



# SVENSK STANDARD SS-EN ISO 11161:2007

Fastställd 2007-05-25

Utgåva 1

## **Maskinsäkerhet – Integrerade tillverkningssystem – Grundläggande krav (ISO 11161:2007)**

## **Safety of machinery – Integrated manufacturing systems – Basic requirements (ISO 11161:2007)**

ICS 13.110; 25.040.01

Språk: engelska

Publicerad: augusti 2007

Europastandarden EN ISO 11161:2007 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 11161:2007.

Denna standard ersätter SS-ISO 11161, utgåva 1.

The European Standard EN ISO 11161:2007 has the status of a Swedish Standard. This document contains the official English version of EN ISO 11161:2007.

This standard supersedes the Swedish Standard SS-ISO 11161, edition 1.

---

Upplysningar om **sakinnehållet** i standarden lämnas av SIS, Swedish Standards Institute, telefon 08 - 555 520 00.

Standarder kan beställas hos SIS Förlag AB som även lämnar **allmänna upplysningar** om svensk och utländsk standard.

*Postadress:* SIS Förlag AB, 118 80 STOCKHOLM  
*Telefon:* 08 - 555 523 10. *Telefax:* 08 - 555 523 11  
*E-post:* [sis.sales@sis.se](mailto:sis.sales@sis.se). *Internet:* [www.sis.se](http://www.sis.se)

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 11161**

May 2007

ICS 13.110; 25.040.01

English Version

**Safety of machinery - Integrated manufacturing systems - Basic requirements (ISO 11161:2007)**

Sécurité des machines - Systèmes de fabrication intégrés -  
Prescriptions fondamentales (ISO 11161:2007)

Sicherheit von Maschinen - Integrierte Fertigungssysteme -  
Grundlegende Anforderungen (ISO 11161:2007)

This European Standard was approved by CEN on 13 April 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

# Contents

Page

Foreword.....	iv
Introduction .....	v
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Strategy for risk assessment and risk reduction .....	6
4.1 General.....	6
4.2 Specification of the limits of the IMS .....	6
4.3 Determination of the task.....	6
4.4 Identifying hazardous situations.....	8
4.5 Risk estimation and risk evaluation.....	8
4.6 Risk reduction .....	8
5 Risk assessment.....	10
5.1 Specifications of the IMS .....	10
5.2 Identification of hazards and hazardous situations.....	12
5.3 Risk estimation .....	13
5.4 Risk evaluation.....	14
6 Risk reduction .....	14
6.1 Protective measures.....	14
6.2 Validation of the protective measures.....	14
7 Task zone(s) .....	14
7.1 General.....	14
7.2 Determination.....	15
7.3 Design .....	15
7.4 Functional analysis.....	16
8 Safeguarding and span of control .....	16
8.1 Safeguarding of task zones .....	16
8.2 Span of control.....	17
8.3 Electrical equipment requirements.....	17
8.4 Modes.....	17
8.5 Safeguards .....	18
8.6 Protective measures when safeguards are suspended.....	18
8.7 Muting and blanking .....	20
8.8 Control .....	20
8.9 Reset of perimeter safeguarding devices .....	21
8.10 Start/restart.....	21
8.11 Emergency stop .....	22
8.12 Measures for the escape and rescue of trapped persons .....	22
9 Information for use .....	22
9.1 General.....	22
9.2 Marking .....	23
10 Validation of the design .....	23
10.1 Validation that the design meets the requirements .....	23
10.2 Validation of the protective measures.....	23
Annex A (informative) Examples of integrated manufacturing systems (IMs).....	24
Annex B (informative) Flow of information between the integrator, user and suppliers.....	27

<b>Annex C</b> (informative) <b>Span of control examples within an IMS</b> .....	<b>28</b>
<b>Annex D</b> (informative) <b>Temporary observation of the automatic process</b> .....	<b>32</b>
<b>Annex ZA</b> (informative) .....	<b>36</b>
<b>Bibliography</b> .....	<b>37</b>

## **Foreword**

This document (EN ISO 11161:2007) has been prepared by Technical Committee ISO/TC 199 "Safety of machinery" in collaboration with Technical Committee CEN/TC 114 "Safety of machinery", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2007, and conflicting national standards shall be withdrawn at the latest by November 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

### **Endorsement notice**

The text of ISO 11161:2007 has been approved by CEN as EN ISO 11161:2007 without any modifications.

## Introduction

The structure of safety standards in the field of machinery is as follows:

- a) Type-A standards (basic safety standards) giving basic concepts, principles for design, and general aspects that can be applied to all machinery.
- b) Type-B standards (generic safety standards) dealing with one safety aspect or one type of safeguard that can be used across a wide range of machinery:
  - type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise);
  - type-B2 standards on safeguards (e.g. two-hand controls, interlocking devices, pressure sensitive devices, guards).
- c) Type-C standards (machine safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

This International Standard is a type-B1 standard as stated in ISO 12100-1.

