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INTERNATIONAL STANDARD



3070/0

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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**Test conditions for boring and milling machines with horizontal spindle — Testing of the accuracy — Part 0 : General introduction**

*Conditions d'essais des machines à aléser et à fraiser, à broche horizontale — Contrôle de la précision — Partie 0 : Introduction générale*

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**Descriptors :** machine tools, boring machines, milling machines, testing conditions, vocabulary.

**FOREWORD**

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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.

International Standard ISO 3070/0 was drawn up by Technical Committee ISO/TC 39, *Machine tools*, and circulated to the Member Bodies in May 1973.

It has been approved by the Member Bodies of the following countries:

- |                |                       |                |
|----------------|-----------------------|----------------|
| Austria        | Japan                 | Thailand       |
| Bulgaria       | Mexico                | Turkey         |
| Czechoslovakia | New Zealand           | United Kingdom |
| France         | Romania               | U.S.A.         |
| Germany        | South Africa, Rep. of | U.S.S.R.       |
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The Member Body of the following country expressed disapproval of the document on technical grounds :

- Belgium

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# Test conditions for boring and milling machines with horizontal spindle – Testing of the accuracy – Part 0 : General introduction

## 1 SCOPE AND FIELD OF APPLICATION

So as to avoid any confusion when performing the tests, this International Standard defines the machining operations carried out on boring and milling machines with horizontal spindle and describes the different types of these machines.

These machines are classified according to the three following groups :

- table type machines (sub-clause 3.1);
- planer type machines (sub-clause 3.2);
- movable column machines or floor type machines (sub-clause 3.3).

In addition, this International Standard gives the terminology of certain elements in the English, French, Russian, German and Italian languages.

## 2 DEFINITION OF THE MACHINING OPERATIONS CARRIED OUT ON THESE MACHINES

### 2.1 Boring operations

Boring consists in machining to the required size the diameter of cylindrical, conical, blind or through holes.

In the case of coaxial bores situated on opposite faces of the same workpiece, the operation may be carried out using a boring bar, the driving taper of which is engaged into the nose of the machine boring spindle (figure 4) and the other end of which is rotating within the bearing of the steady block.

Due to the significant amount of dead time incurred by such an operation it is becoming more and more frequent to bore with a special toolholder directly mounted into the spindle nose, then turn the table 180° to bore the opposite side of the workpiece (reverse boring).

Though more economical, this latter method requires closer tolerances for table positioning.

### 2.2 Milling operations

Milling operations mostly involve face milling or end milling. The tools are mounted either in the boring spindle taper (figure 4) or, as for face milling cutters, on the milling spindle nose.

## 3 DEFINITION AND BRIEF DESCRIPTION OF THE VARIOUS TYPES

The machines referred to below are machines with a horizontal spindle. The technical development of tooling and the efforts to limit workpiece mounting and removal operations have led to the production of machines able to bore and mill.

There is a tendency to use both expressions "boring and milling machines" and "milling and boring machines". However, the latter expression would appear to be preferred when the spindle is mounted in a sleeve, quill or ram, with the spindle axis passing through the spindle head (figure 6).

It is generally accepted that these machines fall into three categories characterized by their particular configuration.

### 3.1 Table type machines (see figure 1)

*Machines à montant fixe* (F)

*Tischbohrwerke* (D)

With this type of machine the column is fixed to the bed.

The cutting movement is generated by the rotation of either the spindle and possibly by the facing head.

The feed movements are as follows :

- Longitudinal, transverse and possibly rotary movements of the table.
- Vertical movement of the spindle head.
- Axial movement of the spindle.
- Possibly movement of radial facing slide.

### 3.2 Planer type machines (see figure 2)

*Machines à banc en croix* (F)

*Kreuzbettbohrwerke* (D)

This type of machine may include three beds, the column and the steady beds being placed on each side of the table bed. The steady bed and the steady block are not shown in figure 2, since they are not integral parts of the machine.

The cutting movements are the same as for type 3.1.

The feed movements are as follows :

- Transverse and possibly rotary movement of table.
- Vertical movement of the spindle head.
- Axial movement of the spindle.
- Axial movement of the column on its bed, parallel to the spindle axis.
- Possibly movement of radial facing slide.

**3.3 Movable column machines or floor type machines**  
(see figure 3)

*Machines à montent mobile ou machines à taque (F)*

*Plattenbohrwerke (D)*

When the floor is utilized, the phrase "floor type machine" should be used instead of "movable column machines" to avoid any misunderstanding concerning planer type machines which also have a movable column. With floor type machines the column is movable along the bed alongside which is installed a fixed table to support workpieces which are too bulky or too heavy to be moved during machining.

The cutting movements are the same as for type 3.1.

The feed movements are as follows :

- Transverse movement of the column on the bed.
- Vertical movement of the spindle head.
- Axial movement of the spindle.
- Possibly movement of radial facing slide.

It should be noted that the column may be mounted on slideways to achieve small additional longitudinal feed movement of the column parallel with the spindle axis.

**4 SPECIAL REMARKS CONCERNING PARTICULAR ELEMENTS**

**4.1 Spindle heads**

Reference should be made to the drawings (figures 4, 5 and 6) to consider examples of the various types of head.

Facing heads generally have a radial facing slide and are either integral or removable, the latter being considered only as an accessory.

It should be noted that the integral facing head may not always be mounted onto the milling spindle and may have its own bearing independent from the main spindle bearings.

**4.2 Workpiece table**

Workpiece tables may have various rectilinear and rotary movements for positioning and feed. The two main rectilinear movements, the directions, of which are perpendicular to each other, are used either for positioning the table or giving specified work feeds.

The rotary movement of the table may be used

- a) for angular positioning in the plane of the table rotation;
- b) as a circular work feed for milling operations;
- c) for circular cutting movements for turning operations.

**4.3 Steady blocks**

Due to the decreasing use of long boring bars, there is an increasing tendency to consider steady blocks as optional parts or auxiliary equipment.

