

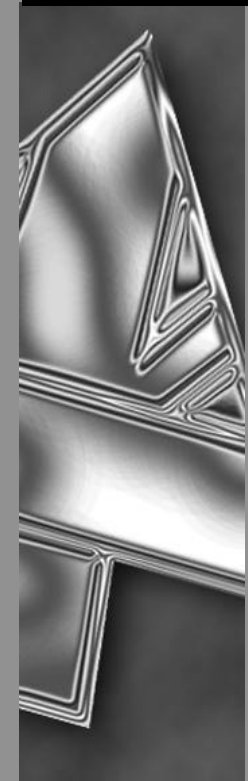
ON THE STANDARDISATION OF OPTICAL STRESS AND STRAIN MEASUREMENT METHODS

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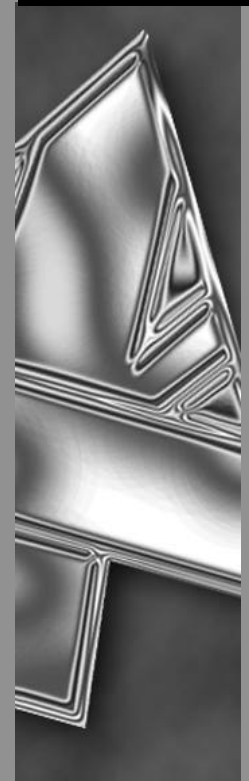
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INTRODUCTION

- Massive expansion in full field optical stress and strain measurement
- Potentially VERY valuable to industry
- Optical non-contact methods readily applied to complex problems
- High measurement and spatial resolution

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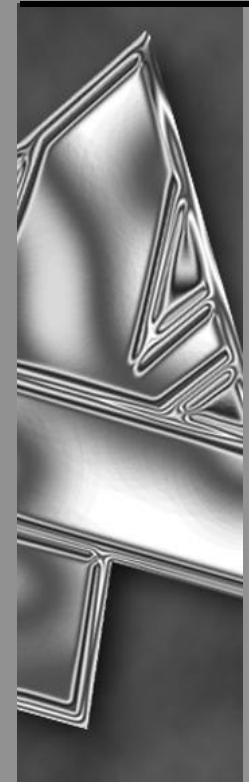
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ANALYSIS STRATEGY

- Combine experimental and numerical methods
- Safest, fastest and most cost effective solution

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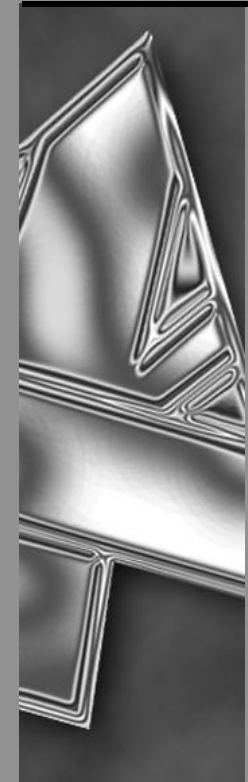
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COMMON AREAS

- Most full field non-contact techniques are based on interference of light
- Measure deformation, strain or stress
- Direct/Indirect measurement

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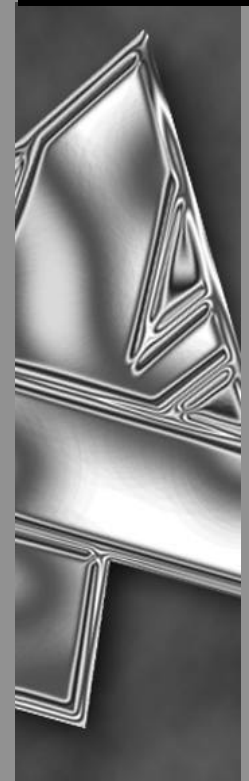
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ACADEMIC/INDUSTRIAL INTEREST

- Large amount of research into optical techniques
- Development in academic and industrial contexts
- Much industrial interest and support

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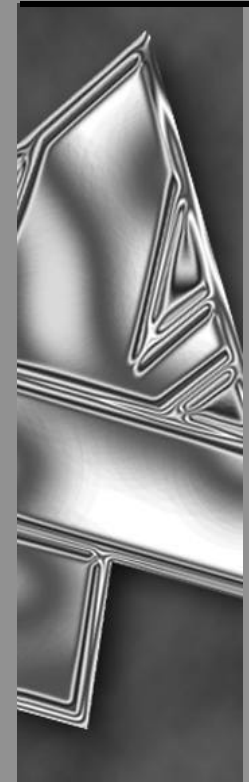
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AIIMS OF VAMAS

