



Precision Pays: INSTEP's Metering Certification Program Drives \$63M Savings

Institut Teknologi Petroleum PETRONAS (INSTEP)

Best Certification Program

November 2024



Company Background



Company-at-a-Glance	
Headquarters	Batu Rakit, Kuala Terengganu, Terengganu
Year Founded	1981
Revenue	RM 203,088,399
Employees	178
Global Scale (Regions that you operate in or provide services to)	50 countries as attached below. Major clients are from: China, India, Italy, Brazil, Spain, Belgium, Turkmenistan, Iraq, Brunei, Canada, Egypt, Dubai, Australia, Japan, Singapore, Papua New Guinea, Thailand, Indonesia
Customers/Output, etc. (Key customers and services offered)	Key Customers: <ol style="list-style-type: none"> 1. PETRONAS fraternity 2. Industry <ul style="list-style-type: none"> ○ Petroleum Arrangement Contractors (PAC) in Malaysia ○ Contractors/manpower serving PETRONAS & PACs (in or outside Malaysia) 3. Stakeholder



- As per government requirements & education sectors
- Host Government from PETRONAS International Operations

Services Offered:

1. Executive and Non-Executive Technical Solutions
Short term programme to enhance and upskill technical competencies for engineers and technicians
2. Onboarding Solutions
Long-term programme to produce job-ready technicians & operators equipped with knowledge and skills required competencies by the industry
3. Technical Certification Solutions
Certify competency of technical workforce based on statutory bodies, professional bodies or company own standard
4. Health, Safety & Environment Sustainability Solutions
Provide wide ranged HSE and sustainability technical training that supports PETRONAS and industry sustainability agenda

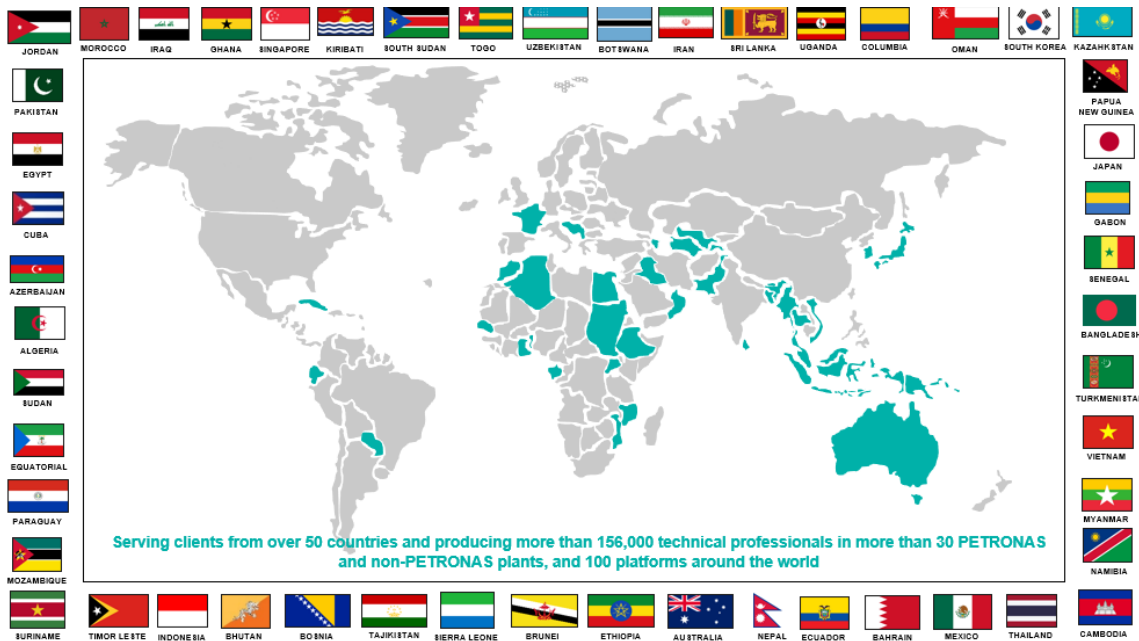
Industry

1. Energy
2. Learning Institution

INSTEP offers experiential learning to enhance technical proficiency, aligned with the evolving demands of the energy sector workforce. Our commitment involves providing a comprehensive learning experience, featuring state-of-the-art facilities and industry-seasoned instructors. Our learning facilities complemented with theoretical classes and practical workshops, including the Upstream Downstream Training Plant (UDTP) simulating real plant scenarios, providing a safe environment for experiential learning, fostering



	technological innovation in digitalisation, automation and sustainability.
Stock Symbol	N/A
Website	INSTEP - 41 years of Going Beyond



Budget and Timeframe

3. Budget and Timeframe	
Overall budget	N/A
Number of (HR, Learning, Talent) employees involved with the implementation?	<p><u>Support Staff</u> Learning Coordinator : 1 pax</p> <p><u>Participants</u> Maximum of 8 pax per session. Scheduled 6 session per year, with 2 additional sessions upon request.</p>
Number of Operations or Subject Matter Expert	<p><u>SME during Programme Development</u></p> <ol style="list-style-type: none"> 1. INSTEP : 4 pax 2. PETRONAS OPU : 5 pax



employees involved with the implementation?	3. Industry : 3 pax 4. NMIM-SIRIM : 2 pax <u>SME during Programme Implementation</u> 1. Trainer : 1 pax 2. Technician (support staff) : 1 pax
Number of contractors involved with implementation	N/A
Timeframe to implement	Continuously
Start date of the program	January 2018

Fit to the Needs

This program was designed to address pain points from business:

- i) Improper validation and calibration of metering system caused lack of integrity and mismeasurement by the metering system (primary measurement), led to inaccuracy usage of tank gauging figures (secondary measurement). Thus, there are potential losses and value leakages due to unbilled oil/gas flow resulting from inaccuracy of the tank measurement.
- ii) High maintenance cost due to over reliance on third party contractors to perform metering system validation and calibration.
- iii) Uncertain competency of third party contractors who are performing the validation and calibration activities as existing SIRIM-CARE system in NMIM-SIRIM only register the third party contractors companies without verifying competency of their manpower.
- iv) Lack of competency among engineers and technicians in PETRONAS and PSC companies as well as metering system integrators who are witnessing metering validation and calibration activities or signing off the reports.

A preliminary study was conducted in 2017 among PETRONAS Metering fraternities to gather their input regarding current competency gap in performing metering validation and calibration activities in the workplace. The study encompassed:

- i) Experience attending knowledge/hands-on training specifically on metering system validation



- ii) Understanding on standard requirements/procedures for metering system validation & calibration
- iii) Possess substantial underpinning knowledge to perform metering system validation & calibration activities
- iv) Ability to perform metering system validation & calibration activities in accordance to the procedures
- v) Ability to solve problems related to metering system validation & calibration

Findings from the preliminary study also showed that merely 26% of participants had acquired metering validation knowledge while 18% gained metering validation skills from existing PETRONAS Skill Group training (for Engineers) and PETRONAS NET training (for Technicians), which were inadequately comprehensive, lacking detailed coverage of metering validation and calibration. Due to the absence of specific training for metering validation and calibration, majority of the engineers and technicians have gained their expertise through on-the-job learning from experienced colleagues, adopting best practices and participating in actual validation works carried out by contractors.

Driven from the key shift from the case for change, INSTEP with the support from PETRONAS Group Technical Services (GTS) had collaborated with NMIM-SIRIM in fostering new learning innovation aimed at propelling the development of competency among metering personnel within PETRONAS as well as oil and gas workforce in Malaysia.

Overview

Through this program, the organization will be able to:

- i) Reduce financial leakages due to mismeasurement or lack of system integrity due to improper validation and calibration as well as reliance on less-accurate measurement of tank gauging for offshore and onshore terminals.
- ii) Optimize cost of operation through upskilling of workforce in PETRONAS Operating Units & PSC companies to carry out their own validation & calibration activity without relying on third party contractors.
- iii) Ensure high integrity and accuracy of measurement during installation and maintenance of metering system by upskilling the competencies of engineers & technicians from third party contractors and metering system integrators who are involved in the validation



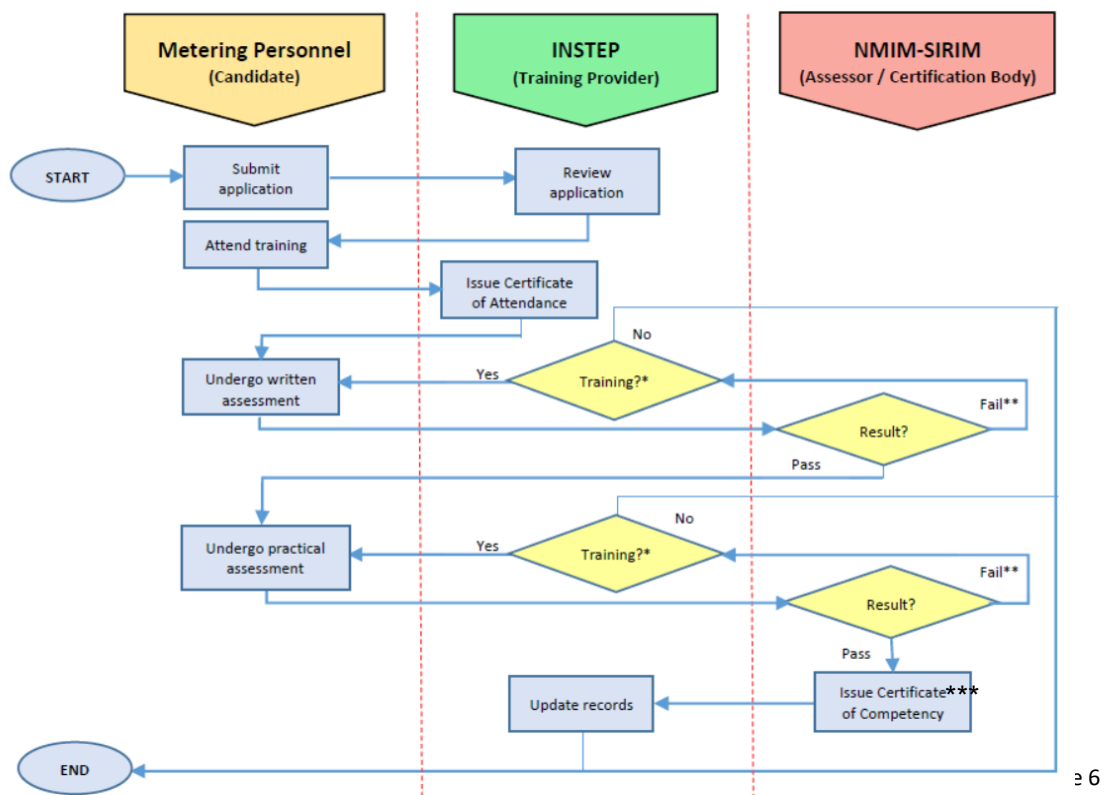
and calibration activities as well as PETRONAS/PSC companies' engineers and technicians witnessing the activities.

Design of the Program

This program was designed to accommodate wide range of audiences, from technicians to technical managers who own and manage the facilities (PETRONAS and PSC contractors) until external parties who are being engaged to perform metering system installation and maintenance. The participants who attend this program shall have a minimum of 1-year related metering experience. At the end of the program, participants will be able to acquire substantial knowledge and skill to enable them to perform metering validation and calibration according to the requirements and procedures.

Candidate who has attended training* will possess a training certificate which is valid for one (1) year. Candidate who failed** written or/and practical assessment will be allowed to resit for the failed assessment once only within one (1) year of training certificate validity. Upon completion of performance assessment, certificate of competency*** will be issued by NMIM and it is valid for 5 years effective from the assessment completion date. Upon expiry, the candidate is required to attend a 1-day refresher course and 1-day assessment for renewal of certificate.

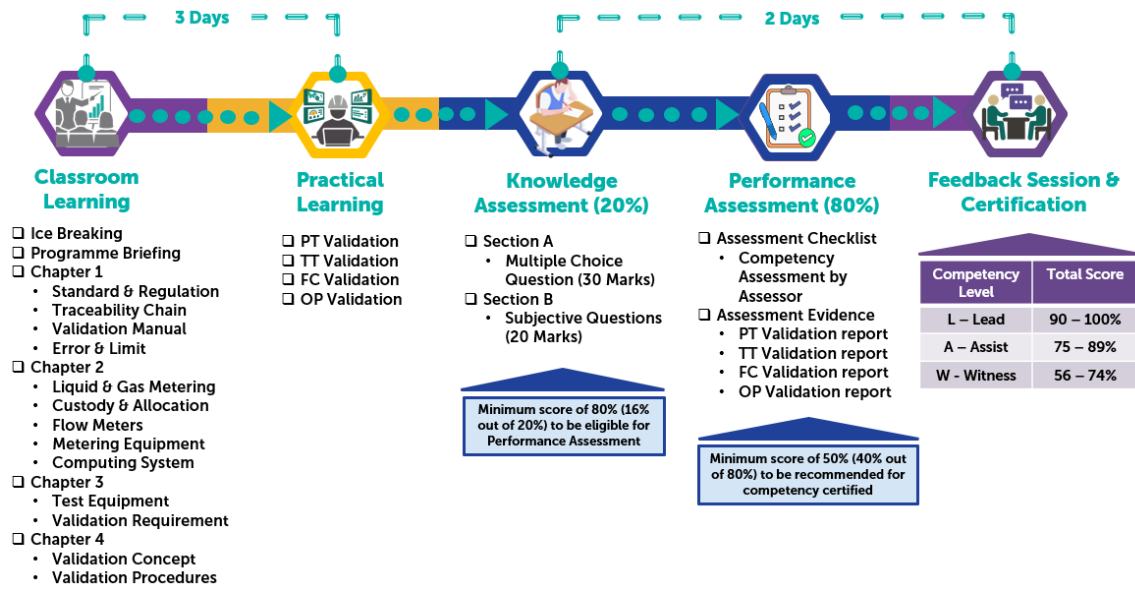
Training and certification process





Delivery of the Program

The 5-day certification program journey comprises of the following elements.



Practical Assessment (PT Validation) by NMIM-Assessor



Practical Assessment (FC Validation) by NMIM-Assessor



Assessment Feedback (1-to-1) Session



Measurable Benefits

- i) Potential value leakages due to incompetent person performing metering validation caused invalid meter reading in flow computer, resulting value leakages in usage of Tank Measurement for billing.

The approximate value leakages were calculated based on average shipment volume per year for metering station A in a crude oil terminal.

Average Shipment Volume (per year)	400k barrel
Approximate Shipment Frequency (per year)	144

Value Leakage due Meter Reading Error

Allowable Error	+/- 0.01%
Approximate Error	0.127%
Approximate Value Leakage	$\text{Volume} \times \text{Frequency} \times \text{Error} \times \text{price/barrel}$ $= 400\text{k barrel} \times 144 \times 0.127\% \times \text{USD}85 \times \text{RM}4.50$ $= \text{RM } 28\text{Mil /year}$

Note: Data above is calculated based on oil price of USD85/barrel at exchange rate of 1USD = RM4.50.

Due to the unacceptable meter reading error or high uncertainty of meter reading, tank gauging figure will be the alternative option in determining the transacted volume in Bill of Lading. However, tank gauging measurement has lower accuracy (allowable error of +/- 0.5% as per CPTM) compared to meter accuracy (+/- 0.01%). The average error of tank measurement was recorded approximately 0.2% more than meter reading, thus it still produced higher value leakages.

- ii) Cost Saving due to upskilling internal workforce to conduct metering validation instead of engaging contractors.

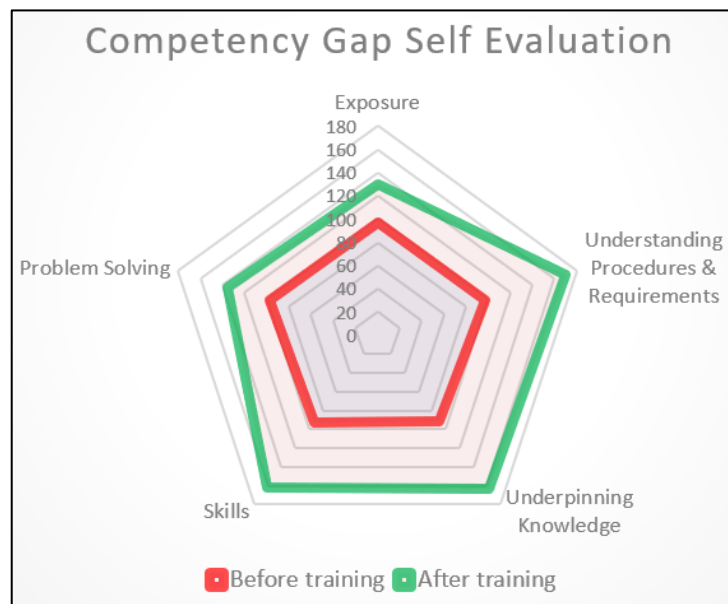
Approximate Contractor Engagement Cost per station	RM45k
Validation Frequency per year	4
Number of metering station	1400
Total Approximate Contractor Engagement Cost	RM 252Mil



In average, validation frequency for each metering station is carried out quarterly (4 times annually). Assuming 25% (1 out of 4 session) to be carried out by internal workforce instead of contractors, this will generate cost saving of approximately RM 63Mil for the company.

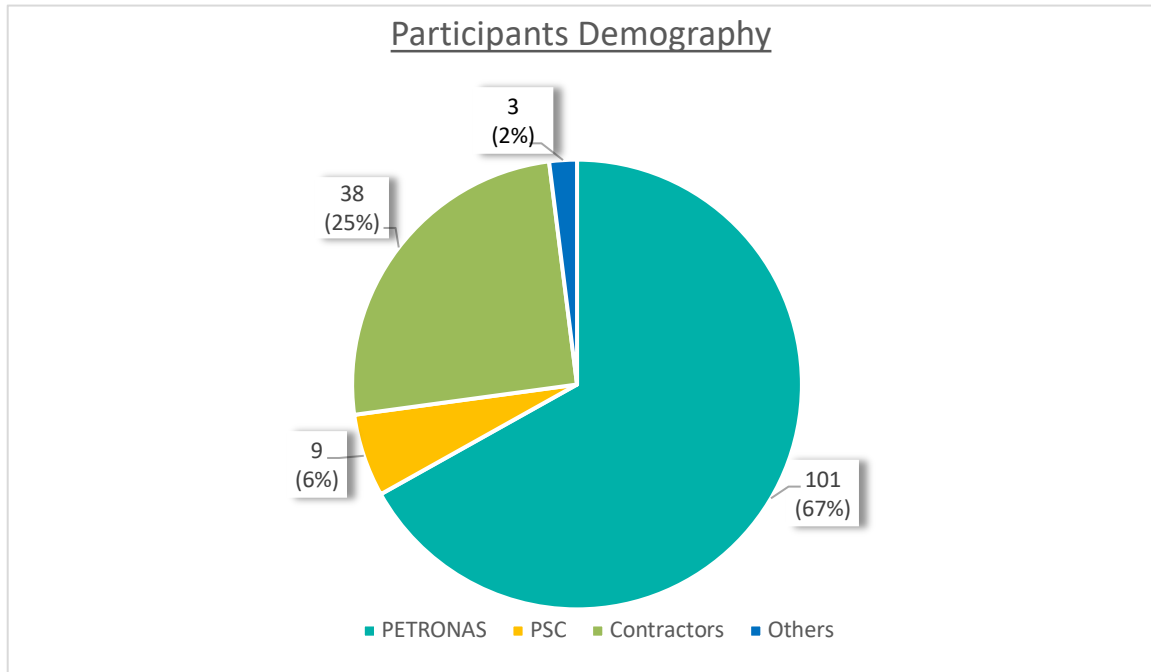
Overall

Post programme survey was conducted in 2019 among programme participants to gather their feedback regarding their current competency gap in performing metering validation and calibration activities in the workplace upon attending the certification programme. The survey encompassed similar scopes as per preliminary study to determine the effectiveness of this certification in closing gaps.



In summary, all five evaluated elements showed significant improvement in gap closure after attending the certification programme. Participants notably improved in having good understanding of procedures and requirements, underpinning knowledge and skills related to metering validation, while experiencing slight progress in the other two elements, indicating a need for further field exposure through learning at work.

Certification record for the past five years showed that 67% of participants are from PETRONAS, 25% are from metering contractors while only 8% are coming from PSC companies and other industries.



The successful adoption of certification requirements within PETRONAS and its' contractors has inspired other PSC companies to begin utilizing a similar strategy in managing metering validation works at their respective metering terminals and platforms. In 2024, INSTEP already received several requests from other PSC companies, mainly from Exxonmobil to conduct multiple sessions to certify over 20 engineers and technicians as Competent Person in Metering Validation and Calibration. This marks an increase of more than double compared to previous years, a trend that will likely persist to meet the demands from other PSC companies, in addition to fulfilling certificate renewal requirement.



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CASE STUDY