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FEED MOVEMENTS

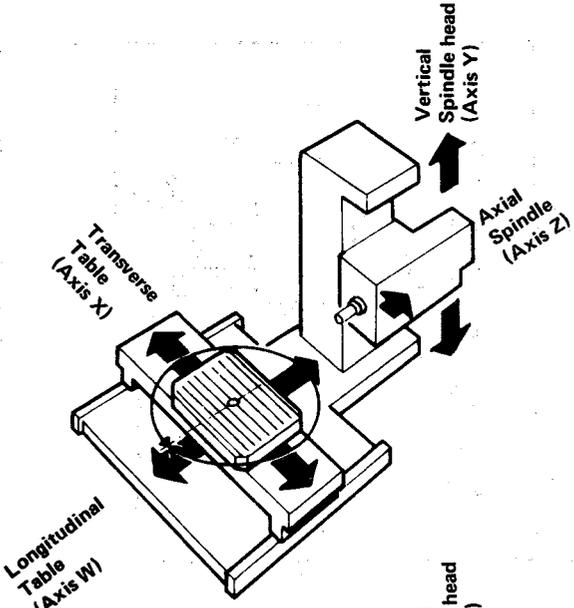


FIGURE 1

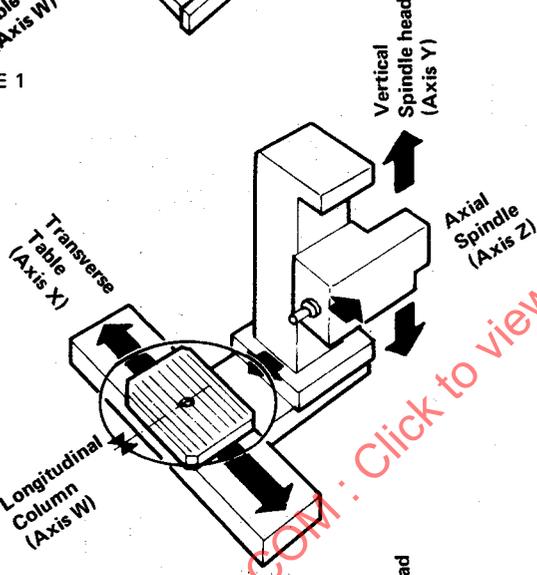


FIGURE 2

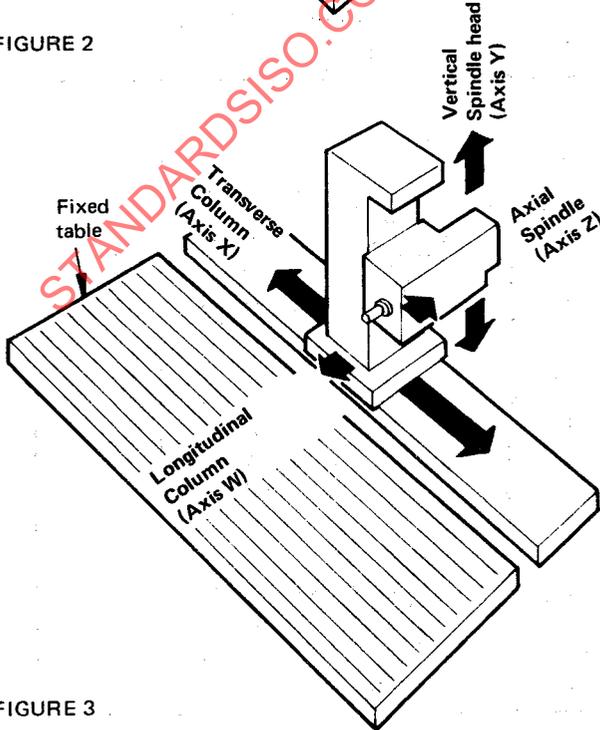


FIGURE 3

SPINDLE HEADS

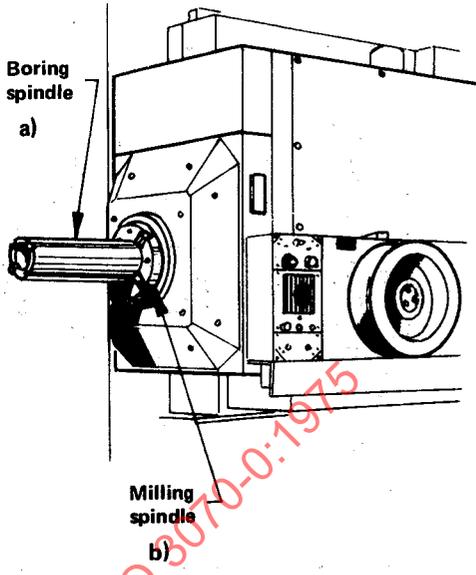


FIGURE 4

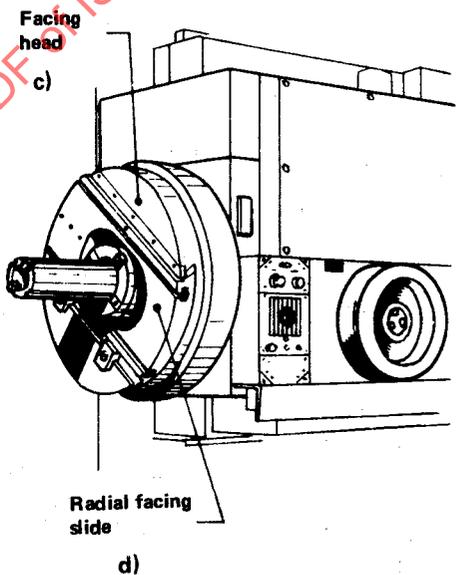


FIGURE 5

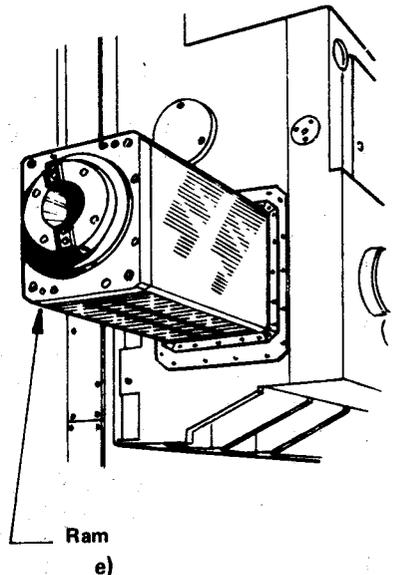
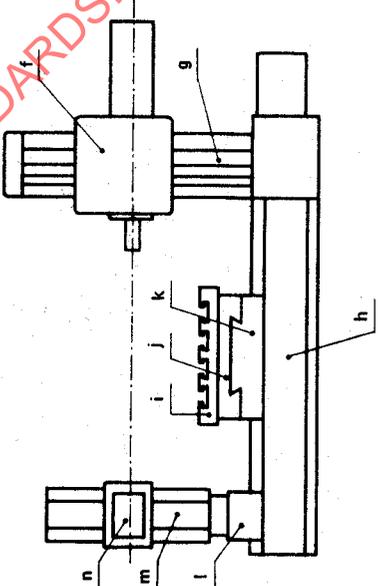
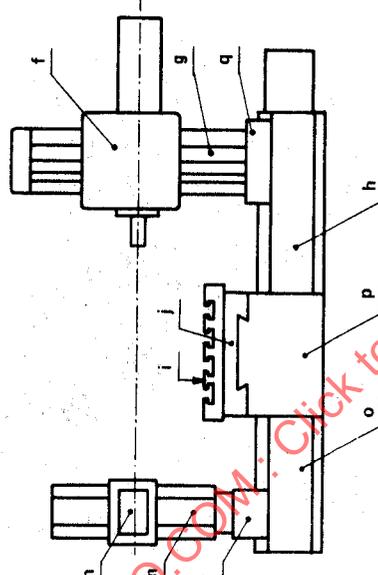
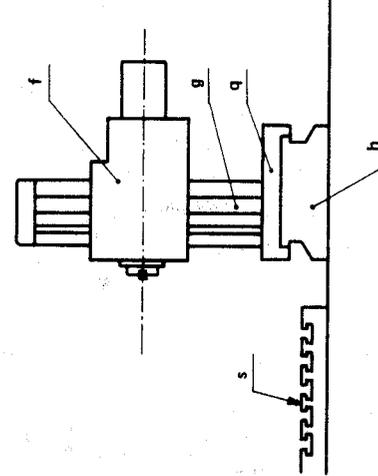
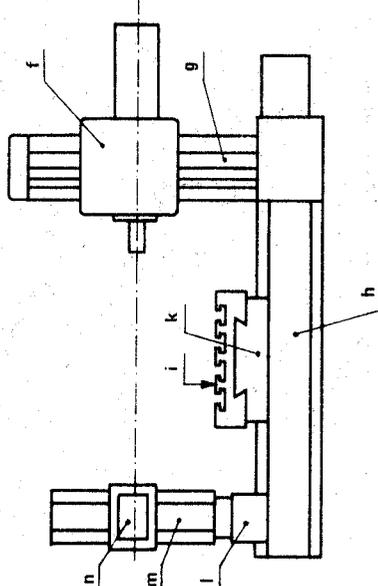
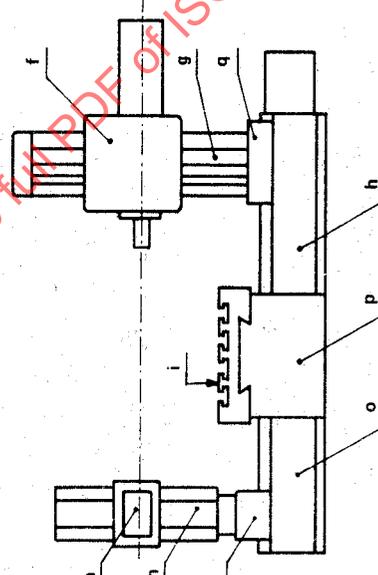
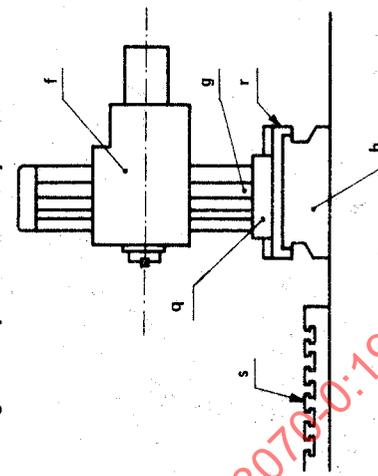


FIGURE 6

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5 TERMINOLOGY

TABLE TYPE MACHINES	PLANNER TYPE MACHINES	MOVABLE COLUMN MACHINES OR FLOOR TYPE MACHINES
<p>with an integral rotary table</p> 	<p>with an integral rotary table</p> 	<p>with a column movable in the transverse direction</p> 
<p>with a non-rotary fixed table</p> 	<p>with a non-rotary fixed table</p> 	<p>with a column movable in two directions: longitudinally and transversely</p> 

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