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Metrology and measurement systems

MULTISCALE - MULTIPHYSICS MANUFACTURING AND MULTISENSOR METROLOGY OF CYLINDER LINER - FROM ROUNDNESS TO NANO-ROUGHNESS

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Recent tribological findings in texture structuring of rubbing surfaces from ski, to cylinder liner (C.L.) are requiring frequently multi-physics manufacturing process and multi-scale surface metrology due to different involving phenomena. Limiting only to cylinder liner technology of manufacturing, the dimensional range to be considered in metrology is varying from a few nanometers via millimeters to meter diameter in case of heavy ship engines. If only the number of engines for civil light weight land vehicles products in 2009 through the world is taken into account, it's over 50 million cars, which is about 0,5 billion of (C.L.) per year on can easily understand importance of the problem. These days, technology of finishing manufacturing process is based on two body abrasion by means of a head of honing with abrasive stones and also occasionally Laser or other morphological structuring. Therefore it requires for morphology characterization very sophisticated multi-sensor, multi-scale metrological control quality strategy due to the multi-functions of different (C.L.) areas and according to their tribological regimes. This paper attempts to extend the understanding of both fundamental tribological regimes and manufacturing processes and to bridge the gap between the form and surface morphology metrology. Also, highlight the importance of multi-physics aspects of manufacturing, multi-scale and multi-sensors metrology in context of cylinder liner tribological applications.

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