



Figure 1. Long Wave InfraRed cooled camera module developed during the FANTOM project

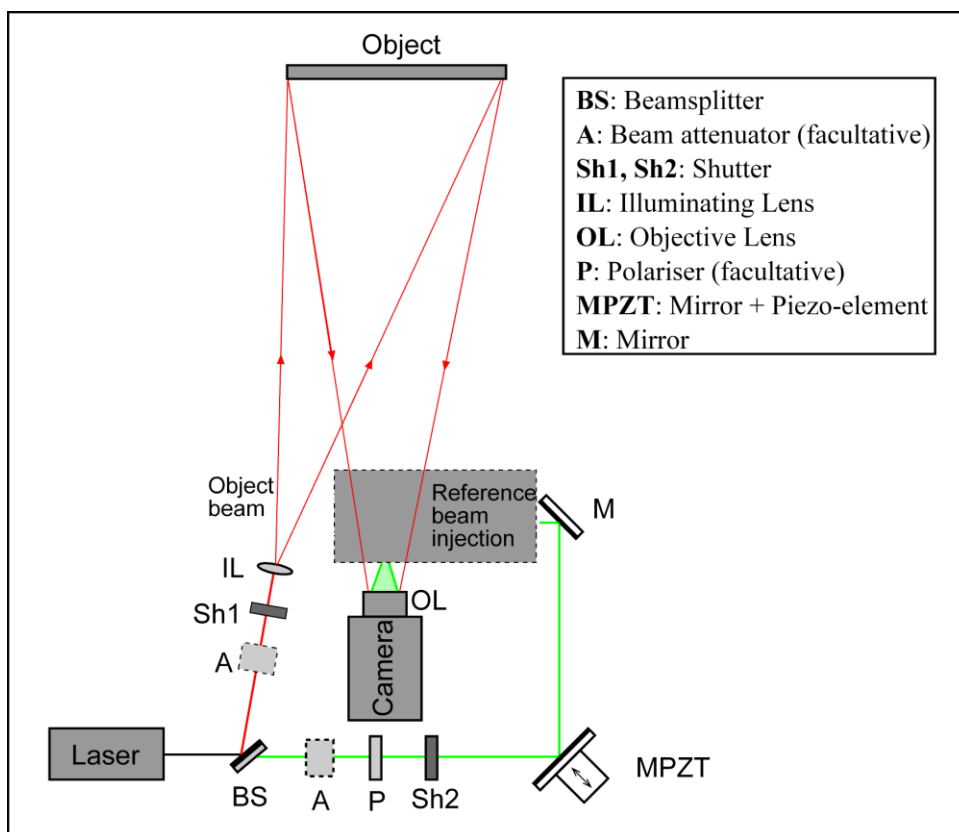


Figure 2. Typical scheme of LWIR Electronic Speckle Pattern Interferometry studied in FANTOM

