Chapter 15
E-training in Maintenance

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Abstract. Although maintenance engineering has been in demand for very long time, maintenance training has yet to fully exploit the recent wave of technological advances in information and communication technologies. Besides formal education and theoretical knowledge, on-the-job training and informal education are recognised to have great importance in developing the maintenance profession. Yet, high costs and inflexible training schedules often put off professionals and organisations. As a consequence there are often gaps between existing personnel skills and those needed for the maintenance function. These gaps are further exacerbated as maintenance services are increasingly equipped with innovative technological solutions and personnel also need to get to grips with them.

The Dynamite project has implemented a vertical integration of a stream of novel technologies for maintenance operations, using wireless sensing devices, RFIDs, handheld computers and decision support tools, as well as back office computing infrastructure in order to streamline the maintenance engineering process and make maintenance data transparently available at multiple levels of operation. Desktop and web-based e-learning applications offer academics and industrialists new tools to raise maintenance-related knowledge and competence. This chapter discusses related work in the field and presents dedicated e-learning tools for e-maintenance training.

15.1 Introduction

The rapid technological advances in industrial production and manufacturing processes, as well as the ever increasing global competition are fuelling a growing
demand for ensuring adequate personnel competences in the maintenance function. In an era when sustainable business operation and development is a paramount strategic goal, the human factor plays a crucial role in implementing the organisation maintenance strategy, but it can only do so insofar as personnel are adequately trained (Starr and Bevis 2009).

This chapter summarises related work in the field of e-training in maintenance. First a discussion on the need and benefits of maintenance training is provided. Next the focus shifts to current e-learning technologies and requirements for vocational training in maintenance. An outline of current application of advanced learning technologies in maintenance training is provided. The next section presents the e-learning tools offered for training in the use of the innovative technologies for maintenance, introduced by the Dynamite project. These have not been developed with the intention to complete a maintenance training curriculum but they are specialised e-courses to train users so that they can efficiently use e-maintenance technology and tools. Finally, the chapter concludes with a summary of the achieved results and a discussion on current requirements and challenges for training in e-maintenance.

15.2 The Need for Maintenance E-training

Modern enterprises cannot afford to under-utilise their assets, being material or human. As they increasingly need to rationalise their function in a way that reduces costs, increase availability and overall equipment efficiency and enhance safety and quality procedures, the efficient lifecycle management of the engineering assets becomes a key factor to support sustainable operation. This implies that personnel have the necessary skills to perform their intended function. Yet companies and professionals do not share common criteria for the required maintenance-related competences and that has detrimental effect on the capacity of an enterprise to efficiently implement a chosen maintenance strategy. At the same time, this lack of clarity in competence requirements affects personnel mobility and employability.

Substantial work is currently under way in an effort to bring maintenance vocational education and training (VET) training in line with competence requirements for the maintenance function (Franlund 2008, Roe 2003). In Europe the EFNMS has specified competence requirements both for maintenance management, as well as for maintenance technician specialists (Franlund 2008). As engineering assets are of varying nature, form and function, the need for specialised training in specific aspects of the maintenance function is also often highlighted (Starr and Bevis 2009). In particular, the need for the certification in more targeted maintenance-related topics, such as condition monitoring, has led to the drafting of dedicated requirement specifications (Roe 2003) leading to their standardisation (ISO 18436-1:2004).