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**Industrial automation systems — Safety
of integrated manufacturing systems —
Basic requirements**

*Systèmes d'automatisation industrielle — Sécurité des systèmes de
fabrication intégrés — Prescriptions fondamentales*



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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.

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.

International Standard ISO 11161 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*.

Annex A of this International Standard is for information only.

Introduction

0.1 This International Standard is part of a series of standards dealing with safety of industrial machines. It has been harmonized with other relevant International Standards dealing with safety issues of industrial equipment.

The intent of this International Standard is to provide safety requirements and guidelines for the design, construction, installation, programming, operation, use, and maintenance of integrated manufacturing systems. It describes basic types of hazards associated with these systems and steps to be taken to assess the risks associated with these hazards and to eliminate or reduce the hazards to an acceptable level.

Where specific points in this International Standard are considered to be in conflict with the requirements of other international standards (now or in the future), these requirements will be analysed to determine if they are to be included or deleted as system safety requirements.

0.2 This International Standard has been created in recognition of the particular hazards which exist in integrated manufacturing systems incorporating industrial machines and associated equipment.

The risks associated with these hazards vary with the types of industrial machines incorporated in integrated manufacturing system and the application of such a system as to how it is installed, programmed, operated, maintained and repaired.

The requirements of this International Standard are aimed at minimizing the possibilities of injuries to personnel while working on or adjacent to an integrated manufacturing system. This International Standard contains definitions, measures or procedures, and devices which are not specific to systems but can also apply to safety requirements for individual machines and equipment. They are included in this International Standard to make it more understandable or because no relevant international standards exist.

Figure 0.1 shows a typical system with the assumption that all of the hazards presented by the system are contained within the work zone. These hazards are suitably protected by safeguarding means determined by the risk assessment (see clause 4) and described in clauses 5 to 8 of this International Standard.

Where hazards are presented by equipment outside the work zone (e.g. electrical shock), it is intended that these hazards be suitably protected by means described in relevant International Standards (e.g. IEC 204-1)

which can be integrated by the procedures developed by the system supplier or user.