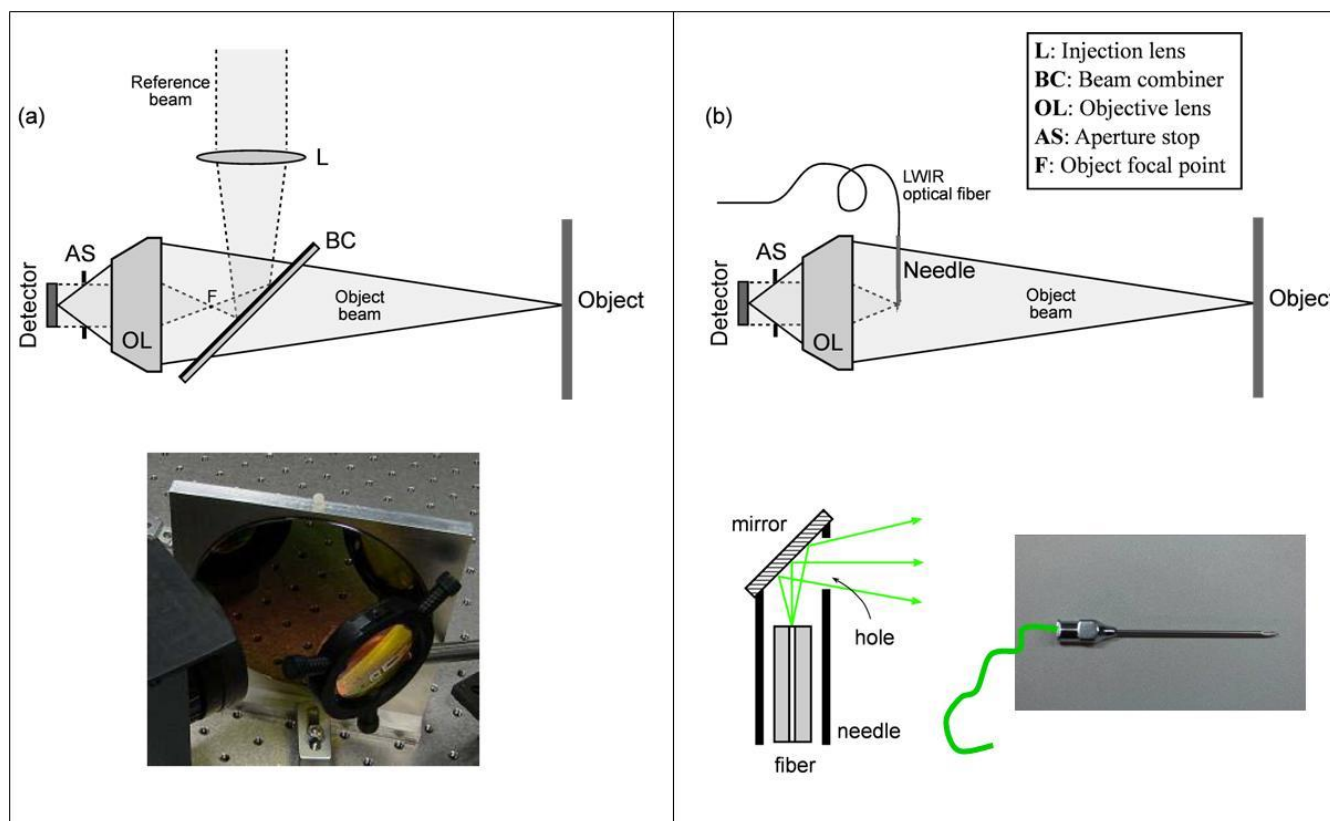


Figure 3. Different schemes for reference beam injection for LWIR ESPI studied in FANTOM.

