datamanipulation

October 18, 2024

```
[1]:
     import pandas as pd
     df=pd.read_csv("01.Data Cleaning and Preprocessing.csv")
     df.head()
[4]:
       Observation
[4]:
                     Y-Kappa
                               ChipRate
                                          {\tt BF-CMratio}
                                                       BlowFlow
                                                                  ChipLevel4
     0
          31-00:00
                        23.10
                                 16.520
                                             121.717
                                                       1177.607
                                                                      169.805
     1
          31-01:00
                        27.60
                                 16.810
                                              79.022
                                                       1328.360
                                                                      341.327
     2
                                 16.709
                        23.19
          31-02:00
                                              79.562
                                                       1329.407
                                                                      239.161
     3
                                              81.011
          31-03:00
                        23.60
                                 16.478
                                                       1334.877
                                                                      213.527
     4
           31-04:00
                                              93.244
                        22.90
                                 15.618
                                                       1334.168
                                                                      243.131
        T-upperExt-2
                        T-lowerExt-2
                                          UCZAA
                                                 WhiteFlow-4
                                                                    SteamFlow-4
     0
               358.282
                                329.545
                                          1.443
                                                       599.253
                                                                           67.122
     1
               351.050
                                          1.549
                                                                           60.012
                                329.067
                                                       537.201
     2
               350.022
                                329.260
                                          1.600
                                                       549.611
                                                                           61.304
     3
               350.938
                                          1.604
                                                       623.362
                                                                           68.496
                                331.142
     4
               351.640
                                332.709
                                                       638.672
                                                                           70.022
                                            NaN
        Lower-HeatT-3
                        Upper-HeatT-3
                                          ChipMass-4
                                                        WeakLiquorF
                                                                        BlackFlow-2
     0
               329.432
                                303.099
                                              175.964
                                                             1127.197
                                                                            1319.039
     1
               330.823
                                               163.202
                                304.879
                                                              665.975
                                                                            1297.317
     2
               329.140
                                303.383
                                                              677.534
                                               164.013
                                                                            1327.072
     3
               328.875
                                302.254
                                               181.487
                                                              767.853
                                                                            1324.461
     4
               328.352
                                300.954
                                               183.929
                                                              888.448
                                                                            1343.424
        WeakWashF
                     SteamHeatF-3
                                      T-Top-Chips-4
                                                       SulphidityL-4
     0
            257.325
                             54.612
                                             252.077
                                                                   NaN
                             46.603
     1
            241.182
                                             251.406
                                                                 29.11
     2
            237.272
                             51.795
                                             251.335
                                                                   NaN
     3
                                                                 29.02
            239.478
                             54.846
                                             250.312
            215.372
                             54.186
                                             249.916
                                                                 29.01
     [5 rows x 23 columns]
```

[7]:

df.loc[(df["Lower-HeatT-3"]>325)]

[7]:		Observation	Y-Kappa	ChipRate	BF-CMratio	BlowFlow Ch	ipLevel4 \
	0	31-00:00	23.10	16.520			169.805
	1	31-01:00	27.60	16.810			341.327
	2	31-02:00	23.19	16.709			239.161
	3	31-03:00	23.60	16.478			213.527
	4	31-04:00	22.90	15.618			
		31-04:00		15.610	93.244	1334.100	243.131
	••						000 055
	319	10-16:00	23.75	12.667			276.955
	320	9-19:00	19.80	12.558			297.071
	321	9-20:00	23.01	12.550	90.842	1188.517	289.826
	322	9-21:00	24.32	13.083	88.910	1192.879	318.006
	323	9-22:00	25.75	13.417	85.451	1186.342	248.312
		T-upperExt-2	T-low	erExt-2	UCZAA Whi	teFlow-4	SteamFlow-4 \
	0	358.28	2	329.545	1.443	599.253	67.122
	1	351.05	0	329.067	1.549	537.201	60.012
	2	350.02	2	329.260	1.600	549.611	61.304
	3	350.93		331.142		623.362	68.496
	4	351.64		332.709		638.672	70.022
		001.01	· ·		waiv		10.022
	 319	347.28	6	 310 970	1.523	 513.956	 61.141
	320	399.13		319.576		570.058	67.667
	321	373.63		314.591			66.446
	322	364.08		308.559		504.852	61.054
	323	356.28	9	310.482	1.474	497.375	58.247
		I II+T	0	II+T O	(1)- ÷ M A	11 - 1-1	' D11-E1 O \
	^	Lower-HeatT-			-	WeakLiquorF	
	0	329.43		303.099			
	1	330.82		304.879			
	2	329.14		303.383			
	3	328.87		302.254			
	4	328.35	2	300.954	183.92	9 888.44	8 1343.424
		***		•••	•••	•••	•••
	319	330.11	7	304.006	148.17	4 1027.20	1357.271
	320	330.84	8	304.616	165.17	8 906.96	1311.177
	321	330.22	6	304.686	160.84	1 887.12	1319.226
	322	327.34	6	304.363	147.58	9 804.42	3 1320.225
	323	328.09	2	304.093	144.21	8 828.32	1320.848
		WeakWashF	SteamHea	tF-3 T-	Top-Chips-4	SulphidityL-	4
	0	257.325	5	4.612	252.077	- '	aN
	1	241.182		6.603	251.406		
	2	237.272		1.795	251.335		aN
	3	239.478		4.846	250.312		
	4	215.372		4.186	249.916		
							V1
	210	 201 642		 E 064	 252 047		0.6
	319	381.643	4	5.264	252.947	30.	00

