In [9]:
```
import pandas as pd
import numpy as np
```

In [10]:
```
df=pd.read_excel("./Data.xlsx")
```

In [11]:
```
df.head()
```

Out[11]:

	Density	StrengthMD	StrengthCD
0	0.801	121.41	70.42
1	0.824	127.70	72.47
2	0.841	129.20	78.20
3	0.816	131.80	74.89
4	0.840	135.10	71.21

In [45]:
```
df.shape
```

Out[45]:
```
(41, 3)
```

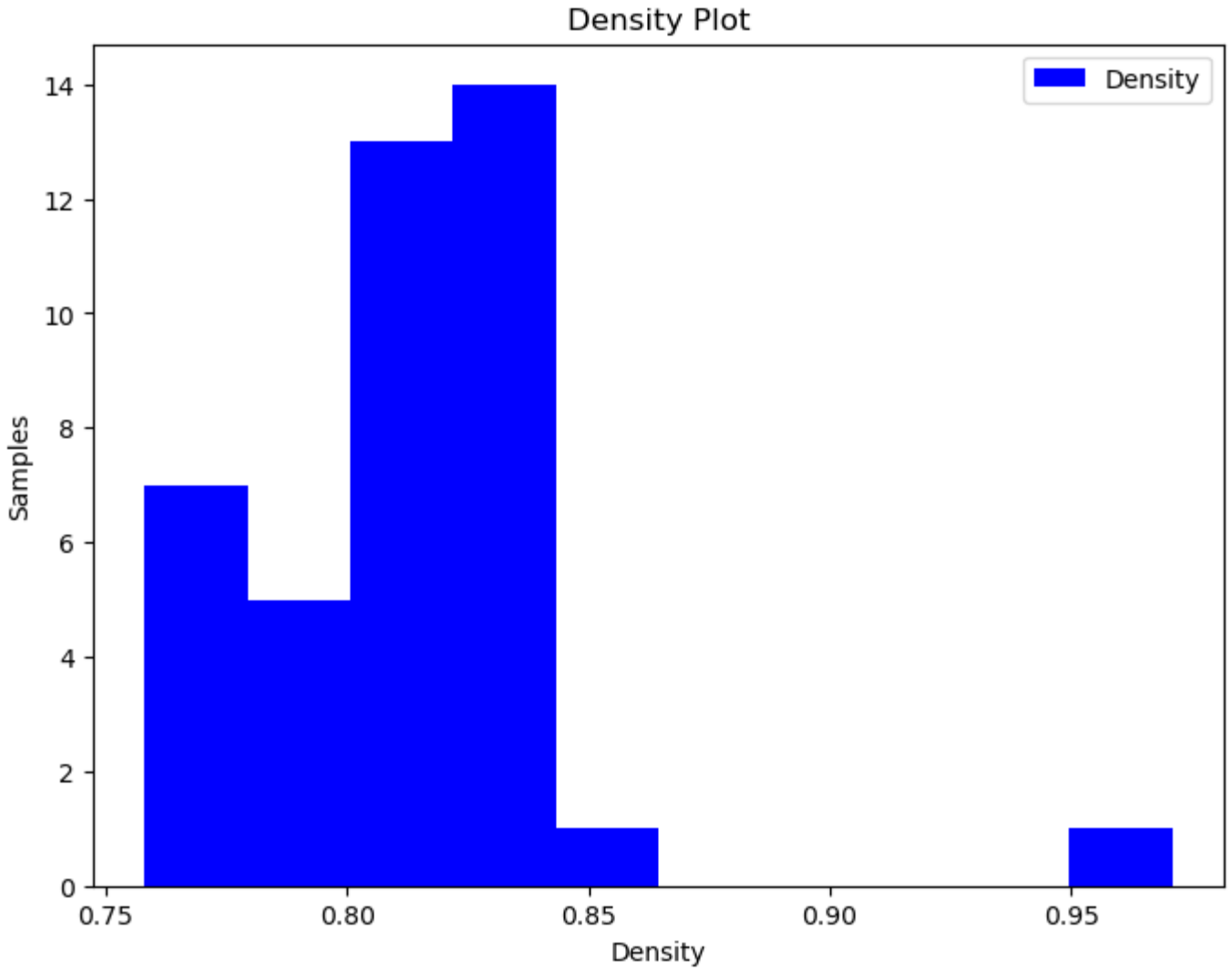
In [12]:
```
df.describe()
```

Out[12]:

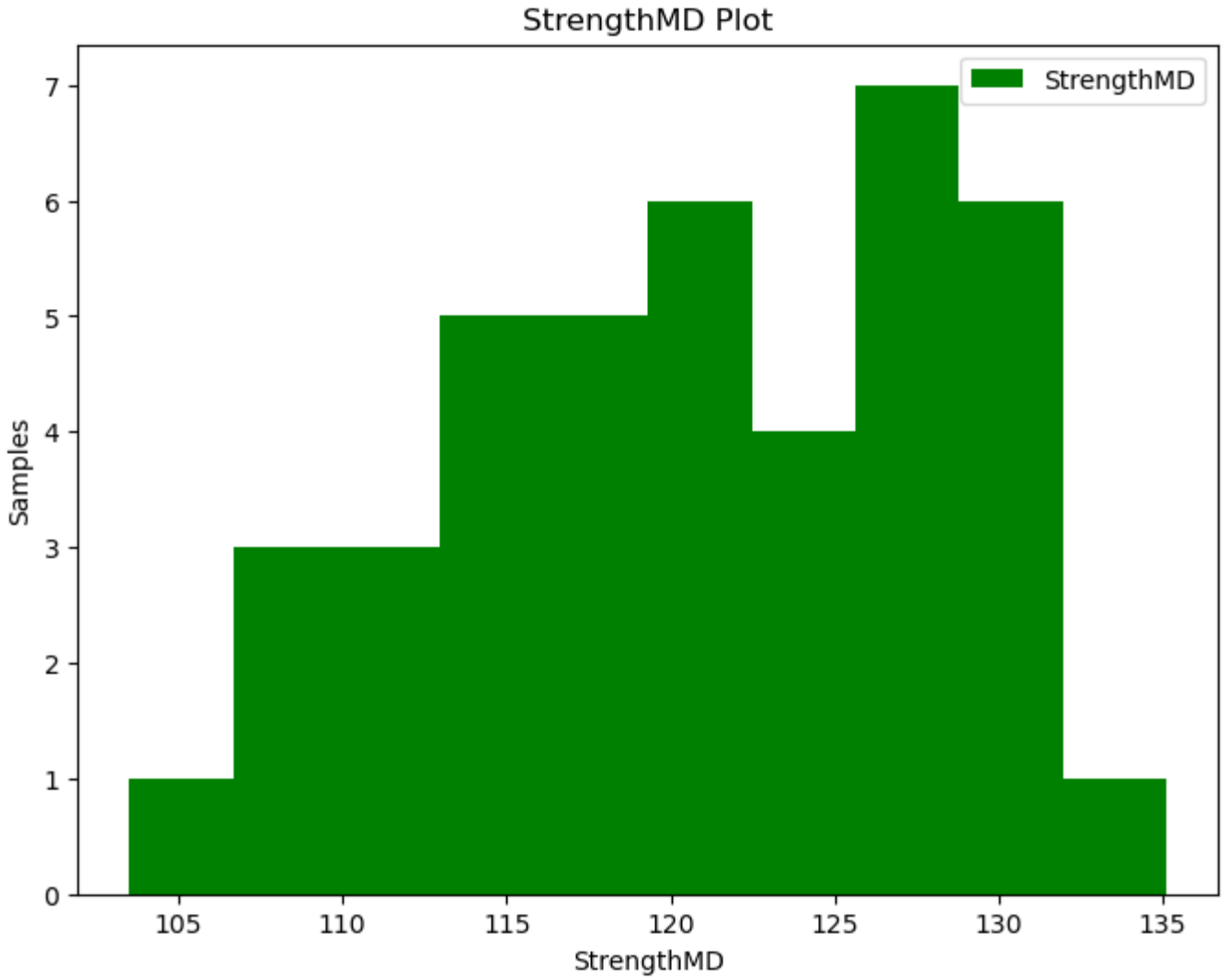
	Density	StrengthMD	StrengthCD
count	41.000000	41.000000	41.000000
mean	0.811854	120.953415	67.723171
std	0.035561	7.702022	9.790642
min	0.758000	103.510000	48.930000
25%	0.795000	115.100000	56.530000
50%	0.815000	121.410000	70.700000
75%	0.826000	126.700000	74.890000
max	0.971000	135.100000	80.330000

