

DESIGN OF FUEL FILTER REMOVAL AND INSTALLATION TOOL ON JT8D ENGINE AS A LEARNING SUPPORT TOOL IN ENGINE SHOP OF SURABAYA AVIATION POLYTECHNIC

Alvin Rohman Fauzi*, Bayu Dwi Cahyo, Suyatmo

Politeknik Penerbangan Surabaya, Jemur Andayani I/73 Wonocolo Surabaya, Jawa Timur, Indonesia, 60236

**Corresponding author. Email: vanvinrohmanfauzi@gmail.com*

ABSTRACT

Special tools are equipment used for a specific purpose, including in the Engine Shop. With a division like this, these tools have different functions, and have a specialization in the engine shop of the Surabaya aviation polytechnic there is an engine type JT8D engine, which is an aircraft engine included in the gas turbine engine, in the engine there are several components that cadets must know and understand their uses including fuel filters, in this component cadets have difficulty removing and installing these components because there is no special tool that makes it easier to remove and install these components. The research method for designing this tool is by testing the tool by doing a practicum on the removal and installation of Fuel filters. In making this tool, namely by using steel (steel). How to use this tool to remove or install the Fuel filter, by installing the Special tool to the Fuel filter clockwise rotation so that the Special tool can be installed on the Fuel filter. And do the test. The results of the design of the special tool Fuel filter From all the tests on the design, it can be concluded that the Special tool Fuel filter tool can support learning during the practice of removing and installing the JT8D engine fuel filter with faster, stronger results so as to produce power efficiency in Gas Turbine Engine subjects by Surabaya Aviation Polytechnic cadets.

Keywords.: Special tool, Fuel Filter, JT8D

1. INTRODUCTION

In 1964 the first JT8D aircraft engine entered commercial service. This engine was used on the Boeing 727 and 737, the McDonnell Douglas DC 9 series and MD-80 series, and the Aeropatliale Caravelle. The short to medium range output of this aircraft takes off and lands as often as every hour. Continuous improvements over the years, have maintained a durable design and improved performance significantly. (William H. Day, 1987)

Gas Turbine Engine learning material that requires cadets to carry out practice to find out all the components in the JT8D engine so that each cadet must disassemble each part of the engine, and especially in the Fuel filter control unit installed in the JT8D engine. Special tools used for removal and install fuel filters are not yet available at the engine shop of the Surabaya aviation polytechnic, which makes it difficult for cadets to remove and install the fuel filter.

From observations through interviews with several cadets who have practiced without using special tools, the result is that cadets have difficulty and need tools that support practice such as special tools, with this the use of special tools is needed for cadets in learning and seeing

the components in the JT8D engine fuel filter, and if cadets can open and install these components easily, cadets will easily understand the Fuel filter component, and if it is never removed, it will result in the engine experiencing a lack of performance or not maximizing the JT8D engine.

Gas Turbine Engine courses, especially those that discuss the JT8D Engine, are not enough to be understood in theory, but must also be learned directly through practicum or special training, therefore the purpose of the design and manufacture of special fuel filter tools on the JT8D engine aims to support teaching and learning activities and support learning at the Surabaya Aviation Polytechnic, and can be developed in the future using equipment that is far more perfect and sophisticated.

release the installation directly to the Fuel filter. If the incised results are in accordance with the plan then the results are in accordance with the actual Special tool Fuel filter.

3. RESULTS AND DISCUSSION

This chapter will explain the results of research and discussion about "Design of Fuel filter Removal and Installation Tool on JT8D Engine as Learning Support at Engine Shop Polytechnic Aviation Surabaya".

3.1 Special tool specifications Fuel Filter

In the process of making a special tool fuel filter before doing the work until the completion of the tool there are designs and sizes and specifications of the special tool fuel filter tool. Below are the specifications

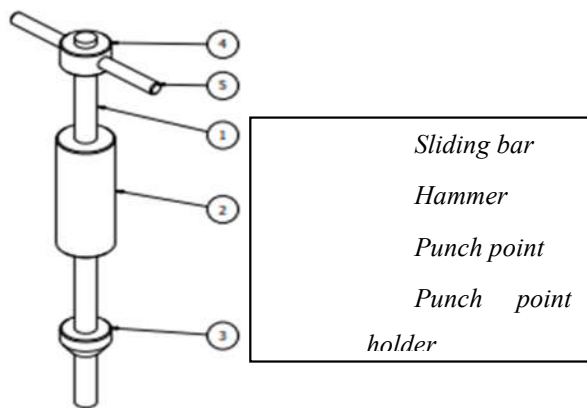


Figure 3.1 Design specifications and tool size Special tool fuel filter

Table 3.1 Special tool size specifications Fuel filter



No	Special tool section in figure 4.1	Size
1.	<i>Punch Point Holder</i>	Diameter 25mm Width 2 cm
2.	<i>Holder</i>	Diameter 10 mm Long 6 cm
3.	<i>Sliding Bor</i>	Diameter 15 mm Long 34,5 cm
4.	<i>Hammer</i>	Diameter 25 mm Long 10 cm
5.	<i>Punch Point</i>	Diameter 25 mm Width 2 cm

The Fuel filter special tool specification is the size of the special tool design itself, so that it is able to pull the Fuel filter on the fuel filter control in the JT8D engine. When conducting trials can pull the Fuel filter as desired.

3.2 Functional Testing Results

Based on the results of conducting functional testing of tools that have been carried out by the author, some image data is obtained which can then be concluded that its use is safe and does not damage the component material with the following results:

Table 3.2 Testing Using Special tools

No	Figure	Description
1.		<p>Without using the Special tool</p> <ol style="list-style-type: none"> 1. Damage the material of the side of the Housing hole on the Fuel control unit Fuel filter part. 2. Draining labor because it is very heavy if done by pulling manually or using a plier.
2.		<p><i>Special tool Fuel filter</i></p> <ol style="list-style-type: none"> 1. Does not damage the material of the side of the housing hole because there is no tool rubbing against the side of the housing hole. 2. Not exhausting and only by moving the Hammer on the special tool.

Safety testing on the special tool Fuel filter aims to find out whether this tool is safe to use. The result of this test using image data is that the Special tool fuel filter tool is needed to remove the fuel filter.

3.3 Test Results Effect of Special tool on fuel filter in Fuel control unit on JT8D engine

This test using the influence of the Special tool is carried out after the tool design has been installed on the Fuel filter component. Hammer Special tool is hit to the

end of the Punch point shaft so that there is a pulling force on the Fuel filter component.

Table 3.3 Testing the effect of Hammer Special tool blows on Fuel filter

No	Number of Special tool hits against Fuel filter	Fuel filter condition
1.	1 punch	<i>Fuel filter does not move</i>
2.	3 punch	<i>Fuel filter moves but has not come out of the housing</i>
3.	5 punch	<i>Fuel filter moves and exits the housing</i>

In this test, the effect of the Special tool on the fuel filter which is still in the housing, when the special tool is used to remove the fuel filter with the pulling force of the special tool which is obtained from the hammer blow of the special tool by doing 5 blows so that the fuel filter can come out of the fuel filter housing in the jt8d engine.

3.4 Special tool strength test results against the given blow

Weld joint testing is carried out by monitoring the condition of the weld joint under hammer loading. The welded joints were tested with a slide hammer every 3 blows. During the design test, there was no change in the damage or looseness of the cylinder seat weld joint. The strength of the welded joint is determined to withstand the predetermined load. The test results can be seen in table 3.4.

Table 4.4 Special tool strength test against the given blow.

No.	Special tool punch during release	Weld Joint Condition
1.	3 strokes	Unchanged
2.	4 strokes	Unchanged
3.	5 strokes	Unchanged

For this test the author also tests by looking at the state of the Special tool whether it has cracked or not after being used to remove and install the fuel filter, the method used is to use a microstructure test on the colliding parts such as the Hammer and punch point as shown in Figures 3.2 and 3.3.

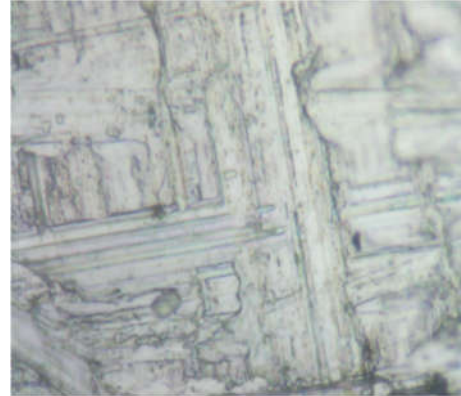


Figure 4.2 Micro test of Hammer parts

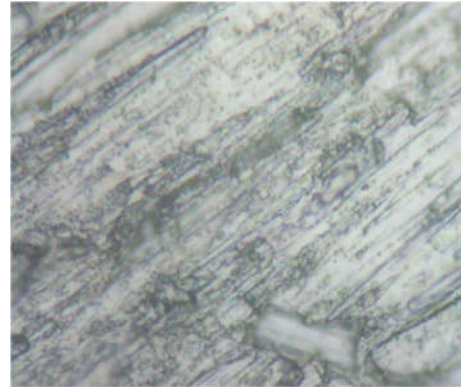


Figure 4.3 Micro test of punch point section

4. CONCLUSIONS

As a result of the research design in the field, the author can conclude the following:

1. How to design a fuel filter special tool, namely analyzing, making designs, preparing tools and materials, forming processes, welding, and tool assembly processes.
2. The way this special fuel filter tool works has the concept of a slide hammer tool to make it easier to remove and install fuel filters with faster, stronger results resulting in power efficiency.

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