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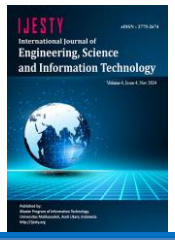

Analysis of Tensile Loads on Metal Inert Gas Welding Spiral Steel Pipe 508

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Abstract

Welding is one of the most widely used material joining techniques in various industries, including automotive, construction, and manufacturing. MIG (Metal Inert Gas) welding and SMAW (Shielded Metal Arc Welding) are the most commonly used welding methods. Both have different processes, speeds, quality of welding results, and application characteristics, but this research will apply it to MIG welding. This research aims to determine the difference in the ultimate tension tensile test (Tu) on a 12 mm thick spiral steel pipe 508 pipes when planted for 10 years and a new 12 mm thick spiral steel pipe 508. From the research results, it can be concluded: that it turns out that the value of the Ultimate Tension (Tu) on the new Spiral Steal Pipe 508 pipe is more significant than that which has been installed, with the average value of the Ultimate Tengan (Tu) on the new Spiral Steal Pipe 508 pipe being 498.72 N/mm2, while the average value of the Ultimate Tension (Tu) on the old Spiral Steal Pipe 508 pipe is 476.49 N/mm2. There is a difference in the Ultimate Tension (Tu) value of 0.95%; this is caused by changes in the structure of the Spiral Steal Pipe 508 pipe, which has been planted for 10 years.

Keywords: *Spiral Steel Pipe 508, tensile strength, Metal Inert Gas.*

1. Introduction

Welding is a common material joining process used in various industries, such as construction, automotive, manufacturing and shipbuilding. The welding process is vital in producing a strong and durable connection between two or more metal materials. As technology develops, various types of welding methods have been developed, including arc welding, MIG (Metal Inert Gas) welding, TIG (Tungsten Inert Gas) Welding, and SMAW (Shielded Metal Arc Welding), each with its advantages and disadvantages.

According to Budi Santoso, 2014, Welding is a local joining process between two metal parts by heating them until they reach the melting point of the metal by utilizing heat energy originating from an arc flame or friction. Welding is an essential process in the industrial world and is an inseparable part of industrial growth because it plays a significant role in engineering and metal production repairs.

One of the main factors that affect the quality of welding results is welding parameters, such as welding current, voltage, and welding speed. A deep understanding of the effect of parameter variations on joint quality is essential to produce products with high mechanical strength, corrosion resistance, and optimal durability. In addition, control of the welding process is also needed to minimize welding defects such as porosity, cracks, and deformation, which can affect joint performance.

The material used in Welding also plays a vital role in determining the appropriate welding method and parameters. Each type of material, such as carbon steel, stainless steel, or non-ferrous metals, has different thermal conductivity, melting point, and stress resistance characteristics. Therefore, research on the effect of various welding parameters on the quality of joints in certain materials is fundamental.

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2. Research Methods

The material used in this research is AISI 1045 steel. The experimental method chosen for this research is the experimental method. In the introductory section, the limitations and scope of the study are shown as follows:
a. Welding type: MIG
b. Current: 120 A
The shape of the specimen follows the ASTM E8 standard as follows:

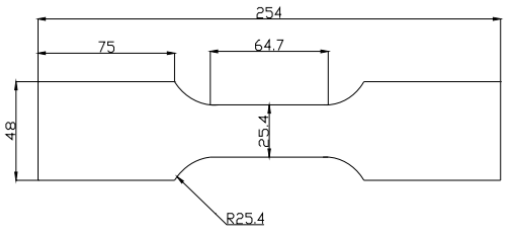

Fig 1. Specimen Shape According to ASTM E8 Standard

Fig 2. Specimen

This research begins with preliminary observation, and the activities include literature study, preparation of tools and materials, machine settings, experiments, data processing, data analysis, discussion, and conclusion. The systematics of this research can be presented in the form of a flow diagram as follows:

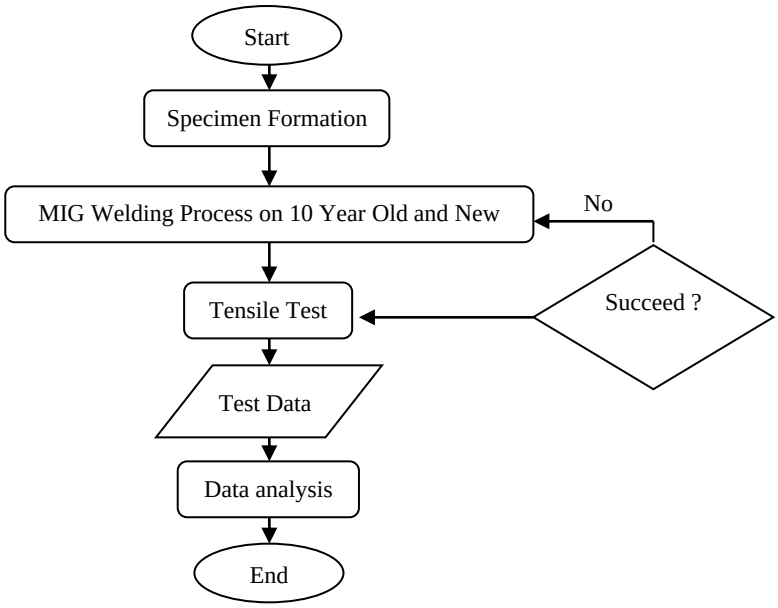

Fig 3. Research Flow Diagram

3. Result and Discussions

The data used in this research is data from direct testing. In this study, there were 5 (five) samples of each type of pipe. Tensile tests were conducted with a Tarnos unit to obtain ultimate stress data (tu) N/mm2.
Table 3. below presents data from the ultimate stress test results (tu) N/mm2 sequentially, with several treatment variations according to the experimental design.

Table 1. Ultimate Stress Test Results (tu) N/mm2

No	Pipe Type	Tu (N/mm^2)					
		1	2	3	4	5	Average
1	Spiral Steel Pipe 508 (New)	522,17	477,15	532,84	454,50	506,98	498,72
2	Spiral Steel Pipe 508 (Plant)	488,31	447,71	455,14	535,70	455,60	476,49

Table 1 shows the results of measuring the ultimate stress on each sample for the type of pipe, both new Spiral Steal Pipe 508 and those installed for 10 years.
Table 3 shows a graph of the ultimate stress (tu) N/mm2) for each sample for the type of pipe, new Spiral Steal Pipe 508 and those installed for 10 years, as in Figure 4.

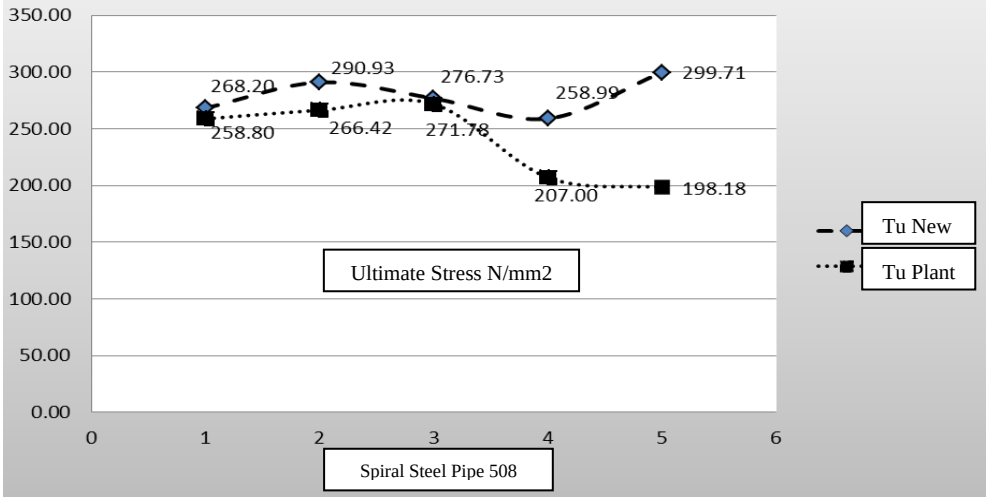

Fig 4. Ultimate Stress Graph (N/mm2), New 508 Spiral Steal Pipe vs 10-Year Plant.

From Figure 4 it can be seen that in each research sample the ultimate stress (tu) value is N/mm2, the ultimate stress (tu) on the new Spiral Steal Pipe 508 pipe type is better than the one that has been planted for 10 years, where in sample 1 the Ultimate Stress (Tu) value for the new Spiral Steal Pipe 508 is 522.17 N/mm2 while for the Spiral Steal Pipe 508 pipe that has been planted for 10 years the Ultimate Stress value (Tu) of 488.31 N/mm2. In sample 2, the Ultimate Stress (Tu) value of the new Spiral Steal Pipe 508 is 477.15 N/mm2, while the value of the Spiral Steal Pipe 508 pipe, which has been planted for 10 years, the Ultimate Stress (Tu) value is 447.71N/mm2. In sample 3, the Ultimate Stress (Tu) value of the new Spiral Steal Pipe 508 is 532.84 N/mm2, while the Ultimate Stress (Tu) value of the Spiral Steal Pipe 508 pipe which has been planted for 10 years is 455.14 N/mm2. In sample 4, the Ultimate Stress (Tu) value of the new Spiral Steal Pipe 508 is 454.50 N/mm2, while the Ultimate Stress (Tu) value of the Spiral Steal Pipe 508 pipe which has been planted for 10 years is 535.70 N/mm2. In sample 5, the Ultimate Stress (Tu) value of the new Spiral Steal Pipe 508 is 506.98 N/mm2, while the Ultimate Stress (Tu) value of the Spiral Steal Pipe 508 pipe which has been planted for 10 years is 455.60 N/mm2. The average value of Ultimate Tension (Tu) on the new Spiral Steal Pipe 508 pipe is 498.72 N/mm2, while the average value of Ultimate Tension (Tu) on the old Spiral Steal Pipe 508 pipe is 476.49 N/mm2.

4. Conclusion

From the research results, it can be concluded: that it turns out that the value of the Ultimate Tension (Tu) on the new Spiral Steal Pipe 508 pipe is more significant than that which has been installed, with the average value of the Ultimate Tengan (Tu) on the new Spiral Steal Pipe 508 pipe being 498.72 N/mm2, while the average value of the Ultimate Tension (Tu) on the old Spiral Steal Pipe 508 pipe is 476.49 N/mm2. There is a difference in the Ultimate Tension (Tu) value of 0.95%, which is caused by changes in the structure of the Spiral Steal Pipe 508 pipe, which has been planted for 10 years.

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