In [58]:
```
import matplotlib.pyplot as plt
%matplotlib inline
```

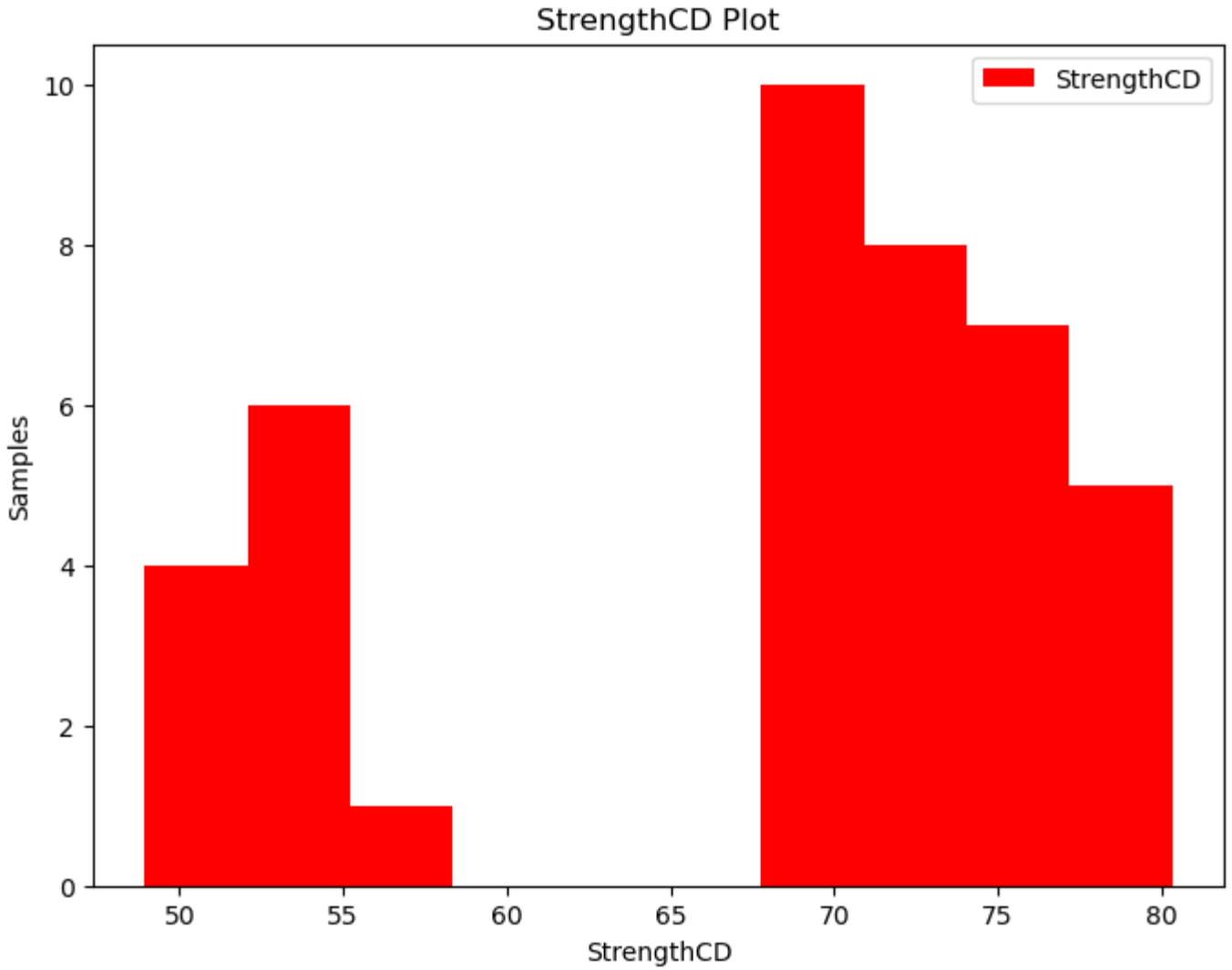
In [26]:
```
plt.figure(figsize=(8, 6))
plt.hist(df['Density'], label='Density', color='blue')
plt.xlabel('Density')
plt.ylabel('Samples')
plt.title('Density Plot')
plt.legend()
plt.show()
```



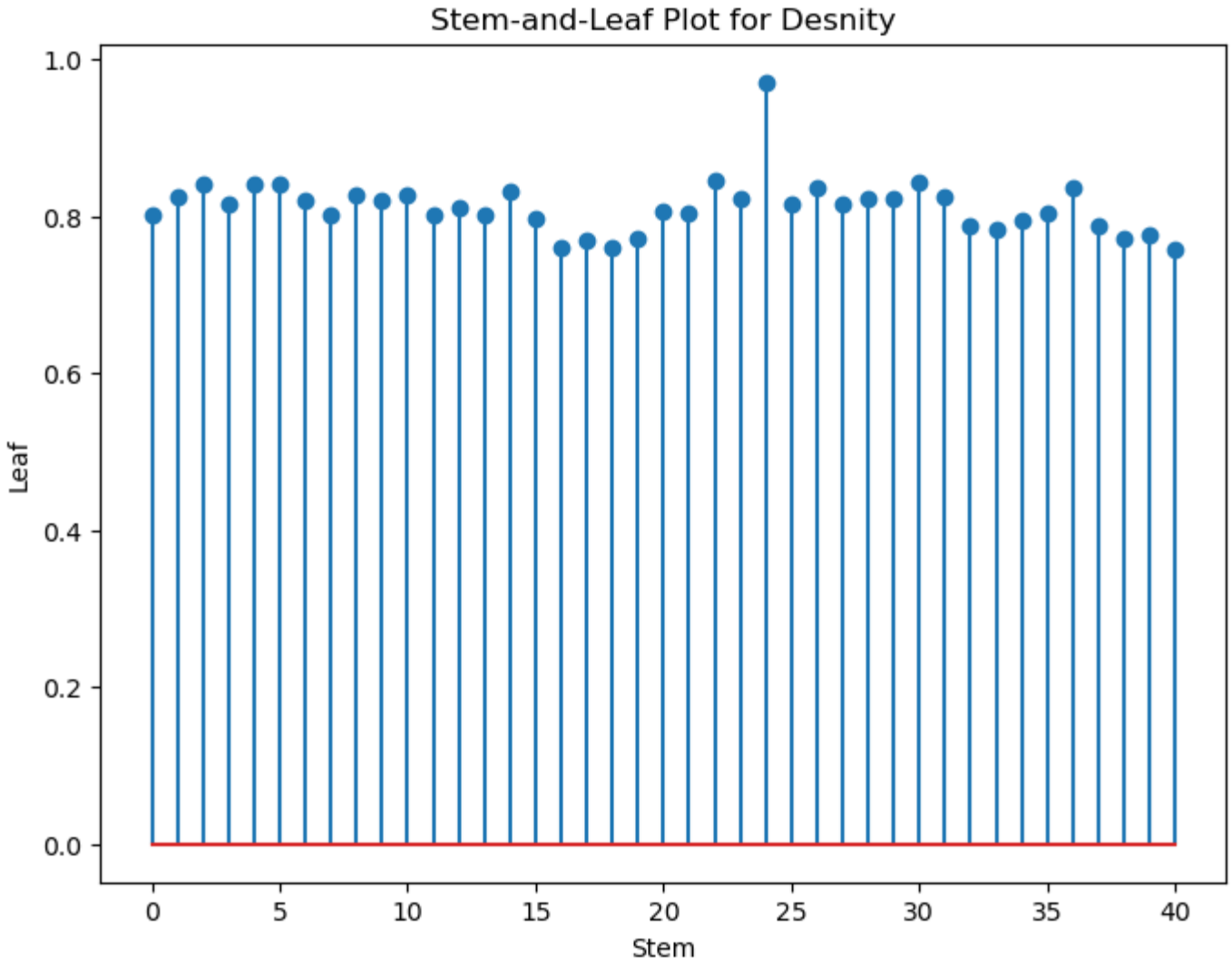
In [27]:
```
plt.figure(figsize=(8, 6))
plt.hist(df['StrengthMD'], label='StrengthMD', color='green')
plt.xlabel('StrengthMD')
plt.ylabel('Samples')
plt.title('StrengthMD Plot')
plt.legend()
plt.show()
```



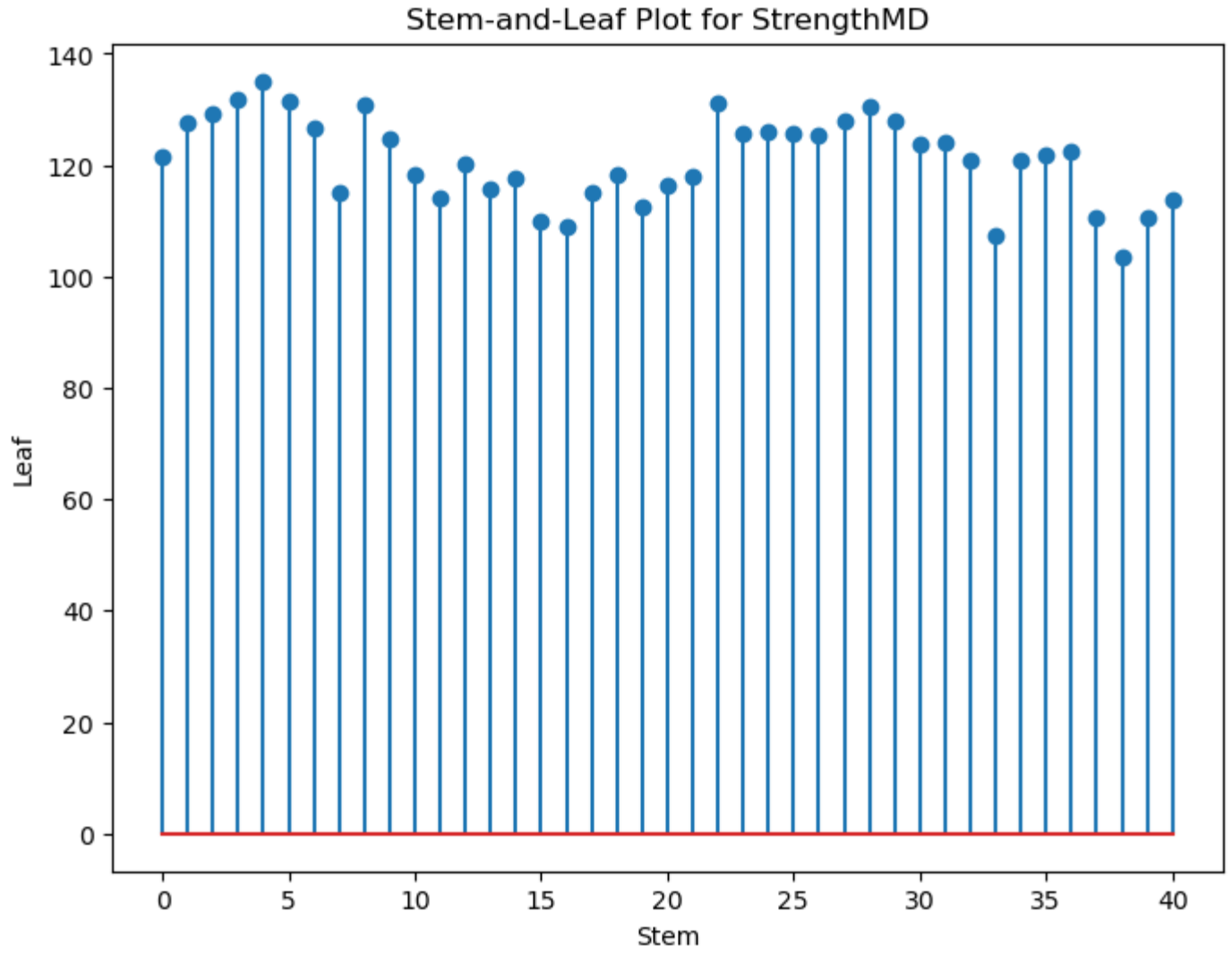
In [28]:
```
plt.figure(figsize=(8, 6))
plt.hist(df['StrengthCD'], label='StrengthCD', color='red')
plt.xlabel('StrengthCD')
plt.ylabel('Samples')
plt.title('StrengthCD Plot')
plt.legend()
plt.show()
```



