https://journal.ypidathu.or.id/index.php/abdimas
P - ISSN: 2987-8470
E - ISSN: 2987-7105

Increasing the competency of Sultan Ageng Tirtayasa University PVTE Students Through PLC Outseal Training

Bagus Dwi Cahyono[1], Irwanto[2]
[1]Universitas Sultan Ageng Tirtayasa, Indonesia
[2]Universitas Sultan Ageng Tirtayasa, Indonesia

ABSTRACT

Background. Outseal PLC Training for PVTE Students at Sultan Ageng University Programmable Logic Controller is a device that can be programmed according to industrial process needs.

Purpose. This activity is a service activity for PVTE Study Program lecturers at Sultan Ageng Tirtayasa University which is expected to be able to improve students' skills in terms of being equipped for the world of work.

Method. This activity is a service activity for PVTE Study Program lecturers at Sultan Ageng Tirtayasa University which is expected to be able to improve students' skills in terms of being equipped for the world of work. This PLC Outseal Training activity is carried out face to face for 8 hours in the FKIP educational room at Sultan Ageng Tirtayasa University. This training method uses a practical based method.

Results. The evaluation results show that students seem interested and do not experience problems when practicing PLC.

Conclusion. This training has a significant impact on students' skills in industrial automation concentration courses.

KEYWORDS: PLC Outseal, Service, Training

INTRODUCTION

Programmable Logic Controller (PLC) is a digital electronics system designed for controlling machines in the industrial sector (Chen et al., 2017). PLCs are currently often used in the industrial automation sector, especially in machine monitoring and control. PLC has input and output that can be connected to sensors, relays, contactors and others (Kusmantoro & Farikhah, 2023; "Solar power and multi-battery for new configuration DC microgrid using centralized control," 2024). Outseal is a brand and automation technology development company from Indonesia www.outseal.com. The technology that has been developed by Outseal is PLC (Programmable Logic Controller) and HMI (Human Machine Interface).

Citation: Cahyono, B, D., & Irwanto, Irwanto. (2024). Outseal PLC Training for PVTE Students at Sultan Ageng University. *Pengabdian: Jurnal Abdimas*, *2*(1), 71–77. https://doi.org/10.55849/abdimas.v2i1.710

Correspondence:
Bagus Dwi Cahyono,
bagus.dwicahyono@untirta.ac.id

Received: February 12, 2024
Accepted: February 15, 2024
Published: March 12, 2024

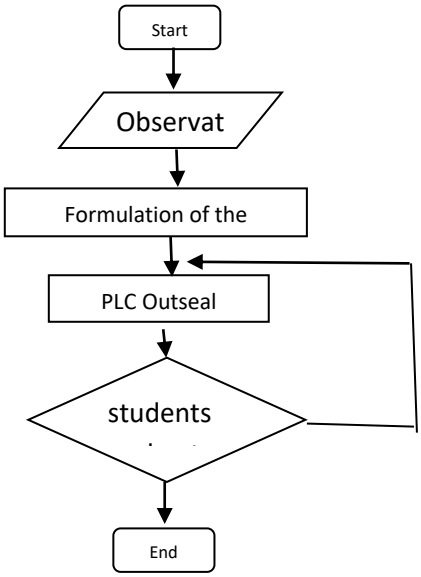
Outseal PLC (Bakhtiar, 2020) is made using standards that are suitable for industrial use and is very compatible with Arduino. PLC is an electronic system tool similar to a small computer that is specifically designed to control automatic processes (Prihatin et al., 2023). According to the

NEMA (National Electrical Manufacturing Association) definition, a PLC is: “A digital electronic device that uses programmable memory to store instructions and perform special functions, such as logic, sequencing, timing, calculations, and arithmetic operations”(Anugrah et al., 2022) . In general, learning about all types of PLCs is similar, namely using ladder diagrams when designing an automatic system (Irawan et al., 2023).The programming used by Outseal PLC is visual programming which uses Indonesian language ladder diagrams. One of the advantages of the Outseal PLC is that the electronic schematic of the Outseal PLC can be viewed, studied, modified and created by yourself (Irawan et al., 2022). Apart from that, this software is also freeware, so it is easy for anyone to use. Training for students provides a great opportunity to be able to compete in the world of work. The implementation of the practicality assessment of training kits is carried out to determine the level of ease and practicality of learning media obtained from programmed control system subject teachers and students (Maulana Putra et al., n.d.). The results of activities carried out by (Amalia et al., 2021) to improve students' skills after the PLC training activities were that students obtained a high average score of 90.5. This training activity is very useful for students in terms of increasing work skills. Programmed training activities are one solution to overcome the problem of minimal abilities and skills of prospective workers in the industrial world (Dwi et al., 2021). The problem of the lack of work skills possessed by job seekers of productive age and the desire to implement knowledge in the field of electricity is the basis for consideration for the service team to participate in solving this problem (Rossi dkk., 2021; Suwarno, 2020). Therefore, through the Community Service (PKM) Electrical Engineering Vocational Education program, a PLC Outseal training program is being held for PVTE FKIP students at Sultan Ageng Tirtayasa University.

RESEARCH METHODOLOGY

The implementation of PLC Outseal training is carried out through several processes, including: observing the condition of partners, in this case PVTE students at Sultan Ageng Tirtayasa University. This is done to find out whether the knowledge to be shared is truly not accepted and needed by PVTE students (Prihatin et al., 2023). The steps for implementing the training can be seen as in Figure 1 below. After making observations and knowing the knowledge that will be shared with PVTE students, PLC Outseal training is then held.

Figure 1. Steps in Implementing Ouseal Training



Apart from the trainer module, a training module is also prepared with various program examples as training. Several case studies are also presented to create student creativity, accompanied by test questions to find out how deeply students understand material presented (Irawan et al., 2022). After the trainer module and training module were ready, Outseal PLC training was carried out for PVTE students at Sultan Ageng Tirtayasa University.

This activity was carried out in the FKIP Edutaria Room at Sultan Ageng Tirtayasa University which was attended by 20 PVTE FKIP students at Sultan Ageng Tirtayasa University. With details of 12 students who served as laboratory assistants and 8 students who took electrical concentrations (Rifaldi dkk., 2023). The activity time is 1 day starting from 08.00 WIB to 16.00 WIB. The form of activity carried out is delivering material on: Introduction to HMI and SCADA; Advanced PLC programming with Outseal PLC hardware; and PLC connection with the upper layer for 8 hours, with delivery of PLC theory material for 3 hours and practice for 5 hours. During practice, students were divided into 5 groups, guided to make PLC connections with the upper layer using PLC Outseal.

Apart from that, several more complicated case studies are also presented to stimulate students' creativity in solving problems. After studying more complicated cases, the training module is also equipped with test questions to test students' understanding during learning in this training (Anugrah Kusuma Yudha et al., 2023)

RESULT AND DISCUSSION

The results of the service consist of the results of the Outseal PLC training activities which were carried out on November 26th, 2022 starting from 08.00 WIB-16.00 WIB. This activity was carried out in the FKIP Edutaria room at Sultan Ageng Tirtayasa University. Below are some photos of PLC Outseal training activities.

Figure 2. Presentation of Resource Person's Profile

Figure 3. Delivery of theoretical material for the introduction of HMI and SCADA

Figure 4. Delivery of advanced PLC programming material with Outseal PLC hardware

Figure 5. Delivery of PLC Connection Material with the upper layer

In this training activity, participants were recruited through data collection for PVTE laboratory assistants as many as 12 students and 8 students taking PLC courses. Furthermore, registered participants created a WhatsApp group which made it easier to coordinate between the committee and participants. Furthermore, during the activity, participant registration was carried out before the activity started, where it was discovered that the participants in the WhatsApp group were all present on time. During registration, participants are also immediately given the Outseal PLC training module. Before the training started, there was a ceremonial opening of the training by the Head of the PVTE Department at Sultan Ageng Tirtayasa University, Muhammad Fatkhurrohman, M.Pd. Through his speech he conveyed the importance of using PLCs in supporting current industrial processes. Furthermore, after the speech, the activity continued with the main activities. In the core activity, the resource person explained material about PLC Outseal. The resource person for this training activity was Drs. Lili Sugeng Diko Nugroho, who comes from PT. Indah Kiat. The training activity lasted for 8 hours using a practical based learning method which was expected to provide basic skills in the field of automation using PLC (Amalia et al., 2021). The learning materials are as follows:

Table 1. Training Materials

Theory: Introduction to HMI and SCADA	Participants are able to understand the functions of HMI and SCADA
Practice: Advanced PLC programming with Outseal PLC hardware	Participants are able to understand advanced PLC programming with Outseal PLC hardware
Practice: PLC connection with upper layer	Participants are able to apply logic and

	instructions in a practical example in the form of a ladder diagram and successfully install the ladder into hardware

Training activities were carried out interactively and filled with discussions related to the cases being carried out. Students seemed enthusiastic in carrying out the training and were able to follow all the processes until the activity was completed the next activity is evaluation and closing of training activities. The activity evaluation stage is carried out after the activity has been completed. Evaluations carried out include: (1) Attendance of participants, where the participants were 100% present at the activity, (2) Technical activities where the training ran smoothly without any problems as planned, (3) The ability of participants to follow the material and apply it to practical programming and testing activities on outseal PLC hardware, it is known that the participants had no difficulty in understanding and following the training. To find out how deeply the students understand the material, at the end of the training all students are asked several questions related to the training program, material, presenters and the modules provided (Tamyiz et al., 2018). Some of the questions given can be seen in Table 2. From these questions, they will then be processed to display the percentage of students' understanding of the material, for this reason each question is given a weighting value (Irwanto, 2019).

Table. 2 Code and Content Questions for Students

Code	Questions
P1	The material is appropriate to student needs
P2	clarity of the material provided
P3	ease of learning material
P4	completeness of trainer materials

Analysis of the data obtained shows that training activities have become part of creating prospective workers who have skills in the field of industrial automation. The training results that have been obtained are in line with research conducted by (Arrezqi et al., 2022)which states that training activities are a vital solution in terms of preparing students to develop their skills before entering the world of work.

CONCLUSION

This community service activity was carried out according to the planned schedule and according to the budget involving a team of lecturers and students in the technical activities. Evaluation takes the form of observing ongoing activities and the results of practice by each participant during the training. The results of observations of class activities proved that the participants did not experience any obstacles in implementing the activities. This training has a significant impact on students' skills in industrial automation concentration courses.

ACKNOWLEDGEMENT

Immense thanks are given to the resource persons, Drs. Lili Sugeng Diko Nugroho who had the opportunity to attend and take the time to share their knowledge and experience, especially in terms of PLC Outseal, to the Electrical Engineering Vocational Education students at Sultan Ageng Tirtayasa University.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Formal analysis; Methodology; Writing - original draft.

REFERENCES

Amalia, D., Saputra, W., Martadinata, Mi., Septiani, V., & Rizko, R. (2021). Pelatihan Programmable Logic Controller Menggunakan Outseal PLC. *Darmabakti: Jurnal Inovasi Pengabdian Dalam Penerbangan* , *2*(1). www.outseal.com.

Anugrah, F., Yudha, K., Nugroho, W., & Wahyono, T. (2022). Rancang Bangun Trainer Otomasi PLC Outseal 16 I/O. In *Journal of Mechanical Engineering and Mechatronics* (Vol. 7, Issue 1).

Anugrah Kusuma Yudha, F., Suwanda, T., Ardiyansyah, N., & Studi Teknik Mesin, P. (2023). PELATIHAN TRAINER PROGRAMMABLE LOGIC CONTROLLER FX1N UNTUK PENGEMBANGAN GURU SMK. *Communnity Development Journal*, *4*(2), 1294–1297.

Arrezqi, M., Indrasari, F., Sai, A., Nurhayati, I., Administrasi Bisnis, J., Teknik Mesin, J., Akuntansi, J., & Negeri Semarang, P. (2022). PELATIHAN DIGITAL MARKETING PADA UMKM TERDAMPAK PANDEMI COVID-19 DI KABUPATEN DEMAK. *ADIMAS*.

Bakhtiar, A. (2020). *PANDUAN DASAR OUTSEAL PLC* (1st ed.). www.outseal.com. www.outseal.com

Chen, J. Y., Thai, K. C., & Chen, G. C. (2017). Application of Programmable Logic Controller to Build-up an Intelligent Industry 4.0 Platform Elsevier Enhanced Reader. *Procedia CIRP*, *63*.

Dwi, S., Kusuma, Y., Al Islami, H., Wicaksono, B. S., Nurlaila, F., & Apriyanto, B. (2021). PENINGKATAN KEMAMPUAN DAN KETERAMPILAN SISWA DI BIDANG TIK BERBASIS SKKNI PADA SMK YPUI PARUNG. *KOMMAS: Jurnal Pengabdian Kepada Masyarakat Universitas Pamulang*, *1*(3).

Irawan, D., Astutik, R. P., Putra Prastya, E., & Hidayah, A. (2023). *Pelatihan Outseal-Haiwell for PLC and SCADA di SMKN 1 Singosari, Malang Outseal-Haiwell Training for PLC and SCADA at SMKN 1 Singosari, Malang*. *3*(2), 240–248. https://doi.org/10.55606/nusantara.v3i2.1675

Irawan, D., Winarno, H. A., Astutik, R. P., Kinanti, Z. A., Putra Prastya, E., & Hidayah, A. (2022). PELATIHAN OUTSEAL-HAIWELL PADA SMK MAMBAUL ULUM, GRESIK. *Journal of Community Service*, *4*(3).

Irwanto. (2019). Pelatihan Masyarakat Dalam Pengelolaan Sampah Rumah Tangga. *To Maega Jurnal Pengabdian Masyarakat*, *2*(2), 11.

Maulana Putra, Y., Setyawan, H., & Yuhendri, M. (n.d.). *Development of Outseal PLC-Based HMI as Learning Training Kits for Programmed Control Systems Subject in Vocational Schools*.

Prihatin, J. Y., Pambudi, S., Rahmat, R., & Kristiyono, R. (2023). PELATIHAN PLC INTERFACE STT "WARGA" PADA SISWA SMA SE-KOTA SURAKARTA. *Abdi Masya*, *4*(2), 169–174. https://doi.org/10.52561/abma.v4i2.292

Tamyiz, M., Hamidah, L. N., Widiyanti, A., Rahmayanti, A., Studi, P., Lingkungan, T., Nahdlatul, U., & Sidoarjo, U. (2018). PELATIHAN PENGELOLAAN SAMPAH RUMAH TANGGA DI DESA KEDUNGSUMUR, KECAMATAN KREMBUNG, KABUPATEN SIDOARJO. In *Journal of Science and Social Development* (Vol. 1, Issue 1).

Kusmantoro, A., & Farikhah, I. (2023). Real-Time Microgrid Centralized Control For Consuming Water Pump. *E3S Web of Conferences*, *465*, 02003. https://doi.org/10.1051/e3sconf/202346502003

Rifaldi, M., Ridwan, A. M., Effendi, M. R., Lestari, F., Yuliyanti, A. Y., & Hilmi, F. (2023). Design of Automatic Transfer Switch (ATS) and Automatic Main Failure (AMF) Based on Outseal. *2023 9th International Conference on Wireless and Telematics (ICWT)*, 1–6. https://doi.org/10.1109/ICWT58823.2023.10335477

Rossi, F., Sembiring, J. P., Jayadi, A., Putri, N. U., & Nugroho, P. (2021). Implementation of Fuzzy Logic in PLC for Three- Story Elevator Control System. *2021 International Conference on Computer Science, Information Technology, and Electrical Engineering (ICOMITEE)*, 179–185. https://doi.org/10.1109/ICOMITEE53461.2021.9650221

Solar power and multi-battery for new configuration DC microgrid using centralized control. (2024). *Archives of Electrical Engineering*. https://doi.org/10.24425/aee.2023.147419

Suwarno, D. U. (2020). *Modbus HMI bluetooth for outseal PLC*. 030124. https://doi.org/10.1063/5.0000583

Copyright Holder :
© Bagus Dwi Cahyono et al. (2024).

First Publication Right :
© Pengabdian: Jurnal Abdimas

This article is under: