

Planned Textbook by Automation Teaching Instruction Committee of Higher Vocational Education of Ministry of Education, PRC
中国教育部高职高专自动化技术专业教学指导委员会规划教材
Achievement in Development of Teaching Resources for Items of the National Vocational Students Skills Competition in 2008
2008年中国职业院校技能大赛赛项教学资源开发成果
Achievement in National Excellent Curriculum Development "Installation & Testing of Automatic Production Line" in 2010
2010年中国国家级《自动化生产线安装与调试》精品课程建设成果

Installation & Testing of Automatic Production Line

自动化生产线**安装与调试**

Lv Jingquan, Chief Editor

吕景泉 主编

Wang Jinfeng, Chief English Editor

王金凤 译审



English Version

英文版

Planned Textbook by Automation Teaching Instruction Committee of Higher Vocational Education of Ministry of Education, PRC
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Lv Jingquan **Chief Editor**

Wang Jinfeng **Chief English Editor**

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Wang Jinfeng, Chen Zhifang, Xue Jian,
Wang Huayi, Zhu Xiaoying, Ren Huifang, **Translators**
Zhao Wanhui, Li Meiyong, Song Bo



English Version

Introduction to the contents

The book consists of six parts. Chapter Zero is the project guidance, which mainly introduces guiding ideology and teaching design. Chapter One is the project start, which introduces national vocational skill competitions and typical Automatic Production Line (APL). Chapter Two is the project preparation, which comprehensively explains knowledge points, technical points and skill points that APL requires. Chapter Three is the project acceptance, which mainly introduces installation and testing process of the five working stations with typical APL as a carrier. Chapter Four is the project decision, which mainly introduces equipment installation, gas circuit connection, electric circuit design and connection in typical APL. Chapter Five is the project challenging, which briefly introduces trend in development of APL and application of modern technology. The disk includes audio materials of Chapter Zero, Chapter One, Vocabulary and Teaching PPT as well.

The book is available for a higher vocational education school curriculum textbook. It also can be used as the reference of the relevant engineers and technicians.

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Brief Introduction to Authors and Translators

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- The 3rd National Distinguished Teacher
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Brief Introduction to Authors and Translators

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- Province-level College Distinguished Teacher
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Main Titles and honors:

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- Leader of Province Excellent Curriculum “Industrial Control Configuration and Touch Screen Technology”
- Leader of Province Excellent Curriculum “PLC Technology”
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The textbook is translated mainly by the English teachers from Tianjin Sino-German Vocational Technical College and in addition, translator (Zhang Yanlin) from Tianjin Iron & Steel Company. The translation tasks for chapters is as following,

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Chapter One: WangJinfeng, Li Meiyong

Chapter Two: Task One and Two: Ren Huifang

Task Three and Four: WangJinfeng, Zhu Xiao Ying

Task Five: Chen Zhifang

Task Six: Zhao Wanhui

Task Seven: Wang Huayi

Chapter Three: WangJinfeng, Ren Huifang, Li Meiyong

Chapter Four: Xue Jian, Zhu Xiaoying

Chapter Five: Chen Zhifang, Wang Huayi, Zhao Wanhui, Song Bo



中国国家教育部与天津市人民政府联合国家有关部委，已经成功举办了4届全国职业院校技能大赛，技能大赛既是学生展示风采技艺比武的舞台，也是集中展示职业教育改革建设成果的平台；既是学校与企业合作沟通的渠道，也是社会各界及国（境）外同行了解中国职业教育的窗口。举办技能大赛的重要目的之一就是引领和促进职业教育教学改革和创新，赛项的开发与设计始终遵循教育与产业深度合作的原则，按照企业岗位要求和职业标准设计赛项、研制赛题，组织裁判工作和提供技术保障，因此，统筹安排赛项成果向教学资源的转化是各赛项执委会的责任之一。

“自动化生产线安装与调试”是教育部高职高专自动化技术类专业教学指导委员会牵头设计、2008年首批入选的全国高职组比赛项目，比赛内容源于相关职业岗位具体要求，既考核了岗位通用技术和选手能力，又考察了选手团队合作精神、职业道德等综合素质。继2008年之后，高职高专自动化技术类专业教学指导委员会连续四年在全国举办该项赛事，使赛项设计日臻完善，影响日益扩大，2012年又一次入选全国职业院校技能大赛高职组比赛项目。

《自动化生产线安装与调试》立体化教材，以赛项为依托，采取任务驱动形式，完整地体现了赛项对学生技术技能、职业素质、团队合作等方面的要求，实为学生日常实训、教师指导学生的重要参考。

该书发行3年来，再版2次，发行量逾5万册，还被译为英文版发行到东盟国家，对东盟技能大赛的赛项设计，产生了重要影响，同时，也是东盟国家学生2012年来华参与中国全国职业院校技能大赛的基础。

此次再版，作者进行了认真的修订，内容更加详实，进一步丰富了职业教育教学资源。

希望各赛项都能以技能大赛为平台，通过多种手段将大赛成果转化为教学资源，也希望作者再接再厉，通过组织、承办比赛，推出更多精品实训教材，更好地发挥技能大赛对教育教学改革的引领和指导作用，促进我国职业教育教学水平不断提高。

中国（全国）职业院校技能大赛执行委员会常务副主任

天津市教育委员会主任

靳润成

2012年6月6日

PREFACE

In cooperation with the national ministries and commissions, the Ministry of Education, PRC and Tianjin Municipal Government have successfully held four sessions of the National Vocational Students Skills Competition. This competition is not only the stage for displaying the students' professional skills, but also the platform for showing the achievements of vocational education reform and development. It is not only the channel of communication between schools and enterprises, but also the window in which domestic and foreign professionals are able to see and learn about vocational education in China. One of the important purposes for holding the skills competition is to lead and promote the reform and innovation of vocational education. The development and design of the competition events pursue the principles of profound cooperation between education and industries. The competition events involving design, competition questions, referee task, and technical support is completed according to the enterprise's requirements to the specific work position and its career standards. Therefore, one of the main duties of the executive committees of different competitions is to transfer competition achievements into teaching resource.

“Installation & Testing of Automatic Production Line”, which is designed by the Automation Teaching Instruction Committee of Higher Vocational Education, Ministry of Education, PRC, was first selected to be a competition event in 2008. The competition contents originate from the specific requirements of the relevant working positions. The competition not only assesses the competitors' general skills and ability, but also examines their overall quality of teamwork and professional ethics, etc. Since 2008, the Automation Teaching Instruction Committee of Higher Vocational Education has successively held the competition for four consecutive years, making the competition more perfect and having greater influence. “Automatic Production Line Installation and Testing” has once again become one of the competition events of National Vocational Students Skills Competition in 2012.

The comprehensive textbook of “Installation & Testing of Automatic Production Line” focuses on the competition events and task-oriented style, and reflects the competition requirements of the students' skills, professional quality and teamwork, etc. Therefore, it is an important reference both for students' daily training and for the teacher's guidance for the students.

Since its publication three years ago, the textbook has been reprinted 2 times. More than 50,000 are in circulation. It has also been translated into English and issued to the ASEAN nations, which has great influence on the ASEAN Skills Competition Design. It is also the basic material for the ASEAN students who will come to China to participate in the National Vocational Students Skills Competition in 2012.

With this latest reprint, the author has conducted the revision. Therefore, vocational education teaching resource has been enriched.

It is hoped that achievements in competition events are to be transferred to teaching resources through various means regarding the skills competition as a platform. The author hopes to make further effort to release more quality training materials by way of organizing and holding competitions. The skills competition will play a leading and guiding role in education and teaching reform, thus improving national vocational education and teaching.

Executive Deputy Director of the Executive Committee
of National Vocational Students Skills Competition
Director of Tianjin Municipal Education Committee

Jin Runcheng
June 6, 2012

FOREWORD

This book is a comprehensive and practical English version of “Installation & Testing of the Automatic Production Line(2nd Edition)”, the planned textbook by the Automation Teaching Instruction Committee of Higher Vocational Education of Ministry of Education, PRC. It focuses on work-processes, National Vocational Students’Skills Competitions, electro-mechanical skills training, and professional English teaching for electro-mechanical major students.

“Installation & Testing of the Automatic Production Line” is one of the competition events of the First National Vocational Students’Skill Competition held in Tianjin in June, 2008. This event was organized by the Ministry of Education of China, Tianjin Municipal Government, Ministry of Labor and Social Security, Ministry of personnel, Ministry of Construction, Ministry of Transportation, Ministry of Information and Industry and so on. During the 8th ASEAN Skills Competition held in Bangkok of Thailand in October, 2010, the Installation and Testing of Automatic Production Line was one of the competition events. The competition equipment, content and standards were provided from China. During the preparatory meeting for the 9th ASEAN Skills competition held in Jakarta in December, 2011, the YL-335B Automatic Production Line Equipment was designated as the competition equipment for the “Industrial Automation Competition Event”. The 9th ASEAN Skills Competition will be held in Jakarta in October, 2012.

The ASEAN Skills Competition is under the World Skills Competition, demonstrating that fully recognized the YL-335B Automatic Production Line Equipment in 10th ASEAN nations. This also shows that the competition standards, contents and teaching resources of the Installation and Testing of Automatic Production Line of China Vocational Education have been internationally recognized.

The 5th National Vocational Students Skills Competition will be held in June, 2012, and the Installation and Testing of Automatic Production Line will be one of the competition events in the higher vocational group.

This book is work-process oriented, and it focuses on the core technologies of APL, which embodies the principles of excellence, sufficiency, and suitability in its use. It is a comprehensive textbook. Many teachers in vocational colleges have made favorable comments on the book, and it is widely used since its publication. The English edition of the “Installation & Testing of Automatic Production Line” aims at internationalize the

competition resources and to serve the professional English courses as well as short-term electro-mechanical skills training.

The book is mainly translated by the teachers of Tianjin Sino-German Vocational Technical College and the engineers from enterprises. The teachers who are involved in the translation have received training for electro-mechanical and basic of the APL knowledge. In order to make the translation more professional and accurate, these teachers frequently communicated with electro-mechanical teachers during the translation of the book.

Task of the Editors

The book includes six main parts. Tasks have been distributed as follows: Prof. Lv Jingquan and Prof. Li Wen were in charge of project guidance Prof. Lv Jingquan and associate Prof. Tang Xiaohua were in charge of the project start; Associate Prof. Tang Xiaohua was in charge of the project preparation; Associate Prof. Zhang Wenming was in charge of the project acceptance; Prof. Li Jun was in charge of the project decision; Prof. Li Wen was in charge of the project challenging; Prof. Lv Jingquan and Prof. Li Wen were in charge of the project design and associate Prof. Yao Ji has aided and supported this book; Senior Engineer Zhang Tongsu has given guidance and provided various materials for the book, and also completed the mission manual and program list; Senior Engineer Li Bo has tested the program of the equipment and completed other various tasks. The whole book was planned and guided by Prof. Lv Jingquan.

Task of the Translators

The translation tasks have been distributed as follows: associate Prof. Wang Jinfeng was in charge of Chapter Zero. Associate Prof. Wang Jinfeng and Li Meiyong were in charge of Chapter One. Ren Huifang was in charge of task One and two of Chapter Two; Associate Prof. Wang Jinfeng and Zhu Xiaoying were in charge of task Three and Four of Chapter Two; Associate Prof. Chen Zhifang was in charge of task Five of Chapter Two; Zhao Wanhui was in charge of task Six of Chapter Two; Wang Huayi was in charge of task Seven of Chapter Two. Associate Prof. Wang Jinfeng, Ren Huifang and Li Meiyong were in charge of Chapter Three. Xue Jian and Zhu Xiaoying were in charge of Chapter Four. Chen Zhifang, Zhao Wanhui, Wang Huayi and Song Bo were in charge of Chapter Five. The translation team has obtained help from American NI Company, Chinese Yalong Science and Technology Group, Prof. Qian Yiqiu (Secretary-General of Automation Teaching Instruction Committee) and American teacher, Jason. The English version of the Installation & Testing of Automatic Production Line has been wholly edited by associate Prof. Wang Jinfeng.

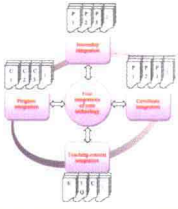
Editors

June 6, 2012

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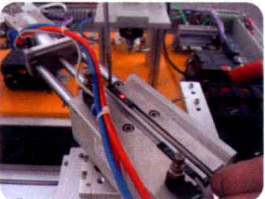
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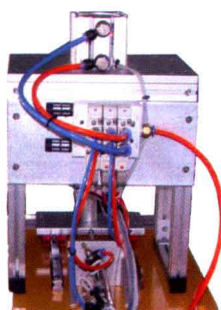
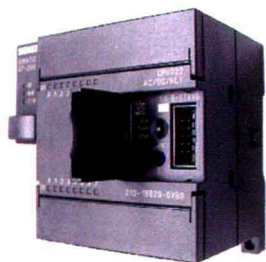
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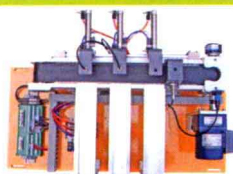


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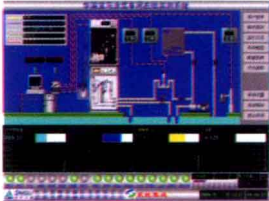
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Installation & Testing of
Automatic Production Line



Chapter Zero

Project Guidance —Teaching Design

Teaching through practice is considered as one of the most important ways and means for higher vocational students to obtain practical ability and multi-vocational abilities. It plays a very important role in the system of higher vocational education. Designing skills training practicum and professional skills training practicum and stimulating the students' interest in studying on their own are essential in training students to apply their acquired knowledge in production practice, which are the qualifications required in working post and also the prerequisite for obtaining ability for sustainable development.

Explanation One Guiding Ideology

To incorporate Integration of Program Core Technology into the curriculum development and teaching practice. To establish four integrations of core technology of professional courses on core knowledge and skills of the curriculum (See Fig. 0-1). Adapt to action guided teaching requirements, increasing the students' comprehensive adaptabilities to working posts. Train highly skilled personnel who need “short transitional period” or “no transitional period”.

This project has won a second class medal for national teaching achievement in 2009.

Integration of program core technologies: Focus on professional training and clearly define a number of core technologies and skills. Plan the system of professional courses as a whole according to core technologies and skills. Make clear the core knowledge and skills in each course and to establish a teaching context (module) guided by working process. Incorporate theory, experiment, training, internships and employment. To build up an integrated and crossed teaching network of classroom, laboratory, attached workshop and production shop. Stressing theory and practice being paralleled, combined and cross-linked to each other longitudinally and

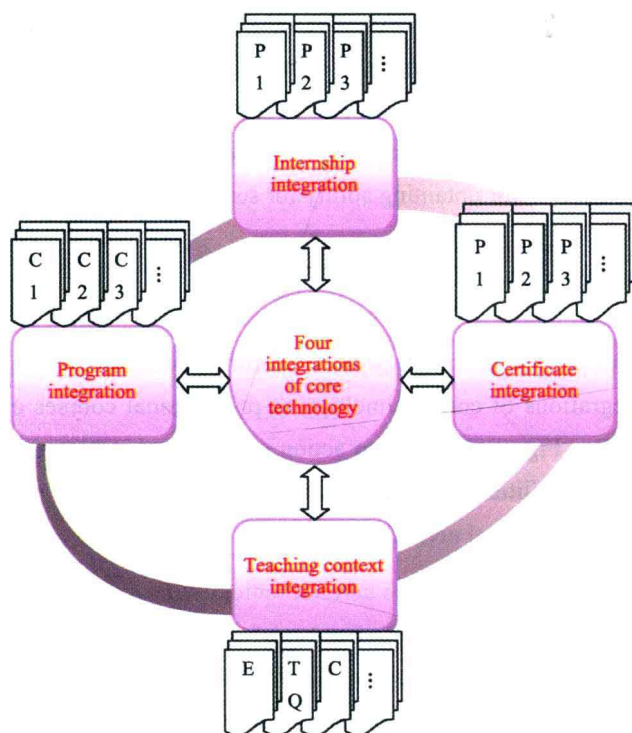
transversely. The teaching process centers around core technologies and skills. Making the curriculum system and teaching contents serve the core technologies and skills and to enable the higher vocational graduates in this field to really acquire the ability to work. Aiming at training highly skilled personnel who need “short transitional period” or “no transitional period”.

— quoted from “Study and Practice of Construction Mode of ‘Integration of Core Technologies’ in Higher Vocational Electro-mechanics” by professor Lv Jingquan.

This project has won a second class medal for the national teaching achievement in 2005.

Action Guided Teaching: From the point of view of teaching professional knowledge and skills, generally increase the students’ comprehensive professional abilities. Enable them to systematically consider problems faced in their work, to understand the meaning of the work to be done, to be familiar with the work procedures and schedule, and to possess abilities to plan, perform and inspect on their own. As a prerequisite to be responsible for the society and to be able to effectively cooperate and communicate with other people. Work actively, carefully, on their own initiative, with a high sense of responsibility and quality; possess a sustainable ability in the associated technical field to adapt to the requirement in the future.

— quoted from “Application and Research on Action Guided Teaching Method in Higher Vocational Teaching Practice” by Professor Lv-Jingquan.



I'm the panda team coach



Fig.0-1 Four integrations of core technologies





Explanation Two Teaching Design

Basic requirement: Equipment in production line for training and mechanical platform for typical Automatic Production Line (APL) should be provided. Each mechanism has a comprehensive function of electro-mechanical technology. The design concept of “Integration of core technologies” will be represented to build up a platform of action guided teaching mode.

Requirements for teachers: They should have a comprehensive knowledge of integration of electro-mechanical, be familiar with Automatic Production Line technology and possess great abilities in teaching and project developing.

Teaching carrier: Taking the YL-335 Automatic Production Line as the training platform to realize the design concept of curriculum development of core technology integration (see Fig. 0-2). Each project of the five sub-stations in the production line comprehensively covers the core technical skills in electro-mechanical field. It can be used to train and assess the students’ ability of mastering core technology and application. It’s an effective way to develop students’ ability in technical innovation.

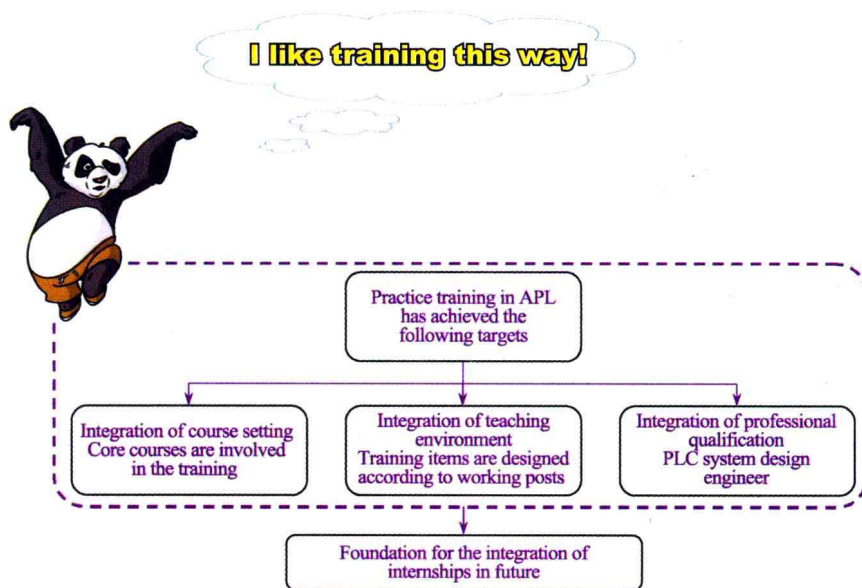


Fig.0-2 Relationship between APL and core technologies

Training mode: Groups of three students cooperate with each other in order to complete installation and testing of the five sub-stations in the automatic production line (see Fig. 0-3).

The general training equipment can be used for single station teaching, dual-stations teaching, multi-stations teaching and general on-line teaching. Each station covers different knowledge and skills. Schools or colleges may make related choices according to its specific requirements in vocational teachings.