Business Technology Centre Hub
Breakfast Briefings
LIMA Group (Laboratory for Integrated Metrology Applications)

Established in 2009 LIMA is an independent centre of excellence for collaborative research and development of innovative metrology enabled applications.

Integrating fundamental research with industrial applications to develop new technologies

Delivered through lab-based and mobile capabilities representing investment of £3.5m
LIMA Group Structure

LIMA Group disseminates research via industry consulting and support to the SME and OEM sectors of manufacturing.

University of Bath
LIMA Group
Chair: Paul Maropoulos

Research
Technology Readiness Level
1 - 4

Consultancy
Technology Readiness Level
4 - 9

Business Technology Centre
Technology Readiness Level
5 - 9

Metrology Assisted Assembly Hub
Large Volume Manufacturing Assembly
Research Collaborations and Projects
Industry Consulting Projects
Original Equipment Manufacturers Projects
SME Development
Technology Readiness Levels
BTC Support in the South West

- Over 230 companies have benefitted from LIMA BTC support
- Valuable network, WEAF, MAS, NPL, SIG
- Predicted GVA growth in excess of £4M
- Over £500k of previous investment in technology now back in use, including calibration equipment and machine tool probes
What is the LIMA BTC Hub?

The BTC Hub, a membership service designed for manufacturing companies requiring on-going support in the following areas:

- Process control best practice and advice
- Measurement and process verification health check
- Support for verification aspects of SC21, NADCAP and other accreditation programmes
- Machine tool verification
- Machine tool calibration (regular maintenance programme)
- Measurement services & process capability improvement
Services – LIMA BTC HUB

A specific list of services are available via the Hub. These are listed below. All services will be delivered at company premises.

• Process control best practice and advice
• Measurement and process verification health check
• Support for verification aspects of SC21, NADCAP, AS9100 and other accreditation programmes
• Machine tool verification (regular maintenance programme)
• Machine tool calibration
• Measurement services
• Reverse Engineering services
Machine tool verification

### Table: Machine Tool Verification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
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<tr>
<td>Measurement</td>
<td>1.2m</td>
<td>2.3m</td>
<td>3.4m</td>
<td>4.5m</td>
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<tr>
<td>Accuracy</td>
<td>0.1mm</td>
<td>0.2mm</td>
<td>0.3mm</td>
<td>0.4mm</td>
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<td>Resolution</td>
<td>0.01mm</td>
<td>0.02mm</td>
<td>0.03mm</td>
<td>0.04mm</td>
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</tbody>
</table>

### Diagram: Machine Tool Verification

- Icon of machine tool verification
- Graphical representation of verification parameters

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[Logo: LIMA]

Laboratory for Integrated Metrology Applications
Machine tool calibration

- Various measurement equipment to test to standards
- Ballbar ISO 230-4
- Laser ISO 230-2 / VDI 3441 / ASME etc.
Measurement Health check

A structured process improvement tool which enables you to improve your product verification capability focusing on the appropriate use of measurement across your manufacturing operations.

Key review areas:

• Measurement fundamentals and foundations
• Measurement and process setting
• In-process control and verification
• Post process and part verification
Reverse Engineering

Scanning and Point Cloud Acquisition

Surface data processing into polygons through to CAD Model
Product Verification

- Component/Assembly Measurement Services
Case Studies

Cross Manufacturing, Bath: Produces high precision brush seals for gas and steam turbines

• Measurement difficulties with tight radius and chamfer features. Variability of results. Low confidence in data.

• LIMA investigated the design specification and conducted a technology review of verification hardware and methods.

• A trial of a GapGun system was conducted with excellent results.

• Impact: - Reduced uncertainty of feature measurement
  - Reduced verification time
Case Studies

Helander are a manufacturer of components for aerospace, defence, nuclear and oil and gas industries and are based in Tewkesbury.

The BTC introduce them to a higher level of machine tool verification, allowing them to implement a machine tool verification regime to benefit their maintenance, quality and production teams.

“Already we have seen increased machine uptime and a decrease in the cost of production.”

“The feedback from our customers has been positive to updating our quality systems. Rolls-Royce supply approval and the SC21 accreditation journey has been greatly enhanced with the LIMA project.”

Martin Speight – Helander Manufacturing Manager
Case Studies

Process verification and control is more important than part verification

A process can’t be controlled unless the performance of that process has been quantified.

Metrology and data acquisition techniques need to be understood and applied, rather than relying solely on general manufacturing principles.

