



SDI Review Form 1.6

Journal Name:	Physical Science International Journal
Manuscript Number:	Ms_PSIJ_65641
Title of the Manuscript:	THERMODYNAMIC CONCEPTS ON EFFICIENCY OF AIRCRAFT ENGINES
Type of the Article	Original Research Article

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound. To know the complete guideline for Peer Review process, reviewers are requested to visit this link:

(<http://www.sciencedomain.org/journal/10/editorial-policy>)

PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	This article introduces that the maximum efficiency of aircraft engines can be done by reducing wasted heat energy and maximizing the work produced. It is novel to analyze the maximum efficiency of the engine based on the thermodynamic concept related to heat engines that apply the Brayton cycle. However, the whole article is too simple, without in-depth analysis. The author needs to further improve the content of the article, rather than simple conceptual statements and examples.	Has been added on page 2-4.
Minor REVISION comments		
Optional/General comments		

PART 2:

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Are there ethical issues in this manuscript?	(If yes, Kindly please write down the ethical issues here in details)	

Reviewer Details:

Name:	Anonymous Reviewer, Reviewer preferred to be anonymous.
Department, University & Country	



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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	<p>This research has an emphasis on aircraft engines and therefore more detailed and technical information about the Boeing 737-524 and CFM56-3B-1 engines should be presented. The various types of aircraft engines and the Brayton thermodynamic cycle are presented with little information. For example, the Brayton thermodynamic cycle should be presented with a schematic drawing explaining in more detail each step in the process. In results and discussions, the isobaric heat dissipation process is being described in the Indian language. At the end of the work, some improvements in the aircraft engines are suggested, but some newer models of Boeing aircraft already have more advanced technologies that increase thermodynamic efficiency and should be commented and compared with other references.</p>	<p>Has been added on page 2-4.</p>
Minor REVISION comments	<p>After equation (1), the following sentence is written: "Where is the isentropic process $dQ = 0$ and $= n c_v (T_2 - T_1)$:" The correct is: "where is the isentropic process $dQ = 0$ and $dU = n c_v (T_2 - T_1)$:" Check for other typos.</p>	<p>The equation has been fixed.</p>
Optional/General comments	<p>This research is a review manuscript that shows thermodynamics concepts on efficiency of aircraft engines. The motivation for this research is based on news of the Sriwijaya Air SJ-182 aircraft crash on January 9, 2021. The aircraft in question is a Boeing 737-524 with almost 27 years of operation. The aircraft contained 62 people on board. A meta-analysis method is used in this research.</p>	<p>Has been added on page 2.</p>

PART 2:



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	Reviewer's comment	Author's comment <i>(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
Are there ethical issues in this manuscript?	<i>(If yes, Kindly please write down the ethical issues here in details)</i>	

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	See On The Corrected Manuscript.	I have accommodated all suggestions.
Minor REVISION comments		
Optional/General comments		

PART 2:

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
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Are there ethical issues in this manuscript?	<i>(If yes, Kindly please write down the ethical issues here in details)</i>	
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Reviewer Details:

Name:	Anonymous Reviewer, Reviewer preferred to be anonymous.
Department, University & Country	

THERMODYNAMIC CONCEPTS ON EFFICIENCY OF AIRCRAFT ENGINES

ABSTRACT

Along with the development of engine technology to be able to produce maximum efficiency in aircraft jet engines, various modifications were made to the machine tools. Modifications are made by taking into account four main factors, namely: maximum power output, reduced engine weight, low fuel consumption and maximum aircraft payload. This research uses a meta-analysis method, namely the analysis of several research results in line with what has been done previously regarding the efficiency of aircraft jet engines. The thermodynamic concept related to the heat engine which implements the Brayton cycle that maximum efficiency can be done by reducing wasted heat energy and maximizing the work produced. From this concept, several attempts to maximize aircraft efficiency, such as modification of design ~~changes~~ that have a significant impact on weight reduction, fuel barrier design with low fan pressure, high bypass design ratio are also carried out in an effort to reduce aircraft noise levels. Aircraft noise levels can also be minimized by modifying the nozzle and ejector on the engine.

Key words: thermodynamics, jet engines, aircraft

INTRODUCTION

News of the Sriwijaya Air SJ-182 airplane crash on January 9, 2021, which has caused quite a lot of speculation. Some of them stated that the wrong cause of the accident occurred because the plane was 26 years old. ~~based~~ Based on the Decree of the Ministry of

Transportation Number 115 of 2020 which states that "the age limit for aircraft that is registered and operated for the first time in Indonesia is provided that aircraft in the transportation category for passenger transportation are at most 20 years old" [1]. Some aviation experts say that the age of an airplane is not a major factor in the occurrence of airplane accidents. One of the factors that can cause an aircraft to be unfit for flight apart from weather and crew performance is a technical factor. The technical factor referred to here is aircraft maintenance [2]. Aircraft engine maintenance includes the structure of the frame and engine ~~to and~~ the electrical system, radio installations and instrumentation. Machine maintenance is carried out regularly and non-routine [3].

The importance of maintenance on aircraft engines ~~because several machine tools that are related to each other have quite sensitive characteristics~~ **THIS SENTENCE IS NOT CLEAR HAS TO BE CHANGED**. There are several machine tools which, if not ~~carried out~~ used in routine maintenance, can ~~result in~~ be subjected to prolonged humidity which in turn can cause corrosion on the machine. ~~Machines that are not used within 2-3 days, it is possible that the equipment in the machine has corroded.~~ If one of the machine tools has a problem or cannot function optimally, it will have a direct impact on the function of the other equipment which results in the machine not working properly [4].

~~Based on thermodynamic principles regarding optimal work on an engine depending on engine performance~~ **THIS SENTENCE IS APPENDED**. The lower the heat output produced, the more work a machine can produce. A jet engine is a machine that can power an airplane that applies the Brayton thermodynamic cycle. This jet engine, known as a gas turbine engine, requires high speed. Various modifications to the jet engine used in aircraft such as turbojet and turbofan engines, rocket engines, ramjets and pump jets.

A turbojet engine is a fairly simple type of jet engine. Not only used in aircraft, but this turbojet engine is used on ships. This machine is powerful 28000 hp with operations that require high speed [5]. Another type of jet engine that is commonly used is a turbofan engine. Turbofan engines are usually used in commercial aircraft and fighter aircraft. In this engine, some of the air is flowed into the combustion chamber, some of it is flowed outside the combustion chamber. In this engine, the air also simultaneously functions as a coolant (lowers the temperature) in the combustion chamber [6]. The next type of jet engine is a turboprop engine. This machine is a turbojet engine equipped with an additional turbine. Apart from being fuel efficient, this machine also has a low noise level. In contrast to a turboprop engine, a turboshaft engine is a type of jet engine, in contrast to a turboprop engine. In this machine is a turboprop engine without using additional turbines. Usually this machine is used on a helicopter [7].

In general, a jet engine is a power-producing engine on an airplane. The components of this machine are the inlet, propulsion turbine, compressor, burner and nozzle. Jet engines have the basic principle of a combustion process that produces heat with high temperatures. As a result of this high temperature, it produces a very fast speed, in other words, from this process the jet engine provides/produces a large amount of energy/power. The advantages of a jet engine are that it produces enormous energy, can travel long distances and produces low vibrations. Of the advantages that a jet engine has, of course, there are drawbacks including high fuel consumption, maintenance that requires high costs and also a high level of noise [8].

In a jet engine work system in an airplane can be explained simply by simple thermodynamic concepts. Whereas in general the maximum efficiency in a heat engine can be generated by reducing the heat input and maximizing the incoming heat is converted into work with the smallest possible waste.

Dear Dr Faradiba Faradiba,

We have found some No's of references in different language in your Reference section. We have translated all these references with the help of GOOGLE TRANSLATOR. Please approve these translated versions of references. If any changes required, you may do that by yellow highlighting on the particular portion.

Yes, I have changed it.

Re: Final version published online

Pinaki Mondal <sciencedomain.editor2@gmail.com>

Thu 2/18/2021 10:09 AM

To: Faradiba <faradiba@uki.ac.id>

Dear Dr. Faradiba Faradiba,

Thank you for your mail and information.

Thank you for your interest in this Journal.

Please be safe during this COVID-19 pandemic situation. We wish best of health for you and your family members.

With Best Regards

Ms. Ruma Bag

Journal editorial office

Reg. Offices:

India: Guest House Road, Street no - 1/6, Hooghly, West Bengal, India, Tele: +91 8617752708

UK: Third Floor, 207 Regent Street, London, W1B 3HH, UK, Fax: +44 20-3031-1429

On Wed, Feb 17, 2021 at 10:23 AM Faradiba <faradiba@uki.ac.id> wrote:

Dear Ruma,

Thanks for your response. If possible on accepted and pulished date after 15th January 2021.
Thanks for your help.

Warm Regards,

Faradiba

From: Pinaki Mondal <sciencedomain.editor2@gmail.com>

Sent: Wednesday, February 17, 2021 11:49 AM

To: Faradiba <faradiba@uki.ac.id>

Subject: Re: Final version published online

Dear Dr. Faradiba Faradiba,

Thank you for your mail. Considering the request to publish your paper in 2021, we are keeping your paper (MS no. 2021/PSIJ/65641) "ON HOLD". The first issue for the year 2021 of this journal will be published within next 10-15 days (approx.).

Please be safe during this COVID-19 pandemic situation. We wish best of health for you and your family members.

With Best Regards
Ms. Ruma Bag

Journal editorial office

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UK: Third Floor, 207 Regent Street, London, W1B 3HH, UK, Fax: +44 20-3031-1429

On Mon, Feb 15, 2021 at 7:11 PM Faradiba <faradiba@uki.ac.id> wrote:

Dear Ruma,

Can you change date of published (after 9 January 2021), because not consistent with paragraph 1. Thanks.

Warm Regards,

Faradiba



(3) Hongpeng Zhang, Dalian Maritime University, China.
(4) Gustavo Alexandre Achilles Fischer, National Institute for Space Research, Brazil.
Complete Peer review History: <http://www.sdiarticle4.com/review-history/65641>

Original Research Article

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ABSTRACT

Along with the development of engine technology to be able to produce maximum efficiency in aircraft jet engines, various modifications were made to the machine tools. Modifications are made by taking into account four main factors, namely: maximum thrust, reduced engine weight, low fuel consumption and maximum aircraft payload. This research uses a meta-analysis method, namely the analysis of several research results in line with what has been done previously regarding the efficiency of aircraft jet engines. The thermodynamic concept related to the heat engine which implements the brayton cycle that maximum efficiency can be done by reducing wasted heat energy and maximizing the work produced. From this concept, several attempts to maximize aircraft efficiency, such as modification of design that have a significant impact on weight reduction, fuel barrier design with low fan pressure, high bypass design ratio are also carried out in an effort to reduce aircraft noise levels. Aircraft noise levels can also be minimized by modifying the nozzle and ejector on the engine.

*Corresponding author: E-mail: faradiba@uki.ac.id;

Faradiba and Yuniarti; PSIJ, 24(11): 43-49, 2020; Article no.PSIJ.65641

Keywords: Thermodynamics; jet engines; aircraft.

1. INTRODUCTION

News of the Sriwijaya Air SJ-182 airplane crash on January 9th, 2021, which has caused quite a lot of speculation. Some of them stated that the wrong cause of the accident occurred because [redacted] on the Decree of the Ministry of Transportation Number 115 of 2020 which states that "the age limit for aircraft that is registered and operated for the first time in Indonesia is provided that aircraft in the transportation category for passenger transportation are at most 20 years old" [1].

The Boeing 737-500 aircraft used on this flight were known to have flown for the first time on May 13th, 1994, with a maximum capacity of 112 passengers, according to various sources. This type of aircraft is included in the Boeing 737 Classic family produced by Boeing Commercial Airplanes and is the second generation of the Boeing 737-100/200. The Boeing 737-500 is the smallest variant and was first flown in 1989 and then began serving passengers in 1990. Although smaller than the 300 and 400 series, the Boeing 737 series 500 engines are more fuel efficient than 737-200 by up to 25 percent. The aircraft relies on two CFM56-3C1 engines made by CFMI, a joint-owned company of France's Safran Aircraft Engine and GE Aviation of United States. With a load of around 1,000 kilograms, the B737-500 can fly up to 4,444 kilometers with

can cause corrosion on the machine. If one of the machine tools has a problem or cannot function optimally, it will have a direct impact on the function of the other equipment which results in the machine not working properly [4].

Based on thermodynamic principles regarding optimal work on the engine depending on engine performance. The incoming heat energy is optimally converted into work, and the remaining heat from the exhaust is small. The lower the heat output produced, the more work a machine can produce. A jet engine is a machine that can power an airplane that applies the brayton thermodynamic cycle. This jet engine, known as a gas turbine engine, requires high speed. Various modifications to jet engine used in aircraft such as turbojet and turbofan engines, rocket engines, ramjets and pump jets.

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From: Faradiba <faradiba@uki.ac.id>
Sent: Monday, February 15, 2021 8:41:04 PM
To: Pinaki Mondal <sciencedomain.editor2@gmail.com>
Subject: Re: Final version published online

Dear Ruma,

Can you change date of published (after 9 January 2021), because not consistent with paragraph 1. Thanks.

Warm Regards,

Faradiba

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From: Faradiba <faradiba@uki.ac.id>
Sent: Monday, February 15, 2021 8:19:35 PM
To: Pinaki Mondal <sciencedomain.editor2@gmail.com>
Subject: Re: Final version published online

Dear Ruma,

Thanks for your information and help.

Warm Regards,

Faradiba

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From: Pinaki Mondal <sciencedomain.editor2@gmail.com>
Sent: Monday, February 15, 2021 8:14:01 PM
To: Faradiba <faradiba@uki.ac.id>
Subject: Final version published online

Subject: Final version published online - manuscript no. 2021/PSIJ/65641

Dear Dr. Faradiba Faradiba,

1. We are pleased to inform you that the final version of your manuscript with full bibliographic details is now available online at:

<https://www.journalpsij.com/index.php/PSIJ/article/view/30224>

2. We are also interested to know your publication experience (peer review standard, technical support, responsiveness, etc). Kindly don't hesitate to write if your experience is negative. Your feedback (positive/negative) will be instrumental for the development of this journal. We request also your kind permission to show your comments in our "Authors Speak" webpage, where other esteemed authors shared

their experience (Link: <http://testimonial.sciencedomain.org/>). From 06-04-2016, we have provided direct comment posting feature at the end of this page. Authors, who want to share their experience directly, can use this feature. Please include the web-link of your paper (<https://www.journalpsij.com/index.php/PSIJ/article/view/30224>) at the end of your comment, to validate your authorship.

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Thank you for your interest in this Journal.

Please be safe during this COVID-19 pandemic situation. We wish best of health for you and your family members.

With Best Regards

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