Trainee's Project Report

Job Code	BE84
Department	BE
Discipline	Surveying
Supervisor	GAYDE Jean-Christophe

Description

After a familiarization time, the applicant will be involved in various upgrades, developments and analysis in standard metrological survey methods, digital photogrammetry, 3D high accuracy scanning for reverse engineering and as-built operations, all as applied to large physics detectors, specifically in contour edges recognition techniques, target-less procedures, filtering and 3D modelisation procedures applied to metrological scanning tests. Others developments and active participations are expected for implementation and analysis of external survey monitoring electro-optics and capacitive instrumentations ((hydrostatic sensors and angle monitor digital cameras) as implemented in present large detectors and planed in future projects; this last part will include upgrading, adapting and analysing the systems in various configurations and working conditions (magnetic field, cryogenics conditions). For all these developments which are the base of modern spatial and geometrical positioning procedures, the final goal is to prepare, evaluate and present the results of the studied and commissioned systems and compare their own performances with respect to more standard industrial survey techniques. Preparatory discussions and works, software developments, data taking and management, documentation, regular presentation of results to technical meetings, participation to the integration, implementation and utilisation of all the above systems to be applied to existing detector upgradings and new ones are a large part of this trainee period.

Special Requirements

ENGINEER SURVEYOR. University degree in Surveying/Geomatics Engineering or equivalent with a university degree in optical 3D industrial metrology or photogrammetry or scanning or a proved knowledge and experience in optical metrology instrumentation and technology, analysis methods used in industrial metrology, photogrammetry or 3D scanning. Proficiency in professional computing (least squares algorithms and stochastic analysis) and the necessary programming and computing skills under various operating systems (C++, Visual basic). Ability to work in a team in an international environment. Good knowledge of English or French; basic knowledge of the other language or an undertaking to acquire it rapidly. Good motivation for technical and development research plus for external contacts with industry and experts in specific domains.

Training Value

The unit in charge of the Positioning Metrology of large scale physics detectors manges various metrological systems namely laser trackers, 3D laser scanner, high resolution digital photogrammetry associated to specific processing software and adapted targeting equipment plus appropriate remote-controlled equipments to monitor on-line positions and deformations of large scale objects and is deeply involved in the study, research and validation before the purchase of high accuracy within a few tens of microns scanning processes to apply to medium and large dimensions. This offer is a unique opportunity for a young engineer desiring to improve his own knowledge in industrial geodesy, photogrammetry, quality assurance controls, as-built, reverse engineering reconstruction and imaging techniques. Apart from accelerators and physics detectors large scale metrology engineering, these techniques are now intensively used in aeronautics, automobile, shipbuildings, large structures like nuclear plants or astronomical observatories, civil engineering works (bridges, dams) and in metrology of industrial automation systems or architectural large dimensions objects. Moreover CERN presents unique examples of unconventionnal working conditions (magnetic field ect), underground environments, reduced working spaces, either large volumes to treat or modelisation of very local enveloppe of small and tight packages of services or pieces, all requiring particular adaptations to meet very specific and often sole demands.