- The development of test methods
- The comparison of test results
- The production of reference materials
- The establishment of databases of material properties
- The agreement of nomenclature

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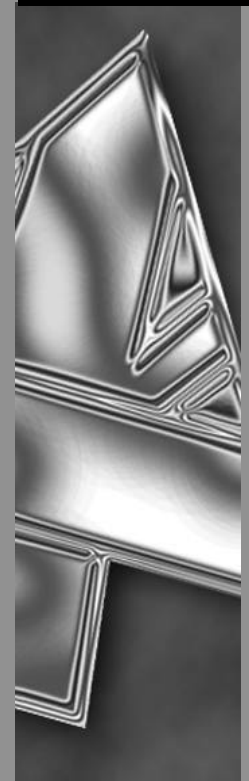
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PRENORMATIVE RESEARCH

- Proposed collaborative grouping under VAMAS
- Generate a new Technical Working Area (TWA)
- International collaboration

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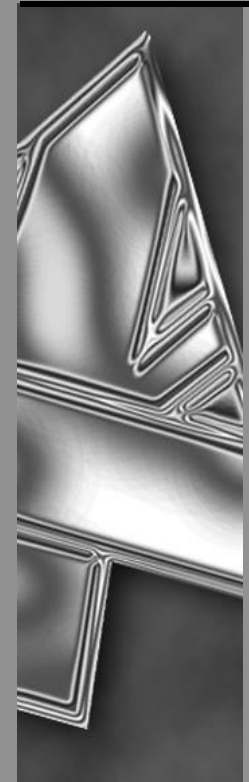
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THE ROUTE TO STANDARDISATION

- Standardisation is an enormous project
- Optical methods share much technology
- Exploitation of this means a more efficient route to standards
- Distribution of labour
- Reduced duplication of effort

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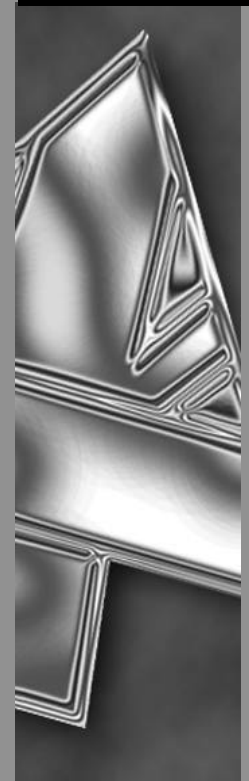
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CURRENT STANDARDS

- No international standards for:
 - Procedures
 - Materials
 - Equipment
- Some acceptance of methods for certification (aerospace)

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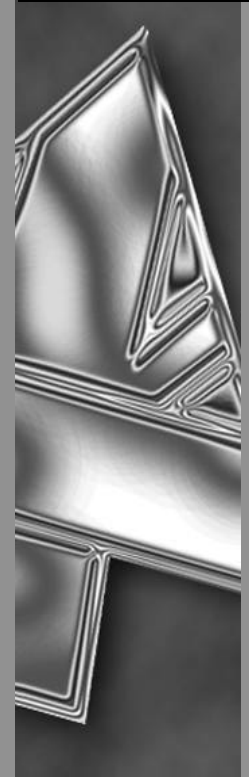
BEST PRACTICE

- Measurements Group
 - Tech notes
 - Tech tips
 - Instruction bulletins(some conformance to standards)

- BSSM
 - Code of practice

Use as a model for setting standards

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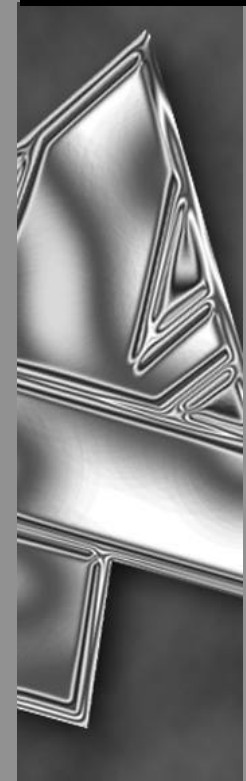
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AIMS

- Some standard practice exists
- Acceptance by standards and certification authorities is fragmented
- Standard methods could enhance:
 - Industrial usage
 - Funding made available for further research
 - Profile of experimental methods

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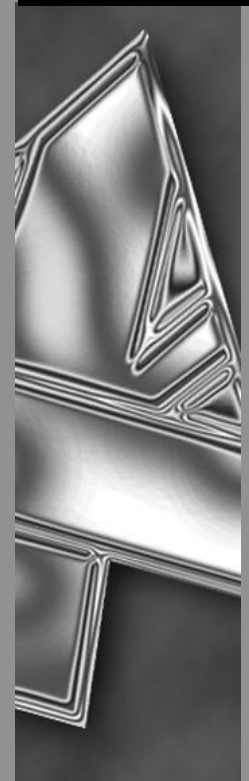
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EQUIPMENT (e.g. cameras/image sensors)

- Detector type (CCD, CID, CMOS)
- Chip size/resolution
- Pixel shape (correction)
- Pixel response characteristics

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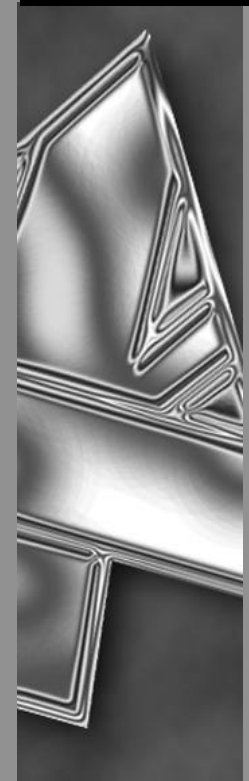
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REFERENCE MATERIALS

- Physical reference materials (polarisers, optics, gratings and coatings)
- Calibration specimens
- Virtual reference materials
 - simulated data
 - simulated noisy data/fringe patterns
 - simulated errors in data sets

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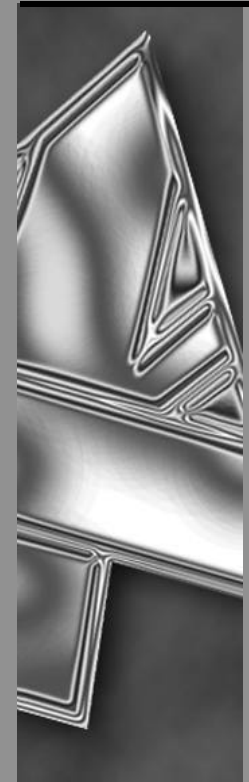
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REFERENCE MATERIALS

- Standards
- Traceability
- Certification (aerospace)

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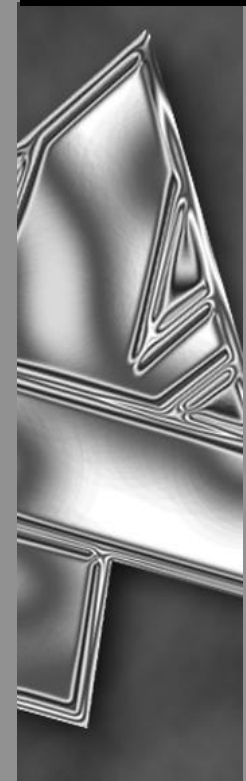
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OPERATIONAL PROCEDURES

- Specimen preparation
- Application of coatings
- Loading; range, strain rate etc
- Ambient conditions
- Alignment of specimens and measurement apparatus

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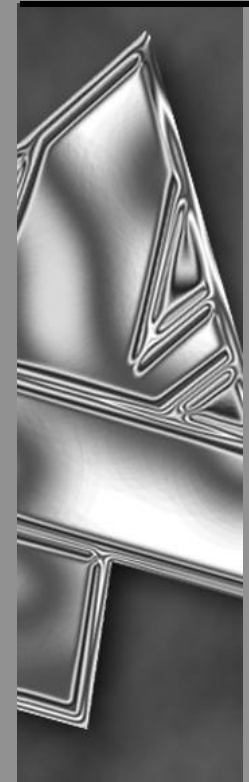
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CONCLUSIONS

- The problem of standardisation exists and needs to be addressed, time is right to tackle the issue now
- Greater collaboration and combination of effort would benefit ESA in general
- Could improve the prospects of ESA to become a more widely used industrial tool

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