Next Steps

- Project outlines to be made available on the website soon:
  http://www.npl.co.uk/characterisation
- Comments / support for projects invited
- Decision conference (Materials MAC WG) 10\textsuperscript{th} November
  - Finalisation of programme contents
Programme Structure
Main Themes

- Structural Materials (SM)
- Surface Engineering and Materials Chemistry (SE)
- Functional Materials (FM)
- Underpinning Materials Metrology (CU)
• **SM06: Modelling plastics materials for design**
  - multiaxial creep model coded into an FE package
  - validation of model for complex stress/strain history
  - case study demonstrating use of the model
  - new measurement method and enhanced understanding of failure mechanisms for small structures
Proposed Projects
Plastics Characterisation

- **FM08: Measurement of Naturalness**
  - New/improved instrument for measuring human-surfaces interaction
  - Good practice guidance on characterisation of the feel of surfaces
  - Characterisation of thermophysical properties of materials relevant to 'feel'
• **SM10: Characterising Interfaces in Continuous and Dispersed Materials Systems**
  - Measurement techniques for stress transfer
  - Investigation of particle debonding failure mechanisms
  - Traceable techniques for interphase property characterisation
Proposed Projects
Polymer matrix composites

- **SM07: Validation of Composite Component Design**
  - thick sections – scale up from coupon testing?
  - multi-axial loading – failure modes

- **SM08: Embedded Sensor Metrology for Condition Monitoring**
  - characterising the performance of sensors under different loading modes
  - measuring the effect of sensors on parent materials/structures
  - measuring the durability and reliability of sensor systems under long-term loading

- **SM09: Traceable Measurements to Improve Quality in Composite Materials**
  - measurement of pre-form quality
  - through-thickness cure measurement
  - residual stress in composite sections
Proposed Projects
Polymer matrix composites

• SM09: Traceable Measurements to Improve Quality in Composite Materials
  – measurement of pre-form quality
  – through-thickness cure measurement
  – residual stress in composite sections
What next

• Review the project outlines:

  http://www.npl.co.uk/characterisation

• NPL will an alert email when this is live.

• Comments in support for projects very valuable

• Decision conference (Materials MAC WG) 10th November
  – Finalisation of programme contents
New NMS Style Programmes

Measurements for
Materials Processability 2005/08
manufacturing / fabrication / recycling

Measurements for
Materials Performance 2004/07
service performance / multi-point data
Whole life costs

Measurements for
Materials Characterisation 2006/09
microstructure / initial properties / single-point data
Objectives of DTI Materials Programmes

- to support innovation in the development and use of materials by providing reliable test methods and predictive models;
- to support trade by assisting the development of standards and codes of practice;
- to provide industry with practical guides on engineering and design procedures to assist the development of new products;
- to maximise value for money by ensuring a high level of industrial involvement in the programme and wide dissemination and use of its results, and
- to improve the availability and use in industry of materials technology developed elsewhere.
NMSD Materials Characterisation Programme 2006-2009…
‘Develop measurement methods & models for understanding the properties and characteristics of materials & materials systems’

• the metrology will impact on a material’s function, effectiveness & fitness for purpose
• benefit current & emerging materials producers, existing & potential users, modellers
• knowledge & best practice will be disseminated to users through access to new facilities & expertise, standardised test methods & materials models
• 3 year ~£7M programme starting April 2006

Orientation meeting…
‘to define Programme objectives, scope, structure, priorities and future consultation needs’
Formulation Timetable

NMSD Kick off meeting 16 Feb 05
Programme website - Industrial Advisory Group responses 23 Mar

NMSD Orientation meeting 13 April

Consultation - focus group & IAG meetings Apr - Jul
Continued Web consultation - request industrial support Aug - Sep
Programme outlines sent to MAC WG Oct
MAC WG ‘Decision Conference’ Nov
Formal proposals prepared Dec - Jan 06
Discuss and implement changes required by NMSD Feb
Set up contract Mar
Contract work starts Apr
Types of Projects

• Core Projects.
Generic projects addressing underlying industrial materials measurement challenges. Significant co-funding required.

• Studio Projects.
Focussed projects to solve immediate industrial materials measurement challenges. Require 50% contribution from at least three industrial partners. Generally shorter term projects.

• Underpinning.
The underpinning expertise or tools (e.g. thermal analysis, thermodynamics, modelling, microstructure, mechanical testing, NDE) that NMI’s should be seen as providing, in order to support materials usage by industry to meet commercial, infrastructure and quality of life requirements.
Programme Co-funding

- Industrial co-funding target 40 to 45% of the DTI funding
- The new programme should contain projects capable of attracting similar levels – probably via IAGs
- However it is accepted that leading edge projects may not initially attract as high a level of co-funding.
Project Selection Stages

• Orientation
• Formulation
• Prioritisation

The Final selection is based on a decision conference. The decision criteria to be scored may include:
• Support to innovation
• Economic impact;
• Science;
• Quality of Life;
• Risk
DTI 5 year Programme ‘Creating Wealth from Knowledge - 17 Nov 04

£370M funding for DTI technology strategy 2005 - 2008
• Nanotechnology, advanced composite materials, pervasive computing, imaging technologies, bio-based industrial products & processes, smart materials & renewable energy technologies

Long term vision for innovation
• Delivering sustainable consumption & production through competitive & profitable products & services
• A more secure environment
• Towards a sustainable & productive, modern built environment
• Environmentally friendly transport systems
• Healthcare in an ageing society
• The intelligent world connected
• Energy research & development
VAMAS: Pre-standardisation collaborative work in materials across G8 including EU - Potential Consultative Committee or sub-committee WG on Materials Metrology through BIPM

Standards: BS, CEN, ISO, ASTM, IEEE, ANSI - Convenors and members on over 100 standards bodies

Other National Measurement Institutes with materials focus:
- NIST (USA) Materials Science and Engineering (MSEL) ~200 staff
- BAM (Germany) ~1600 staff and NIMS (Japan) ~400 staff - very wide materials remit not just measurement
- KRISS (Korea) Division of Chemical Metrology and Materials Evaluation ~58 staff
**Industrial Advisory Groups**

**Website survey results**

### Survey Administration

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<td>No of replies</td>
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<td>No of unique organisations</td>
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### Industry requirements

- GPG: 13%
- Test methods: 34%
- Standards: 6%
- Modelling: 4%
- Environmental: 1%
- Data: 15%
- Design: 3%
- New technology: 3%
- Reference material: 3%
- Case study: 13%
- Other: 8%

### Industry Type

- Consultant: 21%
- Education: 15%
- Enduser: 5%
- Process: 6%
- Supplier: 10%
- Designer: 12%
- Fabricator: 10%
- Trade association: 8%
- Manufacturing: 5%
- Other: 6%

### Support from Industry

<table>
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<th>Support from Industry</th>
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NMS Web site
http://www.dti.gov.uk/nms

http://www.npl.co.uk/characterisation
/characterisation.html

Further opportunities to contribute to the survey