The Ratio Resin Polyester Composite Basal The To Testing Pull

Tumpal Ojahan R[1], Anang Ansyori[1], Zulfikar Alimuddin[1]

[1]Study of the techniqueprogram, machine engineering faculty, MalahayatiUniversity.

Corresponding e-mail: tumpal_ojahan@yahoo.com

Abstract. Dropsy of the pollen and polyester resin constitutes the materials that can make material composite after the mixing of both , namely basal dust as filler and as a matrix. Polyester resin this research do the ratio of basal 40, mesh size of pollen 60, mesh and 150 mesh against 15 %, polyester resin 20 %, and 25 %.To get matrial, composite printed according to standard ASTM-D638 type V as for the purpose of this research is to obtain information regarding the ratio of polyester resin with basal powder against tensile strength and scored a maximum and minimum as well as determine the outcome of tensile strength of the ratio of basal powder 40, mesh 60, mesh150 mesh with resin polyester 15 % , 20 % , 25 % and a mixture of a catalyst 1/10, 1/20, 1/30 of the results of the analysis uses the method taguchi kompsisi resin polyester optimal there are on 25 % and the 60 mesh and catalyst 1/30 gr .The results of minimum found in composite basal the 150 mesh with force 60 Kgf with fariasi resin 15 % and catalyst 1/10 , while a maximum score found in composite basal the 60 mesh with fariasi resin 25 % and catalyst 1/30 with force of 135 Kgf. Of the result analysis using a method of taguchi kompsisi polyester resin levels found in 25%, while basal 60 mesh, powder and a catalyst 1/30 gr.

1. Introduction

Lampung provincial is one of producing basal rocks mfis in indonesia.Basal rocks is in the Lampung dark-colored, has characteristics: fine grained, and composed of mineral plagiokas and pirokesn.Basal rocks due to of the existence of the lava inundated on the surface or who settles hundreds of years on earth often also called to extrusive rock. Rocks basalt this can be processed to be used as a mix to get material composite [1]. Hyndman says that most basal formed as “bedrock” on earth. Basal more formed as an a .Most of the rocks basalt is in the surface of the sea and the earth as illustrated in Figure 1 (a) & (b)

Figure 1 (a). Rocks basalt.

Figure 1 (b). Rocks basalt path in the sea.

The division of basalt rocks in the broad can be divided into two categories which the first one categorized as Rocks Basalt Alkaline where a kind of owning amount minimize the action of an alkali

Na_2O and K_2O which greater than rocks basalt tholeitik. It is also containing titanium augit, fenokris olivine, an oxide of iron, nephelin and petrograph and underaturated right beside the road. The second category is the Rock Basalt Tholeiitic where it contains less Na_2O and K_2O compared to the first one. It is oversaturated and owning amount minimize pigeonit, augit subklasik, and interstitial glass. This type of rocks can be found as lava or very large extraction of magma. Recently, the mineral rocks basalt can be processed to the as a mix to material composite material.

According to Matthews and Rawing [2], composite is a material one which formed from acombination of two or more material one anddid not equally worthless and yet presuming through of a mixture that has are not homogenous, where is of the nature of the mechanics from each material one and did not because they were different from and yet presuming to strive of a mixture of the loan would also be produced material one and did not a composite having the nature of mechanical and of different characteristics of material one and did not equally worthless and yet presuming.

Material composite has been much used as material alternative a substitute for metal diberbagai industry, because matrial metal is already very difficult obtained and the value of selling very high.With the these then done research to get matrial a substitute for namely material composite.