The LIMA BTC has worked with over 230 companies, helping them to improve their understanding of metrology and how to apply it to their manufacturing processes as part of a right first time philosophy.
What are the costs and benefits?

Membership is divided into 3 categories depending on the support level required.

- 1 day service provision = £650 annual membership
- 2 day service provision = £1200 annual membership
- 3 day service provision = £1650 annual membership

Hub benefits
- Discounted rate for services, delivered at your site
- No hidden costs: one fee, all inclusive
- All services aimed at improving your bottom line
- Responsive service delivery to your timetable
- Rapid telephone & e-mail support package
- Access to verification and process control methods fine-tuned through working with a large number of companies
LIMA BTC - Summary

- Centre of Excellence
- Design for Manufacture, Metrology, Process Control
- Hands on Technical Services
- Open to anyone
Quickmach Engineering Pressings Ltd

Dave Marfell – Director
Company information

- Founded in 2002
- 2012 bought 18,000 sq ft detached factory
- Employs 21 people turnover £2.5million
- Automated CMM
- Full Cad / Cam
- 5 CNC Mills
- 4 CNC Lathes
- Range of manual tool room machines
- 9 Various power press tools
Industries served

- Aerospace tooling
- Automotive
- Oil Industry
- Castings
- Building Products (Window and Door)
- Sub Contract Machining, Jigs and fixtures
Examples of parts produced
Quality

• Approvals to **ISO 9001** (2008) standard
• Management system full traceability
• S.P.C. controls
• P.P.A.P. documentation supplied
• First Article Inspection Reports
• Developing AS9100 and first stage review completed
Preventive QA Initiatives

- SQA Audit Schedule
- Continuous Improvement Teams
- 5S programs throughout company
- Scheduled Maintenance Developments
- Source Verification
Engagement with Lima

- 2 day machine tool verification check
- All machines have been verified, adjusted and capability now known
Further development

Health check review

• 2 day review of how we approach the whole measurement cycle identified improvements to be made in the following areas
  • Contract review
  • Process control documentation
  • Use of existing on machine probes
  • Dynamic measurement data collection and action
  • In-house machine tool verification checks
Contract review

Process improved to include

• More robust checks for the cost of measurement
• Measurement plan generation – Quality schedules
• PO update confirmation / delivery schedules
• Improved Engineering process review
Process control documentation

- New tool sheets introduced
- New work instructions introduced
- New quality schedules introduced
- Now have controlled repeatable processes
On machine probes

- Increase the use of current inspection equipment
- Automate data collection and reporting
- Automate tool offset updates
In house machine tool verification

• New process developed to verify machines with the use of our CMM
• Can now run on own monthly checks
• Regular external QC20 check each year
Benefit to our business

Our customers now have confidence that our machines, employee’s, quality systems and procedures are all geared up to achieve zero defects, making components right first time to their schedule. Although it is very difficult to give an accurate saving to the company, due to the fact that we are only part way through our planned investment strategy. We believe in the end it will be in the region of £20,000 per year.”
Questions and contact

Dave Marfell – Director – 01594 829111

www.qmepressings.co.uk

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Forest Vale Industrial Estate
Cinderford
Glos
GL14 2YQ
NATEP

Simon Young
Chief Executive

WEAF
NATIONAL AEROSPACE TECHNOLOGY EXPLOITATION PROGRAMME (NATEP)
National Aerospace Technology Programme (NATEP)

Delivered by UK Aerospace supply chain companies
Supported by the UK’s regional aerospace alliances
Programme managed by ADS, the UK national aerospace body
Funded by BIS as part of AMSCI
NATEP - Lifting off with technology

Invest £39.5M in aerospace technology development
- Including £23M government funding

Committed over 3.5 years

To create and safeguard jobs...
- 1,200 jobs through 100 projects

To support technology development throughout the supply chain
NATEP - Overview

£39.5M programme running until March 2017
Phased over five 6-monthly competitive calls

- The collaboration must involve a supply chain partnership and may include HVM Catapult centre (or other academic partner)

- Technology developed must have exploitation potential - with end user involvement - ie TRL4-6

- Grant, usually 50% of spend, ranging from £50k to £150k

- Projects must have potential to create or safeguard jobs

- Intellectual property will be retained by the collaborating partners

- Should have a duration of up to 18 months
Your Opportunity!  Call Dates

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<thead>
<tr>
<th>Key Dates for Programme</th>
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<tbody>
<tr>
<td>Call 2</td>
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<tr>
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<tr>
<td>Call 3</td>
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<tr>
<td>Call 5</td>
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<td>Programme Ends</td>
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Networking Opportunities