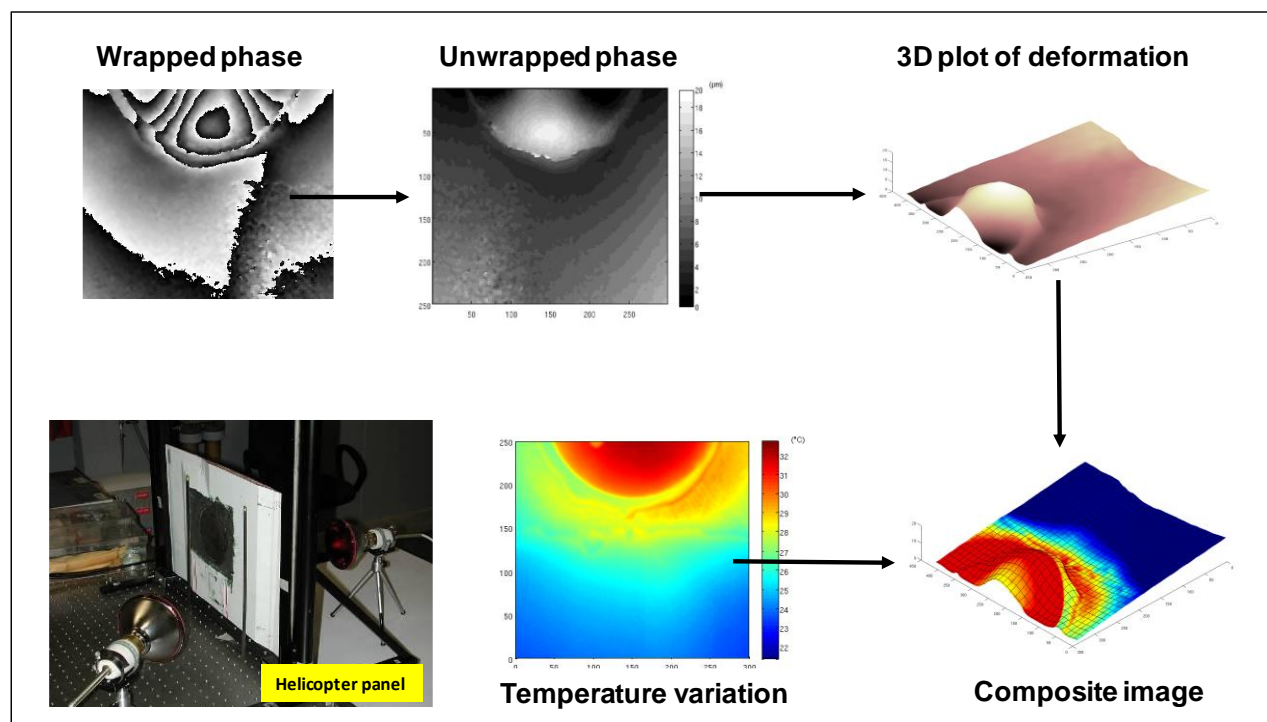


Figure 4. Two types of information recorded simultaneously and separated by specific algorithm developed in FANTOM. The deformation and temperature information are obtained by the single camera. The figure shows example of result obtained on composite helicopter repaired panel undergoing thermal stress. Both information can be used to produce an image of the object deformation related to the local temperature change.

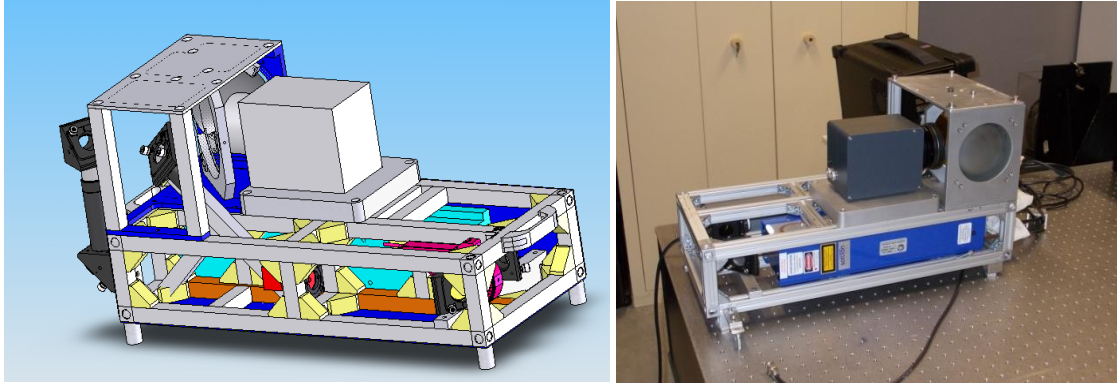


Figure 5. (left) CAD design of the FANTOM prototype instrument, (right) Prototype under building in the laboratory.