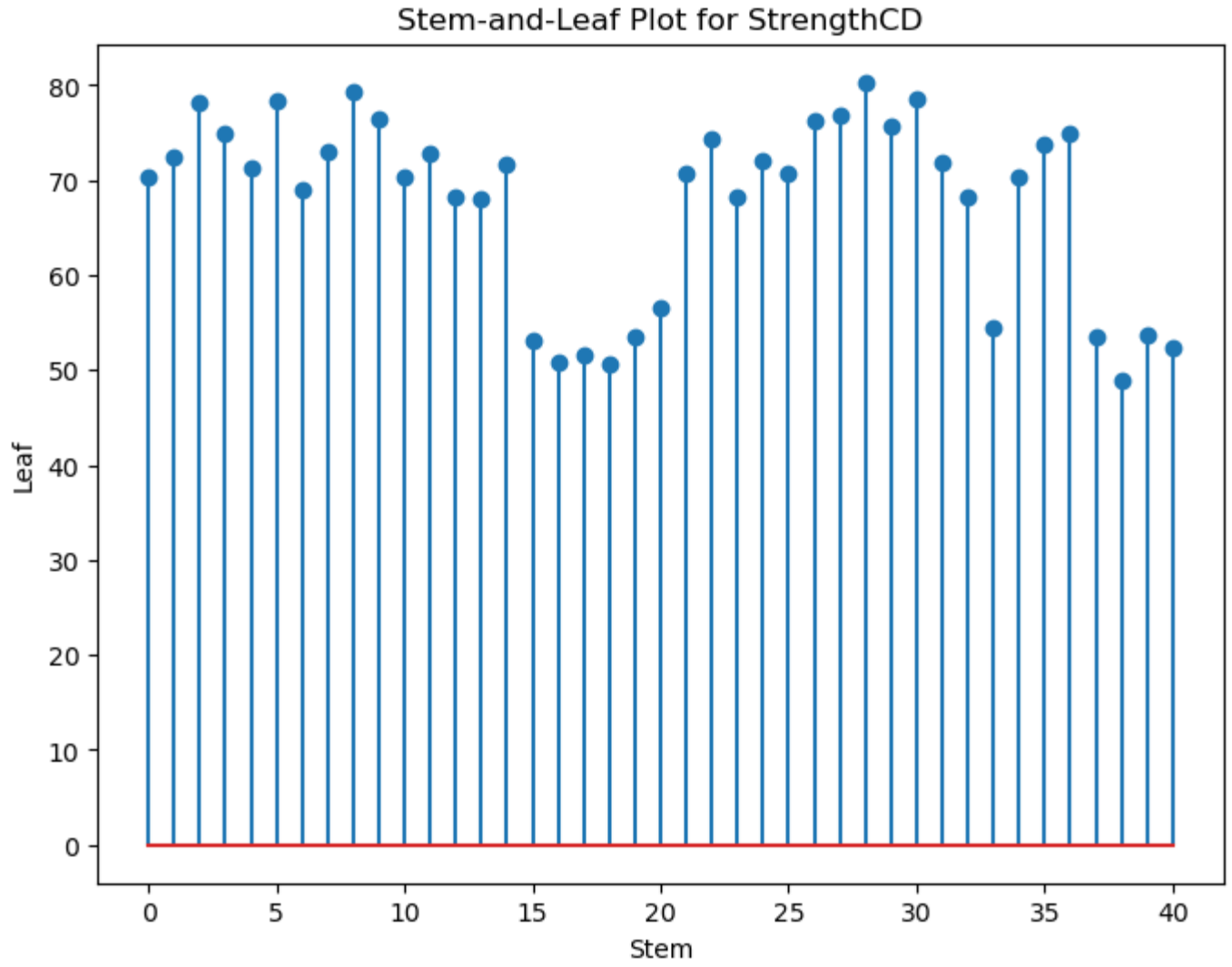
In [29]:
```
plt.figure(figsize=(8, 6))
plt.stem(df['Density'])
plt.xlabel('Stem')
plt.ylabel('Leaf')
plt.title('Stem-and-Leaf Plot for Desnity')
plt.show()
```



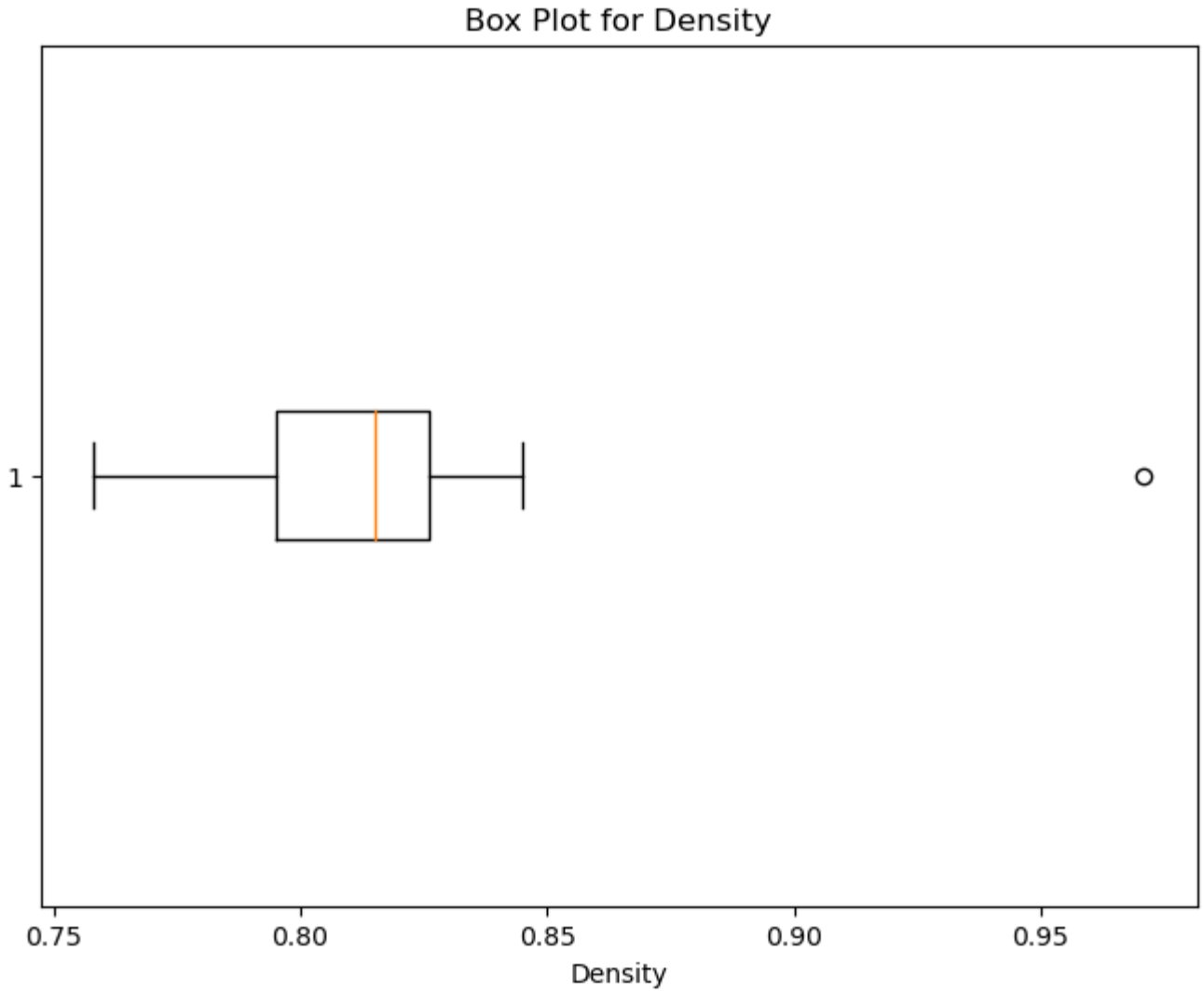
In [30]:
```
plt.figure(figsize=(8, 6))
plt.stem(df['StrengthMD'])
plt.xlabel('Stem')
plt.ylabel('Leaf')
plt.title('Stem-and-Leaf Plot for StrengthMD')
plt.show()
```



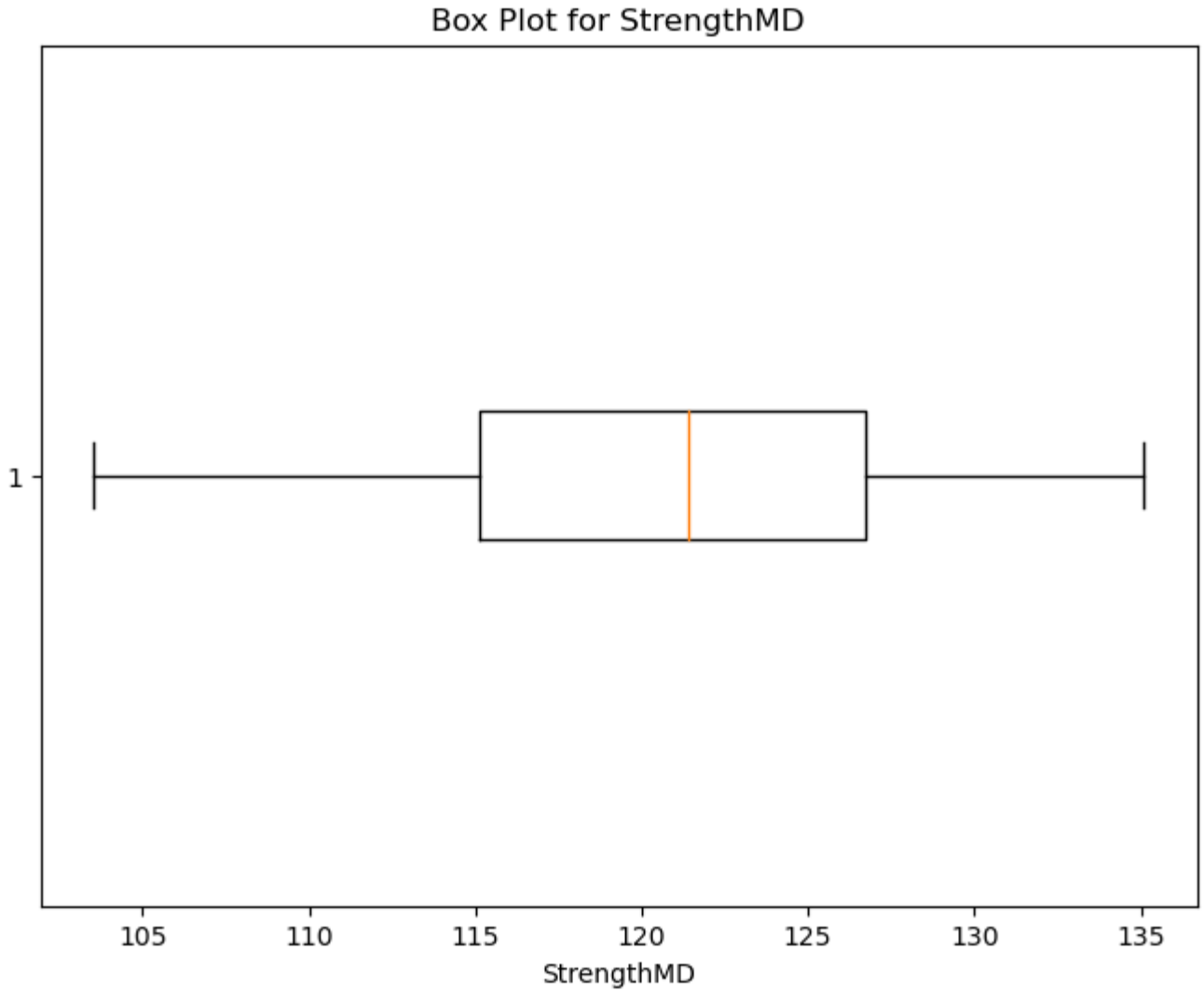
In [31]:
```
plt.figure(figsize=(8, 6))
plt.stem(df['StrengthCD'])
plt.xlabel('Stem')
plt.ylabel('Leaf')
plt.title('Stem-and-Leaf Plot for StrengthCD')
plt.show()
```



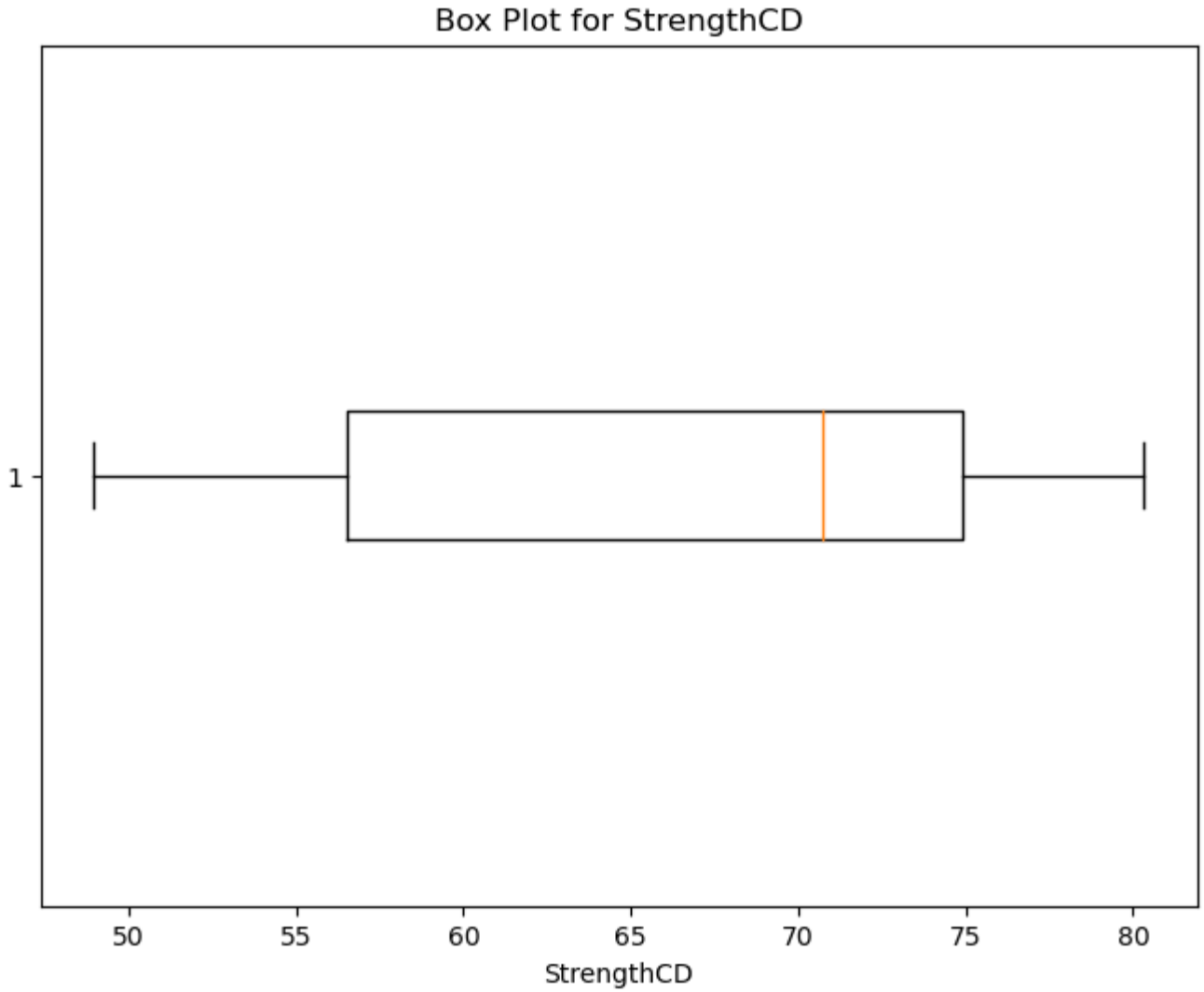
In [32]:
```
plt.figure(figsize=(8, 6))
plt.boxplot(df['Density'], vert=False)
plt.xlabel('Density')
plt.title('Box Plot for Density')
plt.show()
```



