



The Lao People's Democratic Republic
Peace, Independence, Democracy, Unity, Prosperity

Occupational Standard

Occupational Code:

Technician for Industrial Robot (Level IVET4)

Developing Unit(s)	Laos	Vocational Education Development Institute, Ministry of Education and Sports, Lao PDR
	China	Guangxi Vocational & Technical Institute of Industry, Hunan Railway Professional Technology College
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I. Background

Vocational education and training is one of the most important sub-sectors of education in Laos, which is responsible for cultivating skilled labor to support the national economic agenda of industrialization. Lao's Vision 2030 and Ten-Year Socio-Economic Development Strategy (2016-2025) aim Lao PDR to become a developing country with upper-middle income and with innovative, green and sustainable economic growth, which requires a skilled workforce that meets the needs of public and private economic sectors. In order to standardize the practitioners' behaviors in Laos, guide the vocational education and training, and provide a basis for vocational skill appraisal, Vocational Education Development Institute, Ministry of Education and Sports, Lao PDR authorized Lancang-Mekong China Education and Training Promotion Alliance to help Laos introduce vocational education resources from China, give full play to the advantages and characteristics of Chinese vocational education, and jointly build Laos national occupational standards and incorporate them into Laos national vocational education system to meet the needs of the labor market and the national economic agenda. The Alliance organized relevant experts from China and Laos to jointly formulate the Occupational Standard for Technician for Industrial Robot (Level IVET4) (hereinafter referred to as the Standard).

I. This Standard, taking the *Occupational Classification of People's Republic of China (PRC)* as reference, strictly following the relevant requirements of the *Labor Law of the Lao People's Democratic Republic*, the *Education Law of the Lao People's Democratic Republic* and the *Prime Minister's Decree on Vocational Education and Skills Development*, and taking "professional activities as the guide and professional skills as the core" as the guiding ideology, standardizes and describes in detail the professional activities of Technician for Industrial Robot (Level IVET4), and describes their skill level and theoretical knowledge level.

II. Authorization unit of this Standard: Vocational Education Development Institute, Ministry of Education and Sports, Lao PDR.

III. In the process of developing this *Standard*, we have received strong support from the Guangxi Research Institute of Mechanical Industry Co. Ltd., Huibo Robotics and other units, for which we would like to express our gratitude.

IV. Due to the rapid development of technology, this Standard is valid for 3-5 years. At that time, it is necessary to formulate new occupational standards according to the current situation of labor market.

II. Developing Unit(s)

The developing unit(s) of this Standard: Guangxi Vocational & Technical Institute of Industry, Hunan Railway Professional Technology College.

Developers include:

No.	Developing Unit	Name	Position/title	Main Duty in the Project
1	Guangxi Vocational & Technical Institute of Industry	Yang Quan	Dean/ Associate Professor	Overall project co-ordination, co-ordination of staff division of labour, control of development progress, quality control.
2	Guangxi Vocational & Technical Institute of Industry	Xie Yu	Head of Speciality/ Senior Lecturer	Participation in the development of occupational standards, liaison in the organization of meetings, minutes of meetings
3	Guangxi Vocational & Technical Institute of Industry	Wu Jian	Associate Dean/ Associate Professor	Participation in the development of standards and review of materials
4	Guangxi Vocational & Technical Institute of Industry	Qu Hongyuan	Senior Engineer	Participation in the development of occupational standards, proofreading of materials
5	Guangxi Vocational & Technical Institute of Industry	Huang Jie	Associate Dean/ Associate Professor	Research on relevant Lao policies as well as collation and proofreading of standards, criteria and related materials, liaising and communicating with foreign parties

6	Guangxi Vocational & Technical Institute of Industry	Liang Beiyuan	Lecturer	Participation in the development of occupational standards, data collection and archiving
7	Hunan Railway Professional Technology College	Duan Shuhua	Dean of Secondary College/ Professor	Coordination of staff division of labour, development progress control, quality control
8	Hunan Railway Professional Technology College	Liu Hailong	Head of Speciality/ Associate Professor	Participation in the development of standards and review of materials
9	Hunan Railway Professional Technology College	Nan Xiangtong	Deputy Head of Department/ Lecturer	Participation in the development of standards and review of materials
10	Hunan Railway Professional Technology College	Yang Li	Associate Professor	Participation in the development of standards and review of materials
11	Hunan Railway Professional Technology College	Zhang Zhu	Lecturer	Participation in the development of standards and review of materials
12	Hunan Railway Professional Technology College	Yi Tao	Lecturer	Participation in the development of standards and review of materials

