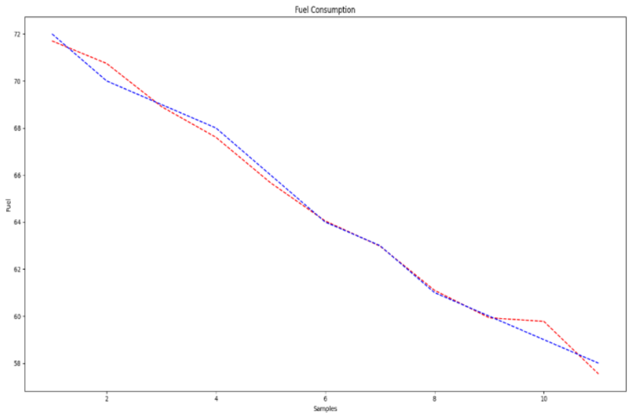

figure 8

fuel=b0+b1*(flame temp) +b2*(time)+b3*(melting rate) +b4*(preheated excess air) -	(2)

1	b0	235.14540003171606
2	b1	-0.00158907278
3	b2	-2.59692563
4	b3	-0.340834258
5	b4=	0.0455217790

Table 5

5.0 Comparison of results using python-

The modeled values of flame temperature were evaluated as per equation (1) and compared with actual experimental values as shown in table 6

sn	Flame Temp(°C)	Time min	Melting rate kg/hr	Preheated excess air m^3	Fuel Litters exp	Fuel Litters modelled	% Variation	Average% variation
1	1510	41	293	995	72	71.70168164	-0.4143311	**-0.094346%**
2	1530	40	300	970	70	70.74294154	+1.061345	
3	1540	39	307.6	930	69	68.91276492	-0.0872351	
4	1545	38	315.7	905	68	67.60294323	-0.5839073	
5	1550	37	324.3	870	66	65.66748661	-0.5038909	
6	1568	37	324.3	835	64	64.04562104	+0.07128281	
7	1570	36	333.3	822	63	62.98007708	-0.03162381	
8	1578	35	342.8	795	61	61.09727664	+0.1594669	
9	1580	34	352.9	788	60	59.92994567	-0.11675667	
10	1590	34	352.9	785	59	59.77748961	+0.19789266	
11	1620	33	363.6	760	**58**	**57.54177202**	-0.79005138	

Table 6

The average percent variation is **= -0.094346%**

The diagrammatical presentation of variation is shown in figure 9

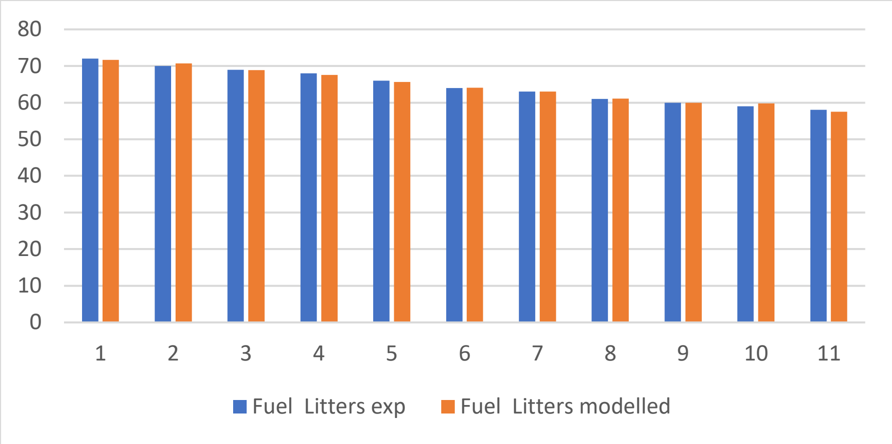

figure 9

the comparison of modeled value and experimental value of fuel consumption utilizing regression analysis (with all other as input parameters) is depicted in table 7

SN	Flame Temp(°C)	Time min	Melting rate kg/hr	Preheated excess air m^3	Fuel Litters exp	Fuel Litters modelled	% Variation
11	1620	33	363.6	760	58	57.5208	-0.82620

Table 7

the comparison of modeled value and experimental value of fuel consumption utilizing Python analysis (with all other as input parameters) is depicted in table 8

SN	Flame Temp(°C)	Time min	Melting rate kg/hr	Preheated excess air m^3	Fuel Litters exp	Fuel Litters modelled	% Variation
11	1620	33	363.6	760	58	**57.54177202**	-0.79004828

Table 8

6.0 Results and Discussion-The Comparison of actual and optimized fuel consumption with both technique including %Error is given in table 9

sn	Technique	Flame Temp(°C)	Time min	Melting rate kg/hr	Preheated excess air m^3	Fuel Litters exp	Fuel Litters modelled	% Variation
1	Python	1620	33	363.6	760	58	57.54177202	-0.79004828
2	Regression	1620	33	363.6	760	58	57.5208	-0.82620

Table 9

The diagrammatical presentation of variation of experimental and modeled value of fuel consumption using python and regression analysis are shown in figure 10

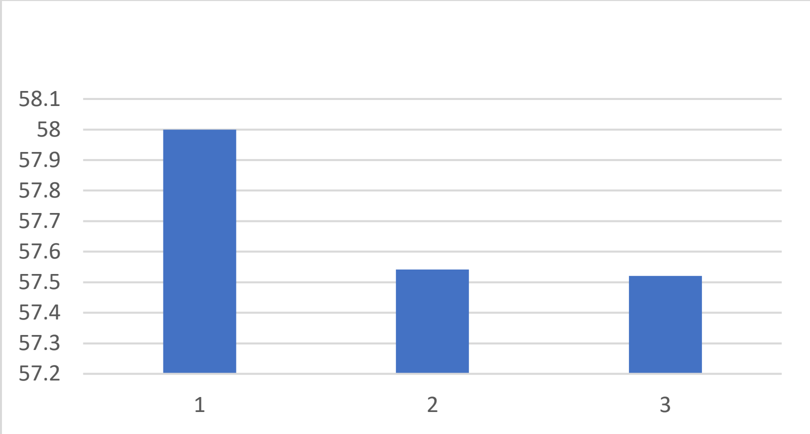

figure 10

as per above analysis it is clear that if furnace is operated with basic input process parameters as shown in table 10 the actual fuel consumption shall be 57.5208 as compared to experimental 58.0 liters shown in table 10

sn	Flame Temp(°C)	Time min	Melting rate kg/hr	Preheated excess air m^3	Fuel Litters exp	Fuel Litters modeled
11	1620	33	363.6	760	58	57.5208

table 10

7. CONCLUSIONS

It is very clear that while applying regression and python the result of both corelates with the experimental result therefore regression analysis and python both can be suitably applied for modeling and optimization of fuel consumption. The final comparison of both above techniques is given in table 11.

sn	Technique	Experimental fuel consumption	Modeled fuel consumption	Percentage error
1	Regression	**58**	**57.5208**	**-0.82620**
2	Python	**58**	**57.54177202**	**-0.7900**

Table11

On comparison the Percentage error is slightly lower in regression analysis hence it is marginally better as given in table11.

Compliance with ethical standards

Conflict of interest: On behalf of all authors, the corresponding author states that there is no conflict of interest**.**

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