30.70	252.092	50.528	25.494	320
NaN	252.438	45.549	0.638	321
31.13	253.176	43.725	0.000	322
NaN	253.216	43.840	1.276	323

[161 rows x 23 columns]

[8]: df.loc[(df["ChipMoisture-4 "]<45)]

[8]:		Observation	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	ChipLevel4	\
	1	31-01:00	27.60	16.810	79.022	1328.360	341.327	
	2	31-02:00	23.19	16.709	79.562	1329.407	239.161	
	12	31-11:00	26.62	15.467	84.447	1334.255	386.971	
	13	31-12:00	27.20	16.083	82.839	1332.331	366.855	
	14	31-13:00	24.05	16.675	77.025	1284.386	246.336	
	38	1-13:00	18.45	12.917	84.483	1175.728	391.599	
	39	1-14:00	24.30	13.917	87.835	1190.889	390.140	
	40	1-15:00	27.10	13.558	83.117	1175.417	289.256	
	41	1-16:00	24.70	14.142	80.809	1171.734	104.205	
	63	2-14:00	24.70	16.183	72.611	1231.362	332.497	
	64	2-15:00	25.40	16.958	74.405	1230.776	295.522	
	65	2-16:00	23.50	16.542	80.093	1246.777	198.217	
	207	8-14:00	16.05	13.114	NaN	NaN	0.000	
	208	8-15:00	17.75	11.283	NaN	NaN	41.607	
	210	8-17:00	19.20	14.183	85.406	1211.339	354.500	
	212	8-19:00	24.13	14.150	91.197	1290.440	219.669	
	234	9-17:00	18.64	14.133	97.318	1248.918	243.523	
	236	9-19:00	19.80	12.558	94.352	1184.119	297.071	
	237	9-20:00	23.01	12.550	90.842	1188.517	289.826	
	238	9-21:00	24.32	13.083	88.910	1192.879	318.006	
	239	9-22:00	25.75	13.417	85.451	1186.342	248.312	
	240		23.22	13.883	89.165	1202.451	236.865	
	241		22.62	13.486	83.330	1177.037	212.868	
	242		24.81	13.800	85.330	1177.558	237.025	
	303		27.60	16.810	79.022	1328.360	341.327	
	304		23.19	16.709	79.562	1329.407	239.161	
	313	31-11:00	26.62	15.467	84.447	1334.255	386.971	
	315	8-14:00	16.05	13.114	NaN	NaN	0.000	
	316		17.75	11.283	NaN	NaN	41.607	
	320		19.80	12.558		1184.119	297.071	
	321		23.01	12.550	90.842		289.826	
	322		24.32	13.083	88.910		318.006	
	323	9-22:00	25.75	13.417	85.451	1186.342	248.312	
		T-upperExt-2	T-low	erExt-2	UCZAA Whit	eFlow-4	SteamFlow-	1 \
	1	351.05	0	329.067	1.549	537.201	60.03	12
	2	350.02	2	329.260	1.600	549.611	61.30	04