Polyester resin is resin thermoset shaped, liquid with relatively low, viscosity containing monomers stiren so that the temperature thermal deformation lower than in resin termoset and have reached 110-140^{o}C. Heat resistance In an arrangement of resin composite fibers responsible for protecting and tie to work well.The most polyester resin used especially for the application of lightweight construction, has the characteristic of low to be tinged typical, transparent, can be made rigid and flexible, waterproof, weatherproof and chemicals.Polyester resin can be used at a temperature of lower than last year reached 79^{O}C network or higher depends particles resin and its need [3]. The characteristics of polyester resin are shown in Table 1. Hence, this paper aims to obtain information regarding the ratio of polyester resin with powder basalt and catalyst of tensile strength to get a maximum and minimum as well as to determine the tensile strength of the ratio of basal 40, mesh 60, mesh 150 mesh with 15, percent polyester resin 20, percent percent and a catalyst 25 1/10, 1/20, 1/30 taguchi by using the method

Table 1. Characteristic of polyester resin

Item	Units	Tipical Score	Note
The specific gravity of need to resort to violence	gr/cm3	1.4	25^{O}C
The temperature of distortion heat	^{o}C	70	
The uptake of water (room temperature)	%	0.188	24 hours
	%	0.446	7 day
Power fleksural	Kg/mm2	9.4	
Modulo fleksural	Kg/mm2	300	
tensile strength	Kg/mm2	5.8	
modulus of elasticity	Kg/mm2	300	
Elongation	%	2.4	

2. Research Methodology

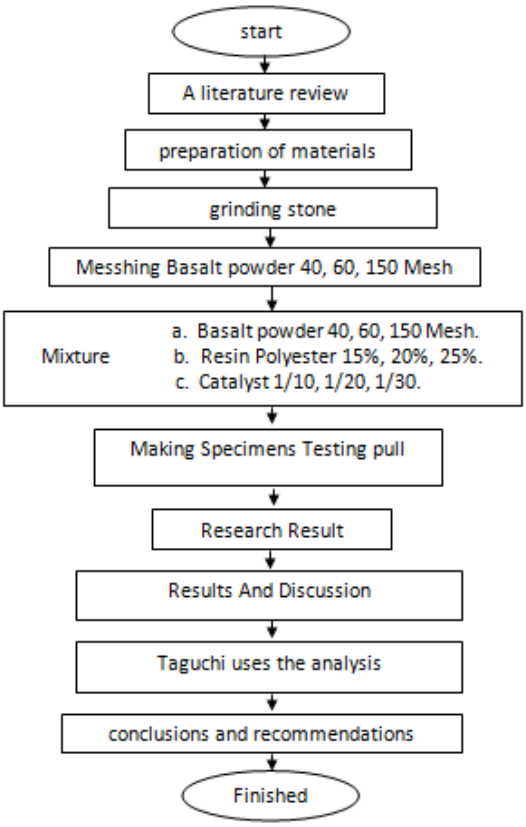


Figure 2. A diagram researches.

Figure 2 above indicates the work flow in order to complete this study. From the rocks basalt ± that has size of 20 cm x 30 cm undergoing a shredding process using a Jaw Crushier with size of 3x3 cm before it go to pegging process using Ballmill until it gained ground ballmill particles of basalt [4]. Figure 3 and 4 below illustrates the equipment used.

Figure 3. Jaw Crushier.

Figure 4. Ballmill.

The basalt was meshed using a smooth ayakan of 40, 60, and 150 mesh. The results were depicted in Figure 5 (a) to (c). The basalt then mixed with resin polyester and catalyst to get material composite with the weight of 40,60,150 mesh, 15%, 20%, 25% and 1/10, 1/20, 1/30 gr. The specimens that have stirred evenly were printed out using printings palaron ½ inches and it is a need to ensure that the specimen test pull conforming to standards ASTM D638 type V [5,9-12] using methods hand lay up. All the specimens were listed in coding system to know the variation of composite that has been done. The composite codes were tabulated in Table 2.

Figure 5 (a). 40 mesh

Figure 5 (b). 60 mesh

Figure 5 (c). 150 mesh

Table 2. Composite codes

No.	Size of Particles (*mesh)*			Resin (%)
	40	60	150	
1.	TA.A.2.1	TA.B.2.1	TA.C.2.1	15%
2.	TA.A.2.2	TA.B.2.2	TA.C.2.2	15%
3.	TA.A.2.3	TA.B.2.3	TA.C.2.3	15%
4.	TA.A.3.1	TA.B.3.1	TA.C.3.1	20%
5.	TA.A.3.2	TA.B.3.2	TA.C.3.2	20%
6.	TA.A.3.3	TA.B.3.3	TA.C.3.3	20%
7.	TA.A.4.1	TA.B.4.1	TA.C.4.1	25%
8.	TA.A.4.2	TA.B.4.2	TA.C.4.2	25%
9	TA.A.4.3	TA.B.4.3	TA.C.4.3	25%

After all the specimens were ready, every specimen was pull tested using type HT-2402 Computer Universal Testing Machines which shown in Figure 6 and the data were processed using Taguchi analysis.

Figure 6. Pull Machine.

3. Results And Discussion

3.1. Research Results

Table 3. The pull the resin polyester and basal of 40 mesh

No.	Basalt 40 mesh				
	Kode	*p*	*t*	*l*	*Max.F*
1	TA.A.2.1	62.90	11.10	14.10	60
2	TA.A.2.2	63.00	10.50	14.00	57
3	TA.A.2.3	63.15	9.91	13.91	58
4	TA.A.3.1	64.11	11.37	15.43	91
5	TA.A.3.2	63.02	11.7	13.98	70
6	TA.A.3.3	62.25	10.43	14.47	69
7	TA.A.4.1	63.11	10.23	14.37	66
8	TA.A.4.2	62.80	11.15	14.56	87
9	TA.A.4.3	64.12	9.74	14.63	96

Table 4. The pull the resin polyester and basal of 60 mesh

No.	Basalt 60 mesh				
	Kode	*p*	*t*	*l*	*Max.F*
1	TA.B.2.1	62.56	11.01	14.50	95
2	TA.B.2.2	62.70	10.81	14.76	98
3	TA.B.2.3	63.67	11.76	15,03	118
4	TA.B.3.1	63.50	10.76	15.68	126
5	TA.B.3.2	62.63	10.17	15.82	124
6	TA.B.3.3	63.13	10.9	14.84	123
7	TA.B.4.1	63.9	11.1	15.62	135
8	TA.B.4.2	62.94	11.49	15.59	139
9	TA.B.4.3	63.85	12.02	15.41	137

Table 5. The pull the resin polyester and basal of 150 mesh

No.	Basalt 150 mesh				
	Kode	*p*	*t*	*l*	*Max.F*
1	TA.C.2.1	62.57	10.97	14.35	53
2	TA.C.2.2	63.12	9.98	15.16	72
3	TA.C.2.3	63.10	9.89	15.02	70
4	TA.C.3.1	62.78	9.52	14.21	80
5	TA.C.3.2	63.08	9.17	14.74	87
6	TA.C.3.3	63.15	9.97	14.2	89
7	TA.C.4.1	63.16	8.78	13.99	92
8	TA.C.4.2	62.12	8.79	14.32	95
9	TA.C.4.3	63.31	9.41	14.7	89

Description:
p (mm) = Long on specimens
t (mm) = High on the specimen
l (mm) = Wide on specimens
Max.F (Kgf) = The power of a specimen strong pull test

3.2. A discussion of test results on pull the results of the power of test pull polyester resin

The results of the power of test pull polyester resin and basal powder 40 mesh the value of the lowest is 57 Kgf while the top is 96 Kgf. On the other hand, the results of the power of test pull polyester resin and basal powder 60 mesh the value of the lowest is 95 Kgf while the top is 139 Kgf and the results of the power of test pull polyester resin and basal powder 150 mesh the value of the lowest is 53 Kgf while the top is 95 Kgf.

On the specimen basal 40 powder mesh showing the value of tensile strength 96 Kgf, while the specimen basal powder 60 mesh showing the value of tensile strength 139 Kgf, that is greater than basal 40 mesh. Powder it was because the dust particles basal 60 mesh that serves as a booster (filler) has the tie (matrix) better than the basal 40 mesh. Powder the ratio of as many as 25 %, polyester resin better resources highchairs against dropsy powder 60 mesh than the ratio of polyester resin 15 % and 20 %.

In specimens basal the 150 mesh are showing value tensile strength 95 Kgf , while specimens basal powder the 60 mesh are showing value tensile strength 139Kgf, larger compared basal the 150 mesh.It was because particles basal the 60 mesh that serves as amplifier (filler) has its headband the (matrix) better than in basal the 150 mesh.The ratio resin polyester 25 %, better power strengh against dropsy 60 mesh than the ratio resin polyester 15 % and 20 %.

In a specimen of basal powder 150 mesh showing the tensile strength 95 Kgf, while the specimen basal of 40 mesh showing the tensile strength 96 Kgf, larger compared by basal of 150 mesh it was because the particles of basal 40 mesh that serves your (filler) has a connective (matrix) its better than this as a basal of 150 mesh the ratio of as many as percent, 25 polyester resin better resources ikatnya against dropsy of 40 mesh ratio than polyester resin 15 % and 20 %.

The results of the analysis are presented in Figure 7 of the curve of the strong pull testing to be the case .

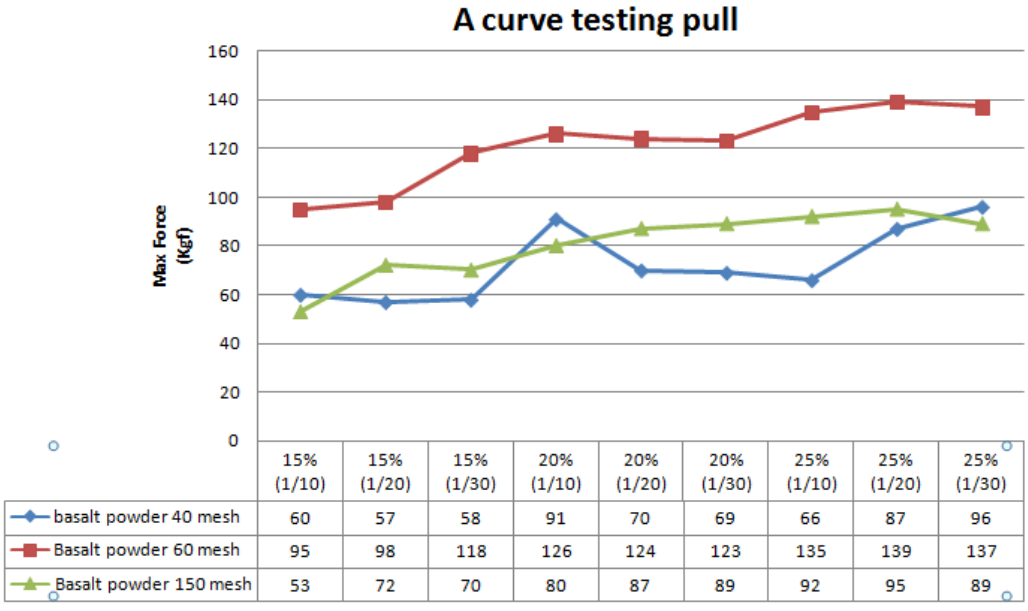


Figure 7. The Pull Curve.

4. Analysis Support For New Uses The Method Taguchi

Through assistance with minitab 16 software able to obtain 9 specimens composite variations selected to analyze a specimen of 27, composite 9 spesiemen variations this is a composite 1 from every representative was chosen from masing-masing variations, basal powder , polyester resin and the catalyst**.**

