iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** IX **Month of publication:** September 2022

DOI: https://doi.org/10.22214/ijraset.2022.46891

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue IX Sep 2022- Available at www.ijraset.com

Critical Study on Vital Factors Influencing Productivity Improvement

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Abstract: ***In the press moulding process, the challenging task is to increase the productivity cycle of the product with zero rejection. Major problems involved in this process are the consumption of time and deduction of temperature for the loading and unloading process of the material in the mould plate. It is recommended to preheat the mould plate to a certain limit so that the temperature needed while processing is obtained in a shorter span of time. To overcome the time consumption problem, the mould plate should be mounted in a shorter interval of time todecrease the raw material loading time process. In this case, it helps to uplift the productiveness and leads us to a zero rejection rate.***
Keywords: press moulding, zero rejection, time consumption, temperature deduction, preheat,productiveness.

I. INTRODUCTION

The productivity of a company depends upon the modern innovation and technology used by the manufacturing unit. When there is a miss appropriation of the techniques and strategies leads to the reaction of quality and quantity of the product in the process of productivity there are several factors influence to ensure the zero reduction of the product. When the technical innovations are properly analysed and the technical know-how is properly used to ensure the productivity of the product. In this study, seven QC tools are critically analysed and the findings helped us to ensure zero rejection with high quality and quantity of the product.

II. LITERATURE REVIEW

It is about quality improvement applied at yarn manufacturing company depending on six sigma methods. Specifically, the DMAIC (Define, Measure, Analyse, Improve and Control), Project management methodology and different tools are used to streamline processes and improve productivity. Defects percent of textile products in yarn manufacturing process are very important in industry perception. It Plays an essential rate for improvement of yield and financial conditions of the company. Actually, Defects percent has direct effect on profit of the product and reduces the quality cost during the Manufacturing of product. By inspection of damages of product at various point in production, where more defects are to happen. A hundred defects opportunities would create in final package of yarn. So it is decided to work and implement DMAIC methodology in winding departments where final Package of yarn is made[1]. It is about the challenges faced by a spinning mill, So they remain unsuccessful, So they need to find the root cause for their failure and rectify it and improve their productivity in better quality. So, they use DMAIC technique used for increase the productivity along with 'why' analysis. It is used to find the root cause of the problem the and Pareto chart is used to plot various factors that affects productivity. It focuses on power failure and absenteeism and hence discovered that pay structure and benefits caused absenteeism .so, productivity-based incentives were given to them. Then the power failure issue, there is a leakage of pipeline in generator .so, it is replaced, then the productivity too increased [2]. It is that every enterprise need to earn profit by selling goods and converting the inputs like manpower, raw materials, energy, cost of material into finished goods. In this the sector is DVD production. To increasethe quantity and reduce cost of production in DVD manufacturing some input parameter and effects were used. Shortening the production cycle time improves the responsiveness to demands, Cycle time reduction is reducing work in process to increase output. The result is reduction of cycle time from 2.5 Seconds to 2 Seconds, this causes cost reduction [3]. Here we discuss, Bus body manufacturing, which has a major role in automotive manufacturing. So, they meet the requirements of delivery on time, cost and quality in their sector to survive. There are some issues like low labour utilization, material wastage and unorganized work flows. To overcome this, they used Value Stream Mapping which is used as productivity improvement tool which was supported by line balancing techniques. This results in increase in efficiency 13.1% and a reduction the cycle time by 7 days [4].

It is about introduction about the lead time reduction in inventory control, this paper proposes key factors, from the study scope, literature are distinguished into four categories from year (1991 to 2000) and second part from (2000 to 2004), a third part from (2005 to 2008) and final part from (2008 to 2012). Literatures in each were reviewed according key factors. This provides a overview of lead time reduction inventory study field, starting point for further work of researches [5]. It is that, there are two paint assembly lines in an automobile assembly plant, in first assembly line they tried to reduce cycle time of different workstation to complete operations in assembly Study done on each bottle neck operation before paint assembly line and found that workers should carry parts to assembly line from sub assembly station which carries lot of time, this time were reduced by introducing trolley kits before paint assembly line and reduced 163 seconds [6].

