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First edition  
2010-08-01

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# Earth-moving machinery and mobile road construction machinery — Worksite data exchange

## Part 1: System architecture

*Engins de terrassement et machines mobiles de construction de routes — Échange de données sur le chantier*

*Partie 1: Architecture du système*



Reference number  
ISO 15143-1:2010(E)

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Published in Switzerland

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## Contents

Page

Foreword .....	iv
Introduction.....	v
1 Scope .....	1
2 Normative references .....	2
3 Terms and definitions .....	3
3.1 General terms relating to information processing.....	3
3.2 Terms specific to worksite data exchange .....	8
3.3 Terms relating to specification and standardization of data elements .....	13
3.4 Terms relating to generalized schema for worksite data exchange .....	19
4 Target services .....	21
5 Method of data exchange in worksite using this part of ISO 15143.....	22
5.1 Principle.....	22
5.2 Data exchange procedure.....	22
5.3 Application .....	23
6 Generalized schema for worksite data exchange .....	23
6.1 Concept of generalized schema for worksite data exchange.....	23
6.2 Function of generalized schema for worksite data exchange .....	23
6.3 Description of generalized schema for worksite data exchange .....	24
Annex A (normative) Extensions to the ISO 15143 application schema and data dictionary .....	26
Annex B (informative) Creation of a worksite data dictionary using ISO 15143 .....	28
Annex C (informative) Relevant diagrams of generalized schema for worksite data exchange .....	34
Annex D (informative) ISO 15143 application example — Machine construction .....	36
Annex E (informative) Process modelling (conceptual) .....	50
Annex F (informative) Process modelling (typical examples).....	53
Bibliography.....	57

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15143-1 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 3, *Machine characteristics, electrical and electronic systems, operation and maintenance*.

ISO 15143 consists of the following parts, under the general title *Earth-moving machinery and mobile road construction machinery — Worksite data exchange*:

- *Part 1: System architecture*
- *Part 2: Data dictionary*

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## Introduction

Rapidly advancing information technology and measuring technology are being used to develop worksite information systems to support control of the finished form of work performed by machinery used in the construction industry. The introduction of such systems into construction projects, including earth-work and road construction work, has begun.

To use these worksite information systems, it must be possible for data to be easily and reliably exchanged between the machinery, measuring equipment and site information systems. When a construction project supported by a worksite information system begins, the system is introduced with specifications suited to the machine and the measuring equipment used at the project, and after this system has been used during the limited duration of the project, it is moved to another project. Therefore, an essential condition for the use of such a worksite information system is that it be possible for the system to exchange electronic data with the construction machine and measuring equipment.

In addition, the many concerned parties, which include not only site managers and machine operators, but also companies contracted to execute the work, machine owners, and project owners, must all have the measurement data, completed work data, machine control data, and so on, used and created during a project. Different information systems are also expected to be able to exchange electronic data.

Achieving data exchange using such electronic data is hampered by the fact that the names and definitions of data and data formats normally differ between worksite information systems, construction machines, and measuring equipment in use: a problem that severely obstructs the development and use of worksite information systems.

ISO 15143 is intended to resolve the above problems and guarantee the interoperability of data.

**NOTE** It includes the definition of data describing the real-time status of a machine in operation. These data are not intended for real time control of the machine (but such use is not prohibited).

The benefits of its use include greater freedom for product developers and users. Manufacturers of construction machinery, measuring equipment and information systems will benefit from the ability to expand the range of their customers and reduce their product development risk by designing products in compliance with ISO 15143, and to lower their costs by shortening product development periods and establishing more efficient development and maintenance systems. Without this standard it is difficult to connect equipment made by different makers for use in such information systems and system development is an extremely risky undertaking, thus making it difficult for manufacturers to begin to sell their products to users of systems made by other manufacturers. Another cause of high costs is the need to continuously employ many technicians to develop and maintain products after delivery, including the introduction of new versions.

However, application of ISO 15143 can be counted on to expand the range of customers of all makers by allowing them to develop and sell products that can be linked with systems from other companies. And the development of products that comply with ISO 15143 will achieve great cost savings by allowing each maker to sell products to many users, at the same time as it increases the efficiency of maintenance work.

It will benefit contractors by expanding the range of products that they can select and use from a single supplier to many suppliers, lowering costs and improving product quality. Systems development in the past was characterized by a general absence of competitiveness, because each user could introduce only products that satisfied the specifications of its existing system and had to continue to rely on its developer for maintenance. The application of ISO 15143 will enhance competition between makers, lowering costs and raising the level of the systems developed.

Expanding the use of information systems on worksites will permit the use of new more advanced products equipped with information technology. For manufacturers of construction machinery and measuring equipment, this will expand the market by developing new business opportunities. One example is stakeless earthwork,

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the replacement of finishing stakes that indicate the targets of construction machines with support systems that use electronic data to indicate target positions to operators. Another is the development of construction machinery with automated blade control.

Owners of construction projects, including the national government, regional administrations and private sector users will enjoy the benefits of lower construction costs and higher quality. These benefits will result from greater competition, improved geometrical tolerances, increased data transfer and the precise control of finished products.