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Array and the Factors for conducting experiments are the main criteria in the Taguchi Process. In Taguchi method, Signal to Noise Ratio (S/N Ratio) is the Statistical measuring process for predict the optimum factors to respected Responses. The smaller the better, the higher the better, and the nominal the better (Ross, 1996) are three sorts for the S/N Ratio for examine the Factor's enactment.

Table 4: Sorts with formulae of S/N Ratio

S. No.	*Sort*	*Formulae*
01	Smaller the Better	$S/N = -10\log_{10} \sum_{i=1}^{n} (1/n)\,(Y^2{}_i)$(or) $S/N = -10\log_{10} Y^2$
02	Nominal the Better	$S/N = -10\log_{10}(\bar{Y}^2/S^2)$, $S/N = -10\log_{10}(S^2)$
03	Bigger the Better	$S/N = -10\log_{10} \sum_{i=1}^{n} (\frac{1}{N})(1/Y2(or)SN = -10\log 101Y2$

In this present work we are adopted that the Smaller the Better Sort for Surface Roughness and Bigger theBetter Sort for MRR response values in S/N Ratio process. Surface roughness (SR) and Material Removal Rate (MRR) of machined objects are playing vital role inthe industrial production rate and cost. The main object of the machining operations is to maximize the MRR and minimize the surface roughness to improve productivity and machinability by controlling the machining factors. Low surface roughness helps to improve the machined object life time and appearance. High MRR gives good industrial productivity in period time.

But the ANOVA is gives the impact of the Factors with respect to their Responses normally.

3.1.1Work piece "X"

Table 5: Analysis of Variance for SN ratios of Surface roughness (R-Sq = 91.9%)

Source	*DF*	*Seq. SS*	*MS*	*F*	*P*
Speed (rpm)	2	27.4218	13.7109	9.55	0.095
Feed(mm/rev)	2	0.4608	0.2304	0.16	0.862
DOC (mm)	2	4.7361	2.3681	1.65	0.378
Residual Error	2	2.8725	1.4362		
Total	8	35.4912			

Table 6: Analysis of Variance for SN ratios of MRR (R-Sq = 97.3%)

Source	*DF*	*Seq. SS*	*MS*	*F*	*P*
Speed (rpm)	2	75.713	37.857	19.73	0.049
Feed(mm/rev)	2	22.907	11.453	5.97	0.143
DOC (mm)	2	37.343	18.671	9.73	0.093
Residual Error	2	3.837	1.919		
Total	8	139.800			

Table 7: Response Table for Signal to Noise Ratios Smaller is better (Surface Roughness)

Level	*Speed (rpm)*	*Feed(mm/rev)*	*DOC (mm)*
1	7.885	5.210	6.489
2	4.936	5.592	5.315
3	3.729	5.749	4.747
Delta	4.156	0.539	1.742
Rank	1	3	2

Table 8: Response Table for Signal to Noise Ratios Larger is better (MRR)

Level	*Speed (rpm)*	*Feed(mm/rev)*	*DOC (mm)*
1	62.77	64.85	64.01
2	69.40	66.84	68.79
3	68.28	68.76	67.65
Delta	6.64	3.91	4.78
Rank	1	3	2

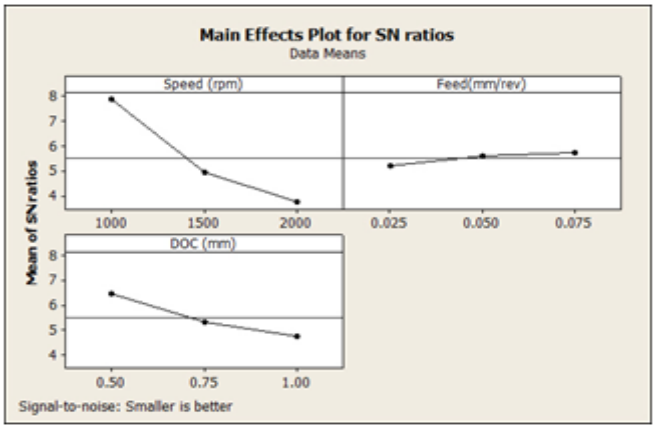

Figure 1: Main Effects plots for SN ratios (Surface roughness)

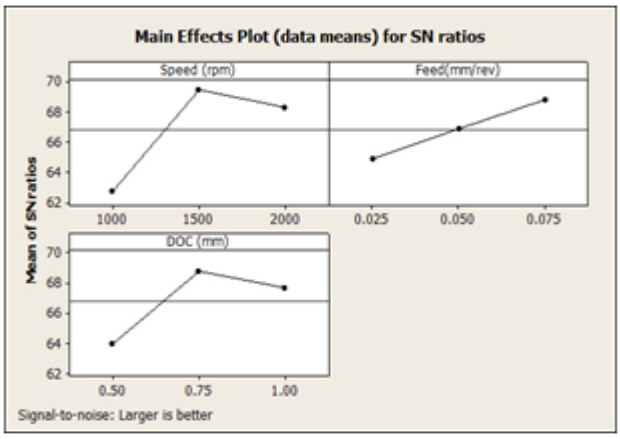

Figure 2: Main Effects plots for SN ratios (MRR)

3.1.2Work piece "Y"

Table 9: Analysis of Variance for SN ratios of Surface roughness (R-Sq =94.8%)

Source	*DF*	*Seq. SS*	*MS*	*F*	*P*
Speed (rpm)	2	13.8066	6.90330	17.03	0.055
Feed(mm/rev)	2	0.8338	0.41689	1.03	0.493
DOC (mm)	2	0.0671	0.03357	0.08	0.924
Residual Error	2	0.8108	0.40539		
Total	8	15.5183			

Table 10: Analysis of Variance for SN ratios of MRR (R-Sq =85.8%)

Source	*DF*	*Seq. SS*	*MS*	*F*	*P*
Speed (rpm)	2	55.61	27.80	2.07	0.325
Feed(mm/rev)	2	38.40	19.20	1.43	0.411
DOC (mm)	2	68.09	34.04	2.54	0.282
Residual Error	2	26.80	13.40		
Total	8	188.90			

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Table11: Response Table for Signal to Noise Ratios Smaller is better (Surface Roughness)

Level	*Speed (rpm)*	*Feed(mm/rev)*	*DOC (mm)*
1	7.047	5.920	5.567
2	5.531	5.494	5.411
3	4.013	5.177	5.612
Delta	3.034	0.743	0.202
Rank	1	2	3

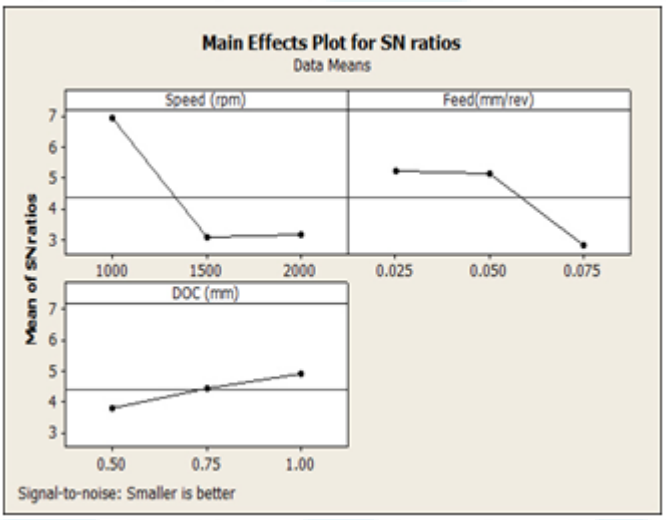

Figure 3: Main Effects plots for SN ratios (Surface roughness)

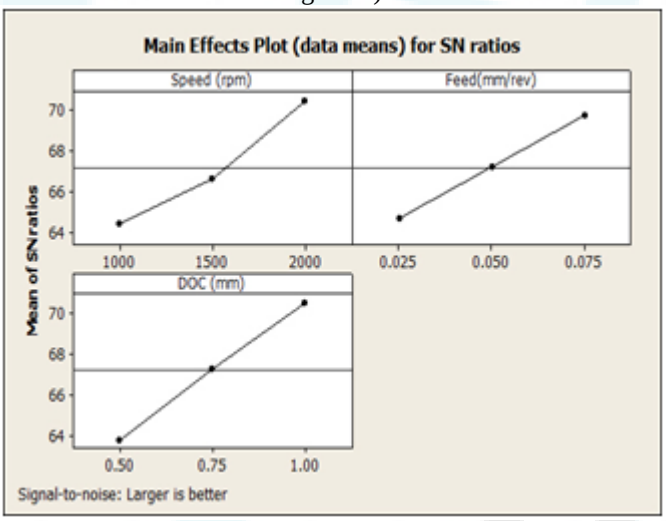

Figure 4: Main Effects plots for SN ratios (MRR)

4. Conclusion

1) In sand casting process we were successfully prepared 10, 15% SiC_p& Gr/Al-6061 Hybrid Particulate Metal Matrix Composite specimens by varying weight fractions of SiC_p and Gr equally.
2) Minitab17 used for to know the impact factor of control factors such as speed, feed, and depth of cut on the turning process's responses factors like as surface roughness and Material removal rate, through the S/N ratio, and ANOVA analysis.
3) While machining the work piece-X and work piece-Y (10, 15% SiC_p& Gr/Al-6061) Speed and Feed were playing more impact on result of surface Roughness, similarly Depth of Cut and Speed were playing more significant on result of Material Removal Rate.
4) The optimal level of control factors forminimum valued result factor surface roughness of turning on both 10, 15% SiC_p& Gr/Al-6061 work pieces is $A_1B_1C_1$ (1000rpm, 0.025mm/rev, 0.50mm).
5) Similarly the optimal level of control factors for maximum MRR (4481.34mm^3/min) result of turning on Al-6061/10 SiC_p& Gr work piece-"X" is $A_3B_3C_2$(2000rpm, 0.075mm/rev, 0.75mm), and for Al-6061 /15 SiC_p& Gr work piece-"Y"maximum MRR(4379.16mm^3/min) at level of $A_3B_1C_3$(2000rpm, 0.025mm/rev, 1.0mm).
6) From the table 3 Work piece-X is having lesser Surface roughness value (0.341Microns) and higher MRR value (4481.34mm^3/min) than the Work piece-Y.
7) The work piece-X is having better response factor values than the work piece-Y.
8) Finally we concluded that the Al-6061/10SiC_p&Gr shows better machinability features than Al-6061/15 SiC_p&Gr.
9) The low feed rate, Depth of cut and high speed values of machining process will tends to good surface finish of final objects, similarly high depth of cut and speed values of machining will tends to high material removal rates normally.
10) This present study reveals that proper utilization of Taguchi's plan of experiments to attainoptimal form with lowermost cost at least possible number of trail runs and Industrial Engineers can use this method.

Table 12: Response Table for Signal to Noise Ratios Larger is better (MRR)

Level	*Speed (rpm)*	*Feed(mm/rev)*	*DOC (mm)*
1	64.47	64.67	63.81
2	66.66	67.20	67.26
3	70.48	69.73	70.54
Delta	6.02	5.06	6.74
Rank	2	3	1

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