III. Overview

The occupational standard contains five aspects:

1. Occupational profile, including name of the occupation, level of the occupation, definition of the occupation, occupational environmental conditions, characteristics of the occupational abilities, general education attainment, reference training hours, and requirements for occupational skills assessment.
2. Basic requirements, including professional ethics and basic knowledge.
3. Outline of occupational functions.
4. Job requirements.
5. Weight table of knowledge and skills.

The *Standard* emphasizes the core knowledge, skills, abilities and personal qualities that a technician for industrial robot (Level IVET3) must possess in order to successfully perform the functions of the occupation, including:

- 1) Specialized English knowledge for industrial robot
- 2) Knowledge of mechanical system installation and debugging
- 3) Knowledge of electrical system installation and debugging
- 4) Basic knowledge of industrial robot system operation
- (5) Industrial robot system programming and debugging
- 6) Industrial robot system planning and adjustment
- 7) Knowledge of technical management
- 8) Training guidance
- 9) Safety production and environmental protection knowledge performance verification
- 10) Quality management knowledge safety verification
- (11) Knowledge of relevant laws and regulations

Occupational Standard

for Technician for Industrial Robot (Level IVET4)

1. Occupational Profile

1.1 Name of Occupation

Technician for Industrial Robot

1.2 Level of Occupation

IVET4

1.3 Definition of Occupation

Persons engaged in using human-machine interaction equipment such as teaching pendant, operation panels, and related mechanical tools to assemble, program, debug, change process parameters, replace fixture and other auxiliary operations for industrial robots, industrial robot workstations or systems.

1.4 Occupational Environmental Conditions

Indoors, at room temperature.

1.5 Characteristics of Occupational Abilities

Strong ability in learning, expression, calculation, operation and logical thinking, with certain spatial sense, perception of form and body, normal colour vision, flexible fingers and arms, and good co-ordination of movement.

1.6 General Educational Attainment

Graduate from senior high school, secondary vocational school, obtain IVET3 certificate or possess the equivalent academic ability.

1.7 Reference Training Hours

80 standard class hours.

1.8 Requirements for Occupational Skill Appraisal

1.8.1 Application Conditions

Those who meet one of the following conditions can apply for this grade:

(1) After obtaining the IVET3 certificate of this occupation or related occupation, have been engaged in this occupation or related occupation for a cumulative total of 4 years (inclusive) or more.

(2) After obtaining the IVET3 certificate of this occupation or related occupation, have been engaged in this occupation or related occupation for a cumulative total of 3 years (inclusive) or more, have reached the prescribed standard class hours through the IVET4 formal training of this occupation or related occupation, and have obtained the completion certificate.

1.8.2 Appraisal Method

It is divided into theoretical knowledge examination, skills assessment and comprehensive evaluation. The theoretical knowledge examination is based on written tests, machine tests and other methods, mainly to assess the basic requirements and related knowledge requirements that practitioners should master to engage in this occupation; the skills assessment is mainly carried out by means of on-site operations, simulated operations and other methods, mainly to assess the level of skills that practitioners should have to engage in this occupation; and the comprehensive evaluation usually adopts the application materials, defence and other ways to carry out a comprehensive evaluation and review.

Theoretical knowledge examination, skills assessment and comprehensive evaluation are implemented in the hundred-point system, and those who score 60 points(inclusive) or more will be qualified.

