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Research on Teaching Boundaries and Optimization Paths of the Course "Industrial Network and Configuration Technology" Based on Differences in Professional Core Competencies

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Abstract: As a "digital cornerstone" course in contemporary engineering education, "Industrial Network and Configuration Technology" has been widely integrated into the teaching system of engineering majors, aiming to cultivate interdisciplinary talents capable of connecting bottom-level control, top-level platforms, and cross-field integration. This paper focuses on the teaching boundary issues of the course. By constructing an analysis model oriented to professional core competencies (e.g., "control" for automation majors, "communication/computation" for computer majors, "measurement" for measurement and control majors, "connection" for intelligent manufacturing majors, and "stability" for energy majors), it systematically analyzes the differentiated characteristics of different majors in terms of teaching objectives, prerequisite course foundation, and teaching content focus. The research clarifies the teaching positioning of key technologies such as configuration technology, industrial networks, industrial communication protocols, and security integration in related majors, as well as the diversified roles of SCADA systems as teaching carriers. Based on the above findings, this paper further proposes an optimization strategy of Minimum Viable Industrial Monitoring Project (MVP), providing theoretical basis and practical paths for enhancing the professional adaptability and overall teaching effectiveness of the course.

Keywords: Industrial Network and Configuration Technology; Teaching Boundaries; Digital Cornerstone; SCADA System; MVP.

1. Research Background of Teaching Boundaries in the Course "Industrial Network and Configuration Technology"

As the core technology for realizing equipment interconnection, data integration, and system monitoring, industrial network and configuration technology has become an indispensable part of the modern industrial automation field. In the construction of university professional clusters, this course is widely offered in multiple majors such as automation/electrical engineering, computer/internet of things (IoT), measurement and control/instrumentation, intelligent manufacturing/robotics, and energy/power engineering[1]. However, due to significant differences in training objectives and core competencies among different majors, the issue of "boundaries" in course teaching has become increasingly prominent. On the one hand, the course content has strong versatility in the field of modern manufacturing, leading to obvious differences in teaching objective setting, teaching content focus, and practical ability requirements among different majors; on the other hand, the varying prerequisite knowledge reserves of students result in uneven teaching effects, making it urgent to conduct targeted teaching design based on the characteristics of different majors. Therefore, in-depth research on the teaching boundaries of "Industrial Network and Configuration Technology" across various majors, and clarifying the teaching focus and knowledge connection paths for each major, are of great significance for improving teaching quality and cultivating interdisciplinary talents meeting industrial needs.

2. Course Orientation and Professional Core Competency-Oriented Analysis of "Industrial Network and Configuration Technology"

2.1. Overview of the Course Content System

The course content of "Industrial Network and Configuration Technology" mainly covers four modules, as shown in Figure 1. While the content is highly versatile in modern manufacturing, its teaching focus varies greatly among different majors and needs to be adjusted according to professional core competencies.

2.2. Course Orientation – The "Digital Cornerstone" of Contemporary Engineering Education "Industrial Network and Configuration Technology" is Hailed as the "Digital Cornerstone" Course in the Contemporary Engineering Education System

This positioning accurately condenses its fundamental, supportive, and leading core status in the training of contemporary engineering talents. The term "cornerstone" does not refer to the simplicity or basic nature of the course content, but highlights its role as the primary and core carrier connecting physical industrial scenarios with the digital

information space. It undertakes the core supporting function of building the underlying architecture for the digitalization, networking, and intellectualization of industrial systems, and serves as an important theoretical and practical foundation driving the digital transformation of modern industry. Its connotation is mainly reflected in the following four dimensions:

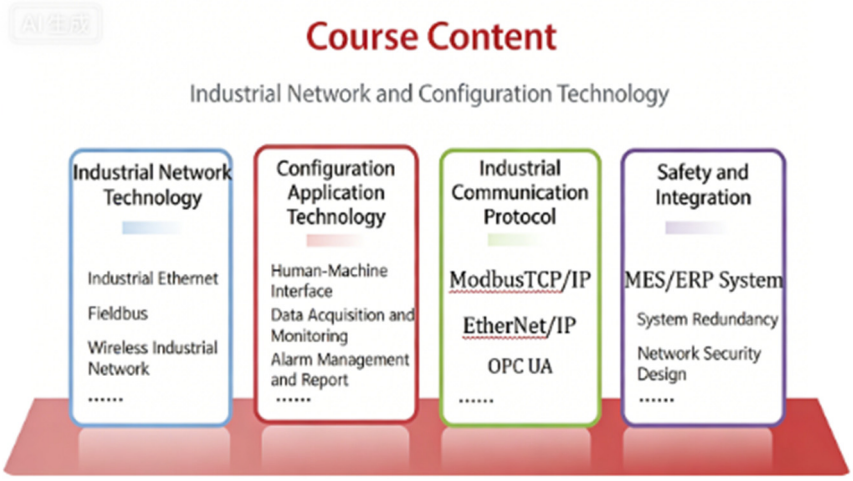


Figure 1. Main Content of Industrial Network and Configuration Technology

2.2.1. Thinking Cornerstone – Dual Construction of "System Thinking" and "Data Thinking" (The Most Core Implicit Connotation)

The course promotes students to reconstruct their perspective of observing and understanding industrial systems from a new dimension. Emphasizing the shift from "individual equipment" to "interconnected systems", it requires students to no longer only focus on how to control a single motor or valve, but to consider how they exchange data and collaborate through networks. This process helps establish crucial system architecture thinking.

Furthermore, the shift from "signal flow" to "data flow" requires students to understand that a 4-20mA current signal, after being transmitted through the network and entering the database, is transformed into data assets that can be used for monitoring, analysis, and optimization. This lays the foundation for data-driven decision-making thinking.

2.2.2. Knowledge Cornerstone – Integrating Interdisciplinary Knowledge Nodes of "OT" and "IT" (The Most Explicit Knowledge Connotation)

The course integrates the intersection of three knowledge domains: "control", "network", and "IT", as shown in Figure 2. It fills the knowledge gap in traditional engineering education. Instead of simply superimposing the three, the course focuses on how to organically integrate them to build a practical monitoring system, solving the key problem of how IT technology can safely and reliably empower OT needs.

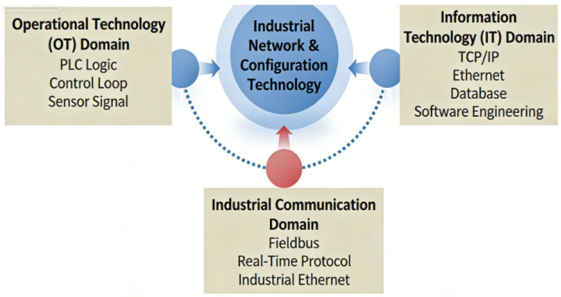


Figure 2. Intersection of Three Knowledge Domains: "Control", "Network", and "IT"

2.2.3. Competency Cornerstone – Cultivating Engineering Capabilities of "System Integration" and "Problem-Solving" (Key Practical Connotation)

Through typical course projects (such as building a SCADA system for a small production line), students experience the complete whole process of "miniature" industrial system integration for the first time, as shown in Figure 3 (SCADA Construction Process). This process cultivates the initial form of the core competency of "solving complex engineering problems" in the era of intelligent manufacturing.