12	349.392	321.021	1.428	531.250	59.407	
13	350.094	327.439	1.486	527.893	60.271	
14	350.317	329.240	1.538	537.811	58.979	
38	343.614	323.472	1.229	561.564	64.834	
39	341.081	320.888	1.346	492.543	54.213	
40	339.168	318.386	1.360		48.568	
41	340.222	319.779	1.367	F.CO. 000	61.146	
63	350.938	322.801	1.455		60.175	
64					52.962	
	350.216	322.740	1.471	540.151		
65	350.521	323.513	1.474	596.506	65.556	
207	NaN	NaN	1.648	500.376	55.180	
208	362.545	331.240	1.658	467.265	50.663	
210	366.827	321.326	1.478	562.029	69.674	
212	364.650	326.870	1.575	476.929	55.521	
234	374.752	325.608	NaN	589.030	67.534	
236	399.135	319.576	1.451	570.058	67.667	
237	373.633	314.591	1.457	549.306	66.446	
238	364.081	308.559	1.523	504.852	61.054	
239	356.289	310.482	1.474	497.375	58.247	
240	352.606	315.395	1.484	500.071	59.050	
241	354.732	317.084	1.480	518.992	59.524	
242	359.333	318.998	1.486	533.539	64.050	
303	351.050	329.067	1.549	537.201	60.012	
304	350.022	329.260	1.600	549.611	61.304	
313	349.392	321.021	1.428	531.250	59.407	
315	NaN	NaN	1.648	500.376	55.180	
316	362.545	331.240	1.658	467.265	50.663	
320	399.135	319.576	1.451	570.058	67.667	
321	373.633	314.591	1.457	549.306	66.446	
322	364.081	308.559	1.523	504.852	61.054	
323	356.289	310.482	1.474	497.375	58.247	
	Lower-HeatT-3	Upper-HeatT-3	ChipMass-4	WeakLiquorF	BlackFlow-2	\
1	330.823	304.879	163.202	665.975	1297.317	
2	329.140	303.383	164.013	677.534	1327.072	
12	330.284	303.248	156.797	799.947	1299.782	
13	330.023	302.883	160.562	771.158	1299.974	
14	329.560	302.146	160.587	823.039	1300.545	
38	321.563	297.095	161.452	596.446	889.171	
39	319.974	295.580	136.052	663.228	995.420	
40	318.228	294.850	131.537	744.659	996.046	
41	318.922	295.046	159.875	734.588	997.246	
63	319.644	296.799	159.557	670.349	1013.140	
64	318.913	295.843	146.914	727.366	1052.879	
65	319.151	296.025	153.147	843.689	1092.750	
207	329.185	303.149	141.763	865.254	1092.730 NaN	
	529.100	505.149	171.100	000.204	ivalv	
208	NaN	NaN	128.396	836.060	1195.731	

210	329.238	301.817	116.333	819.783	1247.445
212	328.312	302.081	145.757	862.711	1301.713
234	330.893	304.864	166.807	1016.622	1318.035
236	330.848	304.616	165.178	906.962	1311.177
237	330.226	304.686	160.841	887.125	1319.226
238	327.346	304.363	147.589	804.423	1320.225
239	328.092	304.093	144.218	828.328	1320.848
240	327.819	303.624	143.035	881.661	1320.164
241	327.923	303.385	148.644	851.318	1319.788
242	328.095	303.434	156.479	812.306	1319.799
303	330.823	304.879	163.202	665.975	1297.317
304	329.140	303.383	164.013	677.534	1327.072
313	330.284	303.248	156.797	799.947	1299.782
315	329.185	303.149	141.763	865.254	NaN
316	NaN	NaN	128.396	836.060	1195.731
320	330.848	304.616	165.178	906.962	1311.177
321	330.226	304.686	160.841	887.125	1319.226
322	327.346	304.363	147.589	804.423	1320.225
323	328.092	304.093	144.218	828.328	1320.848
	WeakWashF Stea	mHeatF-3 T-Top	-Chips-4	SulphidityL-4	
1	241.182	46.603	251.406	29.11	
2	237.272	51.795	251.335	NaN	
12					
	118.901	46.597	251.721	NaN	
13	153.647	47.175	251.767	30.18	
14	372.228	51.740	251.492	NaN	
38	47.408	38.283	252.337	NaN	
39	47.068	35.510	252.662	30.21	
40	118.899	41.985	253.450	NaN	
41	239.941	45.045	252.459	30.44	
63	461.896	39.376	251.426	29.35	
64	476.150	43.701	252.097	NaN	
65	419.893	48.904	251.345	30.39	
207	491.514	47.943	251.696	NaN	
208	418.192	NaN	251.889	29.58	
210	282.044	50.032	248.390	30.21	
212	134.728	53.498	251.035	30.13	
234	248.564	51.310	251.741	NaN	
236	25.494	50.528	252.092	30.70	
237	0.638	45.549	252.438	NaN	
238	0.000	43.725	253.176	31.13	
239	1.276	43.840	253.216	NaN	
240	174.332	45.793	253.156	31.56	
			252.754		
241	186.834	47.494		NaN	
242	301.566	47.217	252.520	31.26	
303	241.182	46.603	251.406	29.11	
304	237.272	51.795	251.335	NaN	

NaN	251.721	46.597	118.901	313
NaN	251.696	47.943	491.514	315
29.58	251.889	NaN	418.192	316
30.70	252.092	50.528	25.494	320
NaN	252.438	45.549	0.638	321
31.13	253.176	43.725	0.000	322
NaN	253.216	43.840	1.276	323

[33 rows x 23 columns]

[9]: newdataset=df.fillna("No data") newdataset

[9]:		Observation '	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	Chi	ipLevel4	\	
	0	31-00:00	23.10	16.52	121.717	1177.607		169.805		
	1	31-01:00	27.60	16.81	79.022	1328.36		341.327		
	2	31-02:00	23.19	16.709	79.562	1329.407		239.161		
	3	31-03:00	23.60	16.478	81.011	1334.877		213.527		
	4	31-04:00	22.90	15.618	93.244	1334.168		243.131		
		•••	•••	•••		•••				
	319	10-16:00	23.75	12.667	93.45	1178.252		276.955		
	320	9-19:00	19.80	12.558	94.352	1184.119		297.071		
	321	9-20:00	23.01	12.55	90.842	1188.517		289.826		
	322	9-21:00	24.32	13.083	88.91	1192.879		318.006		
	323	9-22:00	25.75	13.417	85.451	1186.342		248.312		
		T-upperExt-2	T-lower	Ext-2	UCZAA Wh	iteFlow-4		SteamFlow-	4	\
	0	358.282		329.545	1.443	599.253	•••	67.1	22	
	1	351.05		329.067	1.549	537.201	•••	60.0	12	
	2	350.022		329.26	1.6	549.611	•••	61.3	04	
	3	350.938		331.142	1.604	623.362		68.4	96	
	4	351.64		332.709	No data	638.672	•••	70.0	22	
		•••		•••	•••			•••		
	319	347.286		310.97	1.523	513.956	•••	61.1	41	
	320	399.135		319.576	1.451	570.058	•••	67.6	67	
	321	373.633		314.591	1.457	549.306		66.4	46	
	322	364.081		308.559	1.523	504.852		61.0	54	
	323	356.289		310.482	1.474	497.375		58.2	47	
		Lower-HeatT-3	Upper-H	leatT-3	ChipMass-4	WeakLiquo	rF	BlackFlow-	2	\
	0	329.432		303.099	175.964		197	1319.0	39	
	1	330.823		304.879	163.202	665.9	975	1297.3	17	
	2	329.14		303.383	164.013	677.	534	1327.0	72	
	3	328.875		302.254	181.487	767.8	353	1324.4	61	
	4	328.352		300.954	183.929	888.4	448	1343.4	24	
		•••		•••	•••			•••		
	319	330.117		304.006	148.174	1027.2	201	1357.2	71	

320 321 322 323	330.8 330.3 327.3 328.0	226 304 346 304	.616 165.17 .686 160.84 .363 147.58 .093 144.21	1 887.125 9 804.423	1311.177 1319.226 1320.225 1320.848
	WeakWashF	SteamHeatF-3	T-Top-Chips-4	SulphidityL-4	
0	257.325	54.612		-	
1	241.182	46.603	251.406	29.11	
2	237.272	51.795	251.335	No data	
3	239.478	54.846	250.312	29.02	
4	215.372	54.186	249.916	29.01	
	•••	•••	•••	•••	
319	381.643	45.264	252.947	30.86	
320	25.494	50.528	252.092	30.7	
321	0.638	45.549	252.438	No data	
322	0.0	43.725	253.176	31.13	
323	1.276	43.84	253.216	No data	

[324 rows x 23 columns]

