Violation of the Engineer's Code of Ethics in Recruiting Welder Qualifications Project PLTM Parmonangan

Rijal S. Simanungkalit[1]*, Eka Daryanto[2]

[1,2]Pendidikan Profesi Insinyur, Fakultas Teknik, Unimed, Medan, Indonesia
Coresponden author:
Email: rijal.simanungkalit84@gmail.com

Abstract.
The Engineering Profession carries high moral and legal responsibilities, and is obligated to adhere to the Indonesian Engineers Code of Ethics (KEII) to prioritize public safety. This mini-research examines the dilemma of Engineer integrity during the qualification process of welders for high-pressure pipeline (penstock) installations at the Parmonangan Mini-hydro Power Plant (PLTM) Project. Pressure from project management regarding cost and schedule potentially drives ethical compromises that endanger construction quality and operational safety. This research uses a Descriptive-Analytical Qualitative Case Study approach. Data was collected through a triangulation of findings from interviews with the Project Engineer, analysis of qualification documents, and field observation (Non-Destructive Testing/NDT results) at the Parmonangan PLTM Project. A critical technical gap was found: the project mandated 5G/6G welder qualification (ASME/AWS) for the penstock, yet the Project Engineer accepted welders with a lower 3G qualification, driven by cost and schedule pressures. This practice resulted in a high incidence of weld defects (e.g., porosity and undercut) requiring repair. This compromise was proven to violate fundamental points of the KEII: Mandate 1 (Public Safety): The decision to accept non-competent welders increased the risk of penstock failure, threatening public safety. Mandate 3 (Competence): The Engineer approved work that was technically unjustifiable according to standards. Mandate 6 (Professional Integrity): The Engineer failed to avoid a conflict of interest between ethical obligations and commercial interests. The practice of accepting welders with inadequate qualifications at the Parmonangan PLTM Project constitutes a fundamental violation of the KEII caused by business pressures. This not only diminishes construction quality but also potentially leads to long-term technical consequences, namely reduced integrity and service life of the facility. It is necessary for the Project Owner to affirm quality and safety as non-negotiable criteria. Furthermore, the Indonesian Engineers Association (PII) must strengthen mechanisms for professional protection for Engineers who reject management policies that violate the code of ethics and technical standards

Keywords: *Engineer's code of ethics, Welder and Mini-hydro Power Plant (PLTM).*

I. INTRODUCTION

The engineering profession plays a central and strategic role in the development of a nation's civilization and infrastructure. All forms of design and construction, from buildings and bridges to power plants, are manifestations of engineering work. Therefore, this profession inherently carries a very high moral and legal responsibility, especially related to the safety, health, and welfare of the community. In carrying out these responsibilities, an engineer is obliged to adhere firmly to the Indonesian Engineers Code of Ethics (KEII). This professional ethics serves as a moral guide that ensures that every technical decision is based on objectivity, honesty, competence, and prioritizing the public interest over personal or corporate interests.

The main principles of KEII strictly require engineers to only express opinions that can be accounted for and work according to their competence. The urgency of the case studied arises in the context of energy infrastructure projects such as the Parmonangan Mini-Hydro Power Plant (PLTM). This project involves high-risk construction, particularly in the installation of high-pressure piping (penstock). The quality of welding on this pipe is a crucial factor in determining structural integrity and operational safety. Welding failures can result in massive financial losses and even fatal disasters that threaten the lives of workers and surrounding communities. A critical step in ensuring welding quality lies in the welder qualification process. Engineers, as the quality and technical personnel on a project, have an ethical obligation to ensure that every welder employed is properly certified and competent according to applicable technical standards (e.g., ASME, AWS, or National Standards).

However, in a competitive project environment, integrity dilemmas often arise. Demands from management or contractors to accelerate construction schedules or reduce costs can create pressure on engineers. This pressure can potentially push engineers to make ethical compromises, such as:

- Loosening or manipulating welder qualification test procedures.
- Accepting welders without official certification or adequate competence.
- Ignore welding defects that require repair or retesting.

Therefore, this mini-research considers it important to specifically examine "Potential Violations of the Engineer's Code of Ethics in the Recruitment of Welder Qualified Workers for the Parmonangan Hydroelectric Power Plant Project." This study is urgent because it reflects a direct clash between the nobility of professional character and the reality of the project's business interests, which will ultimately determine the safety and sustainability of the PLTM's function as a public asset.

II. LITERATURE REVIEW

Indonesian Engineers Code of Ethics

The code of ethics of the Indonesian Engineers Association (PII) is called Catur Karsa Sapta Dharma of Indonesian Engineers which consists of 2 parts, namely: Basic principles which consist of 4 (four) basic principles and 7 (seven) attitude guidelines (Canon), which in full are as follows:

First, the Basic Principles:

1. Prioritize nobility of character
2. Using knowledge and abilities for the benefit of human welfare
3. Work earnestly for the benefit of the community, in accordance with their duties and responsibilities.
4. Enhance competence and dignity based on professional engineering expertise.

Second, Seven behavioral guidelines:

1. Indonesian engineers always prioritize the safety, health and welfare of the community.
2. Indonesian engineers always work according to their competence
3. Indonesian engineers can only express opinions that can be accounted for.
4. Indonesian engineers always avoid conflicts of interest in their job responsibilities.
5. Indonesian engineers are constantly building a professional reputation based on their individual abilities.
6. Indonesian engineers always uphold the honor, integrity and dignity of the profession.
7. Indonesian engineers are constantly developing their professional skills.

Professional Competency Standards for Welders

The professional competency standard for welders is a crucial element in the construction industry, especially for high-risk projects such as the Aek Parmonangan Microhydro Power Plant (PLTM). This competency not only determines the quality of construction results but also plays a key role in ensuring the safety, health, and well-being of the community—a fundamental principle in the Engineers' Code of Ethics. In Indonesia, welder competency recognition is regulated by several standards and institutions, which ensure that work meets the technical requirements required by engineers. This welder certificate is issued based on the Indonesian National Work Competency Standards (SKKNI) and is required to ensure work quality and safety.

1. BNSP (National Professional Certification Agency) Competency Certificate

Qualification Examples: Welder Plate 3G/4G, Welder Pipe 5G and 6G, and classification based on welding process (SMAW, GTAW, GMAW, etc.)

2. Certificate of Kemnaker RI (Ministry of Manpower of the Republic of Indonesia)

Classification: Usually divided into Class I, II, and III, where Class I is the highest level for welding work on joints subject to high stress.

3. WPS (Welding Procedure Specification) and WPQ (Welder Performance Qualification) for each

Welder based on ASME IX (American Standard Mechanical Engineers), AWS (American Welding Society) and API 1104 (American Petroleum Institute) Standards.

Parmonangan Hydroelectric Power Plant Project

The Parmonangan Microhydro Power Plant (PLTM) project, located in North Tapanuli Regency, North Sumatra, is part of the government's efforts to diversify energy sources and utilize river flow potential. The project's success and operational safety depend heavily on the quality of its construction, much of which involves critical welding work. The Penstock, which carries high-pressure water from the forebay to the turbine, must be perfect, flawless, and able to withstand high internal pressure to prevent leaks or ruptures. Welding on this component must comply with international standards such as those outlined in ASME Section IX or AWS D1.1, and failure of any single weld could halt operations or, worse, cause a disaster.

III. RESEARCH METHODS

Research Design

The research design used is a Qualitative Case Study, this research is descriptive-analytical qualitative. It analyzes in-depth the welder recruitment/qualification practices in the Parmonangan PLTM project and compares them with the requirements of the Indonesian Engineers Code of Ethics (KEII) and applicable welding technical standards.

Location and Time of Research

The research location is the Parmonangan Mini Hydro Power Plant (PLTM) Project Area, North Tapanuli Regency, or the work location and representative office of the contractor/consultant responsible for the project.

Data source

1. Primary Data

Data collected directly from the field: Job supervisors involved in the welder qualification and supervision process (e.g., Quality Control (QC) Engineer, Welding Inspector, or Project Manager). Welder Workforce working on critical installations (e.g., penstock). and Type of Data: Engineers' perspectives, experiences, and justifications regarding welder acceptance decision-making.

Secondary Data

Data originating from documents or archives.

- Welding Procedure Specification (WPS) and Project Procedure Qualification Record (PQR).
- Welder Performance Qualification (WPQ) or Welder Certificate used in the project (BNSP/Kemnaker/ASME/AWS).
- Results reportNon-Destructive Testing (NDT) of critical welded joints.

IV. RESULTS AND DISCUSSION

Research Results (Field Findings)

The research results obtained through data triangulation—namely interviews with Project Engineers (QC Engineer and Welding Inspector), analysis of Welder Performance Qualification (WPQ) documents, and observation of procedures at the Parmonangan PLTM Project revealed a significant gap between the required technical standards and the practice of recruiting welder workers.

Technical compliance gap of Welder Qualification

Technical Standards (As Per ProjectContract and Literature Review)	Findings in the Parmonangan Hydroelectric Power Plant Project Field
High Pressure Pipe (Penstock) Qualification: Mandatory 5G and 6G certified Welder Qualification (SMAW or GMAW) based on ASME Section IX or AWS D1.1 standards.	SUMMARY OF WELDER TEST PROYEK PLTMH 2 X 4.5 MW PARMONANGAN TAPANULI UTARA **Fig 1**. Summary of Welder Testing Source, Doc. QC/QA PLTM Parmonangan In the field, there were only 3G and 4G certified welders, no 5G and 6G certified pipe welding welders were found.

No	Nama Welder	Welder Stamp	WPS	Posisi	Welding Proses	Thickness	Range Qualified	Material	P. No	Elektroda	F. No	Visual	Result
1	YAYAN MUJIARTO	B 01	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
2	IMRON SULISTYO	B 02	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
3	SUYITNO	B 03	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
4	HARMANTO	B 04	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
5	KHOLIK MAWARDI	B 05	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
6	AGUS SUCIPTO	B 06	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
7	TAMA	B 07	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
8	JAINUDIN	B 08	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
9	HADI MAULAN	B 09	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
10	HERU SUNARTO	B 10	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
11	KHOIRUL HUDA	B 11	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
12	RIDUWAN	B 12	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC
13	LUKMAN HADI	B 13	XA. 1. 1/N - 163 Rev. 0	3 G	SMAW	8 mm	16 mm	A 36	P. No 1	E 7018	F. No 4	ACC	ACC

Technical Standards (As Per Project Contract and Literature Review)	Findings in the Parmonangan Hydroelectric Power Plant Project Field
NDT-PT test results for welding results in the field, Water Way Pipe Welding is not of good quality.	PLTM PARMONANGAN 2 (2 X 5 MW) DYE PENETRANT INSPECTION REPORT **Fig 3.** NDT-PT welding test results Source: QA/QC Mechanical, Parmonangan Hydroelectric Power Plant There are several welding defects in large numbers, resulting in repeated work (re-work and repair) and a high risk of damage to the welding joints.

Technical Standards (As Per Project Contract and Literature Review)	Findings in the Parmonangan Hydroelectric Power Plant Project Field
Visual inspection results in the field, Water Way Pipe Welding is not of good quality.	 **Fig 4, 5 and 6.** Photo/Doc of NDT-PT welding testing Source: Doc/Photo QA/QC Mechanical PLTM Parmonangan The findings in the field were that the welding results of the Water Way and Penstock pipes met the Rejection Criteria, welding defects were found, for this reason repair work/repeated welding work was carried out again.

Project Pressure and Engineer Justification

Interviews with the Project Engineer (QC Engineer) and Welding Inspector revealed that external pressure was the main trigger for procedural deviations,

- Schedule Pressure: The project is facing delays from the initial penstock construction schedule. The Project Manager is demanding that the Engineer immediately fill the welder shortage to meet the weekly target.
- Cost Pressure: Recruiting ASME-certified 5G and 6G welders has a significantly higher daily cost, and skilled 5G/6G welders are hard to find locally. Contractors are attempting to replace highly qualified welders with less qualified ones to reduce operational costs.
- Engineer's Justification: The interviewed job supervisor stated that he was in a position of integrity dilemma.

2. Discussion (Analysis of Violations of the Engineering Code of Ethics)

Field findings indicate a significant potential for violations of the Indonesian Code of Ethics for Engineers (KEII) resulting from a compromise between professional standards and business pressures. This analysis focuses on specific requirements:

2.1. Violation of Guideline 1: Safety, Health, and Welfare of the Community, Guideline 1 (KEII): Indonesian engineers always prioritize the safety, health, and welfare of the community.

Violation Analysis:

The Parmonangan Hydroelectric Power Plant (PLTM) project is a vital infrastructure that operates a penstock pipe with very high water pressure. The use of welders who do not have a valid 5G/6G position qualification certificate (steel pipe welding) at this critical joint directly increases the risk of weld failure. Weld failure at the penstock not only results in financial losses for the Project, but has the potential to cause the high-pressure pipe to rupture, threatening the lives of workers on site and even the surrounding community due to water overflow. The Engineer's decision (or compromise by the Engineer) to accept an incompetent welder for schedule and cost reasons demonstrates a failure to prioritize public safety over the interests of the project, which is a fundamental violation of Guideline 1 KEII.

2.2. Violation of Guideline 3: Work in Accordance with Competence, Guideline 3 (KEII) states: Indonesian engineers only express opinions that can be accounted for and work in accordance with their competence.

Violation Analysis:

Engineers (QC Engineer/Welding Inspector) who sign or authorize Welder Performance Qualification (WPQ) for welders who do not actually meet ASME/AWS standards where welders must have a certificate or test for welding steel pipes in 5G and 6G positions, have implicitly stated that the work is technically accountable.

The act of relaxing the WPQ test passing criteria constitutes a form of professional misconduct. The engineer violated the principles of objectivity and technical honesty, resulting in the permitted work (penstock welding) falling outside the limits of competence (quality) that should have been maintained. This also reflects the engineer's failure to maintain his technical expertise from non-technical (management) intervention.

2.3. Violation of Guideline 6: Integrity and Dignity of the Profession, Guideline 6 (KEII) states: Indonesian engineers must avoid conflicts of interest in carrying out their professional duties.

Violation Analysis:

This case demonstrates a conflict of interest between ethical obligations (maintaining quality and safety) and commercial pressures (accelerating projects and reducing costs). Engineers who succumb to business pressures and permit technical irregularities sacrifice their professional integrity for the benefit of the contractor. This undermines the dignity of the engineering profession, which should act as gatekeepers of engineering quality and ethics. Procedural irregularities such as using

expired certificates or manipulating qualification test results are forms of professional dishonesty that directly contradict Guideline 6 of KEII.

Professional and Operational Impact

3.1. Long-Term Technical Consequences

Decreased Operational Integrity: Welded joints made by substandard welders have internal defects (porosity, slag inclusions, or incomplete fusion) that are not fully detected by compromised NDT. These defects become the starting point for failure when the penstock is subjected to repeated internal stress and fatigue during micro-hydropower operation.

Reduced Facility Lifespan: Poor construction quality results in the need for more frequent and expensive repairs and maintenance, which significantly shortens the economic life of the Parmonangan Hydroelectric Power Plant Project.

3.2. The Clash of KEII's Noble Principles with Business Reality

The noble principles of KEII require engineers to be guardians of public safety, but the business realities of projects (dominated by cost and schedule orientation) force engineers to become facilitators of commercial interests. The decision to compromise, although driven by the threat of professional sanctions, ultimately places engineers as perpetrators of ethical violations. This underscores the need for a stronger professional protection mechanism from the Indonesian Engineers Association (PII) for engineers who refuse management orders that violate the code of ethics and technical standards.

V. CONCLUSION AND SUGGESTIONS

Conclusion

1. Critical Technical Compliance Violation is the discovery of a significant gap between the technical standard requirements for critical welding of Penstock pipes (i.e. 5G/6G qualification according to ASME/AWS standards and contract technical specifications) and the actual qualifications of welders in the field, most of whom only have 3G certificates. Although the WPQ documents are formally complete, this qualification discrepancy, coupled with the discovery of high weld defects (porosity, undercut, hollow bit) that require repair, indicates questionable and risky work quality.
2. Conflict of Interest as a Trigger for Ethical Violations is when the Project Engineer (QC Engineer/Welding Inspector) is under significant external pressure from Project Management (Contractor) regarding accelerated schedules and cost reductions. This pressure forces the Engineer to make ethical and professional compromises, such as allowing the acceptance of unqualified welders or easing quality control.
3. Fundamental Violation of the Indonesian Code of Ethics for Engineers (KEII): This compromise is proven to violate the fundamental points of KEII, in particular:

- Guidance 1 (Public Safety): High risk weld failures on Penstocks directly threaten the safety, health and welfare of the public.
- Requirements 3 (Competence): The engineer has approved work (welding) that is not technically accountable to standards.
- Guideline 6 (Professional Integrity): Engineers fail to avoid conflicts of interest (ethical vs. commercial), thereby damaging the integrity and dignity of the engineering profession.

Suggestion

1. Quality and Safety Priority: The Project Owner must emphasize that Quality and Safety are non-negotiable criteria that exceed schedule and cost in the procurement of critical labor (Welder qualification 5G/6G).
2. Qualification Transparency: Ensure all Welder Performance Qualification (WPQ) documents are audited and verified by an independent third party (e.g., an accredited certification body) before welders are allowed to work on critical installations, especially Penstocks.

3. Compliance Incentives: Implement an incentive system that encourages Field Engineers to report and enforce quality standards, rather than a sanction system that focuses solely on schedule delays.
4. Strengthening Advocacy and Protection: The PII must establish clear legal and professional protection mechanisms for Engineers who refuse Project management orders or policies that violate the KEII and technical standards. Engineers must feel safe reporting irregularities without fear of dismissal or sanctions.
5. Continuous Ethics Education: Improving realistic ethics training (case study based) for Young Engineers, especially those working in the field of Quality Control and Inspection, to equip them to face cost and schedule pressures in the field.

REFERENCE

[1]. Alam Santosa, MT. Engineering Profession and Engineering Ethics
[2]. Technical Specifications, April 2018. Parmonangan II Micro Hydroelectric Power Plant, North Tapanuli
[3]. Oktavian, Y., Hamdani, H., & Fitrayudha, A. . (2025). Effect of Coarse Aggregate Dimensional Variation On The Compressive Strength of Concrete. ***International Journal of Science and Environment (IJSE),*** *5*(3), 285–294. https://doi.org/10.51601/ijse.v5i3.212
[4]. Erwin Harahap, D., Astuti Kuswardani, R. ., HS Siregar, T. ., & Darwis, M. . (2024). Nira Production In Terms Of Slope Level In South Tapanuli District. ***International Journal of Science and Environment (IJSE),*** *4*(4), 112–116. https://doi.org/10.51601/ijse.v4i4.115
[5]. Fitra Syawa Harahap, Arman, I. ., Harahap, N. ., Ahmad Syawaluddin, F. ., & Fitra Yana, R. . (2022). Provision of Chicken Manure and Urea Fertilizer on the Chemical Characteristics of Ultisol Soil in Bilah Barat District. ***International Journal of Science and Environment (IJSE),*** *2*(3), 98–103. https://doi.org/10.51601/ijse.v2i3.34
[6]. Tari Honda, J., M. Yelwa, J. ., Ulteino, A. N. ., Abudllahi, S. ., A. S, U. ., Anchau, H. G. ., & Michael Kalu, K. . (2023). Optimization Of Biosorption Conditions For Crude Oil Spills Using Acetylated And Unacetylated Biosorbents Derived From Cissus Populnea Leaves Stem And Roots. ***International Journal of Science and Environment (IJSE),*** *3*(2), 51–65. https://doi.org/10.51601/ijse.v3i2.67
[7]. Sinambela, M. ., Simangunsong, S., & Harahap, A. . (2023). Conditions Of Phytoplankton Community Structure In Lake Toba Ajibata, Toba Samosir Regency. ***International Journal of Science and Environment (IJSE),*** *3*(2), 66–70. https://doi.org/10.51601/ijse.v3i2.68
[8]. Rosenta Purba, I., & Harahap, A. . (2022). Plankton Diversity In The Labuhanbatu Bilar River. ***International Journal of Science and Environment (IJSE),*** *2*(2), 63–68. https://doi.org/10.51601/ijse.v2i2.27
[9]. *Parmonangan Micro Hydroelectric Power Plant*, NDT-Penetrant Test Report of Parmonangan Micro Hydroelectric Power Plant
[10]. *AWS (American Welding Society) D1.1 /D1.1M:2002*. Structural Welding Code-Steel
[11]. *ASME Section IX 2007 edition*, Qualification Standard For Welding And Bracing Procedures, Welders, Brazers, And Welding and Bracing Operators.
[12]. API (American Petroleum Institute) Standard 1104, Edition 2005. Welding Of Pipelines and Related Facilities.
[13]. WPS and WPQT of Parmonangan Micro Hydroelectric Power Plant. QC/QA Mechanical Report of Parmonangan Micro Hydro Power Plant.