

Overview

This standard identifies the competences you need to carry out machining operations on optical plastic materials, in accordance with approved procedures, using optical plastic process machines. You will confirm with the machine setter that the machine is ready for the operations to be performed and that all the required components/materials and consumables are available. You will be required to operate a range of machines, in order to produce components that combine a mixture of processes identified for plastic materials, using a selection of specified optical plastic 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, power, and stress and strain analysis.

You will be required to operate the machine in line with safe working practices and approved procedures, to continuously monitor the machining operations and, where necessary, make minor adjustments or seek the help of the machine setter to make the adjustments, in order 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 machining activities, materials or equipment used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying optical plastic machining procedures. You will have an understanding of the optical machining processes used, and their application, and will know about the equipment, materials and consumables, in adequate depth to provide a sound background for carrying out the activities to the required specification.

You will understand the safety precautions required when working with the machines, their 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.

Setting up of the machine, its tooling and associated workholding devices, is the subject of another standard and is the responsibility of the machine-tool setter.

Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 confirm that the machine is set up and ready for the machining activities to be carried out
- P3 operate the machine controls in accordance with safe working practices and operational procedures
- P4 produce optical components to the required specification and within the specified dimensional accuracy
- P5 carry out quality sampling checks at suitable intervals
- P6 deal with problems within your control and report those that cannot be solved
- P7 complete and store all relevant documentation in accordance with organisational requirements
- P8 shut down the equipment to a safe condition on conclusion of the machining activities

Knowledge and understanding

You need to know and understand:

- K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- K2 the safety mechanisms on the machine, and the procedure for checking that they function correctly
- K3 the operation of the machine controls in both set-up and run modes, and how to stop the machine in an emergency
- K4 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
- K5 how to extract and use information from optical engineering drawings and related specifications in relation to work undertaken
- K6 how to use imperial and metric systems of measurement
- K7 the various plastic prism/lens operations that can be performed
- K8 how to achieve the required level of finish using hand smoothing and polishing techniques
- K9 how to handle and store all cutting tools and kit required, safe and correctly
- K10 the application of roughing and finishing cuts and pressures used, and the effects on tool life, surface finish and dimensional accuracy
- K11 how tool wear affects surface finish and dimensional accuracy
- K12 how the various types of materials will affect the way the operation is performed
- K13 the application of cutting fluids with regard to the range of material being produced
- K14 the effect of clamping the workpiece, and how this can cause distortion in the finished component
- K15 how to recognise machine faults, and how to identify when tooling needs refurbishment
- K16 the issues that can occur with plastic lens/prism machining activities, and how they can be overcome
- K17 the quality control procedures used, inspection checks to be carried out, and the equipment used
- K18 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

1. Apply all of the following during machine operation:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation)
 - 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 confirm with the machine setter that the machine is ready for production
 - 1.4 where appropriate, seek any necessary instruction/training on the operation of the machine
 - 1.5 ensure that machine guards are in place and are correctly adjusted
 - 1.6 hold components securely, without damage or distortion
 - 1.7 follow the defined operating procedures and apply safe working practices and procedures at all times
 - 1.8 ensure that machine settings are adjusted as and when required (either by yourself or the setter) to maintain the required accuracy
 - 1.9 ensure that the components produced meet the required specification for quality and accuracy
 - 1.10 leave the work area and machine in a safe and appropriate condition on completion of the activities

2. Operate three types of optical plastic process from the following:
 - 2.1 automated process
 - 2.2 prism/flat smoothing process
 - 2.3 plastic diamond turning process
 - 2.4 lens generating process
 - 2.5 hand smooth process
 - 2.6 prism/flat polishing process
 - 2.7 lens edging process
 - 2.8 hand polish process
 - 2.9 optical special materials process
 - 2.10 lens smoothing process
 - 2.11 plastic stabilisation process
 - 2.12 special plastic cleaning process

3. Produce machined optical components that combine different operations and

Operating optical plastic process machines

cover four of the following:

- 3.1 centre thickness
- 3.2 flat parallelism
- 3.3 lens surface generation
- 3.4 angular collimating
- 3.5 lens diameter
- 3.6 lens form analysis
- 3.7 lens cosmetic defects
- 3.8 lens concentricity
- 3.9 lens power analysis
- 3.10 lens truncation and cap height

4. Machine one of the following types of plastic material:

- 4.1 cyclic olefin
- 4.2 acrylic
- 4.3 polyethylene
- 4.4 sulfones
- 4.5 polycarbonate
- 4.6 polyetherimide
- 4.7 nylon
- 4.8 other optical grade plastics

5. Carry out the necessary checks for accuracy during production of at least three of the following:

- 5.1 optical bevels
- 5.2 optical truncations
- 5.3 lens diameters
- 5.4 optical lens wedge
- 5.5 lens cap height
- 5.6 lens surface finish
- 5.7 optical parallelism
- 5.8 lens chamfers
- 5.9 lens surface power/radius error
- 5.10 lens centre thickness
- 5.11 lens surface form error
- 5.12 prism angles

5.13 truncations

6. Produce components with dimensional accuracy, form and surface quality, which comply to one of the following

- 6.1 BS, ISO or BSEN standards and procedures
- 6.2 customer (contractual) standards and requirements
- 6.3 organisational standards and procedures
- 6.4 other accepted international standards

Operating optical plastic process machines

Developed by	Enginuity
---------------------	-----------

Version Number	3
-----------------------	---

Date Approved	31 Mar 2026
----------------------	-------------

Indicative Review Date	01 Apr 2029
-------------------------------	-------------

Validity	Current
-----------------	---------

Status	Original
---------------	----------

Originating Organisation	Enginuity
---------------------------------	-----------

Original URN	SEMMME2-49
---------------------	------------

Relevant Occupations	Engineering, Engineering and Manufacturing Technologies, Engineering Technicians
-----------------------------	--

Suite	Mechanical Manufacturing Engineering Suite 2
--------------	--

Keywords	engineering; manufacturing; mechanical; machining; optical; plastics; lenses; setting up; equipment; machine; lens generating; lens smoothing; process; operating
-----------------	---