

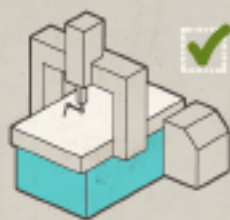


THE VERUS ULTIMATUM

The Metrology Fixture Guide



A.



MEASUREMENT
MACHINE £60,000

B.



COMPONENTS/
SAMPLES
10,000 PER ANNUM

C. 



FIXTURE
STATIONERS. £2.99



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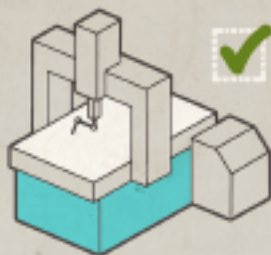
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An **Ultimatum** is a circumstance –

“In which a person or group of people are warned about potentially unpleasant consequences”.



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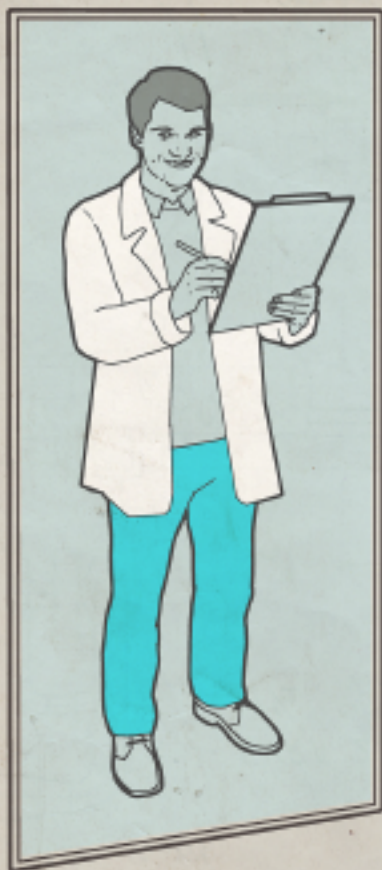
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HELLO
HANDSOME!



0.01 - INTRODUCTION

Preparing for a new moulding project presents many challenges and one such challenge, the **metrology** and **metrology fixtures**, is often the cause of delays, loss of income and frustration.

Upfront preparation and having as much information about how your component will perform during metrology and selecting the **right metrology fixture vendor**, is essential to your project's success.

By utilizing and integrating **metrology fixtures**, **Moldflow analysis** and **off line metrology processes**, you can ensure metrology results are **repeatable** and the metrology process is **efficient**. You can gain an in-depth knowledge of how your components will measure and perform months in advance of your first shots from the injection mould.

The **Ultimatum** describes **Metrology Fixture Design** best practice; it will help guide you and help you avoid those unpleasant consequences.

“When it comes to a new innovative challenge, we listen to our clients, we consider, we evaluate and we plan carefully. That's part of what makes us the best at what we do.”

Michael Nugent
Technical Director, Verus

BESPOKE
FIXTURE DESIGN

AUTODESK
MOLDFLOW

METROLOGY SOFTWARE/
3D PRINTING

0.02 – AN INTEGRATED PROCESS

Our pioneering integrated process that combines the power of world-leading bespoke **Fixture Designs**, **Autodesk Moldflow™ Technology**, **off-line metrology CMM software** and our **3D printing technologies**.

It's a holistic approach and it benefits clients as it allows them to see the as-moulded component assembled into **metrology fixture designs**.

This approach allows for off-line programming and a **full metrology ISIR report** before a physical moulded part has been created and all in a virtual environment.

These are the steps:

1. **Design Qualification (DQ)** with the client at concept stage, presenting 3D draft model concept and initial Moldflow analysis report.
2. Using client feedback from the DQ meeting the Fixture design is **refined** and **finalised**.
3. **Final design** is presented to the client along with full off-line metrology report which may highlight component dimensional features that are out of drawing specification tolerance.
4. The finalised **3D** and **2D engineering drawings** are created and issued for **manufacture**.
5. Fixture components are machined in a **fully managed** and **controlled process** with oversight and transparency checks and balances throughout.
6. The fixture is assembled and **Gauge R&R tested** to ensure full capability to client specifications.
7. Metrology fixture is **shipped** to the client and when requested, installed by a fully qualified and experienced Metrology Application Engineer.

There are NO other Metrology companies in the world that integrate the power of Moldflow technology into the creation of their fixtures.

USE THE EXPERTS....



....OR TAKE YOUR CHANCES.

0.03 - YOUR VERUS TEAM

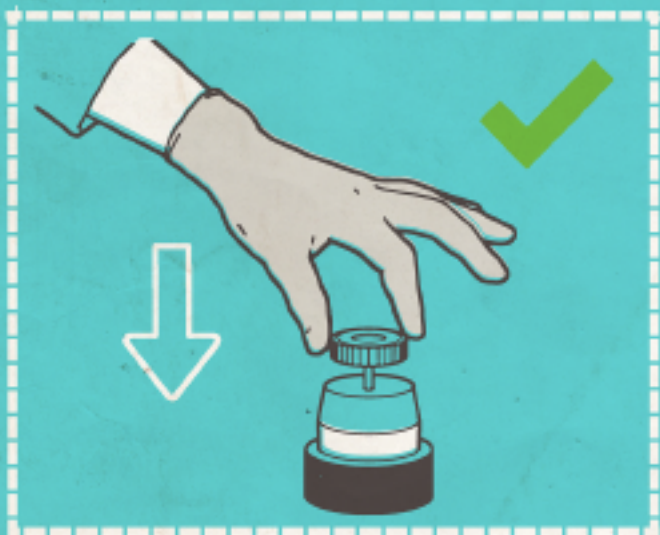
Where ethos and experience collide.

Experienced, passionate and dedicated, this is the team:

1. Metrology Engineers
2. Mechanical Design Engineers
3. Toolmakers and Precision Engineers
4. Plastics Injection moulding Engineers
5. Quality Management Engineers
6. Sales, our Engineers talk to your Engineers, everyone is Sales
7. Most important of all, the Accounts Managers

“At our core, we are skilled trade’s people. We are passionate about our work and take pride in the solutions we deliver”

Steve Mousley
Metrology Engineer, Verus UK



0.04 - FIXTURE DESIGN

Metrology Fixture Design creates a tailored product for a specific client. Like any other industrial design product, it has to be user-centred, intuitive and stand the test of time.

This is what it takes to produce a world leading Metrology Fixture:

1. **Design.** Our Fixture designers work as a team. The checks and balances that we have in place ensure that our Fixture Designers keep to the brief and deliver the product on time.
2. **Materials.** Our designs incorporate the best materials for the application. For example, we use Peek, a highly durable polymer material to hold the parts in our fixtures; with our fixtures, you can feel the difference.
3. **Durability.** Our fixtures last. Typically, they outlive the parts which they are designed to hold. While our fixtures may be more expensive than other companies, we're there for the full-product life cycle.
4. **Guarantee.** If something were to happen to one of our fixtures, we won't abandon it, or the client. We'll arrive on-site and fix it.
5. **Variety.** We've made fixtures which vary in size and complexity from one station to 256 stations.

“We absolutely won't fix the mistakes of others, we create new solutions.”

Sean Murphy
Fixture Design Team Lead, Verus

FIG. 1



FIG. 2



0.05 - METROLOGY

What's fascinating about **Metrology** is that no two jobs are alike. This brings a tremendous sense of satisfaction to us as each job has its own challenges and issues.

Here's how it's done:

1. **Experience.** We have highly experienced staff handpicked from a broad background of relevant skill sets in Metrology, Fixture Design, Moldflow and Toolmaking.
2. **Machinery.** In the same way we've invested in human resources, we are continually investing in machinery and technology to accommodate clients' needs.
3. **Training.** Our Metrology Engineers are sent on formal courses. We don't pick up knowledge secondhand, but only from the original manufacturers. This eliminates bad habits and unleashes the full potential of the latest technologies.
4. **Environment.** To ensure that the integrity of a product is not affected by climate, our lab is a temperature-controlled clean environment.
5. **Quality.** We are accredited and compliant to international quality standards.

We're not shy.

We'll ask, we will interrogate and we will advise.

“When we are working for a client, we represent the client, so if we see something going out of spec we stop and let the client know. What's the point in measuring hundreds of samples, when it's obvious from the start of the metrology process something isn't right.”

Hazel Rooney
Metrology Manager, Verus

OPTION - A



OPTION - B



0.06 - AUTODESK MOLDFLOW ANALYSIS

What if you could test your parts in advance of production? What if you could have a glimpse how your part will perform once off the line? **Moldflow analysis is the answer.**

The following is our Moldflow Expert Certified Process:

1. **Model.** It begins with your nominal 3D component model. We import it and then we begin the virtual moulding process.
2. **Optimisation.** The as-moulded 3D model is exported from Moldflow. We pick up on any moulding problems exactly as the de-moulded physical part would be.
3. **Metrology.** The as-moulded 3D models are then imported into off-line Metrology software. A full range of reports can be outputted, including an ISIR report referencing all the drawing's GD+T.
4. **Confirmation.** The as-moulded model is used to confirm the fixture design in the 3D assembly - our clients can use it for device assembly and gap analysis. The model can also be used for physical testing of fixtures and assembly lines using our 3D printing technology.

With a **Moldflow** report to hand you can refine your product at the design stage leading to savings throughout the entire injection-moulding production-cycle.

This Process reduces the postproduction “**trial and error**” testing, bringing your product to market faster, more affordably and with reduced risk.

“ You'll see your component and metrology fixture before it's been born.
We call it, **Back to the Fixture.** ”

Mark Devanney
Design Engineer, Verus

VALIDATION
CHECK



0.07 - VALIDATION

Metrology fixtures are not delivered to clients without going through a rigorous **Validation** process. It allows us to stand over our products.

Here's the Validation Process:

1. **Scrutiny**. We perform a full visual inspection.
2. **Function**. Load and unload testing is carried out ensuring consistency without compromising the integrity of the component.
3. **Gauge R&R**. A type 1 Gauge R&R is performed on all metrology fixtures. We aim for all fixtures to achieve less than 10% percentage tolerance.
4. **Report**. A full Minitab Gauge R&R report is approved and issued to the client.

Our testing procedures will comply with any client verification requirements.

“Why would you supply a fixture to a client that hasn't been validated?”

Nuala Baker
Design Engineer, Verus

VERUS

OTHER



ABS
FLIGHT CASE



DELIVERY



ENGINEER
INSTALLATION



DAMAGED
FIXTURE



LIFE CYCLE
SUPPORT



BIN



0.08 - DELIVERY, INSTALLATION & SUPPORT

We care about Our **Metrology Fixtures**, how they arrive and how they are used.

Our Post Validation includes:

1. All Metrology Fixtures are shipped in **reinforced ABS** flight cases.
2. When requested, an Applications Engineer will **support installation** qualification (IQ).
3. We continue to support the client throughout the **life cycle** of the Metrology Fixture.

We're a flexible and highly agile company, which places a huge emphasis on client support.

If a client calls with an issue, we'll respond quickly.

“It's like some of our clients have a Bat Phone to Verus. We are considered part of their organisation, not just a supplier, but a true partner.”

Jon Banner
General Manager, Verus UK

CUSTOMER



SERVICE

EFFICIENCY

RELIABILITY

QUALITY



0.09 - THE VERUS WAY... AND THE OTHER WAY














It all starts with your project, your needs and your objectives and it ends with your success.

Listening to and understanding your requirements is what sets us apart.

The Verus Ultimatum describes best practice.

Can your organisation afford to ignore the consequences?

BONUS 001 - GD&T MOST USED SYMBOLS

Symbols	Characteristics	Features and Tolerances	
	Straightness	Form Tolerances	Single Features
	Flatness		
	Circularity		
	Cylindricity		
	Profile of Surface		Single or Related Features
	Profile of Line		
	Perpendicularity	Orientation Tolerances	Related Features
	Angularity		
	Parallelism		
	Position	Location Tolerances	
	Concentricity & Coaxiality		
	Symmetry		
	Circular Runout	Run-out Tolerances	
	Total Runout		

BONUS 002 - PLASTIC MOULD SHRINKAGE

Materials	Mould Shrinkage
ABS	0.6
ABS/PC ALLOY	0.7
ACETAL	1.8
ACRYLIC	0.6
CAB	0.5
HDPE	3
LDPE	3
NYLON 6	1.2
NYLON 6 (30% GF)	0.4
NYLON 6/6	1.5
NYLON 6/6 (33% GF)	0.5
NYLON 11	1
NYLON 12	1.4
PEEK	1.1
POLYCARBONATE	0.6
POLYESTER PBT	2
PET (SEMI CRYSTALLINE)	0.4
PET (AMORPHOUS)	0.4
POLYPROPYLENE (COPOLYMER)	2
POLYPROPYLENE (HOMOPOLYMER)	1.5
POLYPROPYLENE (30% TALC FILLED)	1
POLYPROPYLENE (30% GF)	0.5
POLYSTYRENE	0.5
POLYSTYRENE (30% GF)	0.1
PVC P	1.5
PVC U	0.4
SAN	0.6
SAN (30% GF)	0.1
TPE	2.5





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A good reputation is the key to success for an organisation of any size.

Andrew Hodson

Managing Director, Verus

To find out more about how Verus Precision can help your organisation log on to www.verusmetrology.com or email us at info@verusmetrology.com