

Overview

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This standard identifies the competences you need to carry out machining operations on optical infra-red and special materials, using optical infra-red process machines, in accordance with approved procedures. You will be required to set up and operate a range of machines in order to produce the components, combining a mixture of processes identified for infra-red and special materials, and using a selection of specified optical lens and flat materials. You will be expected to produce a range of components that combine a number of different features, such as centre thickness, diameters, generated blanks, optical lens form and power.

You will be required to set up and operate the machine in line with safe working practices and approved procedures, and to continuously monitor the machining operations, making any necessary adjustments to ensure that the work output is to the required quality and accuracy. Meeting production targets will be an important issue, and your production records must show consistent and satisfactory performance.

Your responsibilities will require you to comply with organisational policy and procedures for the optical machining activities undertaken, and to report any problems with the optical machining activities, materials 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 optical machining procedures. You will understand the optical lens, and flat infra-red and special material processes used, and their application, and will know about the setting-up procedures, equipment, materials and consumables, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the work output is to the required specification.

You will understand the safety precautions required when working with the machine

and with its associated tools and equipment. 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. confirm that the machine is set up and ready for the machining activities to be carried out
3. operate the machine tool controls safely and correctly, in line with operational procedures
4. produce lenses to the required quality and within the specified dimensional accuracy
5. carry out quality sampling checks at suitable intervals
6. complete production documentation
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. shut down the equipment to a safe condition on conclusion of the machining activities

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 safety mechanisms on the machine, and the procedure for checking that they function correctly
3. operation of the machine controls in both set-up and run modes, and how to stop the machine in an emergency
4. the personal protective equipment (PPE) to be worn, and where this can be obtained
5. the hazards associated with optical lens process operations, and how to minimise them and reduce any risks
6. the importance of keeping the work area clean and tidy
7. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken
8. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
9. the various optical lens operations that can be performed, and the shapes and types of tooling that can be used
10. the methods that can be used to set up the workpiece, prior to the operation, to minimise optical wedge and parallelism in relation to the cutting tool
11. the effect of backlash in machine slides, dials and screws, and how this can be overcome
12. how to handle and store all cutting tools and kit required, safely and correctly
13. factors which affect the selection of cutting feeds, pressures and speeds required, and the depth of cut that can be taken
14. how tool wear affects surface finish and dimensional accuracy
15. how the various types of material will affect the way the operation is performed
16. the application of cutting fluids with regard to the range of materials being machined

17. the effect of clamping the workpiece, and how this can cause distortion in the finished component
18. how to recognise machine faults and how to identify when tooling needs refurbishment
19. the problems that can occur with optical lens infra-red and special material machining activities, and how they can be overcome
20. the quality control procedures used, inspection checks to be carried out, and the equipment to be used for this
21. 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 lens machining activities:
 - 1.1 obtain and interpret correctly the documentation for the type of lens being machined
 - 1.2 adhere to procedures or systems in place for risk assessment, , personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 ensure that machine guards/safety mechanisms are in place and correctly adjusted at all times
 - 1.4 ensure that components are correctly positioned and held securely, without damage or distortion
 - 1.5 ensure that tooling is appropriate for the operations and is maintained in a suitable condition
 - 1.6 set the tooling and machine operating parameters to achieve the component specification
 - 1.7 adjust machine settings, as required, during the machining activities to maintain component accuracy
 - 1.8 use safe working practices and machine operating procedures at all times
 - 1.9 leave the machine and work area in a safe and clean condition on completion of the machining activities
2. Operate three types of optical lens process machine from the following:
 - 2.1 conventional pitch
 - 2.2 lens silk polishing
 - 2.3 flat silk polishing
 - 2.4 special materials
 - 2.5 automated
 - 2.6 generating
 - 2.7 lens edging
3. Produce machined optical components that combine different operations, and cover six of the following:
 - 3.1 centre thickness
 - 3.2 flat parallelism
 - 3.3 lens surface generation
 - 3.4 lens diameter
 - 3.5 lens form analysis
 - 3.6 lens cosmetic defects
 - 3.7 lens concentricity

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- 3.8 lens power analysis
- 3.9 lens truncation and cap height
- 4. Machine four different types of material from the following:
 - 4.1 zinc selenide
 - 4.2 zinc sulphide
 - 4.3 optical silicon
 - 4.4 optical infra-red glass 4
 - 4.5 optical infra-red glass 5
 - 4.6 optical infra-red glass 6
 - 4.7 optical grade germanium
 - 4.8 optical thallium ideobromide
 - 4.9 other specific optical material
- 5. During production, carry out the necessary checks for accuracy, to include five of the following:
 - 5.1 lens surface finish
 - 5.2 component cosmetic defects
 - 5.3 lens diameters
 - 5.4 component profiles
 - 5.5 optical parallelism
 - 5.6 optical truncations
 - 5.7 optical bevels
 - 5.8 lens surface form error
 - 5.9 lens surface power error
 - 5.10 lens cap height
 - 5.11 angles
 - 5.12 lens centre thickness
- 6. Produce components with dimensional accuracy, form and surface quality, in compliance with one of the following::
 - 6.1 BS, ISO or EN standards
 - 6.2 customer (contractual) standards and requirements
 - 6.3 company standards and procedures
 - 6.4 other accepted international standards

SEMMME3150



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Developed by Enginuity

Version Number 3

Date Approved 30 Mar 2023

Indicative Review Date 31 Mar 2028

Validity Current

Status Original

Originating Organisation Enginuity

Original URN SEMMME3150

Relevant Occupations Engineering, Engineering and Manufacturing Technologies, Engineering Technicians

Suite Mechanical Manufacturing Engineering Suite 3

Keywords mechanical engineering; photonics; machining; optical; infra-red; special material; lenses; conventional pitch; lens silk polishing; flat silk polishing; automated; generating; lens edging; zinc selenide; zinc sulphide; optical silicon; glass 4; glass 5;
