SEMMME3167

Aligning and setting up holographic equipment

Overview

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This standard identifies the competences you need to align and set up holographic equipment for the production of a hologram, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and test documentation to set up and align the various items of equipment. You will be expected to use the specified/appropriate techniques to carry out the setting up and production of the hologram in the correct sequence. The process will include alignment of the various shutters, lenses or spatial filters, mirrors and holographic plates, making adjustments to bring the settings within specification, and the final fixing of these components in their correct positions. You will need to use an optical power meter to measure the power density incident on the surface of the plate. You will need to work in the appropriate lighting conditions to avoid exposure of the plate during the setting-up phase.

Your responsibilities will require you to comply with organisational policy and procedures for the holographic setting-up activities undertaken, and to report any problems with the activities, components or equipment that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying setting-up and alignment techniques and procedures to produce a hologram. You will understand the hologram production system being set up and aligned. You will know about the setting-up and alignment techniques and procedures, test equipment and methods, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the hologram is produced to the required specification.

You will understand the safety precautions required when carrying out the holographic alignment and setting-up operations, in particular those relating to exposure to laser

light. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

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1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow all relevant setting-up and operating specifications for the equipment being configured
3. follow the defined procedures and set up the equipment correctly, ensuring that all operating parameters are achieved
4. deal promptly and effectively with problems within your control and report those that cannot be solved
5. check that the configuration is complete and that the equipment operates to specification
6. complete all relevant documentation accurately and legibly

Knowledge and understanding

You need to know and understand:

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1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. the personal protective equipment (PPE) that you need to use for both personal protection of yourself and others, and protection of the system components
3. the hazards associated with setting up a holographic system, and with the tools and test equipment that is used, and how to minimise them and reduce any risks
4. how to obtain and interpret drawings, standards, quality control procedures and specifications used in the setting- up and alignment process (including schematics, symbols and terminology)
5. how to carry out currency/issue checks on the specifications you are working with
6. the basic principle of operation of the holographic equipment being set up
7. the optical components to be set up and aligned, and their function within the holographic system
8. the adjustments/corrections/tuning required to bring the equipment/system to operational standard through full range parameters
9. the quality control procedures to be followed during the setting up and testing operations
10. types of test/alignment equipment to be used, and their selection for particular types of test
11. how to interpret holographic plate specifications, power meter readings and calculations relating to exposure time
12. the properties of laser light which allows holograms to be produced both in mono-chromatic and colour form
13. the need for a reference beam as well as an image beam to create the 3D image
14. how to check/calibrate the test/alignment equipment to be used; or the organisational procedures for ensuring that the equipment is maintained and correctly calibrated

15. how to conduct any necessary checks/tests to ensure the integrity, functionality, accuracy and performance of the holographic system and its dependences
16. how to recognise defects
17. how to interpret the alignment/test readings obtained, and the significance of the readings
18. the importance of ensuring that equipment is used only for its intended purpose and within its specified range and limits
19. potential problems or errors that could occur with the setting-up operations, and how these can be overcome
20. the environmental control and company operating procedures relating to the alignment/setting-up activities
21. the documentation required and the procedures to be followed on completion of the alignment/setting-up activities
22. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

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1. Carry out all of the following during the setting up of the hologram equipment:
   1.1 obtain and interpret correctly the documentation for the type of holographic equipment being aligned/set up
   1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant laser safety regulations and procedures to realise a safe system of work
   1.3 check that all tools and test equipment to be used are within their calibration dates
   1.4 obtain clearance to work on the system, and observe power isolation and safety procedures
   1.5 provide safe access and working arrangements for the work area
   1.6 carry out the setting-up activities, using safe and approved techniques and procedures
   1.7 return all tools and equipment to the correct location on completion of the activities
   1.8 leave the machine and work area in a safe and clean condition on completion of the alignment/setting up
2. Set up the system for one of the following types of hologram:
   2.1 to generate a reflection hologram
   2.2 to generate a transmission hologram
3. Set up and align all of the following optical system components, as applicable to the system being aligned:
   3.1 shutter
   3.2 the subject of the hologram
   3.3 lasers
   3.4 beam expander or spatial filter
   3.5 holographic plate or holographic blank
   3.6 mirrors
   3.7 reference beam mirror
4. Carry out alignments, adjustments and tests, using a range of tools and equipment, to include all of the following:
   4.1 use a power meter to measure the incident energy on the plate (to calculate exposure time)
   4.2 check that the suspension system for the equipment is functioning properly
   4.3 ensure that the holographic plate is handled correctly

4.4 ensure that the reflective surfaces are clean

5. Following exposure of the hologram, remove the plate and prepare it for the developer stage, ensuring both of the following:

5.1 the laser is shut down safely

5.2 the holographic plate is removed and stored correctly

6. Set up hologram equipment in compliance with one of the following standards:

6.1 BS, ISO or EN standards and procedures

6.2 customer (contractual) standards and requirements

6.3 company standards and procedures

6.4 specific equipment requirements/manufacturer's data

6.5 recognised compliance agency/body's standards

6.6 other accepted international standards

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