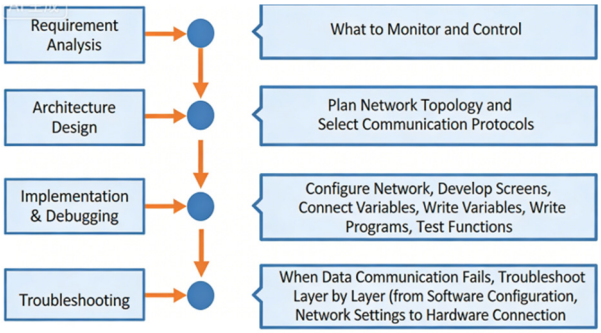


Figure 3. SCADA Construction Process

2.2.4. Transformation Cornerstone – The Starting Point for Supporting Personal and Industrial Intelligent Transformation (Future-Oriented Developmental Connotation)

From a personal development perspective, "Industrial Network and Configuration Technology" builds a key transitional bridge for engineering students to move from traditional industrial technology fields to emerging high-value fields such as industrial internet, digital twins, and intelligent manufacturing. Mastering this "cornerstone" is equivalent to laying a solid technical foundation, providing strong support for subsequent learning of advanced content such as big data analysis, AI algorithms, and cloud platform development.

From an industrial development perspective, the talents cultivated by the course are exactly the "interpreters" and

"implementers" urgently needed by enterprises for digital, networked, and intelligent transformation. They understand both the production processes and actual needs of industrial sites and digital technologies, and can effectively convert business requirements into technical solutions.

2.2.5. The Course Possesses Irreplaceable Basic and Hub Status in the Knowledge System of New Engineering Talents

The reason why "Industrial Network and Configuration Technology" is called a "cornerstone" rather than a "brick" lies in their functional positioning. A "brick" is limited to building a single wall, serving as a unitary building component; a "cornerstone" must bear the weight of the entire building and determine the overall structural stability of the building. If the traditional course "Electrical Control and PLC Technology" is a "brick" focusing on the field of control logic, then "Industrial Network and Configuration Technology" is the "cornerstone" supporting subsequent professional learning and industrial applications. It mainly has the following characteristics:

Bears and connects multiple "walls" such as control, network, and software.

Determines the stability of the superstructure (e.g., MES, big data analysis, digital twins).

Without it or if it is weak, the entire "digital building" cannot be constructed.

Therefore, referring to it as a "digital cornerstone" course accurately emphasizes its irreplaceable basic and hub status in cultivating the knowledge system of new engineering talents who support China's industrial intelligent transformation.

2.3. Analysis of Core Competencies, Course Roles, Prerequisites, and Boundaries of Related Majors

Based on the differences in core competencies of various majors, the positioning, functions, and connection logic of "Industrial Network and Configuration Technology" in the curriculum systems of different majors vary significantly. Specifically, it can be divided into five types of roles, as shown in Table 1.

Table 1. Roles of Industrial Network and Configuration Technology in Different Major Types

Major Category	Automation/Electrical Engineering Majors	Computer/IoT Majors	Measurement and Control/Instrumentation Majors	Intelligent Manufacturing/Robotics Majors	Energy/Power Engineering Majors
Role	Core Connecting Course	Technology Expansion Course	Direction Pillar Course	System Integration Course	Safety Assurance Course

2.3.1. Automation/Electrical Engineering Majors: Core Connecting Course

The essence of the "core competency" of automation/electrical engineering majors is "solving complex engineering control problems". It is a systematic competency system centered on "control" and expanding outward layer by layer[2]. Systematic control thinking is the underlying thinking mode that distinguishes it from other engineering majors and serves as the starting point of the core competency of this major, as shown in Figure 4.

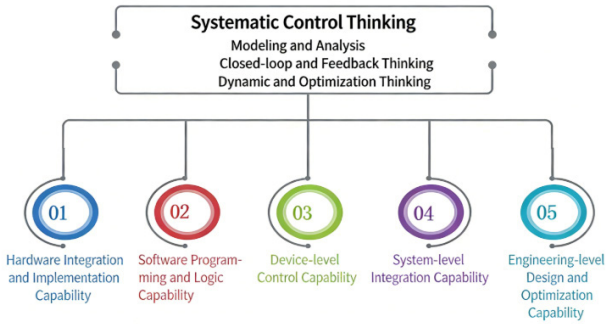


Figure 4. Thinking Ability Diagram of Automation/Electrical Engineering Majors

As a core connecting course of the major, it is a key link in the industrial control technology system. It needs to closely connect prerequisite courses such as "Electrical Control and PLC Technology" and "Electrical and Electronic Technology". On the one hand, it undertakes the foundation of control logic such as PLC programming and motor drive; on the other hand, through industrial network configuration technology, it helps students achieve the competency leap from "single equipment control" to "multi-equipment collaborative control", ultimately forming a complete technical closed loop of "control logic design - network connection configuration - system integration and commissioning", matching the training demand for the core competency of "control" in this major category.

2.3.2. Computer/IoT Majors: Technology Expansion Course

The core competency of computer/IoT majors can be summarized as "building intelligent channels for interaction between the digital world and the physical world centered on data"[3]. Different from the perspective of "controlling physical objects" in automation majors, the core of computer/IoT majors lies in "processing and empowerment".

If the industrial system is compared to a person, automation majors cultivate experts proficient in "motor nerves and conditioned reflexes", responsible for making various parts of the body (equipment) work accurately, collaboratively, and stably. Computer/IoT majors, on the other hand, cultivate experts who build "perceptual systems, information hubs, and cerebral cortices", responsible for collecting sensory signals (data), establishing high-speed neural pathways (networks), forming memory and cognition (platforms), and ultimately making advanced decisions (intelligent applications).

The two intersect in the course "Industrial Network and Configuration Technology". Graduates of automation majors focus on using and integrating these technologies to control physical systems; computer/IoT majors tend to develop, enhance, and empower the technologies themselves to make them more powerful, intelligent, and open. This is the fundamental reason for the existence of teaching boundaries of this course in these two major categories.

Therefore, "Industrial Network and Configuration Technology" is designated as a professional expansion course for computer/IoT majors, serving as an important carrier for extending computer technology to industrial scenarios. In

teaching, it needs to be deeply integrated with core courses such as "Computer Networks" and "Database Principles", transforming general IT technologies such as TCP/IP protocols and data storage into application capabilities adapted to industrial scenarios, such as "industrial Ethernet configuration", "OPC UA protocol development", and "industrial data storage management". This fills the knowledge gap of this major category in the field of "industrial-grade communication and data integration" and supports the implementation of its core competencies of "communication" and "computation".

2.3.3. Measurement and Control/Instrumentation Majors: Direction Pillar Course

The core competency of measurement and control technology/instrumentation majors can be defined as: "accurately perceiving the physical world and reliably converting it into actionable digital information". If computer majors are "architects" of information and automation majors are "commanders" of systems, then measurement and control majors are frontline "scouts" and "analysts" – everything starts with measurement and ends with data.

Graduates of measurement and control majors are experts in "ensuring the quality of industrial data sources". In the intelligent manufacturing and industrial internet systems, they ensure the accuracy and reliability of every data point uploaded to SCADA, MES, and even cloud-based big data platforms. They are the bridge connecting cutting-edge sensing technologies with upper-level information systems, and their core competencies determine the solidity of the foundation of the entire data-driven decision-making system. This is the fundamental reason why this major always focuses on the unique teaching boundary of "how data is collected, whether it is accurate, and how it is used" in the course "Industrial Network and Configuration Technology".

Therefore, as a key course in the field of acquisition and monitoring, industrial network and configuration technology is the core support for measurement and control technology to move from "single-point detection" to "networked monitoring". The course needs to rely on prerequisite knowledge such as "Sensors and Detection Technology" and "Error Theory and Data Processing", focusing on the design of end-to-end data acquisition solutions of "sensor - network - configuration software". It mainly addresses issues such as "how high-precision data can be stably transmitted through industrial networks" and "how to realize real-time data monitoring and abnormal early warning through configuration interfaces", directly serving to deepen the core competency of "measurement" in this major.

2.3.4. Intelligent Manufacturing/Robotics Majors: System Integration Course

For intelligent manufacturing/robotics majors, their core competency is defined as: "designing and optimizing advanced production systems with in-depth integration of 'mechanical - electrical - software - network - intelligent' technologies, and realizing their autonomous collaboration and continuous evolution". It transcends the scope of traditional single disciplines and is the system integration of multi-disciplinary knowledge such as mechanical engineering, automation, computer science, information technology, and management, aiming to solve the overall problems of complex manufacturing systems[4].

Intelligent manufacturing/robotics majors cultivate "chief architects of manufacturing systems". They will stand at the overall perspective of workshops and factories, considering how to integrate advanced automation equipment, information systems, and intelligent algorithms into a flexible, efficient, perceptible, and optimizable organic whole. Their core value lies in the system integration and innovation capability of "1+1>2", which is exactly the most urgently needed capability for the transformation and upgrading of the current manufacturing industry. In the course "Industrial Network and Configuration Technology", the focus is not on isolated network configuration or software operation, but on how to master and apply these two as essential technologies for realizing intelligent manufacturing featuring "interconnection of all things, data-driven, and virtual-real integration".

For example, SCADA is regarded as the core of workshop-level visualization and information integration, and configuration technology is used to build a "command center" integrating 3D visualization (digital twin interface), real-time production information (orders, materials), and equipment status. It also enables seamless communication between the EtherCAT network of robots, the PROFIBUS network of machine tools, and the backbone PROFINET network, ensuring the integrated and real-time collaboration of heterogeneous networks for multi-device synchronization, as shown in Figure 5.

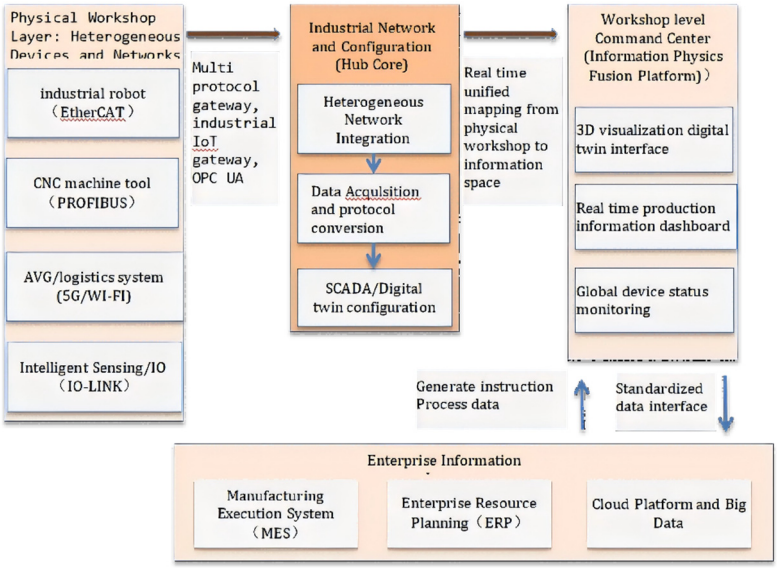


Figure 5. Hub Core Course for Intelligent Manufacturing Majors

Therefore, the course is positioned as a "hub core course" in the intelligent manufacturing technology system, undertaking the role of a system integration course. In teaching, it needs to be linked with courses such as "Production Planning and Control", "Introduction to MES Systems", and "Fundamentals of Digital Twins". Through industrial networks, it realizes vertical connection of "equipment layer (robots, production lines) - data layer (acquisition and transmission) - application layer (MES, digital twin platforms)", helping students understand the overall architecture of intelligent manufacturing systems and aligning with the training objective of its core competency of "connection".

2.3.5. Energy/Power Engineering Majors: Safety Assurance Course

For energy/power engineering majors, their core competency can be accurately defined as: "ensuring the safe, efficient, stable, and clean operation of large-scale energy conversion and transmission systems, and realizing their intelligent monitoring and optimization". It focuses on the multi-objective dynamic balance of "safety, economy, and environmental protection", and its professional system is built around three pillars: "object cognition, system control, and operation optimization", forming a distinct field distinction from automation, computer, and other majors [5].

As a course on process monitoring and optimization, "Industrial Network and Configuration Technology" is a key technical foundation for ensuring the safe and stable operation of energy systems. The course needs to be closely combined with pre-background knowledge such as "Thermal Process Control" and "System Reliability Engineering", focusing on three core modules: wide-area energy network monitoring architecture design, redundant communication configuration (to avoid single-point failures), and data anomaly diagnosis and maintenance during long-term operation. Relying on configuration technology, it realizes real-time monitoring and risk early warning in scenarios such as power plants and power grids, accurately targeting the training objective of the core competency of "stability" for energy majors.

In course teaching, what students learn is not general industrial network and configuration technology, but how to transform these technologies into exclusive solutions adapted to high-risk and continuous process industries. The extreme emphasis on reliability, safety, and industry regulations has thus become a clear boundary that distinguishes this course from other engineering majors in teaching and practical links.

3. Anchoring the Core Hub of the Course – SCADA

SCADA (Supervisory Control and Data Acquisition) is a core technical system in the industrial field for realizing equipment monitoring, data acquisition, remote control, and operation and maintenance management.[6] It serves as the "neural hub" connecting the industrial physical world with digital management.

SCADA is not a simple software tool, but a minimized complete industrial system prototype that puts the theories of "network" and "configuration" into practice. Its "meta-engineering" attribute establishes its core position in course teaching.

3.1. The Core Functions of SCADA Systems Become a Unified Benchmark and Integration Bridge for Teaching in Various Majors

Through the closed-loop process of "acquisition - transmission - processing - control - feedback", SCADA realizes full-process management and control of industrial sites. Its core functions are divided into four modules: data acquisition, data transmission and processing, remote monitoring and visualization, and automatic control and operation and maintenance. These four modules can become a unified benchmark and integration bridge for teaching in different majors for the following three reasons:

It is a "unified benchmark" for comprehensive capabilities

The ability to successfully design, implement, or understand a SCADA system is the ultimate assessment of whether students have mastered the core concepts of this course. It comprehensively tests students' mastery of network communication, data management, human-computer interaction, process understanding, and even engineering specifications.

It is an "integration bridge" for knowledge modules

In SCADA projects, students must actively connect previously isolated knowledge from courses such as "PLC Control and Programming", "Computer Networks", and "Database Principles" to solve real engineering problems. This ability of "integrated application" is exactly the most valuable quality of modern engineers.

It is an "intersection" of professional thinking

When analyzing and discussing the same SCADA system, students majoring in automation focus on the completeness of control logic, students majoring in computer science consider the rationality and scalability of the architecture, and students majoring in intelligent manufacturing evaluate the depth of information integration. This multi-perspective intersection is the best scenario for cultivating interdisciplinary system thinking.

3.2. How Different Majors Build Capabilities Around the "Core Hub" SCADA

In the course "Industrial Network and Configuration Technology", if "industrial network" is compared to "blood vessels and nerves" (responsible for data transmission), and "configuration technology" is compared to "cerebral cortex and facial features" (responsible for logical processing and interaction), then SCADA, as a system, is the final complete living organism that can breathe and operate. It integrates all abstract technical points in the course into a visible, tangible, and operational "living system". It is a key teaching carrier adapted to the training of core competencies of different majors, as shown in Table 2.

In Table 2, each major operates around this core along its unique track (professional perspective), with the ultimate goal of understanding, constructing, or optimizing this classic system representing modern industrial monitoring concepts. This enables SCADA to transcend the limitations of specific majors and become an undisputed, unified theoretical focus and practical hub in the course "Industrial Network and Configuration Technology". Mastering SCADA means mastering the key to connecting industrial sites with the digital world.

Table 2. Professional Perspectives of Related Majors with SCADA as the Carrier

Major Category	Industrial Perspective	Key Capabilities Built	Mapped Core Skills
Automation/Electrical Engineering	Monitoring Brain of Control Systems	Key Capabilities Built	High-reliability and real-time monitoring logic and safety interlocking between PLC/DCS and SCADA
Computer/IoT	A Typical Complex Distributed Software System	Platform Architecture and Data Engineering	Underlying protocols (OPC UA), data architecture, network security, cloud deployment
Intelligent Manufacturing	Integrated Command Center of Digital Factories	MES/MOM System Integration and Visualization	Integrating multi-source data from robots, AGVs, machine tools, etc., and fusing visualization with production information
Measurement and Control/Instrumentation	Visualized Analysis Platform for Precision Data	High-Precision Data Acquisition, Analysis, and Advanced Applications	P&ID standard configuration, alarm and safety interlock configuration, long-term data management and analysis
Energy/Power Engineering	"Neural Hub" Platform for Continuous, Safe, and Efficient Operation of Energy Facilities	Safety Monitoring and Regulation Execution; Energy Efficiency Analysis and Operation Optimization	P&ID standard configuration, alarm and safety interlock configuration, long-term data management and analysis

4. Refinement of Course Modules and Class Hour Suggestions Based on Teaching Boundaries of Each Major

4.1. Construction of a Course Model Oriented to Core Competencies of "Control, Communication, Computation, Measurement, Connection, and Stability"

Based on the orientation of "one major, one core competency", "Industrial Network and Configuration Technology" has different focuses in different majors. Automation/electrical engineering majors take "control" as the core, computer/IoT majors take "communication" and "computation" as the core, measurement and control/ instrumentation majors take "measurement" as the core, intelligent manufacturing/robotics majors take "connection" as the core, and energy/power engineering majors take "stability" as the core. In course teaching, according to the professional core competency orientation of "control, communication, computation, measurement, connection, and stability", the weights of course knowledge modules in each major are shown in Table 3.

Table 3. Weights Based on Core Competency Orientation of Each Major

	Automation Majors (Control)	Computer Majors (Communication/Computation)	Measurement and Control Majors (Measurement)	Intelligent Manufacturing Majors (Connection)	Energy Majors (Stability)
Configuration Application Technology	★★★	★	★★	★★	★
Industrial Network Technology	★★	★	★★	★★★	★
Industrial Communication Protocols	★	★★	★	★	★
Security and Integration	★★	★	★★★	★	★★★

4.2. Class Hour Allocation Suggestions with SCADA as the Teaching Carrier

In the teaching process of "Industrial Network and Configuration Technology", class hour allocation with SCADA as the teaching carrier is essentially the resource mapping of the core competencies of each major in course teaching. Reasonable differentiated class hour allocation is crucial to ensuring that students can master the most critical SCADA knowledge and skills for their career development within limited time, thereby effectively resolving the contradiction between the versatility of the course and the particularity of each major. Suggestions for class hour allocation are shown in Table 4.

4.3. Focus on the Design of the MVP Engineering Education Model

In the fields of engineering and education, "MVP" refers to "Minimum Viable Product". [7] In the teaching of the course Industrial Network and Configuration Technology, it specifically denotes a "Minimum Viable Industrial Monitoring Project"—a functional, professionally-focused, and complexity-controllable SCADA system prototype that students can complete through course practice.

The MVP project serves as the hub for transforming the course from "knowledge transmission" to "competency building". A well-designed MVP enables students to directly experience the practical role of SCADA in their future careers,

making it the most effective practical tool for distinguishing teaching boundaries across majors and achieving targeted teaching.

Table 4. Class Hour Allocation Based on Professional Training Objectives

	Automation Majors (Control)	Computer Majors (Communication/Computation)	Measurement and Control Majors (Measurement)	Intelligent Manufacturing Majors (Connection)	Energy Majors (Stability)
Suggested Class Hours	40-50 class hours	30-40 class hours	40-50 class hours	35-45 class hours	35-45 class hours
Training Objectives	SCADA System Integration Engineer	SCADA Platform Development Architect	Senior Data Analysis and Monitoring Engineer	Manufacturing System Integration Visualization Engineer	Process Industry Safety Monitoring Engineer
Teaching Focus	Network and PLC Integration; Control Logic Visualization	Data Architecture; Open Development; Network Security	High-Precision Data; Data Acquisition and Analysis; Remote Monitoring and Diagnosis	Multi-System Integration; Production Line Digital Twin; Production Efficiency Dashboard	DCS-Level Monitoring; High-Reliability Design; Whole-Plant Energy Efficiency Management

Take the MVP project "Three-Station Conveyor Belt Control and Monitoring System" for automation majors as an example. By completing this project, students can integrate abstract concepts such as "network", "variables", and "interfaces" from the course into a visible, tangible, and operable miniature industrial system. This deepens their understanding of the professional connotations and technical boundaries of automation engineers.

Typical MVP projects translate grand professional training objectives into focused "miniature scenarios" that can be completed within one to two weeks. Through mapping professional core competencies and exploring technical pathways, students gain a sense of accomplishment from project completion and a strong professional identity. They also develop a clear grasp of the most direct and core applications of Industrial Network and Configuration Technology in their future work. This MVP project-based design is the most direct and effective practical tool for resolving the contradiction between the course's general applicability and the specific needs of individual majors.[8] Table 5 presents typical teaching projects for various majors centered on Industrial Network and Configuration Technology.

Table 5. Typical MVP Projects of Each Major

	Automation Majors (Control)	Computer Majors (Communication/Computation)	Measurement and Control Majors (Measurement)	Intelligent Manufacturing Majors (Connection)	Energy Majors (Stability)
Project Name	Three-Station Conveyor Belt Control and Monitoring System	System OPC UA Data Middleware	Vibration Signal Acquisition, Analysis, and Display Platform	Robot Working Status Integrated Monitoring Dashboard	Boiler Water Level Safety Monitoring Simulation Unit
Core Competency Mapping	Control Logic Visualization and Reliable System Integration	Data Access and Service-Oriented Capability	Precision Data Processing and Feature Extraction	Multi-Source Data Integration and Information Fusion	Process Safety and Operational Procedures
Technical Path	Hardware Wiring; PLC Programming; Network Configuration; SCADA Configuration	Protocol Understanding; Acquisition Service; Data Pipeline; API Design	Sensing Acquisition Settings; Data Transmission; Chart Configuration; Analysis Logic	Multi-Protocol Configuration; Data Association; Screen Fusion; Indicator Logic	P&ID Drawing; Safety Logic Configuration; Alarm Management; Operation Audit
Reflection of Professional Boundaries	Light on Aesthetics; Focus on Correspondence with PLC Programs and Operational Safety	Light on Industrial Screens; Focus on Cross-Platform Data Flow and Code Controllability	Light on Equipment Control; Focus on Signal Processing and In-Depth Analysis	Light on 3D; Focus on Equipment Collaboration and Association with Production Information	Light on Simulating Complex Combustion; Focus on Strict Compliance with Industry Safety Regulations and Monitoring Paradigms

5. Conclusion

"Industrial Network and Configuration Technology" is hailed as the "digital cornerstone" of contemporary engineering education because it supports the digital transformation of contemporary industry and possesses four cornerstone connotations: thinking, knowledge, capability, and transformation. Therefore, it is widely offered in multiple majors. However, due to differences in professional role positioning and core competencies, the issue of teaching "boundaries" has become prominent.

To address this, based on professional teaching boundaries, a course model oriented to "control, communication, computation, measurement, connection, and stability" is constructed, with SCADA as the core teaching hub. Its core functions serve as a unified benchmark and integration bridge for teaching in various majors, and different majors have established unique capability objectives around SCADA. Through the refinement of course modules, the weights of knowledge modules in each major are determined according to the core competency orientation of each major. In terms of class hour allocation, reasonable differentiated allocation is carried out with SCADA as the teaching carrier, effectively resolving the contradiction between the versatility of the course and the particularity of each major.

At the same time, focusing on the design of the MVP engineering education model, students can deeply understand the application of professional core competencies in practical work through typical minimum viable industrial monitoring projects, gain a sense of accomplishment from project completion and a sense of professional identity.

Acknowledgments

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