In [33]:
```
plt.figure(figsize=(8, 6))
plt.boxplot(df['StrengthMD'], vert=False)
plt.xlabel('StrengthMD')
plt.title('Box Plot for StrengthMD')
plt.show()
```

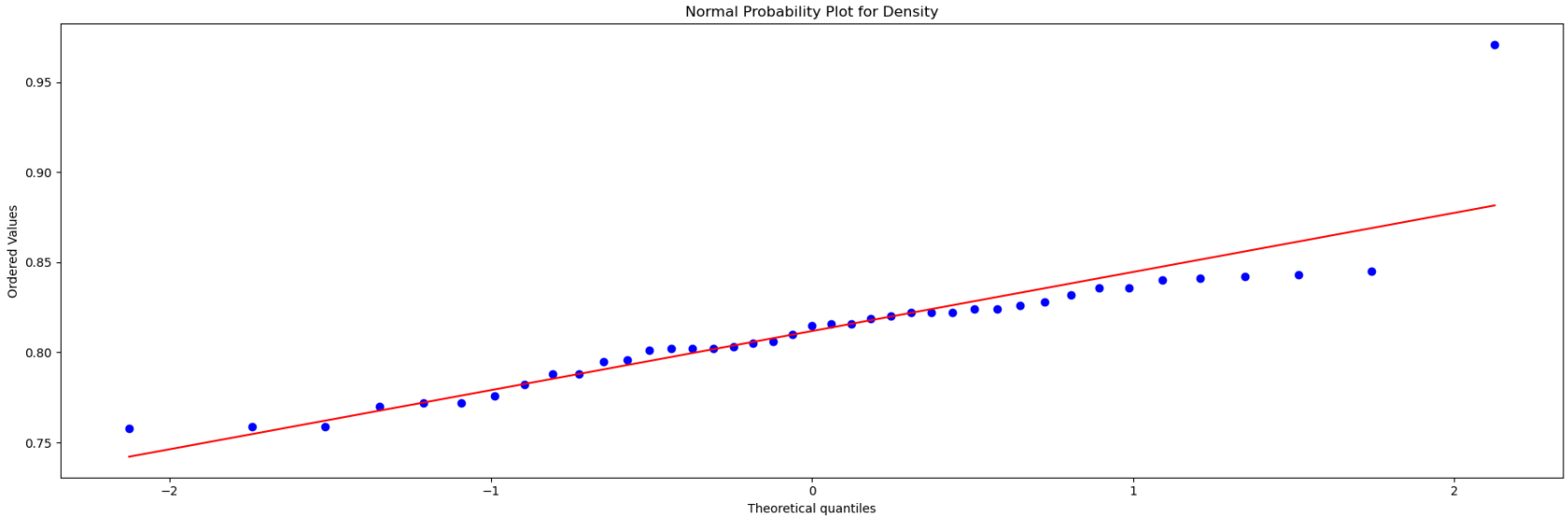


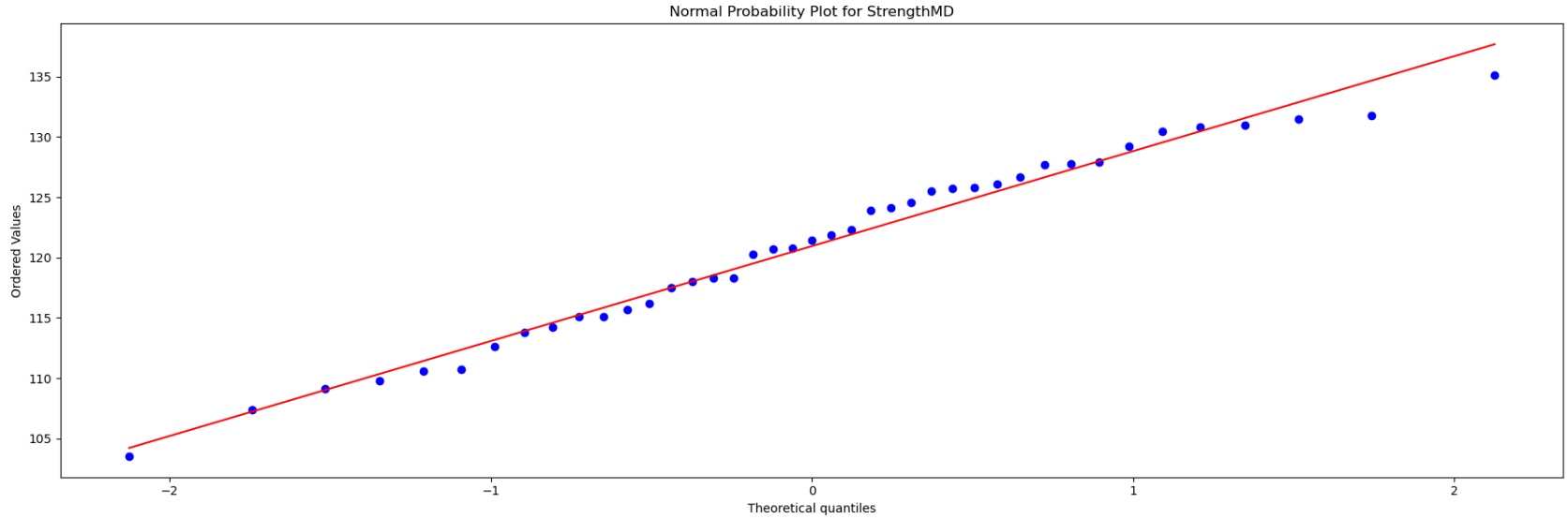
In [35]:
```
plt.figure(figsize=(8, 6))
plt.boxplot(df['StrengthCD'], vert=False)
plt.xlabel('StrengthCD')
plt.title('Box Plot for StrengthCD')
plt.show()
```

