P.A.Hilton Ltd
Horsebridge Mill, King's Somborne
Stockbridge, Hampshire, England, SO20 6PX
T: +44 (0) 1794 388382
F: +44 (0) 1794 388192

HSM45 - Polariscope

Figure 1: With Square Plate Specimen Fitted

Product Summary

- Polariscope for attaching to light box (not supplied as standard) or overhead projector (not supplied).
- Performs photoelastic experiments with mechanical models.
- Bench top frame with rubber feet.
- Quarter wave plates and polarisation filters supplied.
- Plates can be rotated through varying angles to vary stress colouration.
- Specimens loaded into frame with quick connect elements.
- Loading using screw-jack, loading spring and dial gauge.
- Easy adjustment of loading mechanism for different length/ type of specimens.
- Standard set of specimens provided.
- A full technical instruction manual is supplied, which details full unit operation, experimental technique, example results and relevant theory.
- 2 year warranty.

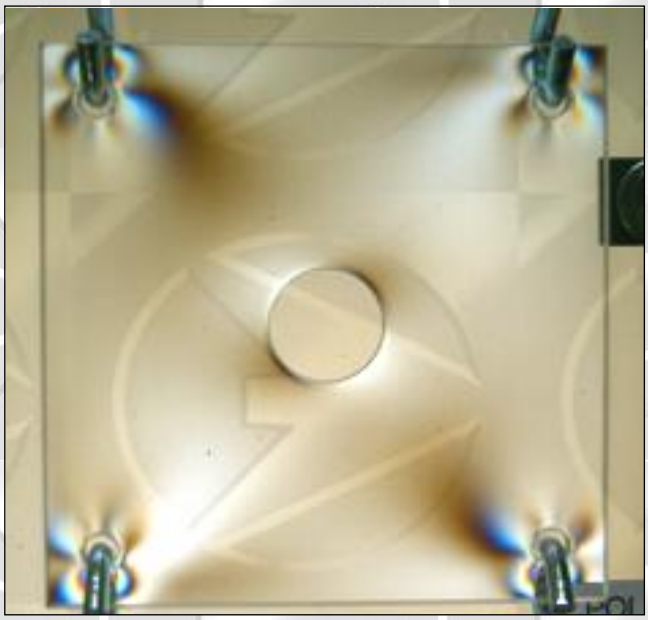
Tender Specification

- Bench top unit for teaching of photoelastic principles or finite element analysis.
- Unit to be mounted on light box or overhead projector (not supplied as standard).
- To be supplied with quarter wave plates and polarisation filters.
- Wave plates and filters to easily slide in frame assembly.
- A variety of mechanical specimens supplied as optional extras.
- Adjustable loading mechanism with easily adjustable positioning.
- To have fine tuning loading mechanism using loading spring, dial gauge and screw-jack.
- Wave plates and filters can be rotated through varying angles to vary colourisation.
- 2 year warranty.

P.A.Hilton Ltd
Horsebridge Mill, King's Somborne
Stockbridge, Hampshire, England, SO20 6PX
T: +44 (0) 1794 388382
F: +44 (0) 1794 388192

PRODUCT DATA SHEET

Description



The HSM45 polariscope is a bench top mounted frame which allows the study of stress patterns and photoelasticity resulting from geometrical changes in loaded mechanical models.

The frame has integral slots along its lengths into which can fit quarter wave plates and polarisation filters. The frame has the polarisation filter and quarter wave plate mounted in to a rotational element. This allows the rotational angle of the plates and filters to be adjusted and hence vary the colourisation seen by the user.

The frame can sit on top of a light box (not supplied as standard- see HSM45d) or overhead projector (not supplied) which supplies monochromatic or white light to pass through the specimens when loaded. Rubber mounting feet enable the apparatus to sit firmly onto the light source without damaging any surfaces.

Specimens are made from CR39 photoelastic material which is a highly specialised reactive plastic polymer- commonly used in lens manufacture. A variety of specimens can be supplied and each one in turn is mounted into the loaded mechanism using quick connect joints.

The loading mechanism consists of a loading spring, dial gauge and screw-jack for precise loading of the specimens. The loading mechanism can be adjusted to suit the length of the specimen using the quick release knobs supplied. 250N loading is achievable from the loading mechanism. Standard specimens supplied include rod and square plate.

The unit comes supplied with standard specimens, quarter wave plate, polarisation filter, and a comprehensive instruction manual. A 2 year warranty is also offered.

Experimental Capabilities

- Photoelastic analysis of standard mechanical models.
- Tensile loading of beams, perforated beams, and overlap element (model set A).
- Tensile loading of crane hook, spanner and stepped bar (model set B)
- Tensile loading of specimens with different notch arrangements (model set C).
- Variation of stress colourisation.
- Rotational position of wave plate and filters.

Specification

- Dimensions: 400(L) x 400(W) x 450mm
- Weight: approximately 12Kg
- Two quarter wave plates, approx. Ø165mm
- Polarisation filter, approx. Ø165
- Analyser filter, approx.. Ø150mm
- Bench mounted frame with integral grooves for sliding plates and loading mechanism.
- 0…250N loading mechanism.
- Rotational adjustment of filter/ wave plate using protractor with 360° travel and 1° resolution.
- Variety of specimens available to order.

P.A.Hilton Ltd
Horsebridge Mill, King's Somborne
Stockbridge, Hampshire, England, SO20 6PX
T: +44 (0) 1794 388382
F: +44 (0) 1794 388192

Standard Specimens Supplied

Please note the following images of samples have been modified in colour to show their shape more clearly.

Actual Polariscope samples are clear (transparent- no colour) apart from when force is exerted through them using the loading mechanism and viewed through the filter setup with a light box/ projector underneath.

Figure 2: Square Plate

Figure 3: Rod

To expand on experiments the specimens sets HSM45a, HSM45b and HSM45c are available to order as separate non-essential accessories.

Accessories and Spares

- Fixtures and fittings
- Loading cord
- Spanner sample accessories (model set B).
- Full instruction manual which includes:
  - Operating instructions
  - Experimental set-up
  - Experiment procedure
  - Example set of results

Operational Conditions

- Storage temperature: -10°C to +70°C
- Operating temperature range: +10°C to +50°C
- Operating relative humidity range: 0 to 95%, non condensing

P.A.Hilton Ltd
Horsebridge Mill, King's Somborne
Stockbridge, Hampshire, England, SO20 6PX
T: +44 (0) 1794 388382
F: +44 (0) 1794 388192

Non Essential Accessories

HSM45a – MODEL SET 'A'

Figure 4: Perforated Beam

Figure 5: Bar Specimen

Figure 6: Bending Element Overlap

HSM45b – MODEL SET 'B'

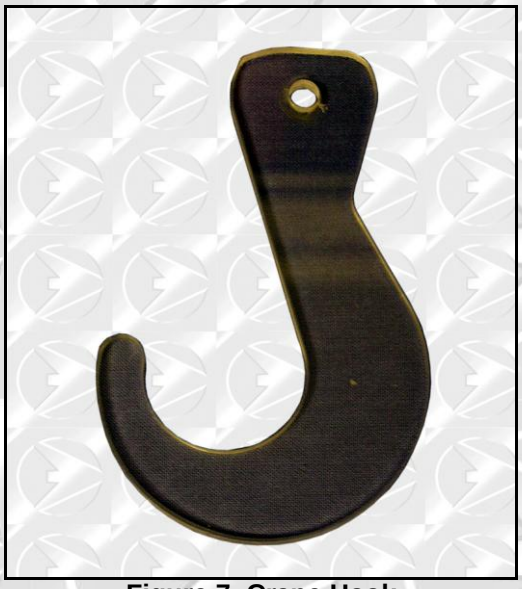


Figure 7: Crane Hook

Figure 8: Spanner

Figure 9: Shaft

HSM45c – MODEL SET 'C'

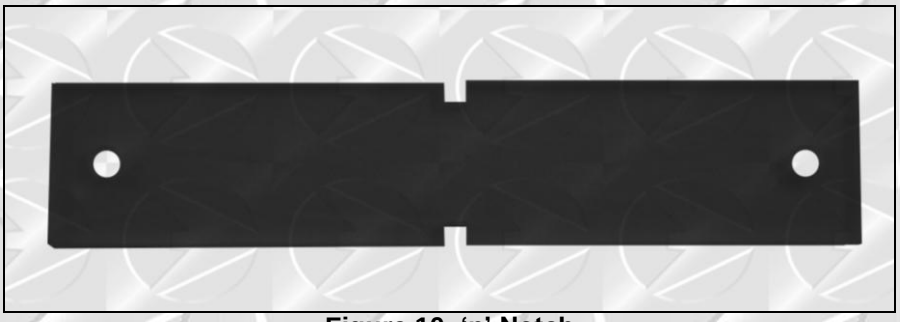


Figure 10: 'n' Notch

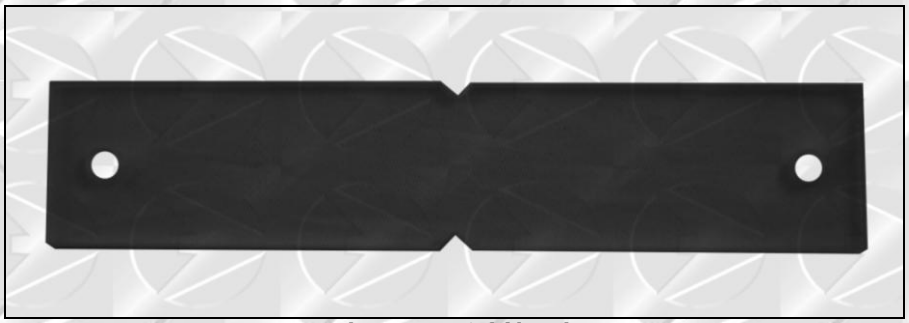


Figure 11: 'v' Notch

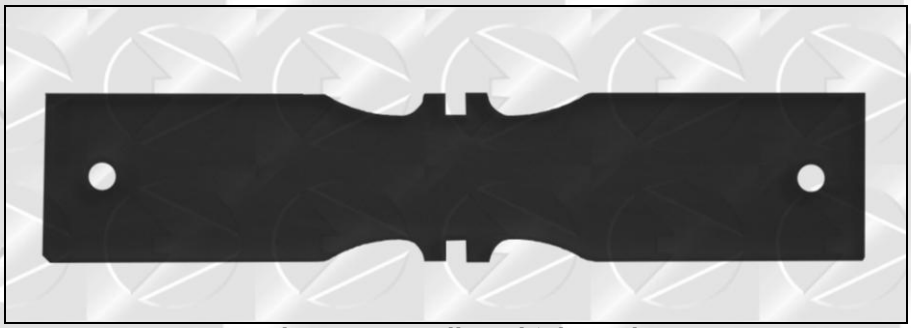


Figure 12: Scalloped 'n' Notch

Figure 13: Welded Seams

HSM45d – Light Box

The HSM45d Light Box is an optional extra to be used in conjuncture with the Polariscope unit to produce the light which is required to see the results through the filters.

The illuminated area of the A4 light box is 210 x 297 mm with an overall working area of 357 x 270 mm. The colour temperature is 9,000 - 10,000 kelvin and the light intensity is 1,500 - 1,800 lux. The light source is LED and has an estimated life span of around 30,000 hours and gives even light output over the illuminated surface. There is an on/off front mounted on/off rocker switch is fitted on the light box as well as non slip rubber feet on the base.

The Polariscope unit is designed to sit on top of the light box and then testing can be performed and observed.

Power is introduced via a universal transformer that can be powered from 100-240V mains input.

Figure 14: Light Box