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Keywords: Characteristics, Aluminum Silicon, Torque, Fracture Period.

Abstract: Aluminumcasting results are still manythat suffered damage.Some of the causes are the lack ofpermeability andprint strength. This researchwasexpected to be able to know the capability ofcastingproductto impactload from variousteperature which wasmeasuredand expected toincreaseproductivity of castingsresult.This researchwas expected to knowthe ability of castingproductstothetorque load of variousforces thatweremeasured and expected to increase the productivityofthe castings. This research used variation of permeability value by testing 3 materialstested with the same length and diameter. This study was conducted by observing theeffect ofcorner and force of torque on the breaking strength performed by torque testing with the firsttestofthe forceof 4.6 ton with the angle 2^0 with the fracture period at 70^0 with the corner 0ton, test the two force of 4.6 ton with corner 2^0 with fracture at 0 ton with corner 70^0, third test of force 3 ton with corner 2^0 with fracture period at 76 ton with corner 0^0.

1 INTRODUCTION

One of the composite-based materials is Al-SiC (Aluminum Silicon Carbide) because this material has a hard and light properties. Aluminum (Al) is as the matrix (main material) and SiC as its amplifier. Aluminum has advantages that have a lightweight, corrosion resistance and composite brakes are not having the sale value of the material is not economical antitheft. Metal Aluminum, when viewed from mechanical properties, such as hardness value (hardness), is very low. Therefore, Aluminum metal as a material has many weaknesses, especially mechanical strength, stiffness and coefficient of expansion. The advantages of Aluminum metal include light weight, corrosion resistant and easily formed (Zhongliang Shi et al. 2001). One way to increase the metal hardness is to strengthen the metal in a way coupled with hard materials, such as ceramic materials. The most commonly used and hardest ceramic type is the SiC

This research performs characteristic of making Al-SiC by stir casting method, with modification of reinforcing fraction. Variations of addition strengthening parameters are 5, 10 and 15% SiC. The subjects covered include chemical composition with various material composition, tensile and impact test. The expected output from this research is the result of tensile strength and impact price. The use of brake blocks for railway canvas in Indonesia commonly used is made from cast iron, where this material has been started since the last decade. Brake block material using cast iron weighs 11 kg, making it difficult to install or installation cost is large enough. One of the efforts that has been taken is to combine the two constituent materials, namely matrix and amplifier called composite.

Composite materials include: resin, fiber and filler. The types of materials for railway brake blocks are gray cast iron and Al-SiC. The composite is a blend of selected ingredients based on the combination of physical properties of each constituent material to produce new and unique materials. Various kinds of amplifiers eg SiC and Al2O3. Based on the matrix material used, the composite can be classified into 3 groups, namely: metal matrix composite (MMC) as matrix, polymer

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matrix composite (PMC) polymer as matrix, and ceramic matrix composite (Ceramic Matrix Compositor/ CMC) ceramics as matrix. While based on the type of reinforcement, the composite material can be explained as follows: particulate composite, amplifier in the form of particles, fiber composite, fiber-strengthening and structural composite, composite materials.

2 RESEARCH METHODS

This research was conducted in February 2017 at the Basic Physics Laboratory, Laboratory Faculty of Engineering Mechanical, Engineering Study Program, University of Harapan Medan, as for the procedural Implementation of research as below:

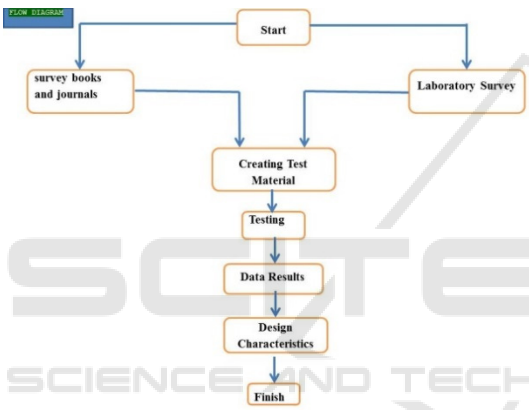

Figure 1: Procedure Implementation of Research.

Figure 2: Profile Materials.

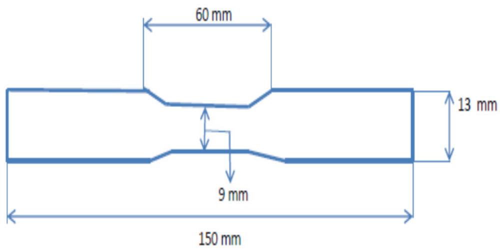

Figure 3: Size of Test Object.

3 RESULTS AND DISCUSSION

The research conducted using torque testing. Testing torsionused Torsion Machine torque test equipment. The Aluminum Silicon Carbide specimen, the maximum force applied to the torque testing apparatus was 4.6 N while the 5%, 10% and 15% Al-SiC specimens and Al-SiC composites with the maximum force of 76 N. The result of the torque test was the amount of broken force that could be seen in the tool with a percentage scale of the maximum force applied to the specimen. Torque testing by measuring the angle of the material was against the shock load, using the Charp method.

Table1: Research Results on Materials 1.

No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton
1	2	4,6	11	22	22,4	21	42	26,2	31	62	1,4
2	4	11	12	24	22,8	22	44	26,4	32	64	0,4
3	6	15,2	13	26	23,2	23	46	26,6	33	66	0,2
4	8	17,2	14	28	23,6	24	48	26,8	34	68	0,2
5	10	18,2	15	30	24,2	25	50	27	35	70	0
6	12	19,2	16	32	24,6	26	52	27,4			
7	14	20	17	34	25	27	54	27,6			
8	16	20,6	18	36	25,4	28	56	27,8			
9	18	21	19	38	25,8	29	58	27,8			
10	20	21,6	20	40	26	30	60	28			

Table 2: Research Results on Materials 2.

