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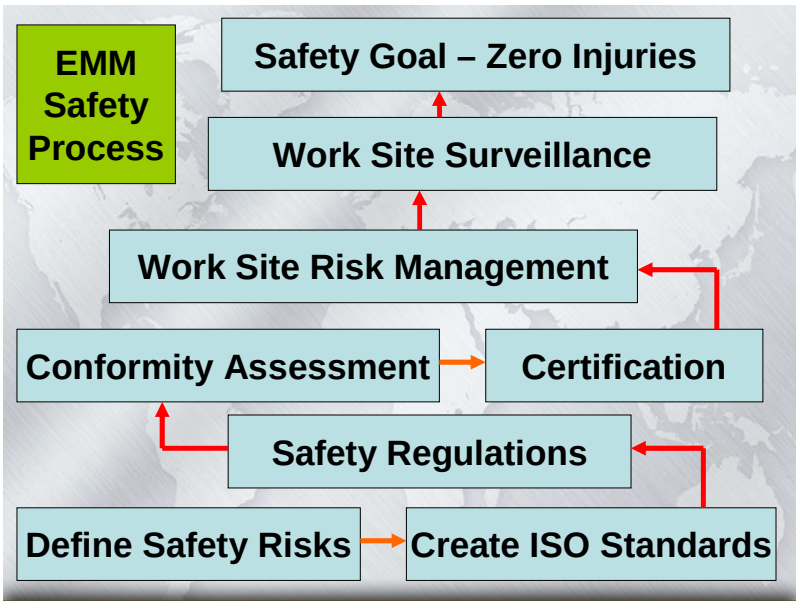
Safety Process for Earth-Moving Machines

The common goal for earth-moving machine (EMM) users, health and safety groups, and machine manufacturers is zero injuries for machine operators and the people on work sites. To achieve this goal, EMM must be developed so that they can be used safely and the work site must have a safety plan for machines and people to work together safely. The safety process for EMM to achieve the safety goal of zero injuries is summarized below:



The safety process starts by defining the safety risks and developing safety standards to address the risks. This is done in ISO/TC 127 with the cooperation of machine users, health and safety organizations, and machine manufacturers.

1. ISO/TC 127 Standards Adoption Process

General ISO/TC 127 Objectives and Process:

ISO/TC 127 develops international standards to meet the need for global standards for earth-moving machines. The objectives and process for ISO/TC 127 are to:

- Create and maintain a complete set of International standards to address all safety risks and commercial needs for earth-moving machines to promote global harmonization of machine requirements
- Define acceptable safety requirements for all safety risks to meet the needs and expectations of customers, health and safety organizations, and regulators
- Promote the use of the ISO/TC 127 standards as national standards and as the technical requirements for national regulations

- Provide training and assistance for:
    - understanding the ISO standards process
    - participating in the development of ISO/TC 127 standards
    - adopting the ISO standards as national standards
    - using the technical requirements in the ISO/TC 127 standards for national regulations

Process for Developing Countries

About 10 years ago ISO/TC 127 recognized that the ISO/TC 127 standards define safety levels that exceed the current technical capability and cultural demands for safety for developing countries. A process was initiated to enable developing countries to more effectively use the ISO/TC 127 standards, and to encourage participation in ISO/TC 127 by developing countries.

To facilitate the adoption and use of the ISO/TC 127 standards by developing countries, ISO/TC 127 implemented the following:

- An ISO 20474 General Machine Safety Standard that references all of the ISO/TC 127 safety standards in a single standard to facilitate national adoption.
- A general guidance document for adopting ISO 20474 as the national safety standard for earth-moving machines. This document recommends that developing countries:
    - Adopt ISO 20474 as the national safety standard
    - During the adoption process, evaluate the need for all of the requirements in ISO 20474, consistent with current technology levels and cultural expectations.
    - Identify some of the requirements in the national standard as voluntary or optional for the short term to accommodate technology level and safety expectations
- Training seminars for developing countries to provide guidance for national adoption of the ISO 20474 standard, with information to help identify requirements that should be evaluated and potentially adopted as voluntary or optional national requirements for the short term.