Many organizations face their competitors and trying to reduce cost and improve quality and production. Lean manufacturing concepts are used in some industries to reduce waste and improve production. In a manufacturing industry, the material handling system plays a major role regarding production, the research carries a case study. Minimizing the defects are important to any industry. It decides their outputs and profits. employees should be appreciated for their hard work. productivity software and other technologies can solve the gaps in communication. It will be creating a workplace engaged, productive and loyal [7]. It is that , Indian economy faced lot of challenge to Indian industries regarding productivity, cost , quality and delivery . Productivity is a important factor, to survive among competitors, it is a work, done at construction equipment company in which they improve the productivity in which the modifications were done for the assemblies of the hoist and the data were collected, before modification it requires 29.466 hours and after modification it requires 27.646 hours. The overall productivity improvement is 6.17% [8]. It is that, new combined methodology to improve the productivity with the help of work study methods along with Lean Manufacturing Principles and Tools. Lean manufacturing tools were used to eliminating wastes (MUDA), improve performance and quality, this concept gives solutions & concepts to implement Work Study Methods covering technical, engineering and manufacturing. This gives a huge scope to implementation and deployment of very own concepts. By using lean tools with method study 100% positive results are assured [9].

It is that traditional productivity matrices were not helpful to identify the problems and solve them for improving productivity in this concept a systematic methodology Overall Equipment Effectiveness (OEE) and Overall Throughput Effectiveness (OTE) were introduced. These were connected with computer simulation to analyse equipment and manufacturing system productivity. These results make possible the factory level productivityor overall effectiveness by OTE, and OTE to the top when compared with others. Experimental results showed that it is very effective in identifying problems and in increasingthe productivity [10]. The integration of production planning and logistics is currently spreading throughout many businesses. A proper definition of logistics is just one of many variables that affect the function and duties of production logistics in a company. A more comprehensive understanding of logistics has emerged as a result of the development of the supply chain concept. The main objective of production logistics can be stated as the development of the implementation and delivery dependability capabilities at the lowest possible logistical and production costs. Production systems that change input quantities into products through time and space fall under this theory. Production and logistics are strongly correlated since distribution networks are at the system's output and logistical supply networks are its input [11]. It states that minimizing the defects in a product is the main condition to reduce the production cost and improve the quality of the product. DMAIC methodology named define, measure, analyse, improve and control is used to minimize the defect rate. Finally, it helps in higher productivity and also reduces the time of reworks [12].

