INTERNATIONAL STANDARD 841

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Numerical control of machines — Axis and motion nomenclature

Commande numérique des machines — Nomenclature des axes et des mouvements

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 97, *Computers and information processing,* has reviewed ISO Recommendation R 841-1968 and found it technically suitable for transformation. International Standard ISO 841 therefore replaces ISO Recommendation R 841-1968, which was approved by the Member Bodies of the following countries :

The Member Bodies of the following countries approved the Recommendation :

Australia	Israel	Spain
Belgium	Italy	Sweden
Czechoslovakia	Japan	Switzerland
Denmark	Korea, Rep. of	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
France	New Zealand	U.S.A.
Germany	Poland	
Iran	Portugal	

No Member Body expressed disapproval of the Recommendation.

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Numerical control of machines — Axis and motion nomenclature

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard defines axis and motion nomenclature for numerically controlled machines. It is intended to simplify programming and to facilitate the interchangeability of recorded data.

1.2 This International Standard applies to all numerically controlled machines.

NOTE — For the sake of simplicity, the majority of the text of this International Standard is written in terms which are applicable to machine-tools but it is nevertheless applicable to numerically controlled machines in general.

1.3 The technical terms used in this International Standard are based on the ISO data processing vocabulary[1].

2 PRINCIPLES USED TO NAME MACHINE MOVEMENTS BASED ON A STANDARD CO-ORDINATE SYSTEM

2.1 This International Standard names a co-ordinate system and the machine movements so that a programmer can describe the machining operations without having to know whether the tool approaches the workpiece or the workpiece approaches the tool. He will always assume that the tool moves relative to the co-ordinate system of the stationary workpiece as defined in 2.2.

2.2 The standard co-ordinate system is a right-handed rectangular Cartesian one, related to a workpiece mounted in a machine and aligned with the principal linear slideways of that machine.

2.3 The positive direction of movement of a component of a machine is that which causes an increasing positive dimension of the workpiece.

2.4 When the machine is used for drilling or boring (using only its three principal linear movements), movement in the negative Z direction will drill or bore into the workpiece.

2.5 When the machine cannot be so used for drilling or boring, special rules are provided to minimize inconsistencies on multipurpose machines.

2.6 On the schematic drawings of the machines, an unprimed letter is used when a tool movement is being dealt with. When a workpiece movement is being dealt with, a primed letter is used and the positive direction of this movement is opposite to the corresponding unprimed letter movement (see clause 10).

3 THE Z AXIS OF MOTION

3.1 The Z axis of motion is (except as described in 3.6) identified by reference to a spindle which imparts cutting power.

3.1.1 In the case of machines such as milling, boring and tapping machines, this spindle rotates the tool.

3.1.2 In the case of machines such as lathes, grinding machines and others which generate a surface of revolution, this spindle rotates the work.

3.2 If there are several spindles, one should be selected as the principal spindle, preferably one perpendicular to the work-holding surface.

3.3 If the principal spindle axis remains constantly parallel to one of the three axes of the standard three-axis system, this axis is the Z axis.

3.4 If the principal spindle axis can be swivelled and if the extent of its motion allows it to lie in only one position parallel to one of the axes of the standard three-axis system, this standard axis is the Z axis.

3.5 If the extent of the swivelling motion is such that the principal spindle may lie parallel to two or three axes of the standard three-axis system, the Z axis is the standard axis which is perpendicular to the work-holding surface of the work-table of the machine, ignoring such ancillaries as angles or packing pieces.

3.6 If there is no spindle, the Z axis is perpendicular to the work-holding surface.

3.7 Positive Z motion increases the clearance between the workpiece and the tool-holder.

1) In preparation.