A man in a dark jacket is focused on working on an electrical assembly on a workbench. In the background, another man in a blue polo shirt is also working. The setting is a well-lit industrial workshop with various tools and equipment visible.

Sii Engineering Team



Safe and Effective Electrical Assembly

Real case studies and industry best practices

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Sławomir
Assembly Site Leader

Introduction

Efficient and safe electrical assembly is the foundation for the smooth operation of modern industrial plants. In the Industry 4.0 era, precise execution of electrical projects affects operational stability, employee safety and cost optimization. This whitepaper was created for leaders and managers in the industrial sector, responsible for safety, automation and process optimization, who would like to raise operational standards in their organizations.

The whitepaper presents a practical approach to the design and implementation of electrical installations, supported by real-world examples from the intralogistics, automotive and food industries. Learn how a responsible approach to health and safety, cutting-edge technology and our know-how are supporting business growth, reducing risk and delivering tangible benefits.

Want to know more?

[Visit our website](#)



Challenges in the electrical installation of industrial plants

Technical complexity of modern installations

The construction of modern electrical installations in industrial plants requires advanced technical expertise and knowledge of current standards and regulations. The integration of automation and energy management systems with high-power equipment imposes the need for precise component selection and coordinated installation. Errors at this stage can lead to:

- High probability of failure
- Costly production downtime
- Unplanned costs in the future



Incorrectly executed electrical installations pose serious risks, including electrocution, fire or explosion in hazardous areas. Therefore, installation of the system must comply with the highest safety standards and consider all possible risks. We take care to meet quality standards at every stage of the work.

		"Electrical measurement protocol Protection against paralysis by automatically disabled power "									
Client						Contractor					
Project Number						Date					
Zone						Made by					
Gauge			S/N:				Permission nr				
Norm						Signature					
Short-circuit loop impedance Z_s											
Module name	Cable nr	Cross Section	Measurement point	Modul parameters			Required		Measured		Resault [OK/NOK]
				Type, model	Charact.	I_n [A]	$Z_{s\ max}$ [Ω]	I_a [A]	Z_s [Ω]	I_v [A]	

Fig. 1. Example of electrical measurement protocol



Safety requirements

Every project begins with the establishment of rules and requirements. PPE and necessary licenses – SEP or work-at-height licenses – are then identified to

guarantee the safety of workers, from the very beginning of the project. Key safety aspects:

- ✔ Dedicated health and safety department
- ✔ Customization of protective equipment to meet customer requirements in non-European markets
- ✔ Equipping engineers with a basic package of tools and personal protective equipment
- ✔ Consistent adherence to contractually stipulated safety requirements



		QUALITY CHECKLIST	
Client		Contractor	Sii Sp. z o.o. Al. Niepodległości 69 02-626 Warszawa
ZONE	AIL	Date	2024-10-06
SUB-ZONE	Z1: OP30, OP40, OP200 Z2: OP100		
UNITS	OP30: C02, C04 - NEW fixtures on turning table OP40: E031, E032 - NEW fixtures OP200: F9 OP100: G021, G022 - NEW fixtures on turning table		
	C02, C04 - pulling cables: profinet, 24VDC, grounding and Pipes + connection		
	E031, E032 - pulling cables: profinet, 24VDC, grounding and Pipes + connection		
	F9 - pulling 2x sensors cables + assembling new festo module		
	G021, G022 - pulling cables: profinet, 24VDC, grounding and Pipes + connection		

Fig. 2. Example acceptance protocol from an electrical installation project for an automotive customer in France.


