A High Resolution Non-Contact Profilometer for Research Applications

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Introduction

We require a non-contact profilometer, based on optical techniques, to measure surface roughness, film thickness and item topography. The system must include the hardware and software necessary to allow a complete measurement and analysis in an automated fashion. The system should be a table-top system, compatible with cleanroom usage.

Specification

Performance criteria

1. The system will be a non-contact profilometer to allow the measurement of an object's surface profile using optical techniques
2. The system will include a white light chromatic con-focal sensor
3. The system must have options for other sensors such as confocal line-sensors and IR interferometers
4. The sensor must allow at least 1mm of measurement range
5. The system must be able to measure with a *z* resolution of 50nm or less
6. The sensor spot size must be less than 5µm
7. The working distance of the sensor must be more than 7.5mm
8. In the *x*-*y* plane the system must have a position resolution of ±100nm
9. The system will include linear and circular scanning modes
10. The system must include an automated stage *x*-*y* to allow measurements over a range of at least 100x100mm (150x150mm desirable, scored)
11. The system must include an automated *z* axis with at least 50mm of motion
12. The system must include autofocus capabilities
13. The system must allow a measurement rate of at least 2 kHz (strong preference for 4 kHz)
14. The system must have software that allows programming of the system to enable automated 3-dimensional measurements to be performed with minimal operator intervention (ie. the operator attaches an object, performs an alignment and starts the measurement routine)
15. The system and associated measurement and analysis routines must be programmable via a supplied GUI

16. Complete 2D and 3D surface profile analysis capabilities must be included within the software package
17. It must be possible to compare dimensions to tolerances and mark objects or measurements as good or bad
18. Software must include integrated SPC and data logging
19. Software must include the ability to do part offset and rotation based on fiducials
20. Details of the software functionality must be provided
21. The unit must not weigh more than 100 kg
22. The system must be supplied with all vibration damping sufficient to allow optimal performance of the measurement system
23. There must be fixation holes around the table to allow clamps to be used and a selection of tapped and clear holes should be available
24. The system must be able to run with quoted performance between 18 and 22 °C and be able to operate between 15 and 30 °C
25. The system will include a calibration piece to allow user calibration of the system
26. The system will be powered via standard UK mains voltage
27. The system will comply with electrical and mechanical UK/EU norms
28. The system must include an additional software license for offline analysis of data

Power supplies and ancillary equipment

29. The system will be supplied with a power supply capable of running the system without alteration
30. The system will be supplied with a suitable base to remove vibrations (eg. granite table top)
31. The system will be supplied with all ancillaries (PC, monitor, mouse, keyboard) required to run the system
32. The supplied PC will run with Windows 7 or Windows 10 (Windows 10 preferred)
33. For a system running on Windows 7, a free-of-charge upgrade to Windows 10 must be offered before the end of Microsoft's official support period

Documentation

34. Full English instructions for operation of the system must be supplied

Safety systems

35. Any required safety systems to ensure safe operation of the station within acceptable limits must be included

Delivery and training

36. Delivery to STFC RAL will be no later than 30th March 2018 (preference for earlier delivery)
37. On-site installation and commissioning should be included in the quote
38. On-site basic training should be provided, including instruction in the usage, calibration and basic maintenance of the system

Warranty and maintenance

39. The system will be guaranteed for a minimum of 12 months (equipment, spares & labour) following commissioning (strong preference for longer)
40. There should be no obligation to purchase service contracts
41. For the period of the warranty, the supplier must accept full responsibility for any failure of the system with respect to the specifications
42. On-going software support must be provided, including questions on usage and upgrade options