



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 16977-2019

**Robots and robotic devices - Coordinate systems and motion
nomenclatures**

Issued on: May 10, 2019

Implemented on: December 1, 2019

Issued by: SAMR; SAC

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces GB/T 16977-2005 "Industrial Robot Coordinate System and Motion Nomenclature", and GB/T 16977-2005

The main technical changes are as follows.

--- The scope of application of standards extends from industrial robots to robots;

--- Chapter 3 lists the terms and definitions involved;

--- Added mobile platform coordinate system, job coordinate system, object coordinate system and camera coordinate system related to service robot.

This standard uses the translation method equivalent to ISO 9787.2013 "Robot and Robot

Equipment Coordinate System and Motion Naming Principles".

This standard was proposed by the China Machinery Industry Federation.

This standard is under the jurisdiction of the National Automation System and Integration Standardization Technical Committee (SAC/TC159).

This standard was drafted. Beijing Machinery Industry Automation Research Institute, Lihong Safety Equipment Engineering (Shanghai) Co., Ltd., Zibo (Jiangsu) Machine Instrument Co., Ltd., Na Enbo (Tianjin) Technology Co., Ltd., Cobos Robot Co., Ltd., Shanghai Jiaotong University, Chongqing Luban Machine Human Technology Research Institute Co., Ltd.

introduction

This standard is one of the series of national standards for robots and robotic equipment. The related standards are. vocabulary, safety, general characteristics, and sex.

Can be standardized and its test methods and mechanical interfaces. These standards are interrelated and related to other standards.

Appendix A of this standard provides examples of applications for robots of various mechanical construction types.

Robot and robot equipment

Coordinate system and motion naming principles

1 Scope

This standard defines and standardizes the robot coordinate system, and also gives the naming principle of the symbolic representation of the basic motion of the robot, so as to facilitate

The robot is calibrated, tested and programmed.

This standard applies to all robots and robotic equipment defined in GB/T 12643-2013.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 12643-2013 Vocabulary for Robotics and Robotics (ISO 8373.2012, IDT)

3 Terms and definitions

The following terms and definitions as defined in GB/T 12643-2013 apply to this document.
For ease of use, the following is repeated

Certain terms and definitions in GB/T 12643-2013.

3.1

Configuration configuration

A set of displacement values for all joints of the robot shape can be completely determined at any time.

[GB/T 12643-2013, definition 3.5]

3.2

Base mounting surface

The connecting surface between the robot and its support.

[GB/T 12643-2013, definition 3.9]

3.3

Mobile platform mobileplatform

An assembly of all components that enable the mobile robot to achieve full motion.

Note. Rewrite GB/T 12643-2013, definition 3.18.

3.4

Absolute coordinate system worldcoordinatesystem

Regardless of the robot motion, refer to the invariant coordinate system of the earth.

[GB/T 12643-2013, definition 4.7.1]

3.5

Base coordinate system basecoordinatesystem

Refer to the coordinate system of the mounting surface of the base.

[GB/T 12643-2013, definition 4.7.2]

3.6

Mechanical interface coordinate system mechanical interfacecoordinatesystem

Refer to the coordinate system of the mechanical interface.

[GB/T 12643-2013, definition 4.7.3]

3.7

Tool coordinate system toolcoordinatesystem

TCS

Refer to the coordinate system of the tool or end effector mounted on the mechanical interface.

[GB/T 12643-2013, definition 4.7.5]

3.8

Workspace workingspace

The space that can be swept by the reference point of the wrist is the area where the joints of the wrists are translated or rotated to be attached to the reference point of the wrist.

[GB/T 12643-2013, definition 4.8.4]

3.9

Tool center point toolcentrepnt

TCP

Refer to the point where the mechanical interface coordinate system is set for a certain purpose.

[GB/T 12643-2013, definition 4.9]

3.10

Mobile platform origin mobileplatformorigin

Mobile platform reference point mobileplatformreferencepoint

The origin of the mobile platform coordinate system.

[GB/T 12643-2013, definition 4.11]

3.11

Job coordinate system taskcoordinatesystem

Refer to the coordinate system of the job site and denote it as $O_k-X_k-Y_k-Z_k$.

[GB/T 19400-2003, definition 3.3.5]

3.12

Object coordinate system objectcoordinatesystem

The coordinate system with the object as the reference, and is represented as $O_j-X_j-Y_j-Z_j$.