[11]: newdataset=df.fillna(method='ffill') newdataset

[11]:		Observation	Y-Kappa	${\tt ChipRate}$	BF-CMr	atio	BlowFlow	C	hipLevel4 \	
	0	31-00:00	23.10	16.520	121	.717	1177.607		169.805	
	1	31-01:00	27.60	16.810	79	.022	1328.360		341.327	
	2	31-02:00	23.19	16.709	79	.562	1329.407		239.161	
	3	31-03:00	23.60	16.478	81	.011	1334.877		213.527	
	4	31-04:00	22.90	15.618	93	.244	1334.168		243.131	
		•••	•••	•••	•••			••		
	319	10-16:00	23.75	12.667	93	.450	1178.252		276.955	
	320	9-19:00	19.80	12.558	94	.352	1184.119		297.071	
	321	9-20:00	23.01	12.550	90	.842	1188.517		289.826	
	322	9-21:00	24.32	13.083	88	.910	1192.879		318.006	
	323	9-22:00	25.75	13.417	85	.451	1186.342		248.312	
		T-upperExt-2	2 T-low	erExt-2	UCZAA	Whit	eFlow-4	•••	SteamFlow-4	\
	0	358.28	32	329.545	1.443		599.253		67.122	
	1	351.05	50	329.067	1.549		537.201		60.012	
	2	350.02	22	329.260	1.600		549.611		61.304	
	3	350.93	38	331.142	1.604		623.362		68.496	
	4	351.64	ł0	332.709	1.604		638.672		70.022	
		•••					•••		•••	
	319	347.28	36	310.970	1.523		513.956		61.141	
	320	399.13	35	319.576	1.451		570.058	•••	67.667	
	320 321	399.13 373.63		319.576 314.591			570.058 549.306		67.667 66.446	

	323	356.2	89	310.482	1.474	497.375 .		58.247	
		Lower-HeatT	-3 Upper	-HeatT-3	ChipMass-4	WeakLique	orF Bla	ckFlow-2	\
	0	329.4		303.099	175.964	-	.197	1319.039	`
	1	330.8		304.879	163.202		.975	1297.317	
	2	329.1		303.383	164.013		.534	1327.072	
	3	328.8		302.254	181.487		.853	1324.461	
	4	328.3		300.954	183.929		.448	1343.424	
		•••				•••			
	319	330.1		304.006	148.174	1027	.201	1357.271	
	320	330.8	48	304.616	165.178	906	.962	1311.177	
	321	330.2	26	304.686	160.841	887	.125	1319.226	
	322	327.3	46	304.363	147.589	804	.423	1320.225	
	323	328.0	92	304.093	144.218	828	.328	1320.848	
		WeakWashF	SteamHea	tF-3 T-7	Cop-Chips-4	Sulphidit	yL-4		
	0	257.325	5	4.612	252.077		NaN		
	1	241.182	4	6.603	251.406	:	29.11		
	2	237.272	5	1.795	251.335	:	29.11		
	3	239.478	5	4.846	250.312	:	29.02		
	4	215.372	5	4.186	249.916	:	29.01		
		•••		•••	•••	•••			
	319	381.643		5.264	252.947		30.86		
	320	25.494	5	0.528	252.092	;	30.70		
	321	0.638	4	5.549	252.438	;	30.70		
	322	0.000	4	3.725	253.176		31.13		
	323	1.276	4	3.840	253.216	;	31.13		
	[324	rows x 23 c	olumns]						
[12]:	newd	ataset=df.fi	llna(meth	od='bfill')				
	newd	ataset							
		_							
[12]:		Observation	Y-Kappa	_		BlowFlow	ChipLeve		
	0	31-00:00	23.10	16.520	121.717	1177.607	169.		
	1	31-01:00	27.60	16.810	79.022	1328.360	341.		
	2	31-02:00	23.19	16.709	79.562	1329.407	239.		
	3	31-03:00	23.60	16.478	81.011	1334.877	213.		
	4	31-04:00	22.90	15.618	93.244	1334.168	243.	131	
	• •	•••	•••	•••		•••			
	319	10-16:00	23.75	12.667	93.450	1178.252	276.		
	320	9-19:00	19.80	12.558	94.352	1184.119	297.		
	321	9-20:00	23.01	12.550	90.842	1188.517	289.		
	322	9-21:00	24.32	13.083	88.910	1192.879	318.	006	