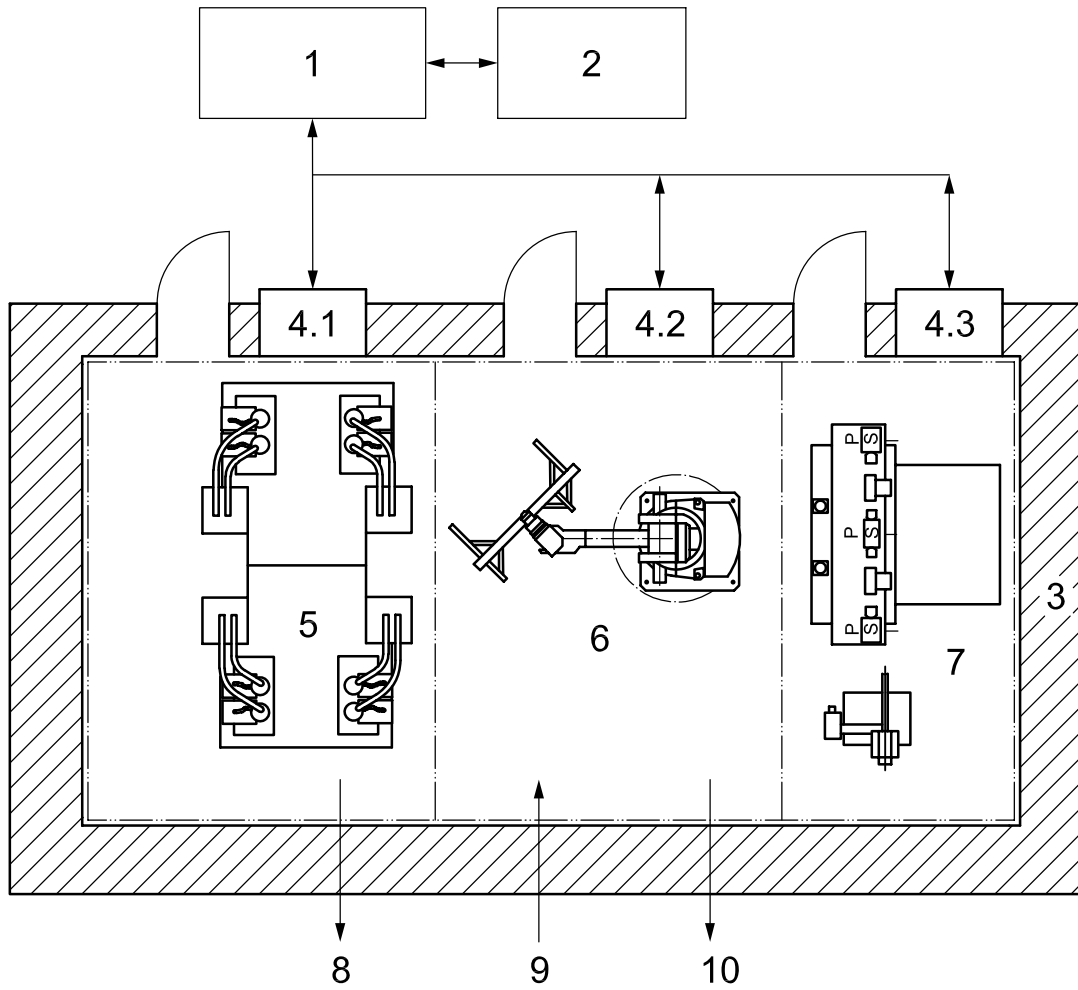
An integrated manufacturing system (IMS, see 3.1) can be very different in terms of size and complexity, and can incorporate different technologies that require diverse expertise and knowledge.

An integrated manufacturing system should be considered to be a whole new and different machine rather than simply its parts combined. The integrator (see 3.10) needs the cooperation of entities who individually know only a part of the whole. Where there are requirements for frequent manual interventions to parts of the IMS, e.g. inspections, maintenance, set-up, it can be impractical or unnecessary to stop the whole IMS. This International Standard gives requirements to provide for the safety of individuals who perform these tasks. Safeguarding for these tasks relates to the concept and use of “task zones”.

The aim of this International Standard is to describe how to apply the requirements of ISO 12100-1:2003, ISO 12100-2:2003 and ISO 14121 in this specific context.

A general configuration of an integrated manufacturing system is shown in Figure 1.

Some examples of integrated manufacturing systems are included in Annex A.



**Key**

- |                     |                              |
|---------------------|------------------------------|
| 1 control           | 6 hazard zone B              |
| 2 operator pendant  | 7 hazard zone C              |
| 3 safeguarded space | 8 scrap and expendables flow |
| 4 local controls    | 9 raw material flow          |
| 5 hazard zone A     | 10 finished goods            |

**Figure 1 — Configuration of an IMS**



# Safety of machinery — Integrated manufacturing systems — Basic requirements

## 1 Scope

This International Standard specifies the safety requirements for integrated manufacturing systems (IMS) that incorporate two or more interconnected machines for specific applications, such as component manufacturing or assembly. It gives requirements and recommendations for the safe design, safeguarding and information for the use of such IMSs (see Figure 1 for the basic configuration of an IMS).

NOTE 1 In the context of this International Standard, the term *system* refers to an integrated manufacturing system.

NOTE 2 In the context of this International Standard, the term *machine* refers to the component machines and associated equipment of the integrated manufacturing system.

This International Standard is not intended to cover safety aspects of individual machines and equipment that may be covered by standards specific to those machines and equipment. Therefore it deals only with those safety aspects that are important for the safety-relevant interconnection of the machines and components. Where machines and equipment of an integrated manufacturing system are operated separately or individually, and while the protective effects of the safeguards provided for production mode are muted or suspended, the relevant safety standards for these machines and equipment apply.

## 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 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ISO 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13849-2:2003, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*

ISO 13850:2006, *Safety of machinery — Emergency stop — Principles for design*

ISO 14120:2002, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

ISO 14121:1999, *Safety of machinery — Principles of risk assessment*

ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of a fixed means of access between two levels*

## EN ISO 11161:2007 (E)

ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*

ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairways, stepladders and guard-rails*

ISO 14122-4:2004, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*

IEC 60204-1:2005, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems*

### 3 Terms and definitions

For the purposes of this document, the following definitions apply:

**3.1**  
**integrated manufacturing system**  
**IMS**  
group of machines working together in a coordinated manner, linked by a material-handling system, interconnected by controls (i.e. IMS controls), for the purpose of manufacturing, treatment, movement or packaging of discrete parts or assemblies

NOTE See also Annex A.

**3.2**  
**detection zone**  
zone within which a specified test piece will be detected by the electro-sensitive protective equipment (ESPE)

[IEC/TS 62046:2004, 3.1.3]

**3.3**  
**emergency stop**  
function which is intended:

- to avert arising or to reduce existing hazards to persons, damage to machinery or to work in progress;
- to be initiated by a single human action

NOTE ISO 13850 gives detailed provisions.

[ISO 12100-1:2003, 3.37]

**3.4**  
**enabling device**  
additional manually operated device used in conjunction with a start control and which, when continuously actuated, allows a machine to function

NOTE IEC 60204-1:2005, 9.2.5.8 gives provisions on enabling devices.

[ISO 12100-1:2003, 3.26.2]

### 3.5

#### **guard**

physical barrier, designed as part of the machine, to provide protection

NOTE 1 A guard may act:

- alone; it is then only effective when it is “closed” for a movable guard or “securely held in place” for a fixed guard;
- in conjunction with an interlocking device with or without guard locking; in this case, protection is ensured whatever the position of the guard.

NOTE 2 Depending on its construction, a guard may be called e.g. casing, shield, cover, screen, door, enclosing guard.

NOTE 3 See ISO 12100-2:2003, 5.3.2, and ISO 14120 for types of guards and their requirements.

[ISO 12100-1:2003, 3.25]

### 3.6

#### **harm**

physical injury or damage to health

[ISO 12100-1:2003, 3.5]

### 3.7

#### **hazard**

potential source of harm

NOTE 1 The term hazard can be qualified in order to define its origin (e.g. mechanical hazard, electrical hazard) or the nature of the potential harm (e.g., electric shock hazard, cutting hazard, toxic hazard, fire hazard).

NOTE 2 The hazard envisaged in this definition:

- either is permanently present during the intended use of the machine (e.g. motion of hazardous moving elements, electric arc during a welding phase, bad posture; noise emissions; high temperature);
- or may appear unexpectedly (e.g. explosion, crushing hazard as a consequence of an unintended/unexpected start-up, ejection as a consequence of a breakage, fall as a consequence of acceleration/deceleration).

[ISO 12100-1: 2003, 3.6]

### 3.8

#### **hazard zone**

danger zone

any space within and/or around machinery in which a person can be exposed to a hazard

[ISO 12100-1:2003, 3.10]

### 3.9

#### **hazardous situation**

circumstance in which a person is exposed to at least one hazard

NOTE The exposure can immediately or over a period of time result in harm.

[ISO 12100-1:2003, 3.9]