This approach benefits national manufacturers who want to market machines internationally by defining the global requirements for selling machines. It also allows the nationally adopted ISO 20474 safety standard to recognize current levels of technology, customer expectations, and social customs by allowing some of the global requirements to be voluntary or not applicable.

The intent is that all countries can use this general safety standard as the basis for national standards and also use the content of this safety standard as the technical requirements for national regulations to promote global harmonization of regulations for earth-moving machines.

2. Conformity Assessment and Certification for EMM

The best practice is to allow manufacturers to do their own conformity assessment testing and declaration of conformity certification, defined as supplier's declaration of conformity (SDoC) in ISO 17050-1. ISO/TC 127 standards define test methods and performance criteria that manufacturers can use for conformity assessment testing and certification. EMM manufacturers verify compliance with standards and regulations during the machine development process and can certify machine compliance using SDoC.

Machine Conformity Assessment Challenge

Some countries require third party certification because manufacturers:

- do not have expertise to do SDoC
- do not have test facilities for SDoC
- are not trusted to do SDoC

Third party conformity assessment and certification is appropriate for these countries. The long term goal is SDoC, but third party conformity assessment and certification may be necessary for the short term for developing countries. To minimize the cost and time required for third party certification, testing done by manufacturers should be accepted by the third party, if it is properly done.

Conformity Assessment Testing

Conformity assessment testing already completed by the manufacturer could be accepted for third party certification, if the manufacturer has the following:

- A quality plan that is at least equivalent to ISO 9000
- A documented conformity assessment process
- A conformity assessment group to manage the conformity assessment
- Access to conformity assessment facilities (internal or third party)
- Documentation of test results

Certification of EMM

Manufacturers are asked to certify many areas for EMM:

- Standards compliance
- Regulations compliance
- Quality process
- Country of origin
- Date of manufacturer
- Compliance with specifications
- Sustainability Information

A simple generic certificate could simplify the certification process for manufacturers and help machine users and customs people recognize official certificates – see the example global certificate on the last page.

3. Work Site Risk Management and Surveillance for EMM

Manufacturers of Earth-Moving Machines perform risk analysis to address all safety risks. To complete the risk management, users of machines should also do a risk analysis for the additional risks on the work site. The information below provides guidance for the work site risk management process and for preparing the appropriate work site organization (rules and procedures for the jobsite that coordinate machines and people safely working together) to address the risks.

Machine Risk Analysis

The ISO/TC 127 Safety Standards define acceptable safety performance levels for all safety risks for earth-moving machines. These performance levels are summarized in ISO 20474. This standard also defines the information that should be included in the machine operations manual to define machine intended use and guidance to the operator for safe machine operations. The machine operations manual can be used as the summary of the risk evaluation for earth-moving machines.

Work Site Risk Analysis

The specific risks on the work site also need to be evaluated to address additional risks for machines and people on the work site. These risks include:

- Risks to Machine: Underground (gas lines, electrical cables), Overhead (Structures, electrical lines), Terrain Conditions (steep, slippery, soft), Other Machines or Vehicles on the Work Site
- Risks for Other People: Other Workers, General Public, Children on the work site

Work Site Organization

Each work site should have rules and procedures that will allow machines to work safely with other machines and with other workers or people on the work site. These should cover the routine procedures as well as the specific rules and procedures to address the work site specific risks, such as:

- Operator and worker training
- Machine maintenance
- Appropriate size and type of machines
- Communication process between workers
- Traffic patterns and restricted areas

Work Site Surveillance

The work site organization plan should include provisions to verify that the plan is being implemented properly. Machines need to be maintained, workers need to be trained and need to follow the work site rules and procedures. This can be done by safety or project leaders on the work site and some governmental agencies may also have responsibility to perform work place surveillance.

Model Global Certificate for Earth-Moving Machines

Manufacture's Name

Declaration of Quality and Conformity

I, the undersigned, _____, herby certify that the construction equipment specified hereunder

1. Category
2. Make
3. Type
4. Serial Number
5. Year of construction

has been manufactured in conformance with quality requirements

- Quality Standard: Certified by:
- Quality Standard: Certified by:

and has been constructed with regard to.

Directives/Standards	No.	Date	Approval Body

Support Information:

Certified by: (firm/third party)

Facility & Country of Origin

Signature

_____

_____

_____

Date: _____