

Improvement of Laboratory Capacity in SMK Manangga Pratama Tasikmalaya

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ABSTRACT

SMK Manangga Pratama consists of several majors including Motorcycle Business Engineering (TBSM), Automotive Light Vehicle Engineering (TKRO), and Software Engineering (RPL). In major Automotive Light Vehicle Engineering (TKRO), some subjects discuss the Air Conditioning system (automotive AC and split room AC). The problem is the lack of equipment for vacuuming, and charging refrigerants for automotive AC units to be used and empowered as a learning resource. The main cause is the lack of affordable equipment for service, unit maintenance. This of course will be a problem when the students have graduated and need direct application to the Automotive AC system and the room. There are about 110 students from the Automotive Light Vehicle Engineering (TKRO) Department in each batch, with such a large number, it would be better if they were given an additional briefing on these skills. This PkM program has been equipped and provided with equipment and service equipment to be used by students as a training unit in improving their skills. The manufacture of tables and assembly of training units for automotive AC service completeness (charging, pumping, and other tools) will be carried out on the Polban Bandung campus. Instructor trainers in this PkM training program are several teaching staff in the Refrigeration and Air Conditioning Engineering Department, while the unit is a complete unit for automotive air conditioning units and rooms, namely (charging, pumping, and other tools). The implementation of community service activities majoring in refrigeration and air conditioning engineering POLBAN as a form of higher education tri dharma has been completed on October 28-29 at SMK Manangga Pratama. The activity consisted of making practicum tools for strengthening school laboratories, accompanied by providing training for the service and maintenance of air conditioning machines (AC).

Keywords: SMK Manangga Pratama, car air conditioning, service, maintenance, training

INTRODUCTION

SMK Manangga Pratama (MP) is located at Jalan Bojong Tengah No. 2D Cipedes District, Tasikmalaya City. Has 3 areas of expertise, namely Automotive Light Vehicle Engineering or Teknik Kendaraan Ringan Otomotif (TKRO), Motorcycle Business Engineering (TBSM), and Software Engineering (RPL). Based on data information, the number of students is about 110 people for one batch, or about 30% of the total students (Data Profil Sekolah, 2020).

Referring to the relatively large number of students, this makes the potential for human resources, especially for labor providers who are practically ready to work. In line with the improvement of the country's economy and the heat of the earth's atmosphere, people's demands for comfortable thermal conditions in the office, hotel, and household rooms are one of them. The students have received special lessons in the field of electrical engineering and the automotive field, but problems in the world of work often get them asked and or offered opportunities to install car (automotive) air conditioning units and rooms.

This is certainly one of the opportunities for SMK Manangga Pratama graduates to be able to actualize themselves and increase their competence in navigating the world of work (Ratnawati,2021). Based on these facts, it would be better if the students, especially the Automotive Light Vehicle Engineering or TKRO major, were provided with knowledge about the basics of refrigeration and air conditioning systems, related materials were about vacuuming, and charging refrigerants. All students will gain basic knowledge of the theory and practice of

vacuuming, and charging refrigerants in-car AC machines and room air conditioners through training debriefing in the classroom and will be given job sheets or instructions for operating the vacuum process, leak tests, and charging refrigerants in-car air conditioners (AC splits). The PkM program is expected to be sustainable for the next batch of students because, in this program, practical equipment/tools (service, maintenance, charging, and other tools) and a job sheet will be provided (Towoliu et al, 2021 Sofiana et al, 2021).

METHOD

The implementation method consists of three steps, namely design production and provision of theoretical.

Table 1. Steps of Activities
Implementation

Implementation		
1. Design	2. Theory	3. Practice

2.1 Design and construction progress

The design phase is carried out according to the target time provided.

- Designing a service equipment trainer unit and its accessories.
- Install the service equipment unit trainer required by the partner.



Figure 1. A/C service equipment and accessories

The finished design tool can be seen in Figure 2 above. The theoretical material will be held for approximately 4 hours (1 day), debriefing as follows:

- The working principle of the A/C system
- A/C Components
- A/C job definition
- How to use and use service equipment
- How to charge refrigerant into the A/C system
- How to detect damage (troubleshooting) and repair it

Practice will be given for approximately 2 days consisting of:

- Brazing (connection) copper pipe (copper)
- A/C system piping process
- Refrigerant vacuuming and charging
- Temperature and pressure measurements to observe A/C performance.

2.2 Place, Personal, and Participants

The stages of implementing the above activities are held at SMK Manangga Pratama (MP) as shown in Figure 3 with the equipment that we will provide in the form of a training unit (trainer) along with supporting equipment resulting from the design. The resource persons for this briefing or training came from expert and senior lecturers from the Department of Refrigeration and Air Conditioning Engineering at the Bandung State Polytechnic (POLBAN)

who had both theoretical and practical experience. Materials for debriefing or training are prepared by resource persons. The maximum number of participants in this training is 10 (ten) people per session, this is due to comply with the Health Protocol due to the Covid 19 pandemic. The majors that can be involved and included must have an engineering background such as the Department of Electrical Engineering, Automotive Engineering, and linear with them.



Figure 2. Front view of SMK MP Tasikmalaya

2.3 Partner of Participation

Partner participation in the implementation of the PkM program is:

- a. Assist in active involvement and contribution in the implementation of this PkM program, such as the provision of places, students who participate, and other infrastructure facilities, both technical and non-technical aspects.
- b. Preparation of training schedules and others, with this activity, it is hoped that a good relationship will be established between several parties (stakeholders), namely SMK MP and POLBAN.

RESULTS And DISCUSSION

The results of the community service program are in the form of practical equipment assistance and training as well as SOP sheets (job sheets) for the use of practical equipment.



Figure 3. Explanation of the operation process of A/C service equipment

The first stage of training is an explanation of the function of each supporting tool for car air conditioning and room air conditioning services, namely: air conditioning unit vacuum pump, manifold gauge pressure, brazing torch-gas welding, flaring and swaging tools, digital thermometer, digital ampere volt-ohm, and digital charging refrigerant (Sutandi et al, 2016 and R Muliawan et al, 2021).



Figure 4. Training of refrigerant vacuum and Refrigerant Charging

In the next stage, the material is given on how the refrigerant charging process circuit. The process starts from the process of vacuuming the car air conditioner unit or room air conditioner and continues with the refrigerant charging process.

CONCLUSIONS AND RECOMMENDATIONS

The implementation of community service activities majoring in refrigeration and airconditioning engineering Polban as a form of higher education Tri Dharma has been completed on 28-29 October 2021 at SMK Manangga Pratama (MP) Tasikmalaya.

The activity consisted of making practicum tools for strengthening school laboratories, accompanied by providing training for the service and maintenance of air conditioning machines (AC). The improvement of facilities and infrastructure for the development of laboratory capacity is expected to provide benefits and contributions to schools in general and students in particular.

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REFERENCES

- Data Profil Sekolah. Pemerintah Provinsi Jawa barat Dinas Pendidikan. 2020.*
- Sutandi, T., Sumeru, Nasution, H. and Ani.F.N. 2016. Evaluation of the impact of refrigerant charge of HC-290 to replace HCFC-22 in a freezer performance. Applied Mechanics and Materials. 819:231-235.*
- R Muliawan. (2021). Cooling system performance comparison of Refrigerant R-134a and MC-134 on Ice Slush Machine. Flywheel Untirta, Vol .1 (1-6).*
- Ratnawati. Improvement of writing batik skills of PKK women, Tajinan Village, Kepanjen District, malang regency. Jurnal abdimas Umtas. 4(2).*
- B I Towoliu. Improvement of knowledge and skills of hospitality in Tourism Group in Budo Village, district Wori, North Sulawesi Province. Jurnal abdimas Umtas. 4(2) Vol. 4 No. 2.*
- J. Sofiana. Increasing PAUD Teacher Knowledge about Children growth detection with KPSP. Jurnal abdimas Umtas. 4(2).*
- Pengertian AC Mobil. <https://daihatsu.co.id/tips-and-event/tips-sahabat/detail-content/ac-mobil-serta-cara-kerjanya/>. Diakses 19 Maret 2021.*

<https://www.asuransiastra.com/tips-article/8-tips-perawatan-ac-mobil-agar-tetap-dingin/>

Windyhm. Diktat Mata Kuliah Dasar Refrigerasi.

Cara vakum sistem AC Mobil dengan benar <https://www.autoexpose.org/2017/07/cara-vakum-ac-mobil.html>

Technical cara isi freon <http://jokosubagyotatung.blogspot.com/2013/12/cara-isi-freon.html>