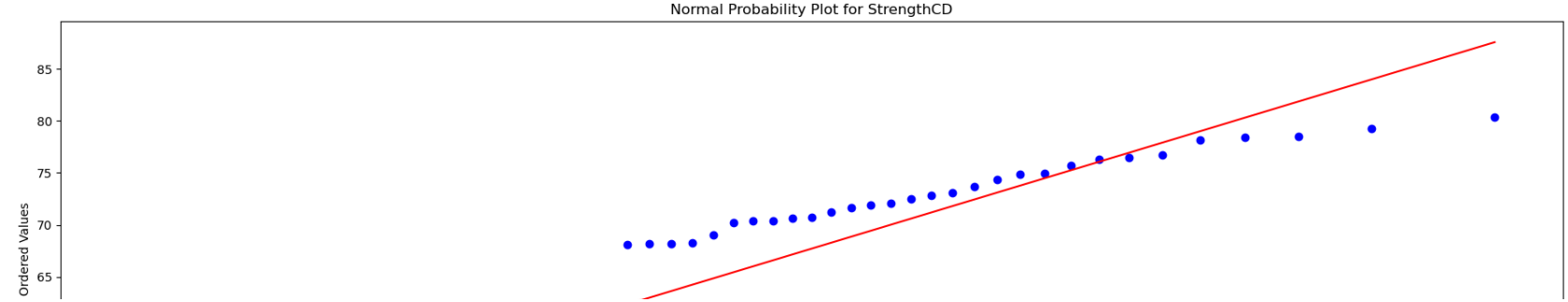


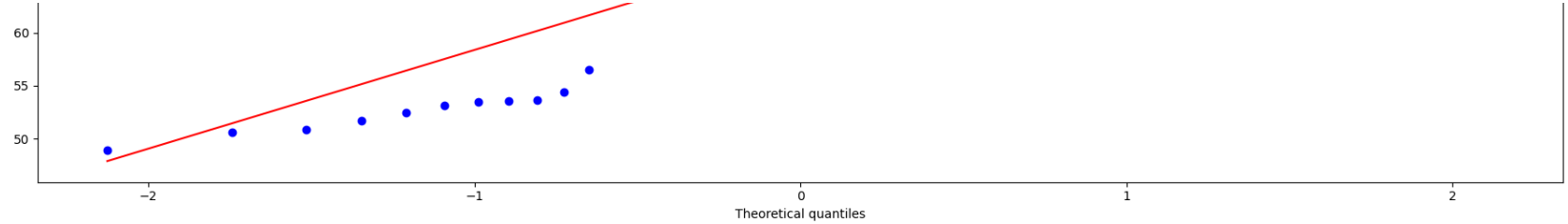
In [43]:
```
import scipy.stats as stats
```

In [65]:
```
plt.figure(figsize=(18,18))
num_columns = len(df.columns)
for i, column in enumerate(df.columns):
    plt.subplot(num_columns, 1, i + 1)
    stats.probplot(df[column], plot=plt)
    plt.title(f'Normal Probability Plot for {column}')
plt.tight_layout()
plt.show()
```


Normal Probability Plot for Density
Ordered Values
Theoretical quantiles
0.95
0.90
0.85
0.80
0.75
−2
−1
0
1
2


Normal Probability Plot for StrengthMD
Ordered Values
Theoretical quantiles
135
130
125
120
115
110
105
−2
−1
0
1
2


Normal Probability Plot for StrengthCD
Ordered Values
85
80
75
70
65



In [36]:
```
correlation_matrix = df.corr()
covariance_matrix = df.cov()
```

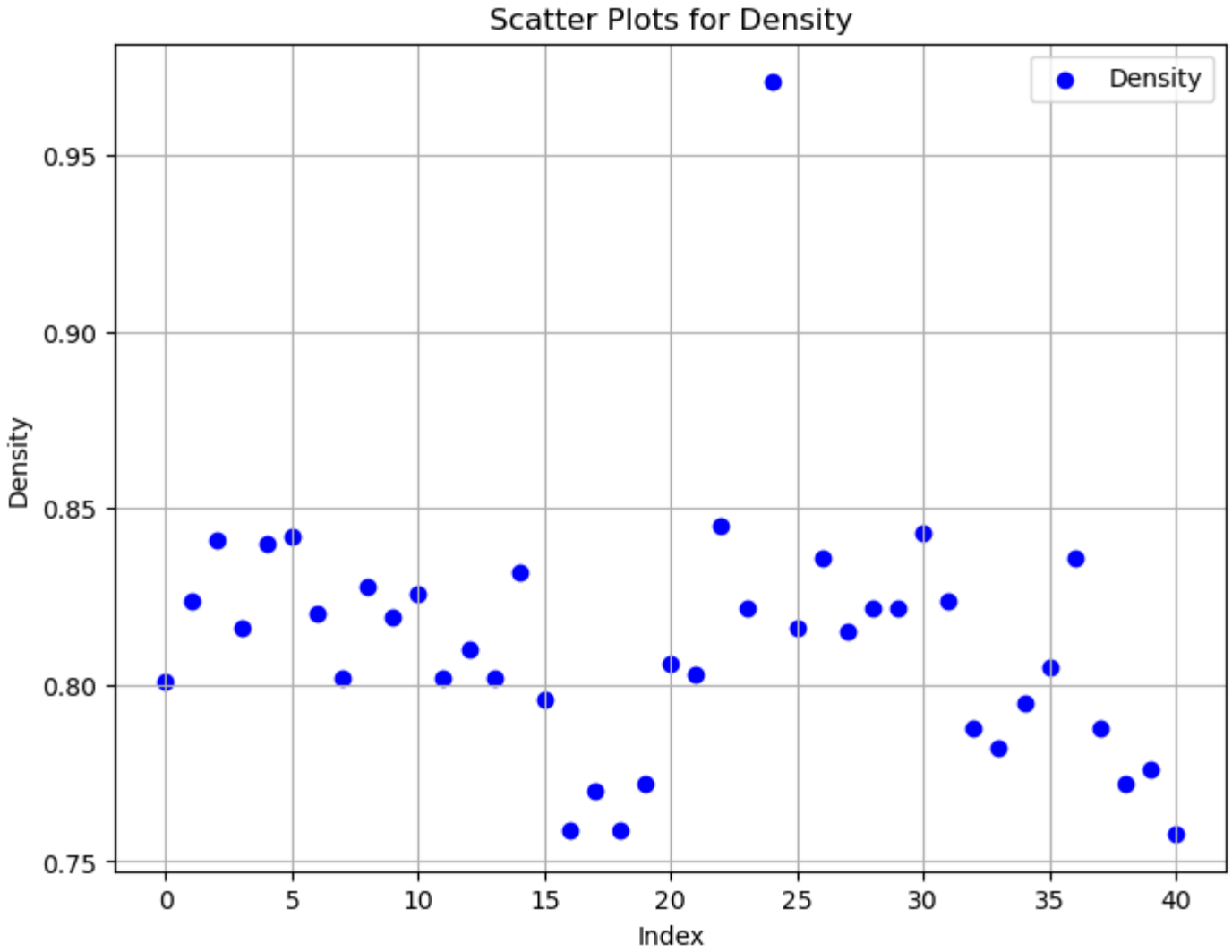
In [37]:
```
print("Correlation Matrix:")
print(correlation_matrix)
```

```
Correlation Matrix:
             Density  StrengthMD  StrengthCD
Density     1.000000    0.615014    0.646959
StrengthMD  0.615014    1.000000    0.808836
StrengthCD  0.646959    0.808836    1.000000
```

