TECHNICAL REPORT

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Information technology — Automatic identification and data capture techniques — Guidelines for direct part marking (DPM)

Technologies de l'information — Techniques automatiques d'identification et de capture des données — Lignes directrices pour DPM («direct part marking»)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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

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

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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

ISO/IEC TR 24720, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

Introduction

Identification technologies have become an essential part of managing the life cycle of manufactured goods, from their "birth" to the scrap recovery process. The need to identify parts easily and correctly is critical for controlling and error proofing the assembly process, tracking work in process and building traceability. Fast and accurate identification methods are also important after the product leaves the plant.

Industries worldwide rely heavily on the use of various marking methods. Because many of these methods were originally designed to apply human-readable marks, they frequently are not appropriate for applying high-density machine-readable symbols.

With the widespread implementation of machine-readable marking, the parts identification industry began to refine existing marking methods. Dot peen machines replaced manual metal stamping and embossing techniques. Desktop publishing systems were developed for the production of stencils. Ink jet machines were built to replace rubber stamps. Laser marking systems were designed to replace electric-arc etching and hot stamping processes.

One of the most popular methods of identifying a part is with a two-dimensional (2D) symbol applied directly onto the surface of parts. Compared with printing and applying labels, marking directly on parts is more secure, more cost-effective and easier to automate. When direct marked, two-dimensional symbols are able to withstand harsh manufacturing processes and abuse in the field.

Several direct part marking (DPM) technologies are addressed in this Technical Report, such as ink jet printing, laser etch, chemical etch and dot peen marking. Ink jet printing is one of the least expensive of the marking methods. Laser etch is popular because of its ability to produce small, precise marks, and the ability of lasers to mark symbols on many materials, from hardened steel to soft plastic. Lasers can also access small, tight locations. Dot peen marking is usually reserved for marking metal. This marking method uses a stylus to indent the surface of the part to create the desired mark. Chemical etch marking is often used to mark printed circuit boards (PCBs), since it is already part of the normal manufacturing process.

For the purposes of this Technical Report, direct part marking (DPM) is considered a generic term referring to methods of applying a permanent mark directly onto a surface of an item. There are two generic direct marking techniques described in this Technical Report: intrusive and non-intrusive.

Intrusive (or subtractive) marking methods alter the surface of a part and are considered controlled defects. Of the intrusive marking methods, this Technical Report addresses dot peen and direct laser marking, and briefly describes other technologies.

Non-intrusive marking methods, also known as additive markings, are produced as part of the manufacturing process or by adding a layer of media to the surface of a part. Of the non-intrusive methods, this Technical Report addresses ink jet marking and other technologies.

Information technology — Automatic identification and data capture techniques — Guidelines for direct part marking (DPM)

1 Scope

This Technical Report describes several methods for applying permanent machine-readable symbols to items – including components, parts and products – using the direct part marking (DPM) methods outlined herein. This Technical Report describes marking methods, marking surface preparation, marking location, protective coatings and other parameters that contribute to the production of quality symbols, but does not specify the information to be encoded.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19762-1, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 1: General terms relating to AIDC*

ISO/IEC 19762-2, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 2: Optically readable media (ORM)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762-1, ISO/IEC 19762-2 and the following apply.

3.1
intrusive marking
marking method designed to alter a surface to form a human- or machine-readable symbol

NOTE This marking category includes, but is not limited to, methods that abrade, burn, corrode, cut, deform, dissolve, etch, melt, oxidize or vaporize a surface. Intrusive marking methods include stamping, laser etching, chemical etching, dot peen and micro-sandblast.

3.2
non-intrusive marking
marking method designed to add material to a surface to form a human- or machine-readable symbol

NOTE Non-intrusive marking methods include ink jet, some forms of laser bonding, liquid metal jet, screen process, stencil and thin film deposition.

3.3
permanent marking
intrusive or non-intrusive markings designed to remain legible for at least the normal service life of an item, subject to operating or usage conditions