following:

1. Phase analysis (area fraction) of various phases present in microstructures. . Analysis based on the parameters types such as area, density, distance, features, perimeter, position, shape. Aspect ratio measurement and phase distribution quantification.
2. Grain size measurements as per ASTM/DIN/JIS specifications automatically in a fraction of second
3. Non-metallic inclusions as per ASTM standards and also should identify inclusion types – A, B, C, D. Also should include inclusion ratings as per DIN, JIS & IS specifications
4. Total & partial decarburization, crack depth, defect size, banding width, plating/ coating thickness measurementsetc.
5. Nodularity percentage, nodule count, size & distribution
6. Graphite flake size classification & graphite type percentage as per ASTM
7. Particle size analysis – area wise and length wise
8. Software should support the following: multiple image print layout. Create multi page report. Image stitching (stitching several images in a large area image). Live image control in terms of color, contrast and brightness.
9. Live image display, image clipping, image binning, automatic white balance and software controlled camera exposure.
10. Floating calibrated scale bar display and automatically adjusts to image with provision of converting scale bar units
11. Multiple image alignment using pattern recognition
12. Interactive measurement: Touch count, Horizontal distance, Vertical distance, Arbitary distance, Polygon length, Enclosed angle area, perimeter, circle and pixel value, chord length, Sorting Auto filter, statistics, XY diagram, Histogram based on data from result sheet. Pixel maps, grey value histogram.
13. Multiple phase analysis: user-define parameter classifications Visual comparison of live images to a set of user defined reference images.
14. Alignment of multiple images to form a single large image with multiple image alignment procedure.

Specifications for desktop computer and color printer

Branded (HP/DELL/IBM) Intel Core 2 Duo 8400, 2.1 GHz, 3 GB DDR2 Ram expandable upto 4 GB, 500 GB HDD 20" TFT monitor, Combo drive, USB ports, Multimedia keyboard, Optical scroll mouse with mouse pad, Windows XP SP3 with media and license (full pack), Color printer with 2KVA offline UPS. (APC/Tata libert/Emersion).

Optional Items:

1. 100xoil immersion objective lens
2. Micro hardness tester may be quoted as separate item.

The above includes all relevant software & drivers. The microscope, digital camera, image analysis software and desktop computer together must be supplied from the same vendor as a single unit and should be compatible with the Image Analysis System. An optimum optical compatibility must be ensured for good performance.

Warranty: 3 years warranty

Installation & Training: Installation and 10 days application training at C.I.M.F.R should be done by the Party