

An Application of Failure Mode and Effect Analysis on Improving Occupational Health and Safety Process of Marble Factories

Case Study

Appendix 1. Analysis Table of FMEA.

Nr.	Section	Main Process	Sub-Process	Before improvement						After improvement								
				P	S	D	RPN	RPN%	RRN1	RRN2	P	S	D	RPN	RPN%	RRN1	RRN2	
1		Transport	Roads in open areas	2	8	1	16	1.10%	22	395	2	8	1	16	2.24%	18	116	
2			Roads indoors	1	6	9	54	3.72%	8	27.19%	1	3	2	6	0.84%	33	16.22%	
3		Social areas		Office rooms	1	1	1	1	0.07%	45	1	1	1	1	0.14%	45	4	
4				Dressing room	1	1	1	1	0.07%	46		1	1	1	1	0.14%		46
5				Cafeteria	1	1	1	1	0.07%	47		1	1	1	1	0.14%		47
6				Dorm	1	1	1	1	0.07%	48		1	1	1	1	0.14%		48
7		Parts of factory	Infrastructure departments	Electric transformer	1	9	3	27	1.86%	15		1	9	3	27	3.78%	6	
8				Supply depot	1	3	3	9	0.62%	31		1	3	3	9	1.26%	29	
9				Repair and maintenance department	1	3	1	3	0.21%	42		1	3	1	3	0.42%	42	
10		Block stock area		Block unloading	2	9	9	162	11.15%	1		1	5	3	15	2.10%	21	
11				Loading and/or fixing block to trolley	2	6	9	108	7.43%	4		1	6	4	24	3.36%	8	
12				Block trimming	1	6	2	12	0.83%	25		1	6	2	12	1.68%	23	
13	Strip cutting by block cutter	Preparation	Assembly, calibration and control of the block cutter blade.	1	6	8	48	3.30%	10	293	1	4	5	20	2.80%	11	139	
14			Feeding block to the block cutter	2	8	9	144	9.91%	2	20,17%	1	6	3	18	2.52%	13	19.44%	
15			Calibrating the block	1	4	1	4	0.28%	39	3	1	4	1	4	0.56%	39	3	
16		Production	Block cutting (Speed and rotation check)	1	5	8	40	2.75%	13		1	5	8	40	5.59%	4		
17			Unloading strips from the block cutter	3	4	3	36	2.48%	14		3	4	3	36	5.03%	5		
18		Finalization of cutting	Taking out the trolley	1	6	3	18	1.24%	19		1	6	3	18	2.52%	14		
19	Cleaning the area		1	3	1	3	0.21%	43		1	3	1	3	0.42%	43			
20	Strip sizing, polishing and tile production	Strip	Feeding strips to the head cutting machine	1	5	1	5	0.34%	38	238	1	5	1	5	0.70%	38	142	
21			Sizing	1	6	1	6	0.41%	34	16,38%	1	6	1	6	0.84%	34	19.86%	
22			Unloading and stowing the sized strips	2	4	8	64	4.40%	7	4	1	4	4	16	2.24%	19	2	
23			Cleaning the area	1	3	3	9	0.62%	32		1	3	3	9	1.26%	30		
24			Feeding and unloading strips to the traversal or longitudinal cutting machine	1	4	1	4	0.28%	40		1	4	1	4	0.56%	40		
25			Feeding and unloading strips to the calibrating and polishing machine	1	6	1	6	0.41%	35		1	6	1	6	0.84%	35		
26			Dimensioning as tile	1	6	2	12	0.83%	26		1	6	2	12	1.68%	24		
27			Drying	1	6	2	12	0.83%	27		1	6	2	12	1.68%	25		
28			Storage	1	3	1	3	0.21%	44		1	3	1	3	0.42%	44		
29			Indoor transport	Transport to stock area	1	6	1	6	0.41%	36		1	6	1	6	0.84%	36	
30	Finalization of the process	Selection	1	3	9	27	1.86%	16		1	3	9	27	3.78%	7			
31		Packing	1	2	6	12	0.83%	28		1	2	6	12	1.68%	26			
32		Loading	2	6	6	72	4.96%	6		2	4	3	24	3.36%	9			

33 34	Slab cutting by gangsaw	Preparation	Assembling blade to the gangsaw and checking the tension and stroke	1	6	9	54	3.72%	9	219	1	3	3	9	1.26%	31	64	
			Feeding block to the gangsaw	2	8	8	128	8.81%	3	15.07%	1	6	3	18	2.52%	15	8.95%	
35 36		Production	Sawing the block	1	6	3	18	1.24%	20	5	1	6	3	18	2.52%	16	5	
			Unloading slabs by breaking	2	3	1	6	0.41%	37		2	3	1	6	0.84%	37		
37 38		Finalization of cutting	Taking out the trolley	1	9	1	9	0.62%	33		1	9	1	9	1.26%	32		
			Cleaning the area	1	4	1	4	0.28%	41		1	4	1	4	0.56%	41		
39	Slab sizing and polishing	Bridge cutting machine	Checking the bridge cutting machine	1	6	8	48	3.30%	11	308	1	6	8	48	6.71%	1	254	
40 41		Slab sizing	Feeding slabs to the bridge cutting machine	2	6	1	12	0.83%	29	21.20%	2	6	1	12	1.68%	27	35.52%	
			Unloading and stowing the dimensioned slabs	2	6	1	12	0.83%	30	2	2	6	1	12	1.68%	28	1	
42		Wideband polish machine	Checking the wideband polish machine	1	6	8	48	3.30%	12		1	6	8	48	6.71%	2		
43 44		Slab polishing	Feeding slabs to the wideband polish machine	2	5	2	20	1.38%	18		2	5	2	20	2.80%	12		
			Unloading and stowing the polished slabs	2	6	2	24	1.65%	17		2	6	2	24	3.36%	10		
45		Indoor transport	Transport to stock area	3	6	1	18	1.24%	21		3	6	1	18	2.52%	17		
46 47 48		Finalization of the process	Selection	1	2	7	14	0.96%	24		1	2	7	14	1.96%	22		
			Packing	1	2	8	16	1.10%	23		1	2	8	16	2.24%	20		
			Loading	2	8	6	96	6.61%	5		1	7	6	42	5.87%	3		
							1453	100.00%							715	100.00%		

* P: Possibility, S: Severity, D: Detectability, RPN: Risk Priority Number, RRN: Risk Ranking Number

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Received: January 16, 2017

Accepted: February 14, 2017

Published: February 16, 2017

Citation: Ersoy M, Eleren A, Kayacan S (2017) An Application of Failure Mode and Effect Analysis on Improving Occupational Health and Safety Process of Marble Factories. *Int J Natural Disaster Health Secur.* 4(1), 22-21.

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