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Doctoral Dissertation
Doctoral Program in Management, Production and Design (31st Cycle)

**Definition and Validation of approaches
special for OS&H in Research
Universities, from Risk Assessment to
Quality Management in the frame of
PoliTo-UniTo Guideline**

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Abstract

Occupational Safety and Health - OS&H is particularly complex in the case of research universities due to a number of typical characteristics that make inadequate the usual approaches to OS&H in industries or secondary educational institutions.

The PhD research project provides substantial developments in some sub-phases of the well-tested Guideline for the Occupational Risk Assessment and Management of employees, students and people in research universities, resulting from a multidisciplinary cooperation of experts from Politecnico di Torino and Università degli Studi di Torino. The research work concerns the analysis of two strictly connected topics of basic relevance for an exhaustive Occupational Risk Assessment and Management for particularly critical areas in research universities:

- *Systematic evaluation of the operating contexts;*
- *Workers' exposure model definition.*

With regard to the first topic, the research validates a special sub-part approach of the Guideline, ensuring a systematic evaluation of the operating contexts in complex facilities, where the most serious criticalities are often of no direct identification. The approach is based on an original development of Forensic Investigation techniques to support the Hazard Identification on shell, services and interior spaces of premises containing workplaces, and on their not-operative content. A series of tests confirmed the effectiveness of the approach in terms of completeness and repeatability, and made possible to draw suggestions on the selection of the better technique in different scenarios. The approach was extended in contexts where "concealed criticalities" (i.e. asbestos containing materials) can be present. Within a Quality Management strategy of these contexts, preliminary tests on high-quality image taking technologies and computerized procedures of image processing and interpretation made possible

systematic checks on the state of conservation of artefacts not needing immediate action, for a real time updated database on critical materials present in the different areas.

Within the second topic, the definition of the workers' exposure to identified Hazard(s) requires measuring processes to quantify the Hazard Factor(s): the measuring processes quality and the measures interpretation lay at the very base of an effective OS&H Risk Assessment, and of the decision-making processes leading to an effective Prevention. The research work discusses an approach to prove the measuring equipment capability to comply the metrological requirements, ensuring the quality of results in terms of metrological confirmation and measuring process efficiency, thanks to key performance indicators used in process quality assessments. The research work also provided a rigorous approach for the design and management of sampling campaigns (as starting point for a subsequent PhD project "Management of work related risks through the measures quality"), making possible the use of formalized evaluation techniques for the measures interpretation, from the potential outliers' analysis to the data representativeness assessments. Within the same topic, a special study enabled to assess the influence of measure uncertainties in very low measured values, e.g. in contexts where degradation phenomena on artefacts containing asbestos can make airborne asbestos fibres. The scenario is frequent in some research universities sited in settlements built, or involved in maintenance interventions, during the '90s.

A visiting study abroad made possible a research context exploration and a sharing of methods, approaches and ideas on the Safety management in the research field, through an overview of the approaches adopted in different scientific research contexts, making clear as the OS&H management approaches shall be specific and tailored for each context.

PhD research work also covered the study of some complex situations (e.g. highway maintenance yards and tunnelling operations) aimed to draw indications for an effective assessment and management of work-related risks, adoptable to address criticalities that sometimes occur also in large public facilities and universities.