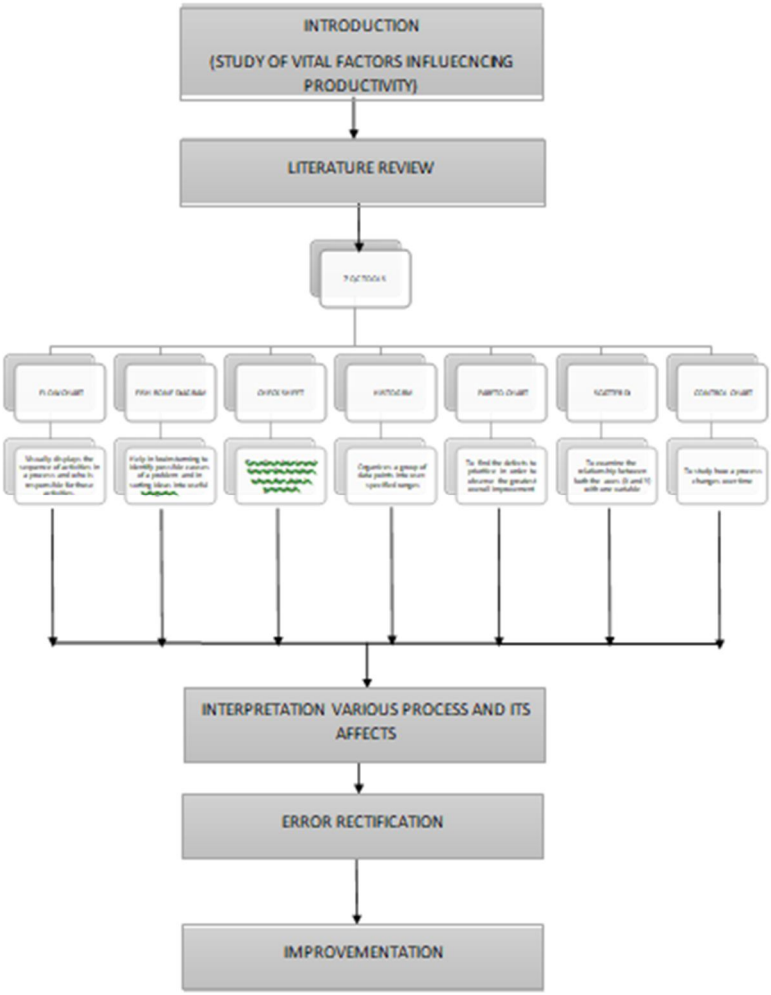
Factory performance remains unpredictable nowadays also productivity measurement and improvement are the main factors because one cannot improve when one cannot measure. So this productivity measure and improvement have been summarized under four divisions (Operations Research- (OR-) based methods, system analysis-based methods, continuous improvement methods and performance metrics-based methods) [13]. Injection moulding is used to increase the production rate and also it can produce the accurate shape of the product at any shape with low cost and faster rate of productivity objective work is to see through the influence of process parameters in injection moulding of PMC cam bush. Now the experiments are conducted according to Taguchi L27 Orthogonal Array and the response dataare analysed and optimized by using GRA [14]. This paper discusses the effect of latex degradation and its effect on aquatic organisms it was concluded that when the latex polymer degraded an increase in the formation of microscopic latex particles was observed. When zincwas used to speed up the rate of the curing process it migrated from the latex polymer into thetest solutions and a mixture containing oxidised latex oligomers with additive residues formed. The exclusion of light and material thickness had a significant impact on degradationrate than stamped moment and PH [15].

The zero-rejection rate is the one that all the production units are aiming for, so the process has been examined and the defects are identified by the Pareto chart, process flow, cause and effect diagram all were helpful to finding the solutions, and reducing the flaw products. Here sigma rule has been taken which plays an important role in the financial results.

All of these help to find the key factor and to control and improve the overall process towards zero rejection [16][17]. In inventory management practices of various industries and companies were taken for study and we have come to understand the ABC analysis was used for a better improvement of the production process. We came to know that many companies were alreadyusing the ABC analysis method and found it very useful either manually or by a resource planning system [18].

Here the objective of the research is to attain zero error production in the industry so that the six sigma DMAIC phases have been adopted. Almost 3.34 defectives per million parts are produced globally. The six sigma phase is implemented with the pareo chart, flow process and fishbone diagram that had been used in the finding of zero error. The critical factors were identified and the improvement towards zero error rejection was implemented. The results from the selected industries show that the rate of rejection came down to 1.2% from 5.3% [19]. Organizations today must consistently and gradually improve their processes, products, and services. Lean six sigma is the only comprehensive strategy that addresses all aspects of an organization's competitiveness and is the only means of achieving total operational excellence. CNC there are many different processes involved in cutting, including machine configuration, blade speed, machine parameter, clamping, cooling, etc. It is incredibly challenging to generate cutting without flaws. The defect may have one or several causes for occurring. Through methodical measures, these causes can be reduced. The process of using different tools and techniques. In this study, cutting faults are analysed, investigated, and corrective actions are identified for a particular industry. On the entire cutting process, a diagnostic analysis was conducted. Cutting goods showed that the five most common flaws incutting rejections—taper cutting, oversize, undersize, rough surface, and burr—were present. It was discovered that these flaws were commonly appearing in various places. To understandthe causes of faults, systematic analyses were done, and appropriate corrective actions were found and put into place [20].

III. METHODOLOGY



IV. EXPERIMENTATION

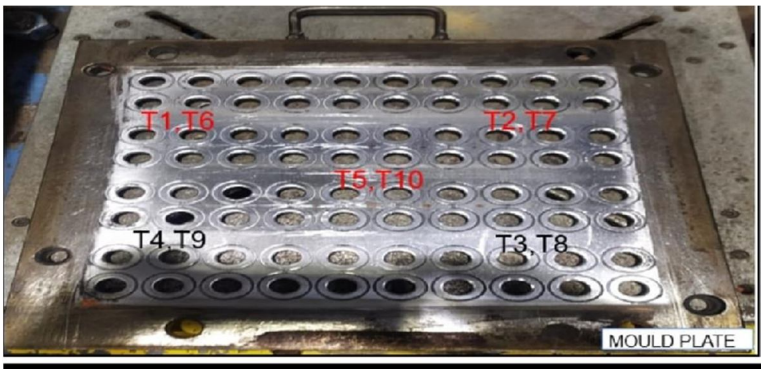


Fig 1: MOULD PLATE USED FOR THE EXPERIMENT

Table 1: The actual data of the loading and unloading of the material in the plate and their respectivetime and temperature during loading and unloading process.

	SETTING TIME			TEMPERATURE DURING UNLOADING					TEMPERATURE DURING LOADING				
S.No.	UNLOADING	LOADING	SECONDS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
1	09:25:33	09:35:04	571	122	117	129	126	119	50	47	46	47	44
2	09:43:04	09:42:52	530	122	132	126	126	121	48	57	52	43	40
3	09:41:40	09:49:50	490	133	132	130	134	125	54	51	46	50	45
4	09:48:43	09:57:48	545	128	129	130	128	125	44	54	52	45	39
5	09:55:55	10:05:04	549	135	133	131	130	136	52	49	48	53	43
6	10:04:20	10:27:25	1385	135	134	131	136	138	44	59	50	41	43
7	10:11:22	10:34:02	1360	137	134	133	130	138	55	61	46	53	50
8	10:33:01	10:43:41	640	136	133	130	138	138	47	66	56	45	44
9	10:39:40	10:50:30	650	123	122	118	126	138	54	52	52	52	42
10	10:49:13	10:58:10	537	133	135	133	132	138	52	62	56	49	46
11	11:57:01	11:08:20	679	136	132	136	137	138	52	51	51	52	53
12	11:05:02	11:15:07	605	118	116	108	119	138	53	54	56	49	44
13	11:14:25	11:27:30	785	121	123	126	124	138	51	49	53	52	48
14	11:25:09	11:53:20	611	121	123	120	117	138	43	46	44	45	38
15	11:32:02	11:43:30	688	122	128	126	123	138	54	51	52	52	48
16	11:41:25	11:50:01	516	125	123	108	118	138	54	56	57	45	40
17	11:49:10	11:58:20	550	126	125	125	125	138	57	54	55	56	52
18	11:56:02	12:07:05	663	121	121	118	113	138	51	52	58	48	45
19	12:04:22	12:16:02	700	120	120	118	119	138	56	60	58	50	48
20	12:12:20	12:24:02	702	118	124	114	123	138	52	56	53	50	46
21	12:22:06	12:33:08	662	125	120	123	122	138	56	51	48	51	44
22	12:20:28	12:39:32	564	132	132	130	129	138	51	54	51	49	47
23	12:39:05	12:50:26	681	133	128	128	128	138	56	51	49	50	48
24	02:08:23	02:16:58	515	120	119	105	107	138	53	51	54	49	46
25	02:08:05	02:09:52	542	125	109	115	116	138	61	58	54	57	50
26	02:56:22	03:06:30	608	126	119	120	125	138	56	52	52	46	43
27	03:04:02	03:14:01	599	124	124	113	125	138	63	56	54	56	53
28	03:13:05	03:21:04	529	132	128	125	129	138	53	64	61	57	48
29	03:20:02	03:29:30	568	128	127	125	128	138	53	52	51	56	54
30	03:27:02	03:26:01	539	127	130	131	128	138	52	64	62	48	44
31	03:34:55	03:43:01	486	130	124	126	127	138	55	47	48	53	49
32	03:41:50	03:49:50	480	123	118	121	120	138	52	62	54	50	48
33	03:48:32	03:29:01	569	133	128	123	126	138	56	57	52	54	53
34	03:55:33	04:05:02	569	132	138	121	132	138	50	63	60	49	45
35	04:03:40	04:12:09	509	133	137	133	131	138	53	52	57	52	49