T-upperExt-2 T-lowerExt-2 UCZAA WhiteFlow-4 ... SteamFlow-4 \

248.312

323 9-22:00 25.75 13.417 85.451 1186.342

0	358.282	329.545	1.443	599.253	67.122	
1	351.050	329.067	1.549	537.201	60.012	
2	350.022	329.260	1.600	549.611	61.304	
3	350.938	331.142	1.604	623.362	68.496	
4	351.640	332.709	1.436	638.672	70.022	
	•••					
319	347.286	310.970	1.523	513.956	61.141	
320	399.135	319.576	1.451	570.058	67.667	
321	373.633	314.591	1.457	549.306	66.446	
322	364.081	308.559	1.523	504.852	61.054	
323	356.289	310.482	1.474	497.375	58.247	
	Lower-HeatT-3	Upper-HeatT-3	ChipMass-4	WeakLiquorF	BlackFlow-2	\
0	329.432	303.099	175.964	1127.197	1319.039	
1	330.823	304.879	163.202	665.975	1297.317	
2	329.140	303.383	164.013	677.534	1327.072	
3	328.875	302.254	181.487	767.853	1324.461	
4	328.352	300.954	183.929	888.448	1343.424	
	•••	•••	•••	•••	•••	
319	330.117	304.006	148.174	1027.201	1357.271	
320	330.848	304.616	165.178	906.962	1311.177	
321	330.226	304.686	160.841	887.125	1319.226	
322	327.346	304.363	147.589	804.423	1320.225	
323	328.092	304.093	144.218	828.328	1320.848	
	WeakWashF St	eamHeatF-3 T-T	op-Chips-4	SulphidityL-4		
0	257.325	54.612	252.077	29.11		
1	241.182	46.603	251.406	29.11		
2	237.272	51.795	251.335	29.02		
3	239.478	54.846	250.312	29.02		
4	215.372	54.186	249.916	29.01		
• •	•••	•••	•••	•••		
319	381.643	45.264	252.947	30.86		
320		50.528	252.092	30.70		
321		45.549	252.438	31.13		
322		43.725	253.176	31.13		
323	1.276	43.840	253.216	NaN		

[324 rows x 23 columns]

[13]: newdataset=df.interpolate() newdataset

```
[13]:
         Observation Y-Kappa ChipRate BF-CMratio BlowFlow
                                                              ChipLevel4
            31-00:00
                        23.10
                                 16.520
                                            121.717
                                                    1177.607
                                                                  169.805
     0
                        27.60
     1
            31-01:00
                                 16.810
                                             79.022 1328.360
                                                                  341.327
     2
            31-02:00
                        23.19
                                 16.709
                                             79.562 1329.407
                                                                  239.161
```

