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Safety of machinery - Relationship with ISO 12100 - Part 4: Guidance to machinery manufacturers for consideration of related IT-security (cyber security) aspects (ISO/TR 22100-4:2018)

Sécurité des machines - Relation avec l'ISO 12100 - Partie 4: Titre manque (ISO/TR 22100-4:2018)

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European foreword

The text of ISO/TR 22100-4:2018 has been prepared by Technical Committee ISO/TC 199 "Safety of machinery" of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TR 22100-4:2020 by Technical Committee CEN/TC 114 "Safety of machinery" the secretariat of which is held by DIN.

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Foreword

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This document was prepared by Technical Committee ISO/TC 199, *Safety of machinery*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

A list of all parts in the ISO 22100 series can be found on the ISO website.

Introduction

Internet, digital services and technology are important enablers for smart manufacturing, which is one part of internet of things (IoT) (see ISO/IEC 20924). For the manufacturing environment, the foundations are vertical networking and horizontal integration across the entire value chain, convergence of design, ordering, delivery and manufacturing capabilities. This results in the transformation of conventional value chains and the emergence of new business models. Smart products based on smart manufacturing know many details on how they were made, their performance and how they are being used. The physical product is linked to its digital representation, and the digital content depends on lifecycle phase. Implementing smart manufacturing creates an efficient and highly responsive package by leveraging existing manufacturing systems, as well as technological and economic potential. Smart manufacturing increases the vulnerabilities of machinery to IT-security threats.

Smart manufacturing leads to the emergence of dynamic, real-time optimized, self-organizing value chains. An appropriate regulatory framework is therefore necessary, as well as standardized interfaces and harmonized business processes. Smart manufacturing is characterized by:

a) increased product flexibility;

b) new intrinsic built-in product properties;

c) flexible work organization;

d) changed scale (up to a lot size 1) and location of manufacturing.

For smart manufacturing, the description of the network infrastructure needs to be further expanded to enable privacy, self-configuration and ease of use. Therefore, there is a need for fast available, robust and secure communication networks.

The primary purpose of this document is to address aspects on safety of machinery that can be affected by IT-security attacks related to the direct or remote access to, and manipulation of, a safety-related control system(s) by persons for intentional abuse (unintended uses). IT-security attacks are increasingly becoming a potential threat to the safety of machinery. Although intentional abuse falls outside the scope of ISO 12100 and the (safety-related) risk assessment process, it is reasonable also for machinery manufacturers to consider such threats.

Current technologies enable machinery to be monitored and/or improved regarding their performance remotely by adjusting parameters without having to be on site at the machine. This ability provides considerable benefits as machinery can be kept operating without the downtime and associated costs of a field service person making a service call.

However, this same capability to adjust machine parameters to improve performance lends itself to the possibility for persons with nefarious or criminal intent to make adjustments that can put workers and others at risk of harm. For example, speeds or forces can be adjusted to dangerous levels, temperatures can be lowered below a kill step level resulting in food contamination, or error codes or messages can be erased or falsified.

Human error can have little relation to IT-security in its strict sense. Those unintentional influences (reasonably foreseeable human error when adjusting parameters of the machine or its control system) are already covered within the normal (safety-related) risk assessment and the resulting inherently safe design of the control system (see ISO 12100:2010, 6.2.11.1).

Safety of machinery — Relationship with ISO 12100 —

Part 4: Guidance to machinery manufacturers for consideration of related IT-security (cyber security) aspects

1 Scope

This document gives machine manufacturers guidance on potential security aspects in relation to safety of machinery when putting a machine into service or placing on the market for the first time. It provides essential information to identify and address IT-security threats which can influence safety of machinery.

This document gives guidance but does not provide detailed specifications on how to address IT-security aspects which can influence safety of machinery.

This document does not address the bypass or defeat of risk reduction measures through physical manipulation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
antivirus tool
software used to detect malicious code, prevent it from infecting a system, and remove malicious code that has infected the system

3.2
attack
attempt to gain unauthorized access to system services, resources, or information

[SOURCE: CNSSI-4009, modified — "., or an attempt to compromise system integrity, availability, or confidentiality" has been deleted at the end of the definition.]