No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton
1	2	4,6	11	22	22,4	21	42	25,6	31	62	21,8
2	4	11	12	24	22,8	22	44	26,6	32	64	4,4
3	6	15,2	13	26	23,2	23	46	26,6	33	66	1,4
4	8	17,2	14	28	23,6	24	48	25,4	34	68	1
5	10	18,2	15	30	24,2	25	50	25,6	35	70	0
6	12	19,2	16	32	24,6	26	52	24			
7	14	20	17	34	25	27	54	24,4			
8	16	20,6	18	36	25,4	28	56	23,8			
9	18	21	19	38	25,8	29	58	23,4			
10	20	21,6	20	40	25,4	30	60	22,6			

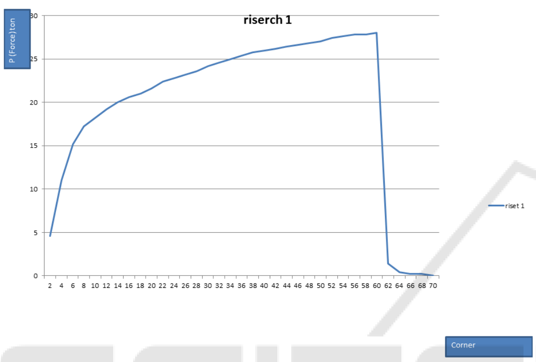

Figure 4: Material Characteristics in Experiment 1.

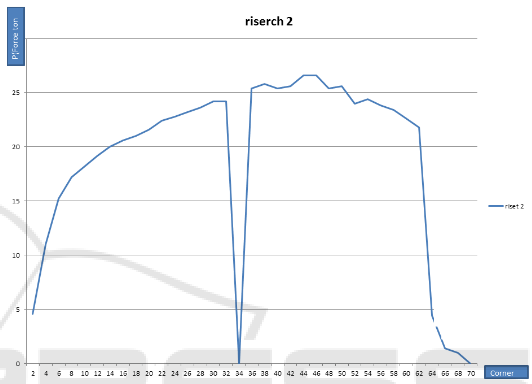

Figure 5: Material Characteristics in Experiment 2.

Table 3: Research Results on Materials 3.

No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton	No	Θ Corner	P (Force) ton
1	2	3	12	24	18,6	23	46	24,8	34	68	27,8
2	4	6,6	13	26	19,4	24	48	25,2	35	70	1,4
3	6	9	14	28	20	25	50	25,4	36	72	1,2
4	8	11	15	30	20,6	26	52	25,8	37	74	1
5	10	12,4	16	32	21	27	54	26,2	38	76	0
6	12	13,4	17	34	21,6	28	56	26,6			
7	14	14,4	18	36	22,2	29	58	26,8			
8	16	15,6	19	38	22,8	30	60	27			
9	18	16,4	20	40	23,2	31	62	27,4			
10	20	17,2	21	42	23,6	32	64	27,4			
11	22	18	22	44	24	33	66	27,6			

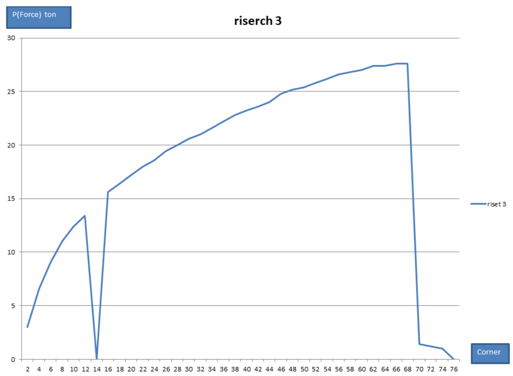

Figure 6: Material Characteristics in Experiment 3.

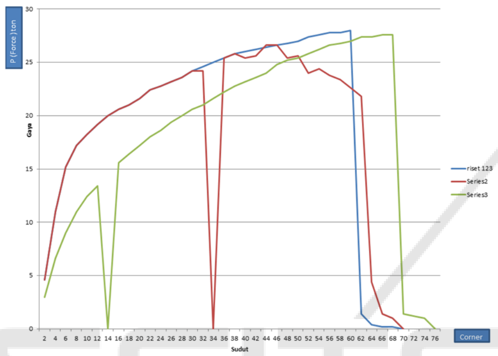

Figure 7: Collect Characteristics of Materials in Experiment 1, 2, 3.

4 CONCLUSIONS AND SUGGESTIONS

4.1 Conclusion

1. For test experiment 1, it shows the beginning oftorque at corner 20 with a force of 4.6 tons, there is a fracture mass on. 700 angleswith Force P = 0 ton.
2. For the experimental test, it shows the beginning of torque at a corner of 20 with a force of 4.6 tons, there is a fracture mass on. 700 corners with Force P = 0 ton, but at the force of approximately 25 ton with corner 340.almosthappenedstress.
3. For the experimental test, it shows the beginning of torque at corner 20 with a force of 3 tons, there is afracture mass on. corner 760 with Force P = 0 tons, but at a force of approximately 170 N with an angle of 140is almost stressful

4.2 Suggestion

1. For the execution of testing, it is required that the torsion test equipment be calibrated so that the tested results obtain valid data results.
2. The material of the test object shall be finished and the surface for clamping the standard forclamping, so as not to be detached from the holder.
3. Characteristic planning tools should be valid in data searched.

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