Table 2: Temperature reduction trend on mould plate over the period of idle time.(Data taken without rubber part ejected from the plate)

OUTPUT TEMPERATURE					OUTPUT TEMP AVERAGE	INPUT TEMPERATURE						
T1	T2	T3	T4	T5		T6	T7	T8	T9	T10	INPUT TEMPERATURE AVERAGE	REDUCTION PERCENTAGE
122	117	129	126	119	122	50	47	46	47	44	46	62
122	132	126	126	121	125	48	57	52	43	40	48	62
133	132	130	134	125	131	54	51	46	50	45	49	62
128	129	130	128	125	128	44	54	52	45	39	47	63
135	133	131	130	136	133	52	49	48	53	43	49	63

Table 3: Temperature reduction trend on mould plate over the period of idle time.(data taken with rubber part not eject from the plate)

SAMPLE	DURATION	T1	T2	T3	T4	T5	AVG	STATUS	REDUCTION	AVERAGE
1	0	133	127	139	129	141	133.8	100	0	18.2
	200	116	117	123	120	125	120.2	89	11	
	300	113	112	116	115	123	115.8	86	14	
	400	110	108	110	108	117	110.6	82	18	
	500	105	105	1055	105	105	105	78	22	
	600	98	96	102	100	102	99.6	74	26	
2	0	128	127	136	1134	134	131.8	100	0	18.8
	200	111	112	117	118	119	115.4	87	13	
	300	108	107	112	117	116	112	84	16	
	400	103	105	107	112	110	107.4	81	19	
	500	98	103	104	106	108	103.8	78	22	
	600	966	97	103	105	106	101.4	76	24	
3	0	135	130	127	133	132	131.4	100	0	20.6
	200	110	108	114	119	117	113.6	86	14	
	300	106	107	106	111	109	107.8	82	18	
	400	103	104	102	108	105	104.4	79	21	
	500	101	100	94	105	100	100	76	24	
	600	100	99	91	103	98	98.2	74	26	
4	0	128	129	135	133	135	132	100	0	19.6
	200	118	118	124	117	128	121	91	9	
	300	108	107	112	109	113	109.8	83	17	
	400	102	104	105	103	106	104	78	22	
	500	100	101	101	102	105	101.8	77	23	
	600	97	95	98	100	96	97.2	7	27	
5	0	128	129	127	124	128	127.2	100	0	21
	200	112	117	116	115	119	115.8	91	9	
	300	110	110	102	105	111	107.6	84	16	
	400	98	102	93	94	102	97.8	76	24	
	500	95	93	91	92	96	93.4	73	27	
	600	92	91	90	89	91	90.6	71	29	

V. IMPLEMENTATION OF HEATER

The plate type heater is chosen, because this kind of heater is appropriate for the machine, A fibre plate is fastened to the bottom of the heating plate to protect the machinery parts. Forthe project, a heater capable of producing 150 degrees Celsius is used. This heater has a total of three electrical circuits and components.

VI. RESULTS AND DISCUSSIONS

Productivity automatically rises as the entire cycle time decreases. Good product quality can be produced with the implementation of the following steps. Reducing the amount of rejected products naturally gives the growth for better products and increases productivity.

VII. CONCLUSIONS

According to the preceding statistics, it can be seen that removing the rubber section right before loading lowers the temperature of the mould plate by 60%. The loading temperature is impacted by this lowering temperature, which also has an impact on productivity cycle time. Unloading temperatures are decreased by an average of 60%, from 120°C to 135°C, to 45°C to 50 °C. Pre-heater will therefore be used to control the constant temperature that is applied to the mould plate. Pre-heater temperature is adjusted to remain between 120°C and 130°C, assisting in reducing quenching and long idle times. Utilizing a pre-heater shortens the cycle time for productivity while increasing productivity and preventing defects in products.

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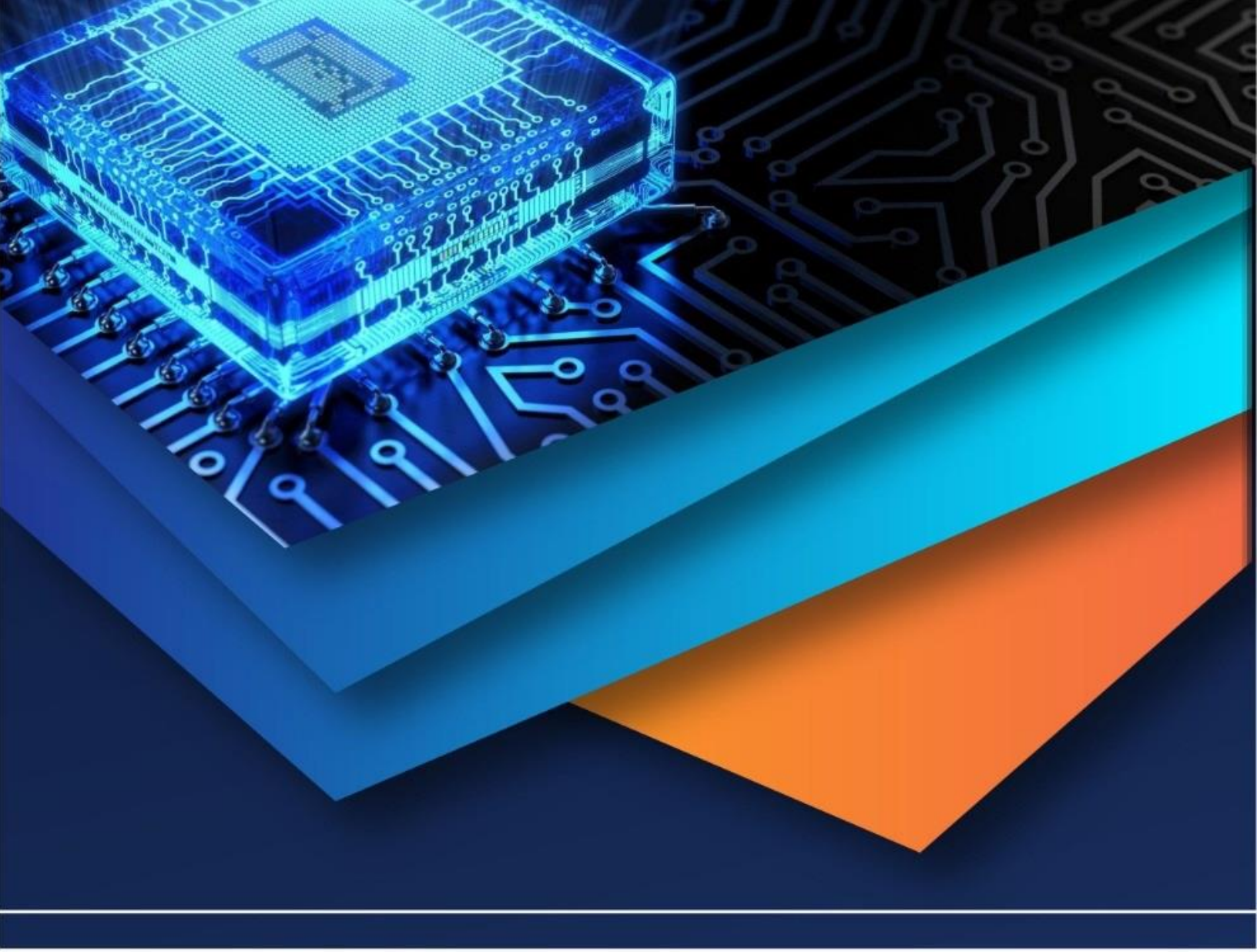

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