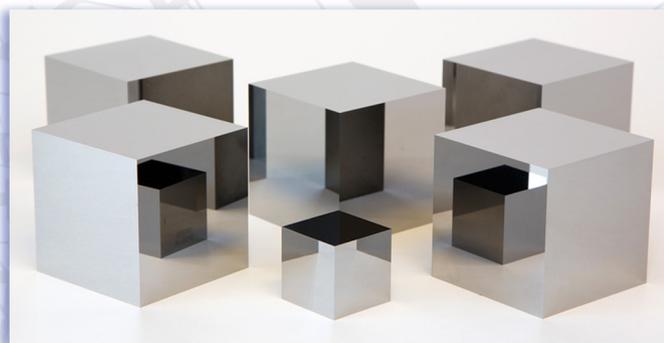
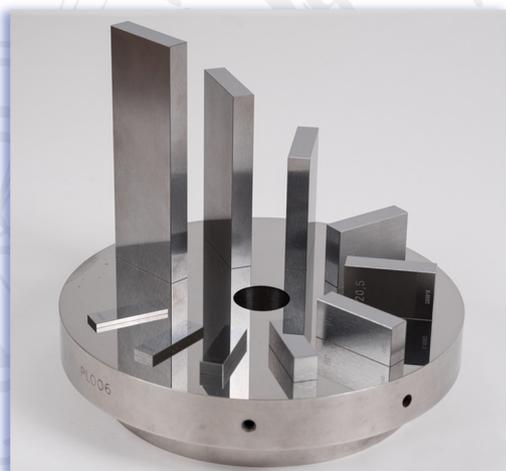


DEDICATED TO ACCURACY AND PRECISION



## OPUS METROLOGY

PRODUCT CATALOGUE

# Welcome to OPUS...

Opus Metrology is one of the UK's leading manufacturers and suppliers of Length and Angle Standards to both British and Worldwide manufacturing industries.

Since its foundation in Corby, Northamptonshire in 1987, Opus has rapidly earned an enviable reputation for quality, value and service from its global customer base.

Initially the company began manufacturing a comprehensive range of Gauge Blocks complemented and supported by a UKAS Calibration service.

Utilising our in depth manufacturing skills, knowledge and experience, our range of high precision, quality products and services has evolved and now includes:

## PRODUCTS

- Steel, Tungsten Carbide and Ceramic Gauge Blocks
- Gauge Block Accessories
- Long Series Gauge Blocks
- Length Bars
- Length Bar Accessories
- Monochromatic Light Units
- Optical Flats
- Optical Parallels
- High Precision Cubes
- Angle Gauge Sets
- Sine Bars
- Engineers' Parallels
- Toolmakers' Flats
- Precision Spheres

## SERVICES

- Dimensional Calibration service – UKAS Accredited
- Flat Lapping Service
- Special Manufacturing for high precision products

## CALIBRATION - ACCURACY AND REPEATABILITY

Regular calibration of your measuring instruments, against traceable standards is an essential part of manufacturing and helps companies improve their quality control.

Opus Metrology can provide a full range of dimensional calibration services at our environmentally controlled laboratory in Corby.

Our 162m<sup>2</sup> laboratory has full UKAS accreditation and is equipped to manage a comprehensive range of dimensional measurement needs.

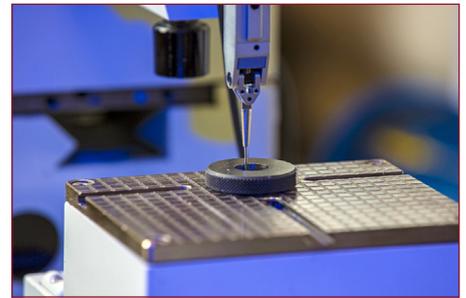
## UKAS – RECOGNISED WORLDWIDE

For most industries, Accreditation is an international activity.

Thanks to the Mutual Recognition Agreement (MRA) established by the International Laboratory Accreditation Cooperation (ILAC), UKAS accreditation of testing and calibration services is recognised as meeting National Standards in over 90 economies around the world.

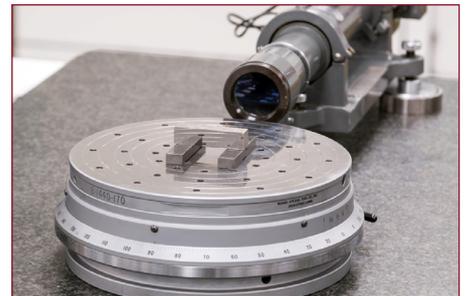
UKAS certification is therefore an internationally accepted, authentic assurance of the quality of the calibration carried out on your equipment.

Further information about ILAC MRA can be found on the ILAC website (<http://ilac.org/ilac-mra-and-signatories>).



*Dedicated to Accuracy  
and Precision*

*Manufactured in the UK*



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*For more information visit [www.opus.co.uk](http://www.opus.co.uk)*

*Dedicated to Accuracy and Precision*

# OPUS GAUGE BLOCKS

Opus Metrology is the largest manufacturer of Tungsten Carbide and Zirconia Ceramic Gauge Blocks in Europe. The high accuracy and quality of Opus Gauge Blocks is the result of many years of experience in manufacturing.

Our use of high quality raw materials and our specially developed finishing techniques ensures Opus Gauge Blocks have superior wringing characteristics combined with dimensional stability providing a long life span.

Both the Tungsten Carbide and Ceramic Gauge Blocks are available as individual gauge blocks, standard composition sets or customer designed composition sets, manufactured and supplied to meet the requirements of ISO: 3650 specification for grades 0, 1 & 2. Standard Gauge Block sizes range from 0.50mm to 100mm. As a manufacturer we can also produce special size gauge blocks to suit specific applications.

Please visit [www.opus.co.uk](http://www.opus.co.uk) for detailed product data sheets.

## Tungsten Carbide Gauge Blocks



- Are approximately 10 times more wear resistant than steel gauge blocks.
- Suitable for frequent use.
- Provide superior wringing characteristics.
- Typical hardness specification 1450-1470 Hv.
- Coefficient of thermal expansion  $4.23 \times 10^{-6}$  per °C.
- Excellent long term dimensional stability.

## Zirconia Ceramic Gauge Blocks



- Provide excellent wringing characteristics.
- Non-Magnetic.
- Coefficient of thermal expansion  $9.5 \times 10^{-6}$  per °C.
- Extremely resistant to scratches and wear.
- Highly visible, low weight.
- Does not corrode in normal use.

## Steel Gauge Blocks



- Provide high resistance to wear.
- Hardness specification  $>63$  Rc.
- Coefficient of thermal expansion  $11.5 \times 10^{-6}$  per °C.
- Supplied as sets, individuals, special sizes up to 100mm (4 inches) in length.

All grades of gauges can be supplied complete with a UKAS Calibration Certificate

## Opus Gauge Block Accessories

Designed for use with gauge blocks, these accessories can be assembled quickly and simply to a variety of precision instruments for use in checking, transferring measurements and marking out.

They are produced from the highest quality steel. the wringing surfaces are precision lapped to provide flatness and surface finish characteristics compatible with Opus Gauge Blocks.



## Opus Long Series Steel Gauge Blocks

Opus Long Series Steel Gauge Blocks are manufactured from high quality steel to ISO 3650:1998 specification and are available in lengths from 125mm to 1000mm.

- Can be supplied in standard sizes as individuals or sets.
- Standard ML8 set comprising 125, 150, 175, 200, 250, 300, 400 and 500mm.
- Special sizes manufactured to order.
- Standard Gauge block cross-section of 35mm x 9mm.
- Each gauge has clamping holes at both ends for use with Toggle Clamps to assemble combination lengths.
- Opus Toggle Clamps are specially designed for ease of use with Long Series Gauge Blocks.





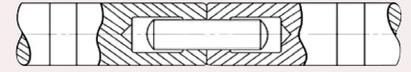
✓ FREE UKAS Calibration Certificate upon request

## Opus Length Bars – Metric

Features:

Opus Length Bars are produced from specially selected steel and are carefully manufactured with the gauging faces hardened then precision lapped to meet the length, flatness and parallelism tolerances of BS 5317 (Metric) specification.

- When joined together (Grades 1 & 2) they provide lengths far in excess of standard Gauge Blocks.
- The use of screws allow the bars to be safely used horizontally as well as vertically and they also allow a range of accessories to be attached.



### Joining Method:

22mm diameter section with a threaded hole in the centre enables quick and accurate assembly of Grade 1 & 2 bars.

Calibration Grade Length Bars have solid ends.



## Opus Length Bar Accessories

Opus Length Bar Accessories widen the scope of use of Opus Length Bars when attached to the length bars using the connecting screws.

- Full sets or individuals can be supplied.
- Sets are supplied in high quality cases.

Typical uses are:

- Use a pair of AA jaws to assemble a precise setting gauge.
- Use a pair of spherical end pieces for internal gauging or as a setting gauge.
- Use a pair of BB jaws to assemble an internal caliper.
- Use one BB jaw in conjunction with the base to assemble a height gauge.

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## Opus Monochromatic Light Unit

Features:

- Use with Optical Flats or Parallels to assess both the flatness and parallelism of the measuring faces by interferometry.
- Can be used to check parallelism of micrometer measuring faces using interferometry.
- The Monochromatic light source provides high contrast interference fringes.
- There are 4 apertures that can be selected, each of which can be closed off if not required, which permit the unit to be used for Profile, Squareness and Straightness testing.



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## Opus Optical Flats

Opus Optical Flats combined with the Monochromatic Light Unit are a simple and effective method to check flatness of reflective surfaces.

The method relies upon the natural phenomena of light interference and is a very sensitive method of flatness assessment.



✓ FREE UKAS Calibration Certificate upon request



## Opus Optical Parallels

Opus Optical Parallels are optics that are precision Flat lapped on two faces and also controlled for parallelism of the two lapped faces.

They are used for examining both flatness and parallelism of micrometer anvils.

The thickness of each Optical Parallel is controlled to ensure that the micrometer anvils are checked for parallelism at approximately every quarter of a turn of the micrometer screw.

Optical Parallel sets are manufactured from low expansion glass and are 25mm diameter.

Each set comprises of 5 sizes: 12.000mm, 12.125mm, 12.250mm, 12.375mm and 25.000mm



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## Opus Angle Gauges

Opus Angle Gauges are available as thin series gauges 50mm x 9mm or to NPL Specification MOY/SCMI/18 Combination Angle Gauges.

- Both styles are made from high quality steel and hardened to a minimum 64 Rc (800 Hv) and then stabilised.
- Each gauge is precision lapped with a superior, highly reflective, wringable finish.
- Flatness of each face is  $< 0.2 \mu\text{m}$  and the faces are square to the ground sides within  $2 \mu\text{m}$ .
- Angle is controlled to  $\pm 2$  seconds of arc.
- Supplied as Sets or individual Angle Gauges.



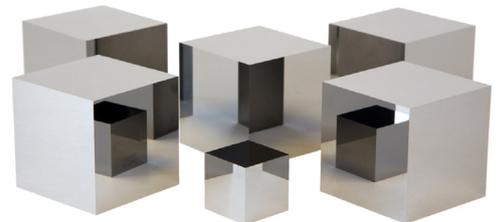
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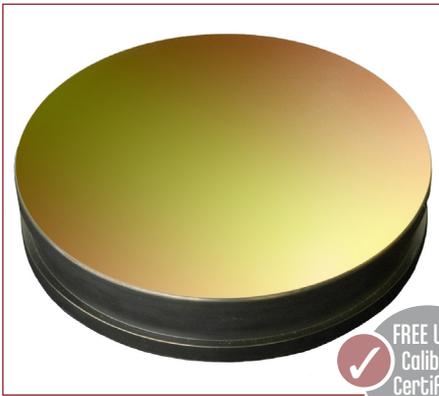


## Opus Precision Cubes

Opus Precision Cubes can be used as a general purpose reflector and for providing a  $90^\circ$  angle standard, accuracy  $\pm 2$  seconds of arc, in three planes for setting or checking perpendiculars.

- Standard Sizes available 50mm (2 inch) or 25mm (1 inch)
- Made from high quality Tungsten Carbide or Special Tool Steel and hardened to 62 Rc (750 Hv).
- Supplied in a high quality case.
- Other sizes and accuracy of cubes can be supplied upon request.





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Calibration  
Certificate  
upon request

## Opus Toolmakers' Flats

Opus Toolmakers' Flats are made to BS 969 from very high quality steel blanks.

- Each flat is heat treated to give a working surface of minimum 64 Rc (800 Hv) and then stabilised.
- The working surface of the flat is precision lapped to the high grade of accuracy required by the specification for flatness and finish.
- Available in 4 sizes: 63mm, 100mm, 160mm and 200mm and supplied in high quality wooden cases.



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Calibration  
Certificate  
upon request

## Opus Engineers' Parallels

Opus Engineers' Parallels are manufactured to BS 906 parts 1 & 2, Metric and Imperial.

- Parallels are available as Grade A or Grade B.
- Grade A is intended for precision applications in an inspection department.
- Grade B is intended for more general toolroom type applications.
- Both grades are made from high quality steel and hardened to 64 Rc (800 Hv), stress relieved and then stabilised.
- Supplied in pairs in a high quality case



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Calibration  
Certificate  
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## Opus Precision Sine Bars

Opus Precision Sine Bars used with Gauge Blocks offer a high degree of accuracy in measuring angles for grinding, milling machine and inspection applications.

Manufactured from specially selected Tool steel to the accuracy requirements of BS 3064:1978 - type 2.

- Sizes available 100mm, 200mm and 300mm (roller distance)
- Every bar is made from high quality tool steel which is hardened to a minimum 62 Rc (750 Hv), stress relieved and then stabilised.
- Supplied in a high quality case.



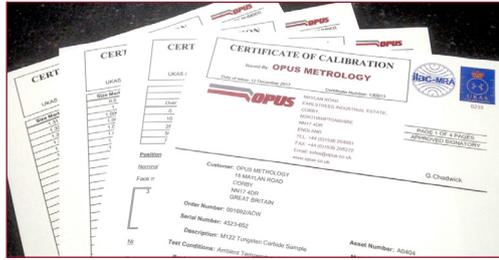
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## Opus Precision Spheres

Opus Calibrated Precision Spheres are used in a wide range of applications including the measurement of spline gears, small internal tapers, internal annular grooves and throated worm wheels.

- Each standard set of Spheres contains a range of sizes with three matched spheres per size.
- Manufactured from high Carbon Chrome Steel (AISI 52100-EN31).
- Metric sizes range from 1 to 25mm or 1.5 to 12.5mm each in 1mm steps.
- Inch sizes range from 1/16 to 1/2 inch in 1/32 inch steps or 9/16 to 1 inch in 1/16 inch steps.
- Special combination sets and individual sizes available.
- Different materials available.





# OPUS DIMENSIONAL CALIBRATION SERVICE

## Dedicated to Accuracy and Precision

Opus has one of the largest (162m<sup>2</sup>), best equipped UKAS Accredited Calibration Laboratories in the UK.

It is temperature controlled at 20° ±1°C and locally for some specialised measurements at ± 0.5°C. The laboratory has a comprehensive range of dimensional accreditation ranging from measurement of gauge blocks using the wavelength of light to the calibration of 150mm steel rules.

Please visit our website to view our comprehensive UKAS Accreditation Schedule.

### Service

Opus offers two types of service:

- A Laboratory-based Calibration service at Corby for portable measuring instruments.
- An On-Site Calibration service for larger instruments including Surface Plates, Surface Tables, Profile Projectors and other large items.

Additionally, to avoid being without instruments for extended periods of time, we also offer a "Pre Booking Service" for both Laboratory based and On-Site Calibration which reserves a calibration slot in our schedule.

Please contact us for further details of our "Pre-Booking Service"

### Best Measurement Capability

The utilisation of specialised equipment enables Opus to provide some of the best measurement capabilities in the UK.

### Measurement by Interferometry

This method of measurement is reserved for high quality master gauge blocks and uses the wavelength of light emitted from HeNe Lasers, which are calibrated by NPL, to determine the length of the gauge blocks.

Opus's best measurement capability for this method is 30 nanometres (nm) for gauge blocks up to 10mm nominal length.

### Measurement of Long Gauge Blocks and Length Bars

We measure both Long Gauge Blocks and Length Bars utilising a 4 metre long SIP Horizontal Measuring Machine incorporating a twin path Renishaw Laser which is accredited for lengths up to 2 metres.

The design of the laser system, combined with localised temperature control and carefully developed procedures enables Opus to achieve one of the best uncertainties of measurement in the UK.

Uncertainty  $0.2 + (1 \times L) \times 10^{-6} \text{m}$  where L is the length in metres.

### Measurement of Angle Gauges and Polygons

Opus uses a high precision Moore 1440 Indexing Table to measure angle gauges and polygons combined with an Autocollimator. The indexing table has a specified accuracy of ± 0.1 second of arc, which enables Opus to quote an uncertainty of measurement of 1 second of arc.



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The range of items that Opus's UKAS accreditation covers extends to more than 60 items and includes those listed below.

- ✓ Gauge blocks by comparison and interferometry
- ✓ Angle Gauges
- ✓ Polygons
- ✓ Length bars
- ✓ Long Gauge Blocks up to 2000mm
- ✓ Precision linear scales and graticules
- ✓ Micrometers
- ✓ Calipers
- ✓ Screw gauges, rings, plugs, plain and taper
- ✓ Comparators
- ✓ Steel rules
- ✓ Toolmakers' Microscopes
- ✓ Profile Projectors
- ✓ Height Gauges
- ✓ Bore Micrometers

### On-Site Calibration:

- ✓ Surface Plates
- ✓ Surface Tables
- ✓ Profile Projectors

## Opus Precision Flat Lapping Service

The Opus Precision Flat Lapping Service can be applied to a wide range of materials and our expertise and skills in flat lapping are applied to a diverse range of components for the Oil & Gas, Aerospace, Printing, Automotive, Medical and Electronic industries.



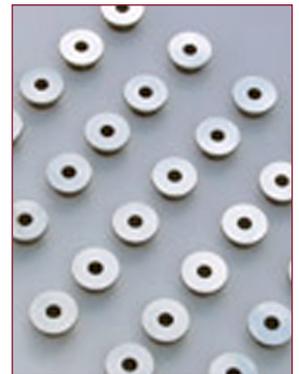
Flat Lapping is ideal for close tolerance work. Opus can work to a flatness and parallelism tolerance of  $0.05 \mu\text{m}$  and thickness to  $\pm 0.05 \mu\text{m}$  (size, shape and material dependant).

Whilst most materials can be lapped, Opus has particular experience with all types of steel (including stainless), tungsten carbide, various ceramics (including PZT), copper, aluminium and titanium. A range of finishes can also be produced ranging from highly reflective, mirror like finishes to satin and matt finishes depending upon the material.

Flat Lapping projects can be verified in our temperature controlled laboratory.

Our flat lapping service offers highly specialised hand lapping techniques to suit one-off component parts and for large quantity components we offer machine lapping on single sided or double sided lapping machines.

Our extensive range of plant and equipment includes surface grinders, single and double sided lapping machines, Fizeau laser flatness interferometers, Talysurf 10, fibre laser marking machine and a temperature controlled fine lapping department.



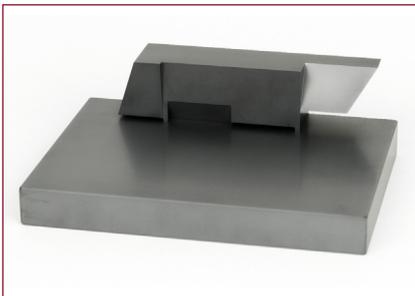
## Opus Special Manufacturing

Opus's Special Manufacturing is based upon the combination of traditional tool making skills with experience gained in reference gauge manufacturing and special lapping skills.

Opus can manufacture and verify gauges, precision fixtures and components to very close tolerances that can seldom be matched by other companies.

Working with one offs or small batches to customer supplied drawings, Opus can help and advise on design and suitability of materials for given applications.

Finished products can be supplied with an in-house calibration / inspection certificate or if appropriate a UKAS Calibration certificate.



# OPUS METROLOGY

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