3	31-03:00	23.60 16.4	478	81.011	1334.877	•	213.527	
4	31-04:00	22.90 15.0		93.244	1334.168		243.131	
			010		1001.100	•	210.101	
• •						••	000	
319	10-16:00	23.75 12.6		93.450	1178.252		276.955	
320	9-19:00	19.80 12.	558	94.352	1184.119	:	297.071	
321	9-20:00	23.01 12.	550	90.842	1188.517	:	289.826	
322	9-21:00	24.32 13.0	083	88.910	1192.879	;	318.006	
323	9-22:00	25.75 13.4		85.451	1186.342		248.312	
020	J 22.00	20.70 10.	111	00.101	1100.012	•	210.012	
	Т	Т 1	O T	10711 111	- F3 4	α±	eamFlow-4 \	
•	T-upperExt-2				eFlow-4			
0	358.282	329.		1.443	599.253	•••	67.122	
1	351.050	329.0	067 1	1.549	537.201	•••	60.012	
2	350.022	329.3	260 1	1.600	549.611	•••	61.304	
3	350.938	331.	142 1	1.604	623.362		68.496	
4	351.640	332.		1.520	638.672	•••	70.022	
				1.020			10.022	
210	247 006	210		 		•••	C1 111	
319	347.286	310.9		1.523	513.956	•••	61.141	
320	399.135	319.		1.451	570.058	•••	67.667	
321	373.633	314.	591 1	1.457	549.306	•••	66.446	
322	364.081	308.	559 1	1.523	504.852		61.054	
323	356.289	310.4	482 1	1.474	497.375		58.247	
	Lower-HeatT-3	Upper-HeatT	-3 (ThinMagg-4	Weaklia	uorF	BlackFlow-2	\
		opper nearr	0 (JIII PHABB I	wcanniq	uOII	DidCRI IOW Z	'
\wedge	200 420	202 /	000	17E 064	110'	7 107	1210 020	
0	329.432	303.0		175.964		7.197	1319.039	
1	330.823	304.8	879	163.202	66	5.975	1297.317	
1 2			879		66			
1	330.823	304.8	879 383	163.202	669 67	5.975	1297.317	
1 2	330.823 329.140	304.8 303.3	879 383 254	163.202 164.013	669 67 76	5.975 7.534	1297.317 1327.072	
1 2 3 4	330.823 329.140 328.875 328.352	304.8 303.3 302.3 300.9	879 383 254	163.202 164.013 181.487	669 67 76	5.975 7.534 7.853	1297.317 1327.072 1324.461	
1 2 3 4	330.823 329.140 328.875 328.352 	304.8 303.3 302.3 300.9	879 383 254 954	163.202 164.013 181.487 183.929	669 67' 76' 889	5.975 7.534 7.853 8.448	1297.317 1327.072 1324.461 1343.424	
1 2 3 4 319	330.823 329.140 328.875 328.352 330.117	304.8 303.3 302.3 300.9 	879 383 254 954	163.202 164.013 181.487 183.929 148.174	669 677 767 888 1027	5.975 7.534 7.853 8.448 7.201	1297.317 1327.072 1324.461 1343.424 1357.271	
1 2 3 4 319 320	330.823 329.140 328.875 328.352 330.117 330.848	304.8 303.3 302.3 300.9 304.0	879 383 254 954 006 616	163.202 164.013 181.487 183.929 148.174 165.178	669 677 767 888 1027 900	5.975 7.534 7.853 8.448 7.201 6.962	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177	
1 2 3 4 319 320 321	330.823 329.140 328.875 328.352 330.117 330.848 330.226	304.8 303.3 302.3 300.9 304.6 304.6	879 383 254 954 006 616 686	163.202 164.013 181.487 183.929 148.174 165.178 160.841	669 677 766 889 1027 900 888	5.975 7.534 7.853 8.448 7.201 6.962 7.125	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226	
1 2 3 4 319 320	330.823 329.140 328.875 328.352 330.117 330.848	304.8 303.3 302.3 300.9 304.0	879 383 254 954 006 616 686	163.202 164.013 181.487 183.929 148.174 165.178	669 677 766 889 1027 900 888	5.975 7.534 7.853 8.448 7.201 6.962	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177	
1 2 3 4 319 320 321	330.823 329.140 328.875 328.352 330.117 330.848 330.226	304.8 303.3 302.3 300.9 304.6 304.6	879 383 254 954 006 616 686 363	163.202 164.013 181.487 183.929 148.174 165.178 160.841	669 677 769 889 1022 900 889 804	5.975 7.534 7.853 8.448 7.201 6.962 7.125	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226	
1 2 3 4 319 320 321 322	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346	304.8 303.3 302.3 300.9 304.6 304.6 304.6	879 383 254 954 006 616 686 363	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589	669 677 769 889 1022 900 889 804	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092	304.8 303.3 302.3 300.9 304.6 304.6 304.6	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589	669 677 766 889 1027 900 889 804 829	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092	304.8 303.3 302.2 300.9 304.6 304.6 304.6	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218	669 677 769 889 1022 900 889 804	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S-257.325	304.8 303.3 302.2 300.9 304.6 304.6 304.6 304.6	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218	669 677 766 888 1022 900 888 804 829 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182	304.8 303.3 302.3 300.9 304.6 304.6 304.6 304.6 46.603	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406	669 677 766 888 1027 900 888 806 829 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272	304.8 303.3 302.2 300.9 304.6 304.6 304.6 304.6 54.612 46.603 51.795	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335	669 677 766 883 1022 900 883 804 825 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272 239.478	304.8 303.3 302.2 300.9 304.6 304.6 304.6 304.6 54.612 46.603 51.795 54.846	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335 250.312	669 677 768888 1022 900 888 806 829 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272	304.8 303.3 302.2 300.9 304.6 304.6 304.6 304.6 54.612 46.603 51.795	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335	669 677 768888 1022 900 888 806 829 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272 239.478	304.8 303.3 302.2 300.9 304.6 304.6 304.6 304.6 54.612 46.603 51.795 54.846	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335 250.312	669 677 768888 1022 900 888 806 829 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272 239.478 215.372	304.8 303.3 302.2 300.9 304.0 304.0 304.0 304.0 46.603 51.795 54.846 54.186	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335 250.312 249.916	669 677 766 888 1027 900 888 800 829 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323 0 1 2 3 4 	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272 239.478 215.372 381.643	304.8 303.3 302.2 300.9 304.0 304.0 304.0 304.0 \$304.0 \$1.795 54.846 54.186 45.264	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335 250.312 249.916 252.947	666 677 766 883 1022 900 883 804 826 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020 29.010	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323 0 1 2 3 4 319 320	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272 239.478 215.372 381.643 25.494	304.8 303.3 302.3 300.9 304.6 304.6 304.6 304.6 304.6 304.6 54.612 46.603 51.795 54.846 54.186 45.264 50.528	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335 250.312 249.916 252.947 252.092	669 677 766 888 1027 900 888 806 826 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020 29.010	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323 0 1 2 3 4 319 320 321	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF 257.325 241.182 237.272 239.478 215.372 381.643 25.494 0.638	304.8 303.3 302.2 300.9 304.6 304.6 304.6 304.6 304.6 304.6 54.612 46.603 51.795 54.846 54.186 45.264 50.528 45.549	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 252.077 251.406 251.335 250.312 249.916 252.947 252.092 252.438	666 677 766 888 1027 900 888 800 826 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020 29.010	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	
1 2 3 4 319 320 321 322 323 0 1 2 3 4 319 320	330.823 329.140 328.875 328.352 330.117 330.848 330.226 327.346 328.092 WeakWashF S- 257.325 241.182 237.272 239.478 215.372 381.643 25.494	304.8 303.3 302.3 300.9 304.6 304.6 304.6 304.6 304.6 304.6 54.612 46.603 51.795 54.846 54.186 45.264 50.528	879 383 254 954 006 616 686 363 093	163.202 164.013 181.487 183.929 148.174 165.178 160.841 147.589 144.218 p-Chips-4 252.077 251.406 251.335 250.312 249.916 252.947 252.092	666 677 766 883 1022 900 883 804 825 Sulphidi	5.975 7.534 7.853 8.448 7.201 6.962 7.125 4.423 8.328 tyL-4 NaN 29.110 29.065 29.020 29.010	1297.317 1327.072 1324.461 1343.424 1357.271 1311.177 1319.226 1320.225	

