



METROLOGY FIXTURES
SUB-CONTRACT METROLOGY
MOLDFLOW ANALYSIS

WE'RE VERUS

Our passion is metrology and our focus is on supporting our global clients with a team of experienced design engineers, metrology engineers and toolmakers that partner with you to create robust metrology solutions you can trust.

OUR MISSION

Verus will partner with our clients to deliver, install and support complete turnkey and validated bespoke metrology fixture solutions, anywhere in the world.

OUR CORE VALUES

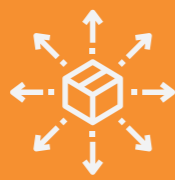
Our Core Values guide our communications, business decisions and working relationships from our service providers, subcontractors, employees and board of directors through to our largest clients.



Partnership



Dedication



Delivery



Curiosity



Responsibility



Management System Certified



MOLDFLOW ANALYSIS

FILL, PACK & WARP

Flow analysis includes the filling and packing stages of the injection moulding process.

Warpage results can be used to identify areas of excessive warpage and shrinkage, referencing product drawings and tolerances, it is possible to take point to point measurements from the analysis results to ensure the critical dimensions will be within tolerance after moulding.

- Fill time: velocity profiles and shot size (machine specific)
- Freeze time: time to freeze the runner, gate and part
- Pack time & pressure: packing phase profiles (machine specific)
- Venting requirements
- Weld line locations
- Volumetric shrinkage: shrinkage values for various part geometries
- Shear rate: shear rates generated during filling and packing
- Pressure at V/P change over
- Injection pressure: pressure rates experienced during filling and packing

COOLING

Cooling analysis is used to evaluate and optimise cooling lane design. Working in partnership with the mould tool designer, multiple cooling designs can be analysed. This is critical to the overall process as cooling design will have an effect on part filling, freeze times, warpage and the overall cycle time.

- Variation in coolant temperature
- Flow rate in each cooling circuit
- Reynolds number in each cooling circuit
- Pressure drop along each cooling circuit
- Surface temperature distribution: top and bottom sides of inserts and parting planes
- Distribution of average plastic temperature at ejection time
- Distribution of maximum plastic temperature at ejection time
- Cavity surface temperature distribution
- Insert temperatures

CORE DEFLECTION & TWIN SHOT MOULDING

Core shift is a frequent problem with long, slender, and not necessarily thin-walled products, such as vials, test tubes, pen barrels. It is often experienced in moulds for thin-walled containers.

- Core deflection
- Final core shift
- Stress in the core
- Re-melt zones
- Pre-mould temperature during over moulding
- Insert over moulding
- Warpage of the overmoulded assembly

Reports and results can be tailored to specific requests for part troubleshooting.

SUB-CONTRACT METROLOGY

DIMENSIONAL INSPECTION

Verus Metrology Partners provides a tailored subcontract inspection service that offers you access to the experience, expert knowledge and technology of the Verus metrology team.

With experience across a wide range of sectors, we partner with both multinational and indigenous clients involved in: medical device, pharmaceutical, consumer products, electronic, aerospace and automotive sectors.

Our aim is to offer the fastest possible turnaround while maintaining the highest level of quality, independent metrology services.

- Initial sample inspection reports (ISIR)
- Tool validation metrology
- Multi cavity inspection reports
- Reverse engineering
- Cavity verification / cad to part deviation
- Gauge R&R
- Inspection program creation
- Measurement procedure creation
- On site metrology support
- Approved latest technical drawing showing the dimensions for inspection
- An approved method of inspection and calibration
- A fully detailed certificate of calibration
- Retained raw data from the inspection process
- A bespoke calibration management software with access for each client and a Data base of all certificates and methods of calibration.

We also calibrate and certify a wide variation of standard gauges including;

- Go no-go gauges
- Plug gauges
- Pin Gauges
- In-production checking gauges.

VALIDATION METROLOGY SERVICE

We understand that the validation process takes a lot of time and resources to work through and can interrupt day to day production verification metrology. To help speed up this vital process and get components into production ahead of project deadlines, Verus will partner with our clients to provide a fast and efficient full dimensional validation service using our Bespoke Metrology fixtures and our extensive range of inhouse metrology equipment and software's. Verus can offer this validation service on equivalent metrology machines to our clients which guarantees confidence in the metrology data.

In addition, we can also install a client Metrology machine at one of our Metrology laboratories, run all validation metrology on the machines with our Bespoke Metrology fixtures and ship the Metrology machine, programmes and fixtures to the client site for installation and qualification ahead of the commencement of production metrology inspection.

- Full validation metrology service
- Equivalency testing
- Equivalent metrology machines and software
- Full Programmes provided
- Delivery of metrology machine, bespoke fixtures and programmes
- Accredited services

METROLOGY EQUIPMENT

Verus Metrology Partners has a wide variety of Inspection Machines at our disposal. All CMMs and Vision Systems are placed in a 24 hour monitored temperature controlled environment. Our diversity of machine types and capacity allows us to offer a tailored solution to all our Clients. All our CMMs and Vision systems are serviced and calibrated each year and are fully traceable to international standards.

We also run all the latest versions of control software which allows us to program the machines and transfer the programs to Client machines if required.

All our Inspection CMMs and Vision System Metrology Engineers are fully trained and certified by the OEMs and through our in house training and development programme.

All our Metrology Engineers complete the following Base Line Training:

- In house training and evaluation
- OEM training and Certification – Basic and Advanced CMM and Vision System training
- Statistical Process Control, SPC using Minitab
- Geometric Dimensioning and Tolerancing or GD&T.

Our commitment to both our employees and our clients drives us to be always at the forefront of Metrology and Inspection technologies and this is reflected in constant investments in new equipment, software and training.

Our current contact and non-contact inspection equipment systems are:

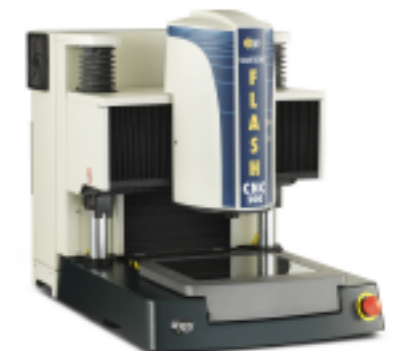
- 2X OGP CNC 500 Vision Systems (Software Measure Mind 3D Version 15.2.27)
- 1X OGP Zip 450 Vision System (Software Measure Mind 3D Version 15.2.27)
- 2X OGP Flash 200 Vision System (Software Measure Mind 3D Version 15.2.27)
- 2X Hexagon Global Silver 7-10-5 Coordinate Measurement Machines (PC-DMIS CAD 2014.1)
- 1X Mitutoyo Coordinate Measurement Machine (MCOSMOS 3.2 and 4.0)
- 1X IMS Impact 1000 Coordinate Measurement Machine (Virtual DMIS Version 7.1)
- 2X IMS Impact 600 Coordinate Measurement Machine (Virtual DMIS Version 7.1)



OGP CNC 500 Vision System



Hexagon Global



OGP Flash 200 Vision System

METROLOGY FIXTURES

METROLOGY FIXTURE DESIGN | CMM & VISION FIXTURES

Through our metrology workshops at the very beginning of your new project, the Verus Metrology Partners design team will work with you and our metrology Engineers, to develop initial concepts and single station prototypes along with extensive and detailed project schedules. This process ensures a fast design and development cycle and an optimised final Inspection fixture solution.

Our Design team specialise in bespoke Metrology Inspection Fixtures for CMM and Vision systems and also Hybrid Inspection Fixtures for use on Vision System CMMs with touch trigger capability. The Metrology Fixture can range from single station to large repeat multi-station solutions.

Our Fixtures are designed to reduce operator interaction and to allow the maximum number of measurements to be taken with the minimum number of setups. In most cases we can develop a single fixture that will allow all dimensions to be taken on any component.

We develop the concept design into final high cavitation multi-station fixtures with full 2D technical drawing and 3D models for client approval and manufacture.

- Digital concepts
- 2D manufacturing drawings
- 3D model assemblies
- Single station prototype development
- Bespoke Multi station / hybrid metrology inspection fixtures design and manufactured
- Detailed Project schedules updated and communicated weekly to clients
- Designed by metrology engineers for metrology engineers

INSPECTION FIXTURE MANUFACTURE | CMM FIXTURES

As toolmakers we pride ourselves on the quality, precision, functionality and finish of the Metrology inspection Fixtures we supply.

To ensure the fastest turn around and maximum capacity we maintain a high quality audited manufacturing centre and an innovative mutually respected process of continual improvement.

This process results in the highest quality of manufacture and metrology fixture solutions that are second to none in the market.

Utilizing a full spectrum we have capacity and capabilities to manufacture the largest multi-station Metrology fixtures to highly complex single station inspection solutions for large or small components.

