datamanipulation

October 18, 2024

[1]:
```
import pandas as pd
```

[3]:
```
df=pd.read_csv("01.Data Cleaning and Preprocessing.csv")
```

[4]:
```
df.head()
```

[4]:

	Observation	Y-Kappa	ChipRate	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	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	

	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	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	NaN	638.672	…	70.022	

	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	

	WeakWashF	SteamHeatF-3	T-Top-Chips-4	SulphidityL-4
0	257.325	54.612	252.077	NaN
1	241.182	46.603	251.406	29.11
2	237.272	51.795	251.335	NaN
3	239.478	54.846	250.312	29.02
4	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	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	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	T-lowerExt-2	UCZAA	WhiteFlow-4	…	SteamFlow-4	\
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	NaN	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	SteamHeatF-3	T-Top-Chips-4	SulphidityL-4
0	257.325	54.612	252.077	NaN
1	241.182	46.603	251.406	29.11
2	237.272	51.795	251.335	NaN
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           30.70
321       0.638         45.549         252.438             NaN
322       0.000         43.725         253.176           31.13
323       1.276         43.840         253.216             NaN

[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	9-23:00	23.22	13.883	89.165	1202.451	236.865	
241	10-00:00	22.62	13.486	83.330	1177.037	212.868	
242	10-01:00	24.81	13.800	85.330	1177.558	237.025	
303	31-01:00	27.60	16.810	79.022	1328.360	341.327	
304	31-02:00	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	8-15:00	17.75	11.283	NaN	NaN	41.607	
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	T-lowerExt-2	UCZAA	WhiteFlow-4	…	SteamFlow-4	\
1	351.050	329.067	1.549	537.201	…	60.012	
2	350.022	329.260	1.600	549.611	…	61.304	

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	480.184	…	48.568
41	340.222	319.779	1.367	562.988	…	61.146
63	350.938	322.801	1.455	564.870	…	60.175
64	350.216	322.740	1.471	540.151	…	52.962
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	NaN	
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	SteamHeatF-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
241	186.834	47.494	252.754	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

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

[33 rows x 23 columns]
```

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

[9]:
```
    Observation  Y-Kappa ChipRate BF-CMratio  BlowFlow ChipLevel4   \
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-lowerExt-2      UCZAA WhiteFlow-4   … SteamFlow-4   \
0         358.282       329.545    1.443      599.253  …       67.122
1          351.05       329.067    1.549      537.201  …       60.012
2         350.022        329.26      1.6      549.611  …       61.304
3         350.938       331.142    1.604      623.362  …       68.496
4          351.64       332.709  No data      638.672  …       70.022
..            …            …       …           …   …           …
319       347.286        310.97    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          329.14       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  SteamHeatF-3  T-Top-Chips-4  SulphidityL-4
0      257.325        54.612        252.077        No data
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  ChipRate  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      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   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
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  1.604       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   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0       257.325         54.612         252.077             NaN
1       241.182         46.603         251.406           29.11
2       237.272         51.795         251.335           29.11
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           30.70
321       0.638         45.549         252.438           30.70
322       0.000         43.725         253.176           31.13
323       1.276         43.840         253.216           31.13

[324 rows x 23 columns]
```

[12]:
```
newdataset=df.fillna(method='bfill')
newdataset
```

[12]:
```
    Observation  Y-Kappa  ChipRate  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      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   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
```

```
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   SteamHeatF-3   T-Top-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      25.494         50.528         252.092           30.70
321       0.638         45.549         252.438           31.13
322       0.000         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   \
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   T-lowerExt-2    UCZAA  WhiteFlow-4   …  SteamFlow-4   \
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  1.520        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   SteamHeatF-3   T-Top-Chips-4   SulphidityL-4
0      257.325         54.612         252.077             NaN
1      241.182         46.603         251.406          29.110
2      237.272         51.795         251.335          29.065
3      239.478         54.846         250.312          29.020
4      215.372         54.186         249.916          29.010
..         …              …              …               …
319    381.643         45.264         252.947          30.860
320     25.494         50.528         252.092          30.700
321      0.638         45.549         252.438          30.915
322      0.000         43.725         253.176          31.130
323      1.276         43.840         253.216          31.130
```

[324 rows x 23 columns]

[14]:
```
df.describe()
```

[14]:

	Y-Kappa	ChipRate	BF-CMratio	BlowFlow	ChipLevel4	\
count	324.000000	319.000000	307.000000	308.000000	323.000000	
mean	20.635370	14.347937	87.464456	1237.837614	258.164483	
std	3.070036	1.499095	7.995012	100.593735	87.987452	
min	12.170000	9.983000	68.645000	0.000000	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	
max	27.600000	16.958000	121.717000	1351.240000	419.014000	

	T-upperExt-2	T-lowerExt-2	UCZAA	WhiteFlow-4	AAWhiteSt-4	\
count	322.000000	322.000000	299.000000	323.000000	173.000000	
mean	356.904295	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	
max	399.135000	337.012000	1.747000	731.394000	6.340000	

	…	SteamFlow-4	Lower-HeatT-3	Upper-HeatT-3	ChipMass-4	\
count	…	323.000000	322.000000	322.000000	323.000000	
mean	…	66.668285	325.567820	300.525699	162.222322	
std	…	5.708587	4.609862	4.568484	14.160688	
min	…	48.568000	318.051000	293.312000	113.922000	
25%	…	62.518000	321.385500	296.513250	153.032500	
50%	…	67.429000	324.741000	299.126000	163.690000	
75%	…	71.522000	329.845250	304.244750	172.555000	
max	…	76.147000	333.854000	311.146000	189.268000	

	WeakLiquorF	BlackFlow-2	WeakWashF	SteamHeatF-3	T-Top-Chips-4	\
count	323.000000	322.000000	323.000000	322.000000	323.000000	
mean	873.828941	1175.917016	263.543068	49.696907	251.240087	
std	122.073521	149.334010	163.666942	4.551909	1.283432	
min	486.938000	838.948000	0.000000	35.510000	248.359000	
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	
max	1226.277000	1395.767000	715.715000	63.332000	254.122000	

	SulphidityL-4
count	173.000000

```
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]
```

[ ]: