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ELECTRIC MOTORBIKE CONVERSION TRAINING TO REDUCE POLLUTION AND CREATE A FRIENDLY ENVIRONMENT FOR SOCIETY

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ABSTRACT

Electric motorbike conversion training at Vocational High Schools (SMK) and motorbike workshops in Kotabumi, North Lampung, is a strategic step to prepare future workers to face the electricity-based transportation revolution. This study aims to evaluate the impact of training on improving the technical skills of vocational school students and motorbike repair shop mechanics, as well as analyzing the contribution of training to the adoption of environmentally friendly technology at the local level. The training method includes theoretical exposure, field practice sessions, and case studies to provide an in-depth understanding of electric motor conversion. Evaluation is carried out through practical exams and collecting feedback from participants and instructors. The research results showed a significant increase in participants' knowledge and skills regarding electric motor conversion. Adoption of this technology in local motorbike workshops is also increasing, creating the potential for reduced environmental impact and generating positive effects on the local automotive industry. The conclusion confirms that this training was successful in empowering vocational school students and motorbike repair mechanics, creating new career opportunities, and stimulating economic growth in the region. However, challenges such as adapting infrastructure and changing mindsets were also identified as areas requiring further attention. Therefore, this research provides valuable insights for further development in supporting technical education, industrial innovation and sustainability at the local level.

KEYWORDS
Electric motorbike conversion, Vocational high school, Motorcycle repair shop

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PENDAHULUAN

The electric motor has become a key catalyst in the transportation revolution, leading towards sustainable and environmentally friendly mobility. In this context, the conversion of fuel-powered motors into electric motors is imperative to reduce environmental impact and replace increasingly unsustainable conventional technologies (Alwan et al., 2016). This research emphasizes the importance of electric motor conversion training in educational settings, particularly in Vocational High Schools (SMK) and motorcycle workshops in Kotabumi, North

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Lampung. Climate change and the need for renewable energy resources have prompted experts and policymakers to accelerate the adoption of environmentally friendly technologies (Hirsh & Koomey, 2016). Training in electric motor conversion is a strategic step to ensure a skilled workforce capable of addressing these challenges (Ranjbar et al., 2017). In the city of Kotabumi, with significant economic growth potential, such training is aimed at empowering the younger generation and involving the local industry, especially motorcycle workshops, in supporting the transition to electric-based mobility.

Kotabumi, a city located in North Lampung, holds significant economic potential. Amidst this growth, it is crucial to guide industrial development towards sustainable principles (Srivinas, 2019). Involving local motorcycle workshops in electric motor conversion training is a strategic step to encourage private sector engagement in the energy transition. This will not only create new job opportunities but also enhance local capacity in adapting to technological changes. Higher education plays a key role in preparing the younger generation to face modern technological challenges. Vocational High Schools (SMK) are one of the educational institutions that can play a vital role in supporting the transition to electric-based mobility (Zainol et al., 2019). In this context, efforts to train in electric motor conversion at SMKs are essential to ensure that students have the knowledge and technical skills required to meet the evolving market demands. The active participation of vocational schools in this training not only provides technical expertise to students but also encourages them to become pioneers of change in society. The active involvement of SMKs in electric motor conversion training is expected to create a ripple effect, motivating students to pursue careers in the renewable energy sector. Furthermore, involving local motorcycle workshops allows the dissemination of necessary knowledge and skills more broadly, providing tangible benefits to the local community.

In the development of sustainable transportation technology, the use of electric motors offers a solution that can reduce greenhouse gas emissions and

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dependence on fossil fuels (Pratama, 2021). Therefore, electric motor conversion training in Vocational High Schools (SMK) and motorcycle workshops in Kotabumi not only has the potential to enhance the competitiveness of the local industry but also can have a positive impact on the environment through increased use of cleaner electric motors. Challenges faced in implementing electric motor conversion in SMKs and motorcycle workshops in Kotabumi involve the availability of trained human resources, adequate technical understanding, as well as support from the government and industry (Permana, 2016). Therefore, this research aims to analyze the implementation of electric motor conversion training in Kotabumi, evaluate its impact on the SMK curriculum, and identify potential challenges that may arise during the implementation process.

This research will provide in-depth insights into the implementation of electric motor conversion training in Kotabumi, covering processes, challenges, and its impacts. As part of a collective effort to reduce the carbon footprint, this program not only benefits the environment but also creates new economic opportunities (Yandri, 2016). A thorough analysis of the effectiveness of the training will help ensure that SMK graduates are truly prepared to meet the demands of the ever-evolving industry. Through this research, valuable lessons that can be applied on a larger scale are expected to be discovered. The success of this training program can serve as an example for other regions to adopt similar models, strengthening the network between education and industry to support positive transformation in the implementation of environmentally friendly technology in the transportation sector (Harahap, 2016).

METODE

Activity methods

The implementation of activities is carried out using five methods, those are:

Presentation, question and answer

The presentation method is used to explain the implementation of the program in each session so that participants can understand the regulations

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governing the activities, including introducing the implementing team to the participants. The use of presentations is not limited to explaining rules but is also necessary to elaborate on various aspects related to the practices that will be carried out in each session. In addition to the presentation method, this program also adopts the question-and-answer method, as explained by [not provided]. The implementation of the question-and-answer method is carried out to facilitate interaction and communication between the implementing team and participants. Questions and answers are not only conducted in the room but also outside the room in response to participants' curiosity about the ongoing practices.

The question-and-answer method is not limited to indoor discussions; it is done to respond to participants' curiosity about the ongoing practices. Furthermore, the question-and-answer method can evolve into a practical method if the implementing team deems it necessary to demonstrate directly to participants about the ongoing practices. The goal is for participants to witness and apply practices directly, acquire information, and apply the concepts given to the maximum extent possible (Hernawati & Amin, 2017).

Practice

The practical method is implemented in training with the primary goal of providing participants with the opportunity to directly apply the knowledge gained from presentation and question-and-answer methods. In other words, through the practical method, participants have the chance to apply theoretical concepts they have learned in real-life situations. Additionally, the practical method is designed to help participants deepen their understanding of the training material.

Instructors in the practical method not only provide explanations and general guidance but also demonstrate specific examples that have been applied. The aim is to provide participants with a more realistic and in-depth understanding of how theoretical knowledge can be implemented in practical contexts. The examples presented by instructors serve as references for participants to comprehend the application of concepts in various situations they may encounter in the real world.

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Direct guidance provided to participants during the practical method is a key aspect of this approach. Instructors give instructions and guidance to participants as they apply knowledge in practical situations. This guidance helps participants understand the involved processes, improve their skills directly, and receive constructive feedback from instructors. With the inclusion of the practical method accompanied by direct guidance, it is expected that participants can experience first-hand the application of their knowledge, thereby enhancing their understanding and skills significantly (Muhsinin et al., 2019).

Modules

The use of modules in this training aims to provide participants with systematic and structured reference material regarding various aspects of utilizing electric motor conversion. Modules are designed as learning aids to guide participants in understanding and applying relevant information related to electric motor conversion training. The content of the module includes a summary of the material prepared by the training implementation team. This module serves as a guide for participants to explore and understand various ways of utilizing electric motor conversion. Each section of the module presents up-to-date and reliable information on specific topics related to electric motor conversion training. Therefore, this module can be considered a comprehensive guide that covers various forms of electric motor conversion training.

In this context, the training implementation team has summarized information deemed essential and relevant for participants to apply. The module functions as a reference source that participants can use during and after training. Furthermore, the use of modules also facilitates participants in accessing information without being restricted by time or place, allowing them to continue learning and reflecting on the training material provided.

In addition to serving as a guide, this module also creates opportunities for participants to engage in self-directed learning. By having access to the module, participants can develop their own understanding of various forms of electric

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motor conversion utilization, making them more independent in decision-making and implementing sustainable practices in their daily lives. In other words, the module not only functions as an information source but also as a tool that empowers participants to take concrete steps towards more sustainable plastic waste management.

Evaluation design

In the implementation of the community service program in the form of this training, there are three criteria that will serve as the basic benchmarks for the achievement of the training activities. Firstly, the benchmark for the success of the activity is to carry out the program according to the specified time and the number of meetings. This emphasizes the importance of good cooperation between the organizers and participants in order to achieve the set training targets.

The second criterion, serving as a measure of success from the participants' perspective, is the participants' ability to individually practice or apply and understand the methods used to utilize plastic waste to create decorative products. At this level, the success of participants is measured by their ability to apply the concepts learned during the training in a practical context. This indicates the extent to which participants can internalize and implement the knowledge they have gained.

The third criterion serving as a benchmark for the success of the organizers is their ability to provide explanations and assistance to help participants facing difficulties in the practical aspects of creating products. Additionally, the success of the organizing team can be measured by their effective communication during the program, including the alignment of the team's attendance with the specified number of meetings. This demonstrates the commitment of the organizing team to provide maximum support to participants and maintain the overall quality of the program. By establishing these criteria, it is expected to clearly measure the extent to which the achievements and success of this training can be evaluated.

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HASIL dan PEMBAHASAN

Training participants, including vocational high school students (SMK) and motorcycle workshop mechanics, have significantly improved their technical knowledge concerning electric motor conversion. They have gained a deeper understanding of electric motor components, conversion systems, and associated technologies. Moreover, through hands-on practical sessions, participants have successfully enhanced their practical skills in assembling, configuring, and testing converted electric motors. This hands-on training has provided invaluable first hand experience.

Active participation and collaboration were key features of the training sessions. Participants engaged effectively in small group discussions, exchanging experiences and ideas, thus creating a dynamic learning environment where knowledge was shared not only by the facilitator but also among peers. The training has also deepened participants' understanding of the importance of electric motors in promoting sustainability and environmental protection, offering them a comprehensive view of the technology's environmental impact.

Participants have sharpened their troubleshooting skills, being trained to identify and address potential issues that may arise during electric motor conversion, preparing them effectively for real-world challenges. Furthermore, through practical tasks, participants have developed a heightened sense of responsibility for their work, particularly concerning the maintenance and care of converted electric motors.

The training has encouraged participants to think creatively and innovatively in finding technical solutions to challenges encountered during electric motor conversion, thereby fostering increased creativity in problem-solving.As a result of the training, students and mechanics alike have experienced a boost in confidence in dealing with new technology, feeling more equipped to meet the evolving demands of the industry.

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Additionally, the training covers business aspects, providing participants with an understanding of market potential and business opportunities related to electric motor conversion in their communities. Finally, the training has facilitated the formation of a professional network among trainees, fostering collaboration in training and creating opportunities for future knowledge exchange and collaboration.

The urgency of electric motor conversion as a crucial step towards more sustainable transportation is emphasized, highlighting its positive environmental impact. In vocational schools, this training enhances curriculum relevance by incorporating the latest technology and explores potential career opportunities for students in the growing electric motor industry. Moreover, it empowers local motorcycle workshops to follow technological trends, with community support seen as vital for local economic development.

Participants are taught technical skills like assembling electrical systems and installing batteries, alongside practical skills applicable in the workplace. Understanding the latest developments in electric motor technology ensures participants keep pace with advancements, contributing to the evolution of the automotive industry. Implementation strategies in motorcycle workshops focus on integrating electric motor technology into daily operations, with solutions presented to overcome potential challenges. Active community participation and the role of local government in policy-making for electric motor conversion are crucial for training success.

Success indicators include participation rates, skill improvement, and technology adoption in workshops, evaluated through structured methods. Socially and economically, electric motor conversion creates job opportunities and reduces carbon emissions, benefitting the local economy and environment. Collaboration between vocational schools and the electric motor industry ensures curriculum relevance, while network development facilitates knowledge exchange and career opportunities among participants, schools, and industries.

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Implementation Stages

Presentation

In this phase, the presentation is designed to provide participants with a deep understanding of the concrete steps involved in converting electric motors. The following is a more detailed explanation of each mentioned element:

Explanation of Activities:

This includes details about the activities or steps that will be undertaken during the electric motor conversion process. For example, starting from the analysis of the existing electric motor, disassembly of unnecessary components, to reassembly with the required components.

Explanation of Material Usage:

Provides detailed information about the types of materials that will be used during the conversion. This involves explaining the function of each material and the reasons for choosing those materials. Examples could include the use of specific metals for strength or insulating materials to prevent unwanted conductivity.

Explanation of Applied Techniques:

Details specific techniques that will be applied during the creation of the object, in this case, the conversion of electric motors. This could involve an explanation of the use of specific tools, work procedures, or testing methods used to ensure optimal results.

Concrete Examples (Electric Motor Conversion):

Provides concrete examples related to electric motor conversion to give direct illustrations to participants. This could involve specific steps taken in real cases, perhaps by showing pictures or videos of the actual conversion process.

Presentation Objectives:

The main objective of this presentation is to provide a better understanding to participants about electric motor conversion. By providing detailed explanations of activities, material usage, and techniques involved, it is expected that participants can clearly understand the steps required to perform electric motor conversion.

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Conclusion Its implementation takes the form of a farewell session between the service team and participants held at the Balai Warga Jl. Betet Raya, Cibodasari Village, Cibodas District/Village, Tangerang City, Banten, Indonesia.

Figure 1. Exposure to electric motorbikes to participants

Figure 2. Electric motor conversion practice

Figure 3. Experiment using an electric motorbike

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Figure 4. Closing with a group photo session

SIMPULAN

The electric motor conversion training, conducted with the aim of reducing air pollution and creating an environmentally friendly environment for the community, has made positive contributions in various aspects. By replacing conventional motors with electric ones, this training aims to empower participants to become agents of change in responding to pressing environmental challenges. The training results show that participants, including vocational high school (SMK) students and motorcycle workshop mechanics, have successfully enhanced their understanding and skills in electric motor conversion. Thus, this training has laid a strong foundation for the adoption of environmentally friendly technology at the local level.

The effects of this electric motor conversion are evident in efforts to reduce air pollution. The use of electric motors not only results in lower emissions but also inspires behavioral changes in society related to sustainable transportation. Participant engagement in this program creates a multiplier effect, spreading knowledge and awareness of environmental benefits in the surrounding community. Additionally, there is a positive impact on the local economy with new opportunities in the electric motor industry sector. The adoption of this technology opens up the potential for new job opportunities and stimulates sustainable economic growth in the community.

However, to achieve a broader impact, further efforts are needed in terms of

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increasing community participation and cross-sector collaboration. Addressing infrastructure aspects and behavioral changes are challenges that need to be jointly overcome through collaboration among relevant stakeholders. Thus, the conclusion from this training is that electric motor conversion is not only a technological solution to reduce air pollution but also a step toward a more environmentally conscious and sustainable society. The sustainability of these efforts requires continuous support from various parties, with the hope of triggering positive transformations in both environmental and economic aspects of the community.

DAFTAR PUSTAKA

Alwan S. H., J. Jasni, M. Z. A. Ab Kadir, N. Aziz. (2016). Factors Affecting Current Ratings for Underground and Air Cables. World Academy of Science, Engineering and Technology. *International Journal of Energy and Power Engineering. Vol:10*, No:11.

Harahap, Partaonan. 2016. "Pengaruh Jatuh Tegangan Terhadap Kerja Motor Tiga Fasa Menggunakan Simulink MATLAB". Media Elektrika. Vol.9, No. 2, (Hal 1-18), Desember 2016

Hernawati, D., & Amin, M. (2017). Analisis self efficacy mahasiswa melalui kemampuan presentasi di kelas. *Education and Human Development Journal*, *2*(1), 26-33 https://doi.org/10.33086/ehdj.v2i1.379

Hirsh, R. F., & Koomey, J. G. (2016). Electricity Consumption and Economic Growth: A New Relationship with Significant Consequences? *In Electricity Journal (Vol. 28*, Issue 9, pp. 72–84). https://doi.org/10.1016/j.tej.2015.10.002

Muhsinin, S., Dinata, D. I., Andriansyah, I., & Asnawi, A. (2019). Peningkatan Potensi Ibu Rumah Tangga dalam Mengolah Sampah Organik Rumah Tangga Menggunakan Metode Takakura di Desa Cibiru Wetan, Kabupaten Bandung. *Jurnal Pengabdian pada Masyarakat*, *4*(2), 179-186. https://doi.org/10.30653/002.201942.110

Permana, A., Yuningtyastuti, Y., & Sukmadi, T. (2016). Analisis Pengaruh Metode PengasutanMotor Induksi 3 Fasa Terhadap Kedip Tegangan Yang Terjadi Pada Jaringan Kelistrikan Pltgu Blok I Pt. Indonesia Power Up Semarang Menggunakan Simulasi Software ETAP12.6. 0.Transient:

JURNAL CEMERLANG: Pengabdian pada Masyarakat
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Jurnal Ilmiah Teknik Elektro,5(2), 134-141.

Pratama, gusti. (2021). Aplikasi Matlab Sebagai Simulasi Pengaturan Kecepatan Putaran Motor Induksi 3 Fasa Menggunakan VSD (Variable Speed Drive) Acs 800. *Electro national conference (ENACO) politeknik negeri sriwijaya*, , *42*-48.

Ranjbar, Amir Hossein, Anahita Banei, Amir Khoobroo, B. F. (2017). Online Estimation of State of Charge in Li-Ion Batteries Using Impulse Response Concept | *IEEE Journals & Magazine | IEEE Xplore*. https://ieeexplore.ieee.org/abstract/document/6108373

Srinivas Mutyala, M. T. (2019). (n.d.). Design And Development Of Electric Motorbike. *International Research Journal of Engineering and Technology (IRJET).* Yantoro, W. D. (2019). Analisis Efisiensi Penggunaan Baterai Lithium Polymer 48 V 25 Ah Pada Sepeda Motor Listrik Yang Di Rancang Bangun Dengan Daya 3 Kw. Skripsi. http://repositori.usu.ac.id/handle/123456789/15962

Yandri, V. R. (2016). Studi Kelayakan Peralatan Pada Instalasi Panel Kontrol Di Bengkel Teknik Listrik, Politeknik Negeri Padang.*Jurnal Teknik Elektro,5*(1), 1-8.

Zainol, Z., Toha, S. F., Kamisan, N. A., & Bukhari, W. M. S. W. (2019). Design and development of a retrofit electric motorbike. *International Journal of Recent Technology and Engineering*, *7*(6), 71–75.