		CHECKLIST			
Client		Contractor	Sii Sp. z o.o. Al. Niepodległości 69 02-626 Warszawa		
Project Number		Date			
Zone		Made by			
Cabinets and other components					
Cabinets and other components		YES	NO	Comment	
1	Are all the glands in the cabinets tightened? KDP 2D				
2	Are all the glands in the inverters tightened? KDP 2D				
3	Are all the glands in the motors tightened? KDP 2D				
4	Are all the glands in the switches tightened? KDP 2D				
5	Are all empty glands plugged? KDP 4A				
6	Do all devices have a sticker? KDP 4B				
7	Are all connections tightened? KDP 4C				
8	Are all devices grounded? KDP 1G				
9	Are all the caps on the Asi modules in place? KDP 4D				
10	Have all the temporary markers been removed? KDP 4E				
11	Are the cabinets cleaned out? KDP 4F				
12	Is the workspace cleared? KDP 4G				

Fig. 3. Example of quality control protocol

Characteristics of challenges and consequences of negligence in the area of health and safety

Main hazards in electrical installation

1. **Electric shock**
 - Risk of serious injury or death.
 - The need for proper safeguards and procedures.
2. **Fires and explosions**
 - May result from faulty installations or improper use.
 - Require special fire protection systems and evacuation procedures.
3. **Working at heights**
 - Common when installing systems in large industrial facilities.
 - Requires specialized equipment and training.
4. **Ergonomic problem**
 - Prolonged work in uncomfortable positions can lead to injury.
 - Need to use appropriate tools and work techniques.



Effects of poor safety management

Negligence in the area of health and safety leads to serious consequences, such as:

Occupational accidents – direct threats to the health and lives of employees.

Occupational diseases – long-term health effects resulting from exposure to harmful agents.

Reduced employee morale – lack of a sense of security affects productivity and job satisfaction.

Financial losses – compensation costs, production downtime, repairs.

Loss of reputation – negative impact on company image and customer relations.

The importance of a proactive approach to health and safety

Investment in safety is not just a legal requirement. It is first and foremost an ethical and business imperative. A proactive approach to health and safety enables you to:

- Minimize the risk of accidents and occupational diseases.
- Increase work efficiency by optimizing processes.

- Build a safety culture in the organization.
- Strengthen the company's position on the market as a responsible employer.

At Sii – thanks to our experience and commitment to health and safety issues – we can effectively address these challenges. We guarantee the highest safety standards in executed projects.

Examples of activities improving safety

We implement proven solutions that improve occupational safety and increase the efficiency of processes in implemented projects. The most important activities include:

> Health and safety training

Regular training tailored to the specifics of projects and industry requirements, covering both basic safety principles and advanced procedures related to working in difficult conditions

> Technical audits

Detailed analyses and technical assessments of installations and processes, supporting the identification of potential hazards and the implementation of preventive measures.

> Alignment of procedures with ISO 45001 standards

Introduction of occupational safety management standards in line with international standards.



Bartosz
Senior Control System
Engineer

Why cooperate with experts?

Professional electrical installation requires knowledge, experience and appropriate certifications. Our experts are qualified to ensure the appropriate level of safety and regulatory compliance. The most important advantages of cooperation are:

✔ **Certifications**

✔ **Experience**

✔ **Reduction of the risk of errors**

Certifications and training

Our employees are a team of highly qualified specialists who hold a number of certificates confirming their competence in the area of safety and electrical installation. Among the most important certifications worth mentioning:



Marcin
Fitter

SEP certificates – authorization to perform work related to the operation and supervision of electrical equipment.

LOTO (Lockout/Tagout) authorizations– ensure that employees are trained in lockout and tagout procedures (minimal risk of accidental activation of machinery during maintenance).

French Fictis Prevention certificates – confirms knowledge of health and safety regulations and the ability to assess risks in the context of working in difficult conditions.

VCA/SCC certificates – confirm knowledge of health and safety principles in the context of projects in high-risk industries (e.g., construction or industrial).

We place great emphasis on developing the competence of our employees through systematic internal training. The professional development program includes, among others:

Fundamentals of electrical engineering – training in this area serves to familiarize employees with the fundamental principles of electrical engineering.

Principles of safety in working with electricity – trainees gain knowledge about the safe handling of electrical equipment and emergency procedures.

Practical installation exercises – training in this area allows participants to gain practical skills in the installation of electrical systems.

Through these activities, we ensure that employees are always up-to-date with the latest standards and technologies. Our customers can always count on the high quality of our services and the safety of our projects.



Mariusz
Senior Fitter

Quality management system

We implement advanced risk management procedures that allow us to effectively monitor and minimize risks at every stage of the project. One of the key tools is the “Risk Log” system, which allows you to:

Monitor risks – regularly identify potential risks and analyze them in real time.

Improve decision-making processes – with accurate data and analysis, it is possible to make informed decisions and reduce the risk of errors.

Increase customer confidence – transparent risk management and compliance with international standards build credibility and a positive corporate image. We

RISK DESCRIPTION	SOURCE / CAUSE (5 X WHY?)	RESPONSE TYPE	SUGGESTED ACTIONS
Lack of competencies or insufficient team size at project start	Lack of time to build the team	Avoidance	Include sufficient time in the schedule (offer, project) for professional planning of project activities, including team building after Delivery GO.
		Transfer/ Sharing	Confirm the availability of required resources with the Competence Center (CC) at an early stage of the offer process. Formalize agreements with the Resource Manager (RM) and Line Manager (LM). In case of delays in the initially planned schedule, reconfirm availability and revise the timeline (determine whether the Client should be informed). The involved CC, RM, and LM are responsible for finding suitable profiles available within the required timeframe.
	Participation of a person with unique skills and low initial availability	Transfer/ Sharing	The involved CC, RM, and LM are responsible for finding suitable profiles available within the required timeframe. If the rules are unclear, define clear allocation principles between the Delivery Manager (DM) and CC RM/LM based on Sii's general policies and practices. Set a deadline for considering an alternative scenario in which a replacement for the person with unique competencies must be found. Formalize agreements with RM/LM and, in case of delays in the initially planned schedule, reconfirm availability and revise the timeline (determine whether the Client should be informed).
Critical resource unavailable as planned	Difficulty obtaining assignment confirmation from Resource Manager/Line Manager	Avoidance	Reassign critical tasks to other team members with more typical profiles (alternative task distribution). Include a significant time buffer in the schedule to secure the onboarding of new resources. In case of delays in the initially planned schedule, reconfirm availability and revise the timeline (determine whether the Client should be informed).
		Transfer/ Sharing	Schedule the project so that tasks assigned to critical resources are kept off the project's critical path.
		Transfer/ Sharing	Engage an additional person in the project who is prepared to take over the planned scope of tasks. The main goal: transfer of business and technical knowledge. Ensure the availability of such a person in case the risk materializes.
		Acceptance	If transferring/sharing the risk with the Resource Manager/Line Manager fails, look for similar profiles on the market or among Sii's business partners. Check availability under project conditions (costs, time to assign).

conduct regular internal and external audits – confirm compliance of operations with the requirements of ISO 9001 (quality management) and ISO 45001 (occupational health and safety management). All projects are implemented in accordance with these standards.

Benefits of the quality management system

Consistency of processes – clearly defined procedures ensure uniformity of operations across projects and locations.

Prevention of problems – early identification of potential risks allows preventive measures to be implemented.

Raising standards – continuous process improvement and regular employee training translate into better quality services.

By implementing effective quality and safety management tools, we meet customer requirements and set new standards in the industry.



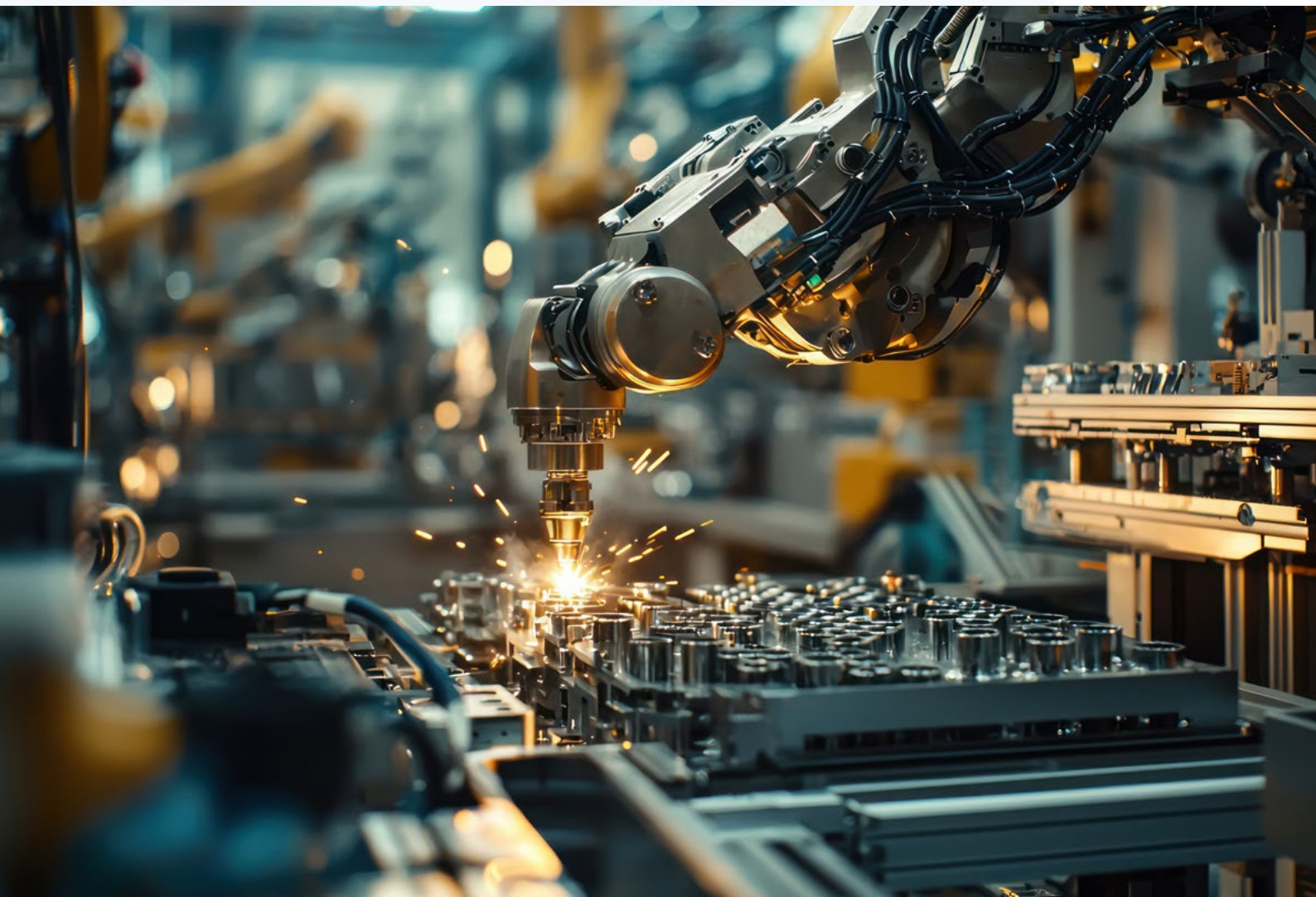
Case studies – automotive industry

Assembly of welding lines for Renault



Challenge

Renault faced the difficult task of modernizing its production facility. It was necessary to install new, advanced welding lines during a planned production shutdown. The main challenge was to carry out the upgrade within a strict timeframe. One of the objectives was to minimize losses resulting from the production stoppage.



Solution

Sii's team of 30 highly qualified specialists undertook this ambitious project. Our experts:

- Conducted analysis of the existing infrastructure and developed an upgrade plan.
- Implemented new robotic welding lines with the highest precision.
- Integrated the new lines with the factory's existing systems.
- Carried out comprehensive testing.

Thanks to excellent work organization and the use of the latest technology, our team completed the project in record time, well ahead of the original schedule.

Benefits

Minimized production downtime

- Reduction in installation time by about 10%.
- Rapid resumption of production – savings for Renault.

