

# The ISO 14001 certification of a machine-process

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## Abstract

Some process machines in industrial manufacturing can be defined *machine-process*: their operations can be analysed by several points of view independently from the larger manufacturing process where they are included. For a machine-process, an Ems—Environmental management system can be set up and the ISO 14001 certification reached in an 'earlier application' way, with the involvement of both supplier/manufacturer and client/user. The 'earlier certification' of machine-processes adds new contents to the product, linked to the environment, helping the market of 'clean technologies', and fosters the diffusion of ISO 14001 certification among supplying/manufacturing companies and clients/users whose entire process is not yet certified.

A case study is presented that has been experienced in Italy. The 'offer and design' phase of a port mobile shiploader is completely developed by following the 'earlier application' scheme for ISO 14001 certification of a machine process—introduced and explained in the paper. Achieved results are shown, and the perspective of a complete application of the scheme to the following 'detailed design and assembly' and 'operations' phases of the same machine are outlined. The feasibility of such a new application of ISO 14000 standards is proved, together with its advantages, while the readiness of the market for the new sector of earlier certification of machine-processes is highlighted. © 2000 Published by Elsevier Science Ltd. All rights reserved.

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## 1. The machine-process

In the analysis of industrial processes, a single machine often realises an entire and well-defined part of a manufacturing cycle. This machine is what we call a 'machine-process'. It can be seen, from the management point of view, as a whole 'small' industry. All the existing environmental and quality standards, as well as procedures for optimising management systems can be applied to the machine-process. Even when it is part of a larger manufacturing flow. And, if needed, independently from this one. A machine-process can be run following its own procedures, and educating, training and organising its own specialised personnel. The machine-process has input materials and output materials and waste, like a 'classical' entire production process. For the financial analysis, its costs and revenues can be taken into account, and its economical performance evaluated.

## 2. Environmental management systems and standards

New ideas and social needs have driven for the past 20 years to the setting up of Ems for industrial operations. This trend has been continuously increasing in importance. The ISO 14000 series of environmental standards provide a widely recognised set of references for the development of Ems in industry (the ISO 14001 certifications in the world raised to 11.421 up to the 1 September 1999 [7]). There are several standards in the 14000 series, ready to be applied by companies for developing an Ems: ISO 14001, ISO 14004, ISO 14010, ISO 14011, ISO 14012, ISO 14013/15.

The ISO 14001 is the key standard: Environmental management systems—specifications with guidance for use; it specifies the requirements and sets out the main elements of an Ems structure, and is the only standard of the series to be used for certification. ISO 14004 provides guidance for the implementation of Ems principles, systems and supporting techniques. ISO 14010 and 14011 address general principles for environmental auditing and audit procedures respectively, and ISO 14012

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sets out qualification criteria for environmental auditors. ISO 14013/15 provide guidelines for audit programmes, reviews and assessments. Those standards are currently applied to organisations, as well as units/departments. The organisation (or unit/department) needs to be analysed from the environmental point of view and several steps are made—following the ISO 14001 requests—to reach a complete Ems implementation, and to reach environmental certification [6].

The standards [2] require or recommend the clear identification of:

1. Environmental review (ISO 14001 annex A and ISO 14004, 4.1.3);
2. Environmental policy (ISO 14001, 4.2);
3. Environmental aspects (ISO 14001, 4.3)
4. Environmental management system (ISO 14001, 4.1 and ISO 14004);
5. Application (ISO 14001, 4.4);
6. Control (ISO 14001, 4.5);
7. Management review (ISO 14001, 4.6).

Once the mentioned steps<sup>1</sup> have been made, the validation and registration can be requested. And the process certified through an audit.

### 3. The ‘earlier application’ of ISO 14000 standards to a machine-process

ISO 14000 standards and ISO 14001 certification can be applied to a single machine, when this machine belongs to the family we called ‘machine-process’.

Steps 1–7 of the certification procedure can be easily applied to a machine-process, considering and analysing its own characteristics and production phases. Environmental review, policy, aspects, Ems set-up, application, control and management review procedures can be identified. This is currently done only when a company identifies the machine-process with a unit or a department of its organisation, and when the machine is already operating at the production site.

The Ems set-up and ISO 14001 certification of the machine-process would also be possible in an ‘earlier application’ way, with the involvement of both supplier/manufacturer and client/user. The ‘earlier application’ is not implemented by companies and consultants yet, and is not recognised, at the moment, by qualified verifiers. Its implementation will allow new benefits for the market of ‘clean technologies’, and for the diffusion of environmental certification (and attention to the

environment) among machines manufacturing companies and final users [8]. The ‘earlier certification’ of machine-processes aims at giving to machines manufacturers the possibility to enrich their offer with new value-added elements, linked to the environment, and secondarily at helping the diffusion of ISO 14001 certification of processes. Neither the supplier, nor the client need to be certified ISO 14001 for the ‘earlier certification’ of the machine-process.

The possibility to obtain a clear visibility (and a tangible result: the ISO 14001 certification of the machine-process) is essential for the strategic choice of manufacturers [4] of addressing their design, production and marketing towards environment friendly technologies and solutions for their final product: the machine-process. The enlargement of the market of clean technologies is one of the targets of the research, helping to increase the availability of ‘environmental compatible products’, intending for compatibility with the environment not only of the ‘product’ machine (LCA and related or similar analysis), but also of the machine when operating. This compatibility will be certified with the ‘earlier application’ of ISO 14001 to the machine-process.

This way of proceeding is also useful for client companies that are still afraid of going towards a company-wide (or unit/department-wide) environmental certification. They could accept more easily a way to invest a bit more money buying a new ‘piece’ of their company with the ISO 14001 certification, which would also be valid for a first ‘exploration’ of Ems certification within their organisation [5,8].

The two target groups are: manufacturers/suppliers interested in opening new ‘environmental compatible’ markets, and users/buyers interested in ‘testing’ benefits and problems of environmental management systems set-up and certification within their organisation.

The purchaser of the certified machine does not need to be certified in order to properly use the machine according to ISO 14001 instructions. Its condition is comparable to that of a company that only certifies one of its units/departments. But the ‘environmental certification seed’ is put inside the company through the machine-process certification, and is expected to grow, fostering a following certification of other units and/or of the complete organisation.

The application of the environmental standards to a machine-process is possible by starting from the ‘offer’ and ‘design’ phases of its realisation project. The certification procedure can be partially or entirely completed by the manufacturer. A ‘ready to be ISO 14001 certified’ machine can be offered, designed, produced and sold to a client, as well as a ‘ISO 14001 certified’ machine, as shown below.

<sup>1</sup> The steps are listed in the order foreseen by the methodology under development (through a real application to a chemical production plant) at CIRPS—Environmental research group, University of Rome ‘La Sapienza’, Rome, Italy.

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