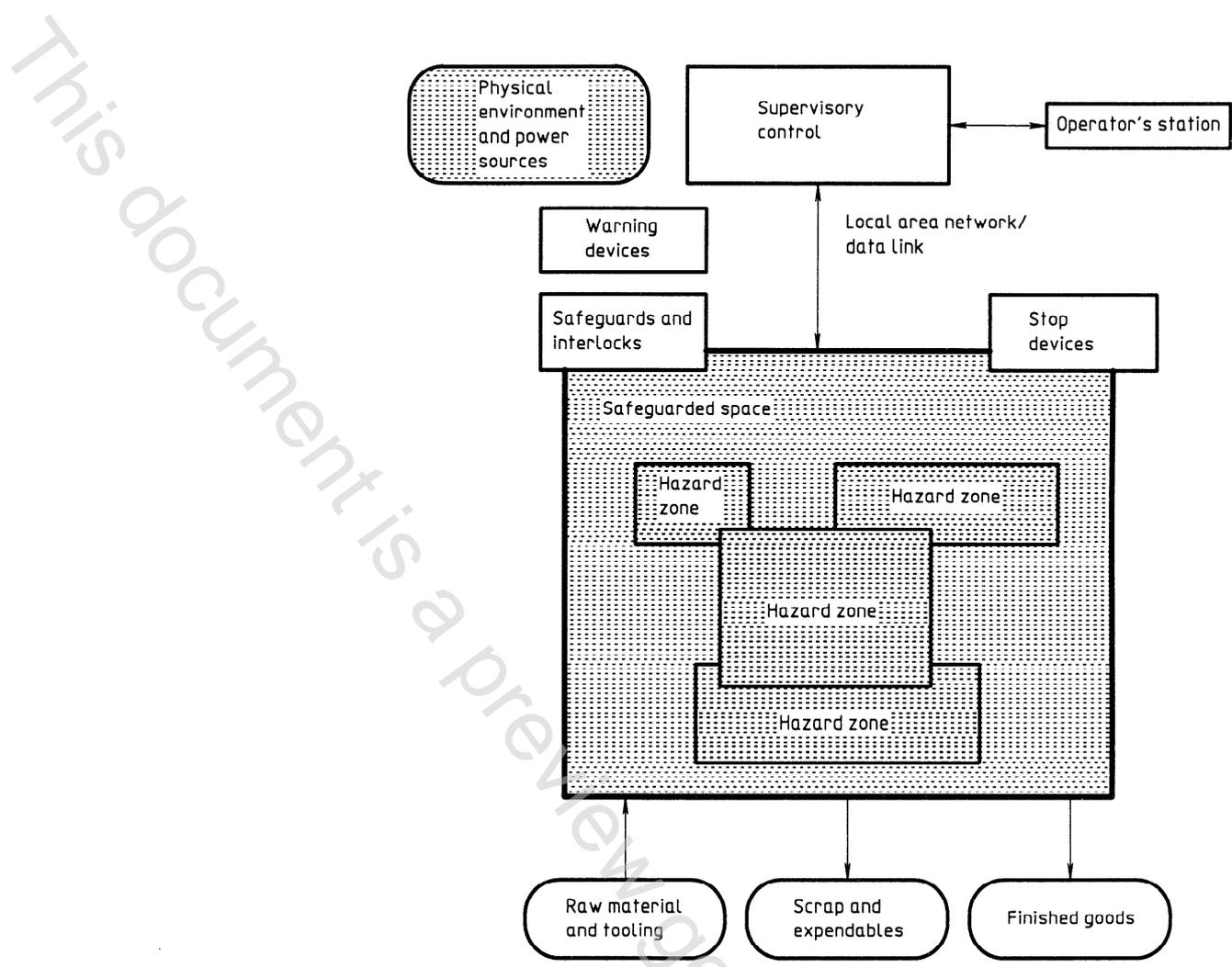


Figure 0.1 — Basic integrated manufacturing system

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Industrial automation systems — Safety of integrated manufacturing systems — Basic requirements

1 Scope

This International Standard specifies the safety requirements for integrated manufacturing systems that incorporate two or more industrial machines interconnected with and operated by a controller(s) capable of being reprogrammed for the manufacturing of discrete parts or assemblies. It describes the requirements and recommendations for the safe installation, programming, operation, maintenance, or repair of such systems (see figure 0.1 for the basic configuration of an integrated manufacturing system).

This International Standard is not intended to cover safety aspects of individual machines and equipment which may be covered by standards specific to those machines and equipment. Where machines and equipment of an integrated manufacturing system are operated separately or individually and while the protective effects of the safeguards provided for automatic mode are muted or suspended, the relevant safety standards for these machines and equipment shall apply.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3864:1984, *Safety colours and safety signs*.

ISO 6385:1981, *Ergonomic principles in the design of work systems*.

ISO/TR 8373:1988, *Manipulating industrial robots — Vocabulary*.

ISO 10218:1992, *Manipulating industrial robots — Safety*.

CEI 204-1:1992, *Electrical equipment of industrial machines — Part 1: General requirements*.

EN 418:1992, *Safety of machinery — Emergency stop equipment, Functional aspects — Principles for design*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 awareness barrier: Attachment or obstacle that by physical contact warns of an approaching or present hazard.

3.2 barrier: Physical boundary to a hazard.

3.3 controlled stop: The stopping of machine motion by reducing the command signal to 0 once the signal has been recognized by the control but retaining power to the machine actuators during the stopping process. [IEC 204-1:1992, 3.12]

3.4 enabling device: Manually-operated device which, when continuously activated in one position only, allows hazardous functions but does not initiate them. In any other position, hazardous functions are stopped safely.

3.5 guard: Machine element specifically used to provide protection by means of a physical barrier. Depending on its construction, a guard may be called casing, cover, screen, door, enclosing guard, etc.