- Highest Quality of Manufacture
- Innovative and responsive
- Large capacity and wide range of capabilities
- Fast turnaround times

METROLOGY FIXTURE QUALIFICATION

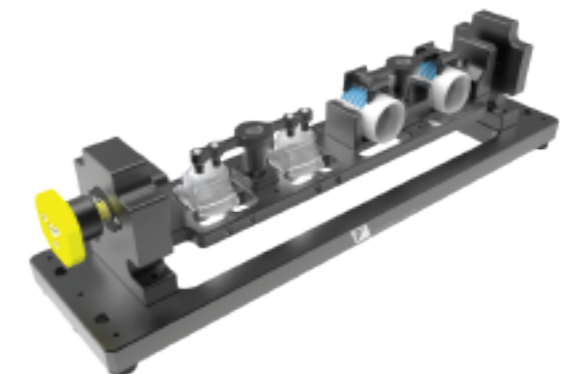
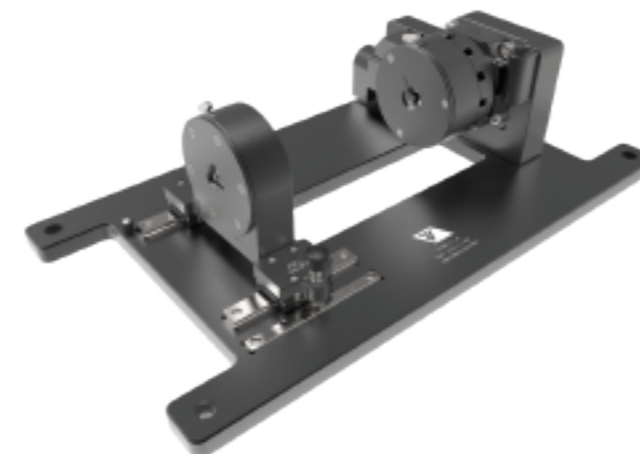
We strongly believe in delivering a Metrology Inspection fixture that will perform and function to the highest standards. To support this, we perform gauge R+R on all the Metrology Inspection fixtures we provide.

Once the gauge R+R has been completed, the results are loaded in to our statistical software package. Only once it has passed our strict criteria is the Metrology fixture released for delivery.

Along with the gauge R+R report, our fixtures can be shipped with a program ready to be loaded to your CMM or Vision system metrology machine. Onsite support can also be provided for installation and Qualification.

Tests and validations of the program can be completed and sent to you before shipping to ensure no delay in the Inspection fixture deployment.

- Gauge R+R carried out on all Bespoke Metrology Inspection Fixtures
- CMM and Vision system programs provided
- Onsite installation and qualification
- Ongoing support maintenance



VIP
(Verus Integrated Process)

THE VERUS INTEGRATED PROCESS

The Verus Integrated Process, or VIP as we call it, is our new pioneering integrated service that combines the power of our:

- World-leading bespoke Fixture Designs
- Autodesk Moldflow Technology
- Off-line metrology CMM software
- 3D printing technologies

It's often the case that Fixture Design, Metrology, Moldflow and 3D printing are treated as four separate processes with their own specific goals. Not at Verus Precision as we incorporate all these technologies, capabilities and experience and apply them to all our Metrology Fixture designs.

We believe that by integrating these services we offer our customers the best of not one, but four worlds. It's a holistic approach and it benefits our clients as it allows their as-moulded component to be assembled into our fixture designs and programmed off-line; then they can see a full metrology ISIR report before a physical moulded part has been created, and all in a virtual environment.

Typically, when plastic parts come off the line, a lot of troubleshooting and testing takes place. While it's a vital part of the process, it has the potential to slow down production thus causing delays. Furthermore, these delays can be costly as they can have a serious knock-on effect on budgets and timelines.

As VIP catches issues before a part has been created, you can be confident that when the plastic part comes off the line, it will be as good as it possibly can be. We can eliminate the most common issues that can occur and by doing so, validation and production will run smoother and there will be no expensive delays.

There are no, subcontract Metrology organisations in the world that can integrate the power of Moldflow technology and off-line CMM programming, into the creation of their Metrology Fixture Design process.

That's it – however we have left out a few vital parts of the process, as we can't reveal all our secrets!

HERE'S HOW IT WORKS

1. It begins with your nominal 3D component model. We import it into our Autodesk Moldflow Insight software and then we begin the virtual moulding process using Autodesk Moldflow software.
2. After extensive process optimisation, the as-moulded 3D model is exported from Moldflow. We can pick up on any moulding problems, such as filling issues, excessive warpage or shrinkage, exactly as the de-moulded physical part would be. Validation experiments can also be analysed and nominal processing windows established.
3. These 3D models are then imported into off-line Metrology software. It's the same software that drives our CMMs, but it's not connected to a metrology machine. The software can be programmed and run in a virtual environment as if the physical machine and the component were present. A full range of reports can be outputted, including an ISIR report referencing all the drawing GD+T.
4. With this as-moulded 3D model to hand, we can use it to confirm our holding techniques on the fixture design in the 3D assembly and our clients can use it for device assembly and gap analysis. The model can also be used for physical testing of our fixtures and downstream assembly lines, by utilizing our 3D printing technology.
5. Finally the as-moulded model can also be reversed and a model which is now compensated for warpage deflections and shrinkage can be exported and used in the tool design process to cut steel, saving weeks of steel recuts and processing.