[324 rows x 23 columns]

[14]: df.describe() [14]: ChipRate BF-CMratio BlowFlow ChipLevel4 Y-Kappa 324.000000 319.000000 308.000000 323.000000 307.000000 count 14.347937 mean 20.635370 87.464456 1237.837614 258.164483 3.070036 std 1.499095 7.995012 100.593735 87.987452 9.983000 68.645000 0.00000 min 12.170000 0.000000 25% 18.382500 13.358000 81.823000 1193.215250 213.527000 50% 20.845000 14.308000 86.739000 1273.138500 271.792000 75% 23.032500 15.517000 92.372000 1289.196000 321.680000 27.600000 max16.958000 121.717000 1351.240000 419.014000 WhiteFlow-4 T-upperExt-2 T-lowerExt-2 **UCZAA** AAWhiteSt-4 \ 322.000000 322.000000 299.000000 323.000000 173.000000 count 356.904295 mean 324.020180 1.492010 591.732260 6.140410 std 9.209290 7.621402 0.105923 67.016351 0.081609 min 339.168000 284.633000 1.182000 405.111000 5.890000 25% 350.241250 321.420000 1.431500 540.989500 6.089000 50% 356.843000 325.669000 1.498000 592.895000 6.135000 75% 362.242250 329.175000 1.560500 639.480500 6.199000 731.394000 399.135000 337.012000 1.747000 6.340000 maxSteamFlow-4 Lower-HeatT-3 Upper-HeatT-3 ChipMass-4 323.000000 323.000000 count 322.000000 322.000000 325.567820 300.525699 162.222322 66.668285 mean std 5.708587 4.609862 4.568484 14.160688 48.568000 318.051000 293.312000 113.922000 min 25% 62.518000 321.385500 296.513250 153.032500 50% 67.429000 324.741000 299.126000 163.690000 71.522000 75% 329.845250 304.244750 172.555000 max76.147000 333.854000 311.146000 189.268000 WeakLiquorF BlackFlow-2 WeakWashF SteamHeatF-3 T-Top-Chips-4 323.000000 323.000000 count 322.000000 323.000000 322.000000 873.828941 1175.917016 263.543068 49.696907 251.240087 mean std 122.073521 149.334010 163.666942 4.551909 1.283432 486.938000 838.948000 0.00000 248.359000 min 35.510000 25% 792.019500 1044.817500 134.649000 46.389750 250.312000 50% 865.254000 1150.221500 269.193000 50.277000 251.380000 75% 965.286500 1319.021250 405.563000 53.294250 252.323500 1226.277000 1395.767000 715.715000 63.332000 254.122000 maxSulphidityL-4

173.000000

count

mean	30.411671
std	0.701317
min	29.010000
25%	29.970000
50%	30.370000
75%	30.820000
max	32.840000

[8 rows x 22 columns]

[]: