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Research Article

Electric Engine Stand with Trolley

Rene C. Dizon Jr.*, Mark Vincent Abadam, John Mark Alcantara, Stephen Kylle Doctor

President Ramon Magsaysay State University, Iba, Zambales, 2201

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**Corresponding author:*
E-mail:
renedizonjr@gmail.com

ABSTRACT

This study focused on the fabrication of an electric engine stand with trolley. This study aimed to fabricate electric engine stand with trolley and assess its efficiency in terms of safety, durability and functionality. The project followed a systematic approach including planning and designing, gathering all the materials, construction, testing, revision and finalization phases. The finish device Electric, Engine Stand with Trolley, demonstrated capabilities such as that the engine stand can lessen the time consumption in assembling and disassembling of an engine and it is safe for automotive technician to avoid accidents. The project evaluation revealed Highly Efficient that the Electric Engine Stand with Trolley fulfilled its purpose of providing safe, durable, and functional equipment that automotive student can use effectively when assemble and disassemble of engine. In terms of safety, the design incorporates several features aimed at minimizing risks associated with engine handling. The trolley mechanism allows for smooth transportation, reducing the likelihood of accidents during movement. The materials and construction of the Electric Engine Stand with Trolley withstand the rigors of daily use, with a lifespan exceeding industry standards of a Highly Efficient in the level of efficiency. Additionally, its multifunctional design accommodates a variety of engine sizes and configurations, making it versatile for different automotive tasks. The Electric Engine Stand with Trolley offers notable improvements in efficiency, safety, durability, and functionality, positioning it as an essential tool for modern automotive workshops.

Keywords*: Electric, Engine Stand, Trolley, Automotive.*

Introduction

Various equipment is used in engine assembly and disassembly to improve efficiency and safety. When it is using in the workshop, especially all the equipment is used just to be able to be assemble or disassemble the engine easily. As a result, we considered to make an equipment that can easily assemble or dissemble the engine with easy access.

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The Electric Engine Stand with Trolley is an equipment for assembling and disassembling of engine. All engine stands are constructed the same design. They usually have a head with four arms. Because each engine is mounted differently so these arms can be adjusted to reached different positions. The engine is usually mounted on a stand on the flywheel end using four holes in which the gearbox is mounted. Before starting work, it need to make sure that it has the right bolts.

The head of engine stand rotates can turn the engine upside down easy access. A basic engine stand is rotated with an electric motor or manual and fixed with a locking pin. There are about 6-8 different angles at which the engine can be held. The longer the tube, the better the leverage, but it can place a metal tube over the handle to add leverage. Professional engine stands use a crank handle that rotates a worm gear to turn the engine. This makes turning heavy engines much easier, and it can even turn the engine to any angle by using electric hoist controller switch.

Engine stand stability is important both for applying torque to fixing, and while wheeling the engine around the shop. Stands are available with 3, 4 and 6 castors. There is no big difference in stability between 4 and 6 castors, but 6 castors will tend to be easier to run because of the weight is spread across more wheels. The stand should have at least two locking castors so it doesn't chase you around the workshop while trying to loosen the bolts. In light of the aforementioned context above, the researchers came up with this study to fabricate an Electric Engine Stand with Trolley and determine its acceptability.

This research study would benefit the researchers to increase knowledge about Electric Engine Stand with Trolley and providing the way of construction easily and it's differences from other engine stands, the benefits of Electric Engine Stand with Trolley has to the population of Iba, Zambales and also the benefits of the research.

The Electric Engine Stand with a Trolley is specifically beneficial over traditional models because it offers enhanced mobility, improved safety, and greater efficiency, allowing for easier transportation, reduced injury risks, and streamlined workflows in various applications.

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Statement of the Project Objectives

The main purpose of this study is to design and construct an Electric Engine Stand with Trolley for automotive engine to use by the automotive students, technicians and to determine its efficiency.

Specifically, this will attempt to attain the following objectives:

1. To design an Electric Engine Stand with Trolley.
2. To fabricate an Electric Engine Stand with Trolley.
3. Determine the capabilities and limitations of Electric Engine Stand with Trolley.
4. To evaluate the efficiency of the project in terms of:
   4.1. Safety;
   4.2. Durability; and
   4.3. Functionality

Conceptual Framework

This study is based on the concept of Fabricating Electric Engine Stand with Trolley. The conceptualization of the project leads to the development of the device and further led the researcher to construct the project using materials available in local market. Testing and evaluation of the device was done to determine the operating capability and efficiency of the device.

Frame 1 present the input, Frame 2 the process, Frame 3 the output and Frame 4 evaluation on the efficiency of Electric Engine Stand with Trolley.

Frame 1 pertains to inputs which covers the problems that arise when fabricating Electric Engine Stand with Trolley.

Frame 2 presents the process. This includes project planning and designing, gathering materials, project development, testing and evaluation, revision and finalization, and production.

Frame 3 which is the output, presents the Electric Engine Stand with Trolley.

Frame 4 is the result of the evaluation of stakeholders on.

Research Paradigm

The research paradigm of the study was shown below

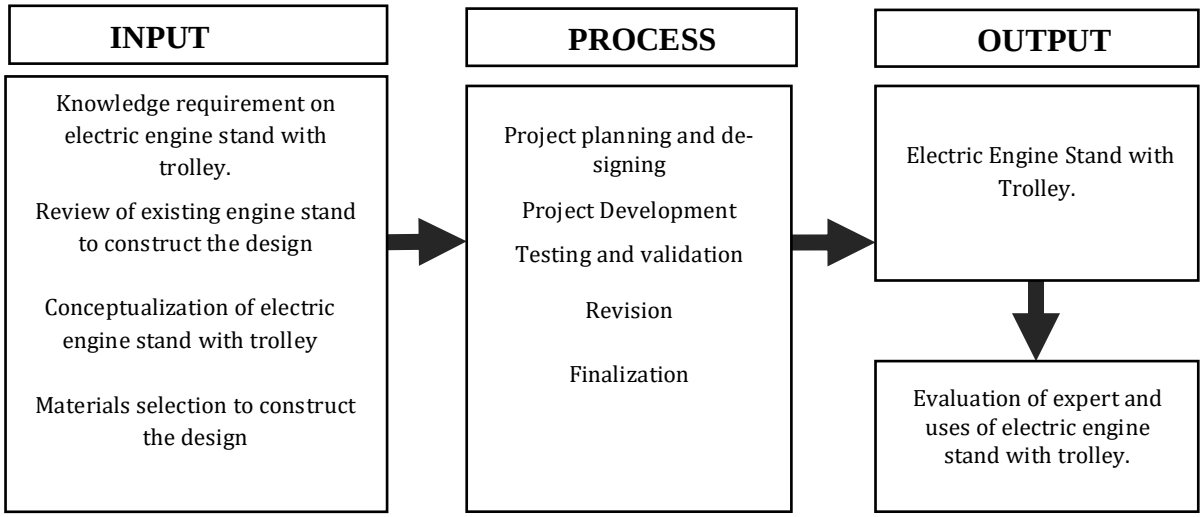

Figure 1. The Research Paradigm of the Study

Operational Framework

Project Design

This section explained how the project work. This contains component portion definitions as well as what each component accomplishes for the system or project. Block diagrams, raw materials utilized, and specifications and details were all detailed.

The major parts of the device are the following:

Mounting plate (1). It is the head of the stand that has four fully adjustable arms.

Adjustable arms (2). It is adjustable with a bolt holes to accommodate various load sizes.

Caster wheel (3). It's a swivel wheels that can move forward, sideward and backward to provide excellent maneuverability.

Upright post (4). A long, sturdy piece of channel bar steel set upright in the leg to support the engine

Electric motor. Is a device that can rotate the engine block without manually rotating.

Support post (5). A short piece channel bar steel that support the upright post form horizontal base

Horizontal base (6). A long sturdy piece of channel bar set above of rear and front base.

Rear base (7). A piece of channel bar that support the horizontal base.

Front base (8). Like rear base it is also support the horizontal base.

Lock (10). A circular metal that has four (4) holes

Axle (11). A long study axle that connected to the mounting plate and handle for rotation.

Handle (12). A long sturdy axle that will rotate the axle and mounting plate.

Drip tray (13). It is a catchment area for drips and minor spills. It allows maintenance on equipment where there is a possibility of residual liquids within the pipework and equipment after isolation and drainage

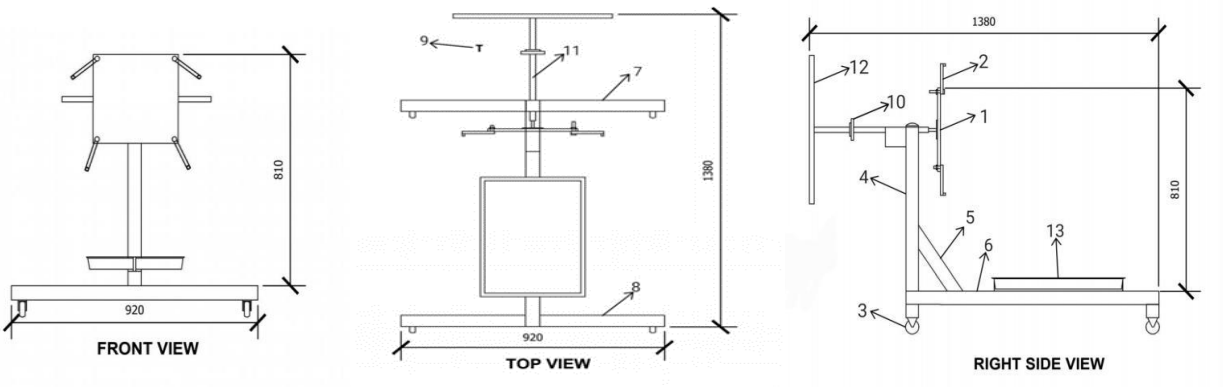

Table 1. Project Cost

No.	Particulars	Total Cost
1	Supplies and Materials	**13,827**
2	Machine shop	**3000**
3	Labor	**2,200**
	Total Production Cost	**19,027**

The tools and equipment used to construct the Engine Stand with Trolley was shown in Table 3.
Table 2. Tools and Equipment

Quantity	Unit	Description
1	pc	AC welding machine 250 amp
1	pc	220 AC grinder
1	pc	Drill
1	pc	L-square ruler
2	pc	C-Clamp
1	set	Socket wrench
1	pc	Steel tape measure
1	pc	Level bar
1	pc	Hammer

Project Development

The development of the Engine Stand with Trolley presents the methods and procedure in the construction of the project. This is represented by a flow chart followed by a detailed explanation of the stages of development of the project.

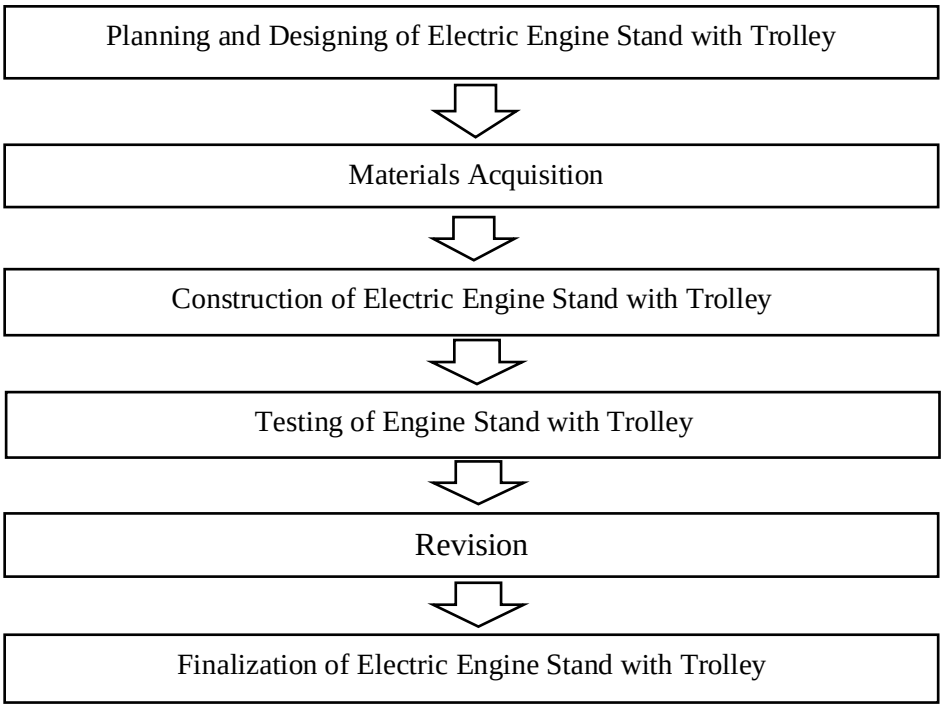

Figure 2. Flow Chart of Engine Stand with Trolley

Description of the Stages of the Flow Chart of Engine Stand with Trolley

Planning and Designing. A schematic drawing of Electric Engine Stand with Trolley was drafted by the researchers to come up with the final design. Upon thorough study the design was finalized for fabrication.

Material Acquisitions. At this stage, all materials and tools required for the construction of the Electric Engine Stand with Trolley were purchased and secured. The research goal is to make an efficient and high-quality device, so the materials used must meet those requirements. Today, there are many low-quality products on the market, so the researchers searched for the best-reviewed online store to purchase all the materials that will be used to develop the Electric Engine Stand with Trolley.

Construction of Engine Stand with Trolley. This is the step by step assembling of the different parts of the project taking into consideration every detail as planned. 2/4 channel bar, metal bar, casters, knot and volt, tray, cutting disc, steel, welding rod

Testing of Electric Engine Stand with Trolley. In this stage the device was put into test and determined which part of the device needs to be revised.

Revision. This stage calls for the replacement of the incompatible component and refinement of the case as well as putting up finishing touches on the project.

Finalization. The device was subjected to final inspection of each member of the research group until everybody was convinced that the output project conforms to the designed agreed. The device is now prepared for the evaluation by the respondents.

Results And Discussions

1. Project Description

The Electric Engine Stand with Trolley is an equipment that use in automotive industry. It was designed to assemble and disassemble the engine of vehicle. It also helps to lessen the time consumption while assembling and disassembling of an engine.

2. Project Structure

This part of the research described the result of the Electric Engine Stand with Trolley.

Figure 3. Perspective View

3. Project Capabilities and Limitations

The Electric Engine Stand with Trolley is an equipment used for overhauling of automotive engine and was designed to maximize the ease of use which helps the mechanic lessen the time consumption on specifications. The overall construction of the Electric Engine Stand with

Trolley can bring the potential of the device itself. The size of the engine stand is 68cm in height, 101cm in length and 81cm in width therefore it can only hold a maximum weight of 1 tone engine.

4. Project Evaluation on Efficiency of Electric Engine Stand with Trolley

This section presented the gathered and processed data using tabular form so as to provide a better and clear understanding on the attainment of objectives stated in Chapter 1 as determination of the level of efficiency of Engine Stand with Trolley Combined with Electric in terms of safety, durability, and functionality as shown from page number four (4).

4.1 Efficiency of Electric Engine Stand with Trolley in terms of Safety

The level of efficiency of the Electric Engine Stand with Trolley in terms of safety was shown in table 6.

Table 6. Level of Efficiency of the Electric Engine Stand with Trolley in terms of Safety

Safety	WM	DE
The electric engine stand with trolley handles the engine carefully.	3.88	Highly Efficient
With the use of electric engine stand with trolley, the mechanic has a safe position to do the work.	3.88	Highly Efficient
The electric engine stand rotates the engine finely.	3.88	Highly Efficient
With the use of electric engine stand with trolley the mechanic is safety do the work.	3.92	Highly Efficient
The device has easier access to all parts of the engine, increased safety and reduces strain on the technician's body.	3.86	Highly Efficient
Average Weighted Mean	**3.88**	**Highly Efficient**

As shown in table 6, the respondents evaluated the safety of the Electric Engine Stand with Trolley, on indicator (1) "The electric engine stand with trolley handle the engine carefully." With ta weighted mean of 3.88 which is described as highly efficient, while on indicator (2) "With the use of electric engine stand with trolley, the mechanic has a safe position to do the work." Got a weighted mean of 3.88 which is interpreted as a highly efficient. On indicator (3) "The electric engine stand rotates the engine finely." Got a weighted mean of 3.88 which is described as highly efficient, followed by indicator (4) "With the use of electric engine stand with trolley the mechanic is safety do the work." With a weighted mean of 3.92 which is interpreted as highly efficient, and lastly, indicator (5) "The device has easier access to all parts of the engine, increased safety and reduces strain on the technician's body." With a weighted mean of 3.86 which is described as highly efficient.

The assessment of Electric Engine Stand with Trolley in terms of safety obtained weighted mean of 3.88 interpreted as a highly efficient. This means the Electric Engine Stand with Trolley is safe to use for assembling and disassembling of engine.

4.2 Efficiency of Electric Engine Stand with Trolley in terms of Durability

The level of efficiency of the Electric Engine Stand with Trolley in terms of durability was shown in table 7.

Table 7. Level of Efficiency of the Electric Engine Stand with Trolley in terms of Durability

Durability	WM	DE
Stability of the engine stand with loads(engine).	3.94	Highly Efficient
The electric engine stand with trolley has a good quality for an engine to carry.	3.89	Highly Efficient
Made of high quality steel and built to standard of quality and durability.	3.84	Highly Efficient

Durability	WM	DE
Adjustable arms hold the engine tightly.	3.92	Highly Efficient
Upright post still balanced while the device has an engine.	3.93	Highly Efficient
Average Weighted Mean	**3.90**	**Highly Efficient**

As shown in table 7, the respondents evaluated the durability of the Electric Engine Stand with Trolley, on indicator (1) "Stability of the engine stand with loads(engine)." With a weighted mean of 3.94 which is described as highly efficient, while on indicator (2) "The electric engine stand with trolley has a good quality for an engine to carry." Got a weighted mean of 3.89 which is interpreted as a highly efficient. On indicator (3) "Made of high-quality steel and built to standard of quality and durability." Got a weighted mean of 3.84 which is described as highly efficient, followed by indicator (4) "Adjustable arms hold the engine tightly" With a weighted mean of 3.92 which is interpreted as highly efficient, and lastly, indicator (5) "Upright post still balanced while the device has an engine." With a weighted mean of 3.93 which is described as highly efficient.

The assessment of Electric Engine Stand with Trolley in terms of durability obtained a weighted mean of 3.90 interpreted as a highly efficient. Therefore, the results of the study proved the durability of Electric Engine Stand with Trolley.

4.3 Efficiency of Electric Engine Stand with Trolley in terms of Functionality

The level of efficiency of the Electric Engine Stand with Trolley in terms of functionality was shown in Table 8.

Table 8. Level of Efficiency of the Electric Engine Stand with Trolley in terms of Functionality

Functionality	WM	DE
The electric engine stand can rotate the engine finely.	3.88	Highly Efficient
This electric engine stand has fully adjustable mounting arms for excellent functionality.	3.92	Highly Efficient
Electric Engine stand can push and lock with the use of heavy duty castors.	3.9	Highly Efficient
Electric Engine stands is rotated using a metal bar, and then secured in position with a automatic and locking pin.	3.86	Highly Efficient
With the use of electric engine stand with trolley it helps the mechanic to easy to see the main problem of the engine.	3.96	Highly Efficient
Average Weighted Mean	**3.90**	**Highly Efficient**

As shown in table 8, the respondents evaluated the functionality of the Electric Engine Stand with Trolley, on indicator (1) "The electric engine stand can rotate the engine finely." With a weighted mean of 3.88 which is described as highly efficient, while on indicator (2) "This electric engine stand has fully adjustable mounting arms for excellent functionality." Got a weighted mean of 3.92 which is interpreted as a highly efficient. On indicator (3) "Engine stand can push and lock with the use of heavy duty castors." Got a weighted mean of 3.9 which is described as highly efficient, followed by indicator (4) "Electric Engine stands is rotated using a metal bar, and then secured in position with a automatic and locking pin." With a weighted mean of 3.86 which is interpreted as highly efficient, and lastly, indicator (5) "With the use of electric engine stand with trolley it helps the mechanic easy to see the main problem of the engine" With a weighted mean of 3.96 which is described as highly efficient.

The assessment of Electric Engine Stand with Trolley in terms of functionality obtained a weighted mean of 3.90 interpreted as a highly efficient. Therefore, the result of the study proved that the Electric Engine Stand with

Trolley is functional to use and beneficial for the Automotive students enrolled in President Ramon Magsaysay State University main campus.

Table 9. Summary on the Level of Efficiency of the Electric Engine Stand with Trolley

Summary of Efficiency	AWM	DE
1.Safety	**3.88**	**Highly Efficient**
2. Durability	**3.90**	**Highly Efficient**
3. Functionality	**3.90**	**Highly Efficient**

The respondents evaluated Highly Efficient on safety with an average weighted mean of 3.88; durability with an average weighted mean of 3.90; and functionality with an average weighted mean of 3.90. The general assessment of the Electric Engine Stand with Trolley gained a general weighted mean of 3.90 interpreted as Highly Efficient in the level of efficiency.

Conclusion

1. The design of the Electric Engine Stand with Trolley is an equipment for automotive which can lessen the time consumption of assembling and disassembling of an engine.
2. The size of the engine stand is 68cm in height, 101cm in length and 86cm in width therefore, it can hold a maximum weight of 1 tone engine. Its multifunctional design accommodates a variety of engine sizes and configurations, making it versatile for different automotive tasks.
3. The engine stand can lessen the time consumption in assembling and disassembling of an engine
4. The Electric Engine Stand with Trolley design incorporates several features aimed at minimizing risks associated with engine handling. The trolley mechanism allows for smooth transportation, reducing the likelihood of accidents during movement.
5. The respondent evaluated the Electric Engine Stand with Trolley 3.89 as highly efficient.
6. This means that the Electric Engine Stand with Trolley fulfilled its purpose of providing safe, durable, and functional equipment that automotive student can use effectively when assembling and disassembling of engine.

RECOMMENDATIONS

1. This will give further knowledge in the design of engine stand encompassing its functions, mechanisms, tests, and performance. Thus, this will give more inputs and highlights in the design of engine stands.
2. The structure of the Electric Engine Stand with Trolley can be improved in the future with the use of a plenty of capable machine and making it more convenient to use.
3. Future researchers are strongly encouraged to use our study as their reference work to further develop the Electric Engine Stand with Trolley.
4. The implementation of an Electric Engine Stand with Trolley can contribute to increased workshop productivity, enhanced technician safety, and better customer service by streamlining engine repair and maintenance workflows. Automotive businesses should carefully evaluate the cost-benefit analysis and consider integrating this technology into their operations.
5. Perform extra research applications to ensure the quality and durability of the devices.
6. Enhance the performance of device to have more quality output and find the added function that could be more usable for the device.

References

Aviationtoolsus (2015, June 18). Aircraft Engine Stand on Slideshare https://www.slideshare.net/aviationtoolsus/aircraft-engine-stand

Aviationtoolsus (2015, October 01). *One Of The Distinct Engines Stands Ever Made.* Aviationtoolsus. Retrieved from https://aviationtoolsus.wordpress.com/author/aviationtoolsus/page/3/

Engine stand. (2021, July 25). In Wikipedia. https://en.m.wikipedia.org/wiki/Engine_stand

Miller, B. (2015, March 27). *What is engine stand and from what parts it consists*. KnockOutEngine. Retrieved from https://www.knockoutengine.com/what-is-engine-stand-and-from-what-parts-it-consists/

Muhammed, A. (2020, February 24). Design of Light Duty Engine Overhauling Stand. https://www.scribd.com/document/500006802/Design-of-Light-Duty-Engine-Overhauling-Stand

Muir, A. (2018, February 15). Engine Stand – How a Car Works https://www.howacarworks.com/engine-stand

Pera, A. (2016, March 11). *Engine Stand.* Share and Discover Knowledge on SlideShare. Retrieved from https://www.slideshare.net/angelitopera/enginestand