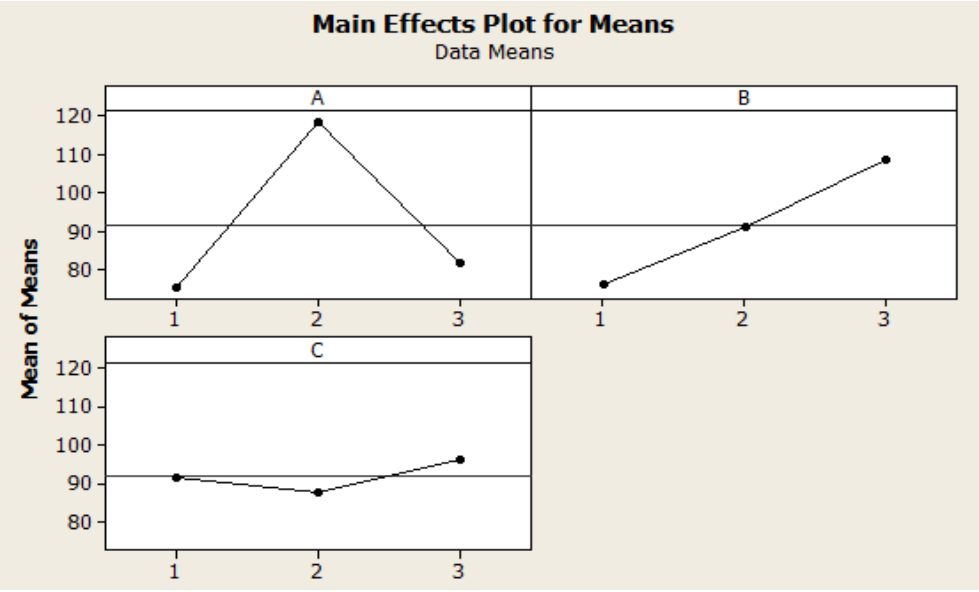
The selection of 9 of 27 specimen is referred to as gust with Orthogonal Array (OA) , that is one of the a splinter group from guinea pigs all of whom only using a part of the condition of the total , which is hard for this part only menggambil men learned in the mosaic , a quarter or shall be an eighth of an experiment of factorial is full of .OA advantage is its ability to evaluate a number of factors to the total number of a test by which the a minimum [6-8]. Variation composite is close they can be seen in Table 6

Table 6. A specimen of a composite select with OA Taguchi.

Code Specimen	Factor			
	A	B	C	Max.F (Kgf)
TA.A.2.1	1	1	1	60
TA.A.3.2	1	2	2	70
TA.A.4.2	1	3	3	96
TA.B.2.1	2	1	2	98
TA.B.3.3	2	2	3	123
TA.B.4.1	2	3	1	135
TA.C.2.3	3	1	3	70
TA.C.3.1	3	2	1	80
TA.C.4.2	3	3	2	95

Description:
Factor A = Basalt Powder
Factor B = *Resin Polyester*
Factor C = catalyst

A factor with numbers 1 is 40 mesh, basalt powder the numbers 2 is 60 mesh, basalt powder and figures 3 is 150 mesh. Basalt powder to the factors b with numbers 1 is 15 %, polyester resin the numbers 2 is 20 %, polyester resin and figures 3 is 25%. polyester resin. While the c with numbers 1 is 1/10, catalyst the numbers 2 is 1/20 a catalyst and figures 3 is 1 / 30 catalyst. Figure 8 and Table 7 below shows the effect of each factor and an optimum result for each factor.



Description:
X-axis: Code Specimen
Y-axis: Max F (Kgf)

Figure 8. A plot the effect of each factor.

Table 7. The results of an optimum every factor

Level	A	B	C
1	37.37	37.43	37.74
2	41.41	38.92	38.76
3	38.17	40.60	39.45
Delta	4.04	3.17	0.70
Rank	1	2	3

5. Conclusion

As a conclusion, it was revealed from the result analysis using a of Taguchi's method, the composition polyester resin levels found in 25%, while basal 60 mesh, powder and a catalyst 1/30 gr. Other than that, the result of minimum was found in composite basal the 150 mesh with force 60 Kgf with fariasi resin 15% and catalyst 1/10, while a maximum score was found in composite basal the 60 mesh with fariasi resin 25 % and catalyst 1/30 with force of 135 Kgf.

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