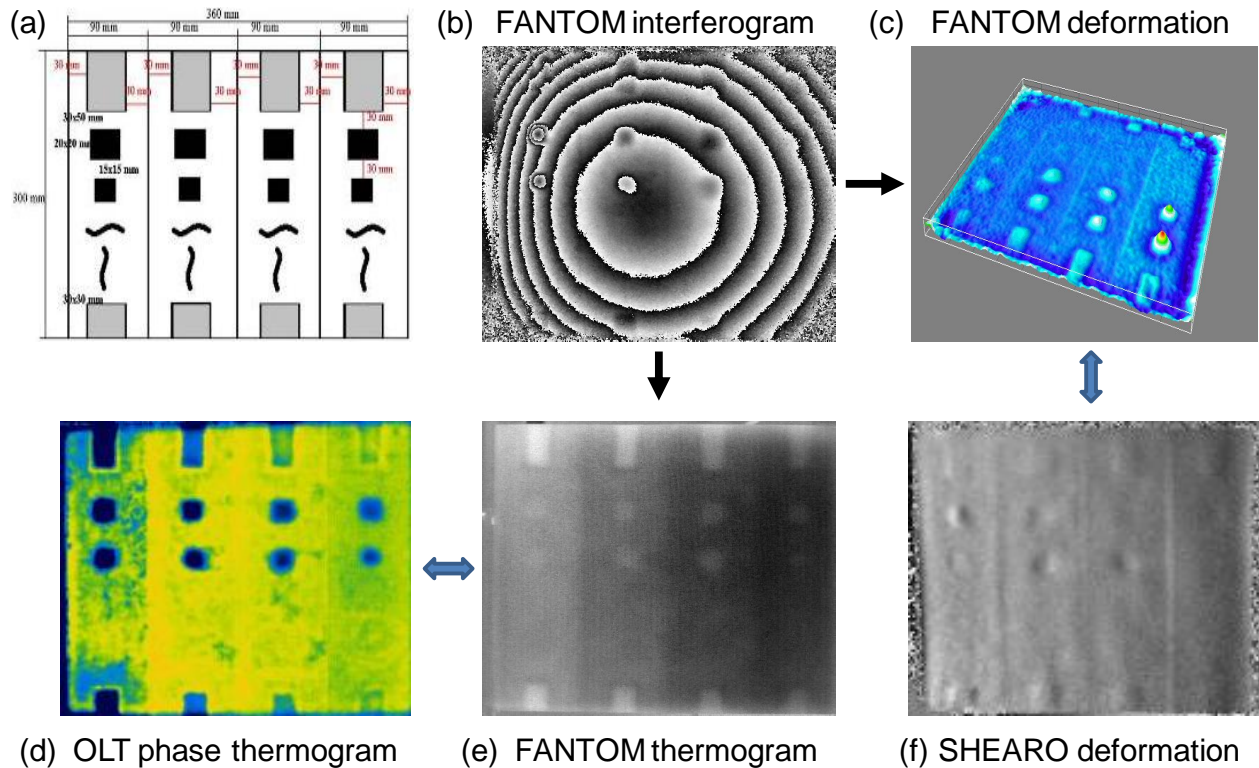


Figure 6. Comparison of defect detection in a composite panel (a) between FANTOM combined technique (b), providing both the deformation (c), and (e) and separate optical lock-in thermography (d) and shearography (f).



Figure 7. FANTOM prototype observing a composite fuselage on-site

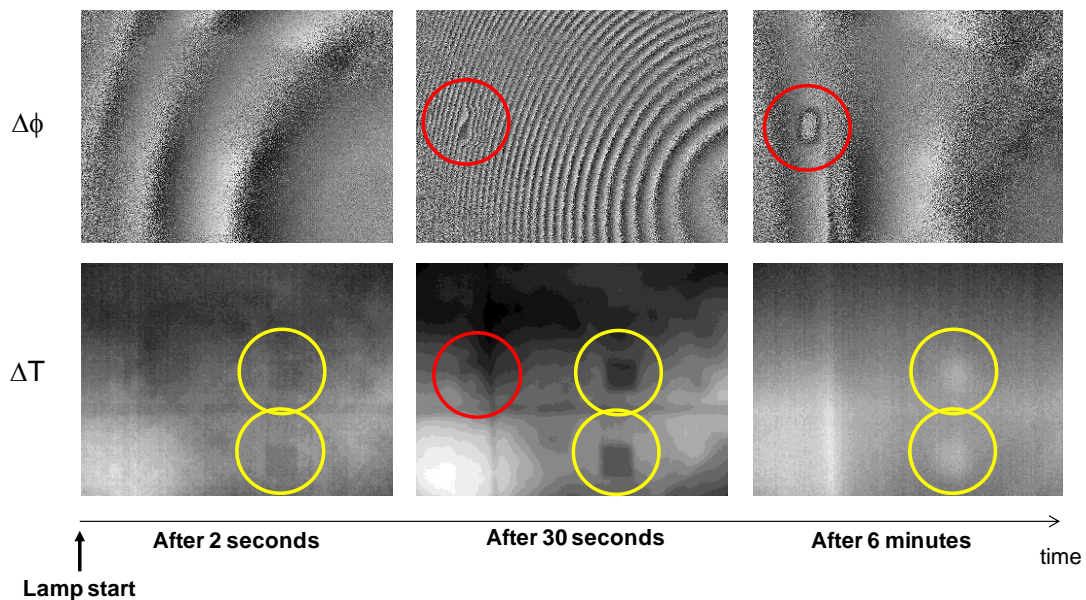


Figure 8. Typical FANTOM result obtained on composite structure in Non Destructive Testing. A lamp heats the part and the deformation and temperature change are recorded during the time. Some defects are observed through the temperature image (ΔT), whereas others are observed only through the local deformation ($\Delta\phi$). This image demonstrates the improved probability to detect defects by the combined technique, with respect with separate ones.