Increased production efficiency

- Increased productivity of welding lines by 15%.

Adaptation of the plant to modern standards

- Implementation of Industry 4.0 technology – enabling full digitization of production processes.
- Increased production flexibility – faster adaptation to market changes.

The project strengthened Renault's position as an innovation leader in the automotive industry. It also confirmed our competence in implementing complex industrial projects.

Case studies – food industry

Installation of a bottling line for world-leading manufacturer of innovative filling and packaging solutions.



Challenge

A leading manufacturer of filling and packaging systems faced the challenge of quickly installing a new bottling line at a production plant in Poland. It was paramount to minimize production downtime and ensure a smooth startup of the line while maintaining quality and safety standards.



Solution

Our specialists developed a solution that included:

- Precision installation of cable trays – ensured efficient and safe cable routing.
- Installation of advanced conveyors for bottles, rolls and packs – optimized product flow.
- Installation of control cabinets – formed the heart of the control system.
- Installation of Profinet cabling – enabled fast and reliable communication between system components.
- Performed detailed testing and calibration prior to startup.

Our team worked under variable conditions (availability to the customer's line, adjusting to delivery deadlines) to meet the tight schedule and ensure timely startup of the line.

Benefits

Increased production capacity

- The new line increased the plant's production capacity by 10%.
- Optimized product flow has reduced production time.

Packaging automation

- Implementation of advanced packaging systems reduced labor costs by about 10%.
- Increased packing precision reduced damaged products by about 10%.

Minimizing downtime

- Quick installation and commissioning of the line reduced downtime to an absolute minimum.

The project increased the client's competitiveness in the market and confirmed our position as an expert in automation of production processes in the food industry.

Case studies – intralogistics

Project for Żabka's intralogistics warehouse



Challenge

Żabka – one of the largest retail chains in Poland – faced the challenge of optimizing its logistics system. The goal was to create a fully automated distribution center that could handle the ever-growing chain of stores. The essence of the project was to design and implement a complex electrical installation for an advanced goods sorting system.



Solution

Our team took on this ambitious task with a project of unprecedented scale, where 40 experts collaborated over 1.5 years to make it a reality.

- More than 60,000 hours of installation work were performed – a project of enormous undertaking size.
- Comprehensive wiring of Profinet systems was carried out – ensuring reliable communication between all system components.
- Implemented extensive cable routing – optimized energy and data flow throughout the facility.
- Advanced control and monitoring systems were installed and configured.
- Detailed testing and optimization of the entire system was carried out before the official launch.

The project was carried out in cooperation with Dematic, a leader in automated logistics systems.

Benefits

Speeding up logistics processes

- Reduced lead times thanks to the automated sorting system.
- Increased capacity of the distribution center, enabling it to serve more stores.

Optimization of employment

- Reduce labor costs by about 15% through process automation.
- Redeployment of employees to higher value-added tasks – increasing the efficiency of operations.

Increasing the precision of goods sorting

- Reduction of errors in order picking – higher customer satisfaction.
- Minimization of losses associated with damage to goods during sorting and transportation.

The project revolutionized Żabka's logistics system and set new standards in the intralogistics industry in Poland. The success of this project confirmed our position as a leader in implementing complex automation projects for the trade and logistics sector.

Why is it worth choosing Sii?

500+ projects

from various industry. More than 500 assembly and installation projects for industry leaders such as intralogistics, automotive, food and rail.

Flexibility and speed

We are able to deliver a team of 40 specialists within 1 week, ensuring continuity and scalability of projects.

Quality without compromise

95% of projects completed on time, without defects, in accordance with ISO, CE, VCA/SCC and LOTO standards.

Modern infrastructure

A 2000 m² hall in Gdansk, Poland, for projects of various scales with the highest standards.

Looking for electrical installation support?

Contact our expert



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With over 7 500 Power People, Sii is the leading technology consulting, digital transformation, engineering, and business services vendor in Poland.

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