2. Basic Requirements

2.1 Professional Ethics

2.1.1 Basic Knowledge of Professional Ethics

2.1.2 Professional Code

- (1) Comply with the law and dedicate to work
- (2) Perform duties and strive for excellence
- (3) Standardize operation and take good care of equipment
- (4) Focus on safety and civilized production
- (5) Be honest and trustworthy and strengthen solidarity and coordination
- (6) Continue to learn and dare to innovate

2.2 Basic Knowledge

2.2.1 Specialized English Knowledge for Industrial Robot

- (1) Specialized vocabulary for industrial robot system
- (2) Elementary English for mechanical and electrical engineering

2.2.2 Knowledge of Mechanical System Installation and Commissioning

- (1) Mechanical engineering drawings
- (2) Mechanical principle and design
- (3) Tolerance fit and form and position tolerance
- (4) Measurement and error analysis

2.2.3 Knowledge of Electrical System Installation and Commissioning

- (1) Electrical wiring diagram
- (2) Electrical and electronic technology
- (3) Electrical control technology
- (4) Hydraulic and pneumatic technology and application
- (5) Principle and application of sensor
- (6) Motion control technology and application

- (7) Programmable control technology and application

2.2.4 Knowledge of Industrial Robot System Operation

- (1) Definition and configuration classification of industrial robot
- (2) Basic composition of industrial robot body
- (3) Industrial robot system settings
- (4) Industrial robot system simulation and debugging
- (5) Industrial robot teaching programming and operation
- (6) Industrial system network foundation
- (7) Use of common assembly tools, instruments and jigs and fixtures
- (8) Mechanical and electrical assembly processes and operation

2.2.5 Knowledge of Safety Production and Environmental Protection

- (1) Requirements for civilized production on site
- (2) Safety operation and labour protection
- (3) Safety use of electricity
- (4) Environmental protection

2.2.6 Knowledge of Quality Management

- (1) Enterprise quality management objectives
- (2) Post quality management requirements
- (3) Post quality assurance measures and responsibilities

2.2.7 Basic Knowledge of Safety Production

- (1) Knowledge related to safety use of electricity
- (2) Knowledge of fire, explosion, water and theft prevention
- (3) Knowledge related to security and confidentiality

2.2.8 Knowledge of Relevant Laws and Regulations

- (1) Knowledge of labour law
- (2) Knowledge of the cybersecurity law

3. Outline of Occupational Functions

Occupational function	Job Description				
1. Industrial Robot System Parameter Setting	1.1 System settings with external axes	1.2 System calibration with external axes	1.3 Operation and maintenance of industrial robot system and external devices		
2. System Operation and Programming Debugging	2.1 Industrial robot system programming and optimization	2.2 System programming of industrial robot with external axes	2.3 External device communication and application programming	2.4 Integrated application programming for industrial robot production line	2.5 Industrial robot system integration, operation and maintenance
3. Industrial Robot System Simulation and Development	3.1 Virtual debugging of industrial robot system	3.2 Secondary development of industrial robot	3.3 Application scheme formulation	3.4 System evaluation and optimization	
4. Technical Management	4.1 System implementation management	4.2 On-site personnel management			
5. Training and Guidance	5.1 Training	5.2 Skill guidance			

4. Job Requirements

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system parameter setting	Occupational function No.	401
Job description	System settings with external axes	Job description No.	4011
Appraisal criteria	The person performing this job must be able to carry out system settings with external axes in accordance with the operation manual.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Robot external axis parameters</p> <p>1.2 Import the system configuration parameters to the industrial robot controller</p> <p>1.3 Configure interlock signals between system units</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Configure external axis parameters according to the operation manual</p> <p>2. Import system configuration parameters into the industrial robot controller.</p> <p>3. Configure interlock signals between system units according to task requirements</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system parameter setting	Occupational function No.	401
Job description	System calibration with external axes	Job description No.	4012
Appraisal criteria	The person performing this job must be able to carry out system calibration with external axes in accordance with the operation manual.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Industrial robot body coordinate system calibration</p> <p>1.2 Coordinate system calibration of external axes</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Complete the coordinate system calibration of the industrial robot body and linear external axes according to the operation manual.</p> <p>2. Complete the coordinate system calibration of the industrial robot body and rotary external axes according to the operation manual.</p> <p>3. Complete the coordinate system calibration between multiple industrial robot bodies according to the operation manual.</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system parameter setting	Occupational function No.	401
Job description	Operation and maintenance of industrial robot system and external devices	Job description No.	4013
Appraisal criteria	The person performing this job must be able to carry out hardware and software maintenance of industrial robot system and external device operation and maintenance in accordance with the operation manual.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Replacement of industrial robot body batteries</p> <p>1.2 Calibration of industrial robot axis joints</p> <p>1.3 Inspection and troubleshooting of industrial robot system wiring</p> <p>1.4 Recovery and restoration of industrial robot software system</p> <p>1.5 Calibration and other routine maintenance of industrial robot touch screen</p> <p>1.6 Maintenance of movable joints of industrial robots</p> <p>2. Essential Skills</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Replace the batteries of industrial robots and complete the corresponding joint calibration according to the operation manual.</p> <p>2. Complete the configuration, restoration and recovery from system failure of industrial robots according to the operation manual.</p> <p>3. Complete the daily operation configuration, calibration and system maintenance of the industrial robot teaching pendant according to the operation manual.</p> <p>4. Complete the inspection, lubricant</p>	

<p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>	<p>replacement and daily maintenance of moving joints, belts and other parts of industrial robot according to the operation manual.</p> <p>5. Complete the wiring inspection and troubleshooting of industrial robot system according to operation manual.</p>
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Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	System operation and programming debugging	Occupational function No.	402
Job description	Programming and optimization of industrial robot system	Job description No.	4021
Appraisal criteria	The person performing this job must be able to carry out industrial robot system programming and optimization.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Industrial robot system programs and parameters</p> <p>1.2 Industrial robot system program optimization method</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Debug industrial robot system programs and parameters according to process requirements</p> <p>2. Optimize industrial robot system program according to process requirements</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	System operation and programming debugging	Occupational function No.	402
Job description	System programming of industrial robot with external axes	Job description No.	4022
Appraisal criteria	The person performing this job must be able to carry out programming the system with external axes in accordance with the operation manual		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Industrial robot linear axis linkage</p> <p>1.2 Industrial robot rotation axis linkage</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Use external axis control instructions for programming to achieve linear axis linkage according to the task requirements.</p> <p>2. Use external axis control instructions for programming to achieve rotation axis linkage according to the task requirements.</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	System operation and programming debugging	Occupational function No.	402
Job description	External device communications and application programming	Job description No.	4023
Appraisal criteria	The person performing this job must be able to carry out external device communication and application programming in accordance with the operation manual.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Industrial robot communication function module</p> <p>1.2 System application program under the linkage between robots and external devices</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Use existing communication function module, set interface parameters, and compile external device communication programs according to the task requirements.</p> <p>2. Develop customized communication function modules and compile external device communication programs according to the task requirements.</p> <p>3. Realize system applications under the linkage of robots and external devices according to the task requirements.</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	System operation and programming debugging	Occupational function No.	402
Job description	Integrated application programming for industrial robot production line	Job description No.	4024
Appraisal criteria	The person performing this job must be able to carry out the integrated application programming of production line in accordance with the operation manual.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Human-machine interface program for industrial robot production line</p> <p>1.2 Integrated applications for industrial robot production line</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Design process flow and install industrial robot production line according to the task requirements</p> <p>2. Develop human-machine interface program for industrial robot production lines according to the task requirements.</p> <p>3. Develop comprehensive applications for industrial robot production lines according to task requirements.</p>	

3.3 Optimism and devotion	
3.4 Consistency	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	System operation and programming debugging	Occupational function No.	402
Job description	Industrial robot system integration, operation and maintenance	Job description No.	4025
Appraisal criteria	The person performing this job must be able to carry out industrial robot system integration and operation and maintenance in accordance with operation manuals		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Integration of industrial robots and external devices</p> <p>1.2 Periodic linkage of industrial robots and external devices</p> <p>1.3 Communication of industrial robot external devices</p> <p>1.4 Multi-device programming and joint debugging</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Design comprehensive application programs of industrial robots according to the task requirements.</p> <p>2. Design industrial robots and sensor data acquisition and processing according to the task requirements</p> <p>3. Design and debug the program of robot system external devices according to task requirements</p> <p>4. Achieve multi-device communication and joint debugging according to the task requirements</p> <p>5. Realize system integration and</p>	

<p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>	<p>debugging of industrial robots, sensors, control devices, PLCs or upper computers and other equipment according to the task requirements.</p> <p>6. Realize the operation and maintenance of the robot integrated application system according to the task requirements.</p>
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Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system simulation and development	Occupational function No.	403
Job description	Virtual debugging of industrial robot system	Job description No.	4031
Appraisal criteria	The person performing this job must be able to carry out virtual debugging of the system in accordance with the operation manual		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Building of industrial robot application system in virtual simulation software</p> <p>1.2 Virtual debugging and verification of the industrial robot application system</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Build industrial robot application system in virtual simulation software and configure virtual debugging parameters according to the task requirements.</p> <p>2. Realize simulation programming verification and optimize the industrial robot system and process flow according to the production process and on-site requirements.</p> <p>3. Carry out virtual debugging and verification of industrial robot application system according to task requirements</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system simulation and development	Occupational function No.	403
Job description	Secondary development of industrial robot	Job description No.	4032
Appraisal criteria	The person performing this job must be able to realize the secondary development of industrial robot system in accordance with the task requirements		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory Steps and processes of secondary development</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Realize the secondary development environment configuration of industrial robot system according to the task requirements</p> <p>2. Use SDK for secondary development programming of industrial robots according to the task requirements</p> <p>3. Develop teaching box application according to the task requirements</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system simulation and development	Occupational function No.	403
Job description	Application scheme formulation	Job description No.	4033
Appraisal criteria	The person performing this job must be able to participate in the development of robot system integration planning program and application programming for human-machine collaborative operations.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Methods for formulating robot system integration planning schemes</p> <p>1.2 Technical parameters of the core components of the robot system</p> <p>1.3 Methods for estimating cost of each hardware component of robot system</p> <p>1.4 Impact of performance degradation of the core components of the robot system on the technical parameters of the robot system</p> <p>1.5 Methods for the application of the industrial internet of things, industrial big data, artificial intelligence, etc.</p> <p>1.6 Methods for developing programming</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Participate in programming and debugging of the system program for human-machine collaborative operation system integration planning according to the product characteristics, workshop structure layout, production rhythm, cost, etc.</p> <p>2. Develop robot system upgrading application program according to the technical parameters of the robot system contained in the existing production equipment, according to new products, new processes, new standards, etc. Participate in the development of robotics system integration planning program and</p>	

<p>specifications for robot system</p> <p>1.7 Requirements for the preparation of specifications for the use of robots and fixtures for robot system</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>	<p>programming and debugging of human-machine collaborative operation according to the characteristics of the product, the layout of the workshop structure, the production timing, cost, etc.</p> <p>3. Formulate emergency response plans and standard operating procedures (SOP) for robot system failures for smart workshops or smart factories.</p> <p>4. Develop programming specifications according to the robot system application program</p> <p>5. Develop specifications for the use of robots and fixtures in accordance with the application of robot system.</p>
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Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Industrial robot system simulation and development	Occupational function No.	403
Job description	System evaluation and optimization	Job description No.	4034
Appraisal criteria	The person performing this job must be able to optimize robot system equipment and system evaluation in accordance with production management data.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Use method of intelligent production management system</p> <p>1.2 Method of production process optimization</p> <p>1.3 Method of production planning and production timing management</p> <p>1.4 Method of the preparation of the technical summary report</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Optimize the robot system equipment and related parameters and improve the equipment operating rate according to the production management data.</p> <p>2. Propose the optimization of the production process, timing, tooling and layout of the robot system according to the actual production requirements.</p> <p>3. Summarize the status for production of use of new technologies, processes, materials, etc., and prepare technical summary reports according to the improvement and optimization of the robot system.</p>	

<p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>	<p>4. Debug industrial robot system programs and parameters according to process requirements.</p> <p>5. Optimize industrial robot system programs according to process requirements.</p>
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Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Technical management	Occupational function No.	404
Job description	System implementation management	Job description No.	4041
Appraisal criteria	The person performing this job must be able to implement management according to the robot system integration or technical solutions.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Content and development methods of the implementation rules of the robot system</p> <p>1.2 Engineering management methods</p> <p>1.3 Robot system acceptance methods</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Develop implementation rules according to robot system integration or technical solutions</p> <p>2. Carry out technical management of the whole process of robot system from construction to acceptance.</p> <p>3. Complete the trial operation and equipment acceptance of the robot system</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Technical management	Occupational function No.	404
Job description	On-site personnel management	Job description No.	4042
Appraisal criteria	The person performing this job must be able to carry out on-site management according to the actual situation of the production line site.		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>1.1 Management methods of robotic system operator</p> <p>1.2 Organization and management methods of multi-person collaborative work</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Develop robot system operator management specifications according to the production plan</p> <p>2. Organize the collaborative work of robot system operators according to the actual situation of the production line.</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Training guidance	Occupational function No.	405
Job description	Training	Job description No.	4051
Appraisal criteria	The person performing this job must be able to train level II/technician personnel in theoretical knowledge and skills		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>Methods for the preparation of training materials and practical operation instructions</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Train level II/technician personnel in theoretical knowledge and skills</p> <p>2. Organize and prepare training materials and practical operation instructions</p>	

Occupation	Technician for Industrial Robot	Occupational level	IVET4
Occupational function No.	Training guide	Occupational function No.	405
Job description	Skill guidance	Job description No.	4052
Appraisal criteria	The person performing this job must be able to instruct level II/ technician personnel in robotic workstation or system skills instruction and training		
Working environment	Software: computer, Portal software Hardware: industrial robot, PLC, inverter, network cable, switch, touch screen, servo system		
Requirements of theoretical knowledge		Requirements of practical skills	
<p>The person performing this job must be able to explain:</p> <p>1. Theory</p> <p>Methods for troubleshooting, emergency or difficult problems</p> <p>2. Essential Skills</p> <p>2.1 Good communication skills</p> <p>2.2 Teamwork ability</p> <p>2.3 Independent study and research spirit</p> <p>3. Professionalism</p> <p>3.1 Love and dedication</p> <p>3.2 Strictness and prudence</p> <p>3.3 Optimism and devotion</p> <p>3.4 Consistency</p>		<p>The person performing this job must be able to do the following:</p> <p>1. Instruct level II/ technician personnel in the installation, setup, operation, programming, and debugging of robotic workstations or systems</p> <p>2. Instruct level II/ technician personnel on site to handle malfunctions, emergencies or difficult problems of robotic workstations or systems</p>	

5. Weight Table of Knowledge and Skills

5.1 Weight Table of Theoretical Knowledge

Item (s)		Proportion (%)	Corresponding Courses
Basic Requirements	Professional ethics	5	<i>College English, Advanced Mathematics, Computer Applications and Artificial Intelligence Fundamentals, Mental Health Education for College Students, Safety Education, Physical Education and Vocational Fitness, Aesthetics Courses, Applied Electrical Technology, Mechanical Drawing, Mechanical Design Fundamentals, PLC Application Technology, EPLAN Technology and Electrical Controls</i>
	Basic knowledge	5	
Relevant Knowledge Requirements	Installation and debugging of mechanical system	-	
	Installation and debugging of electrical system	-	
	System operation and programming debugging	15	
	System planning and adjustment	40	
	Technical management	20	
	Training guidance	15	
Total		100	

5.2 Weight Table of Skill Requirements

Item (s)		Proportion (%)	Corresponding Courses
Skill Requirements	Installation and debugging of electrical system	-	<i>Machine Vision Technology, Industrial Robotics Fundamentals and Field Programming, Industrial Robotics System Integration, Industrial Robotics System Modelling, Industrial Robot Production Line Simulation Technology, Frequency Conversion Servo Drive Technology, Hydraulic and Pneumatic Technology, Advanced Manufacturing Technology, Numerical Control Processing Technology</i>
	Installation and debugging of electrical system	-	
	System operation and programming debugging	20	
	System planning and adjustment	45	
	Technical management	20	
	Training guidance	15	
Total		100	