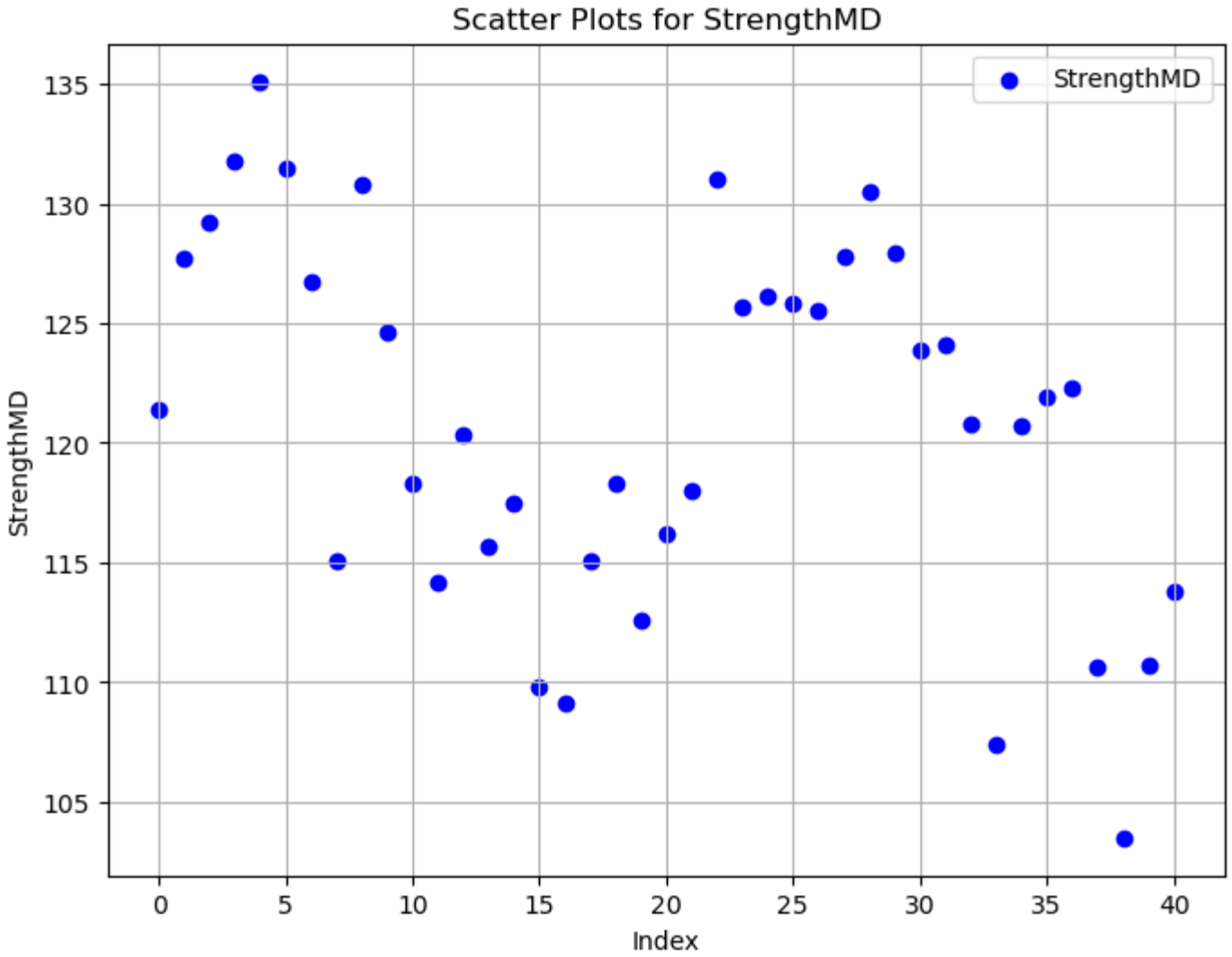
In [38]:
```
print("\nCovariance Matrix:")
print(covariance_matrix)
```

```
Covariance Matrix:
             Density  StrengthMD  StrengthCD
Density     0.001265    0.168447    0.225248
StrengthMD  0.168447   59.321148   60.992531
StrengthCD  0.225248   60.992531   95.856667
```

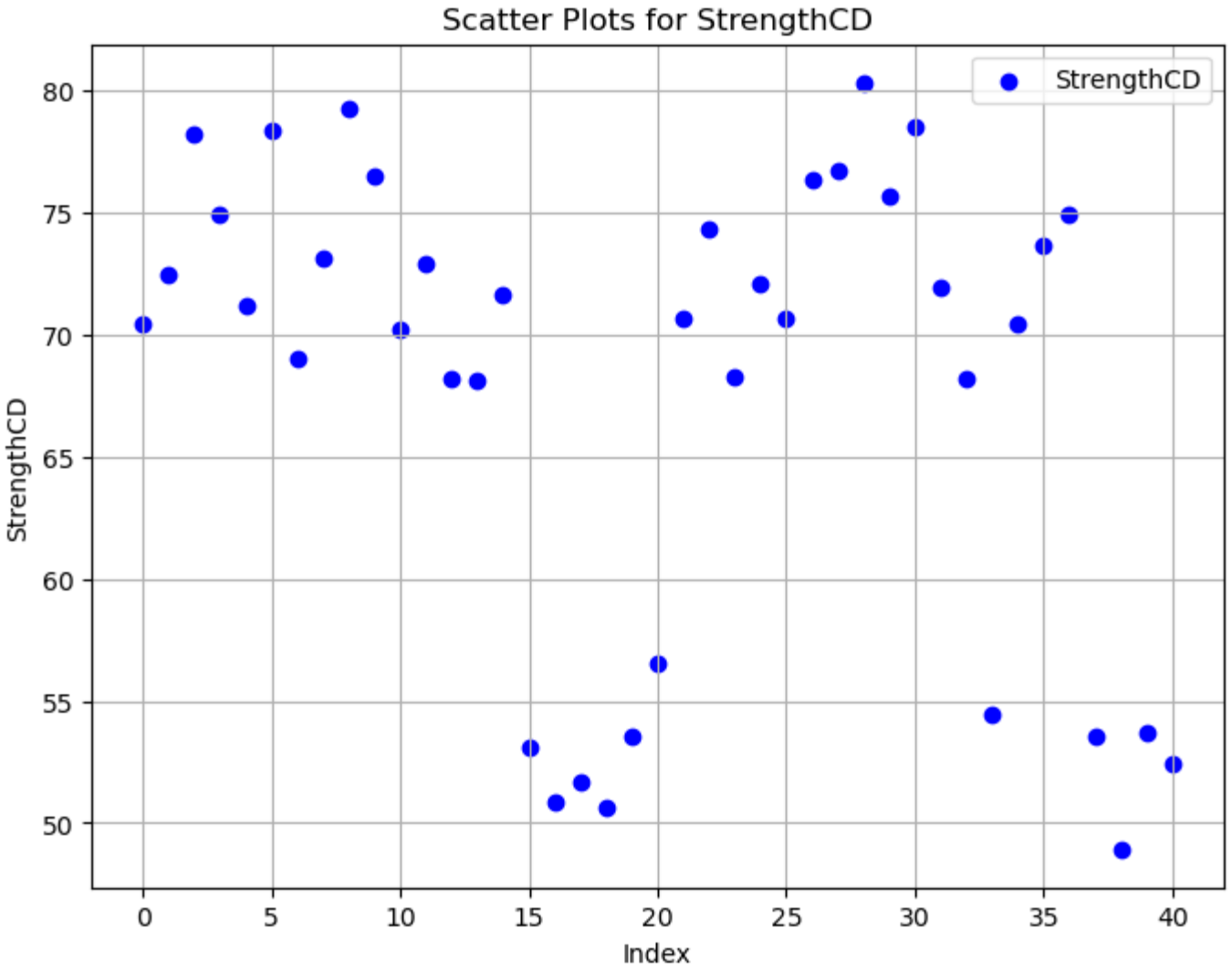
In [40]:
```
plt.figure(figsize=(8, 6))
plt.scatter(df.index, df['Density'], label='Density', color='blue', marker='o')
plt.xlabel('Index')
plt.ylabel('Density')
plt.title('Scatter Plots for Density')
plt.legend()
plt.grid(True)
plt.show()
```



In [41]:
```
plt.figure(figsize=(8, 6))
plt.scatter(df.index, df['StrengthMD'], label='StrengthMD', color='blue', marker='o')
plt.xlabel('Index')
plt.ylabel('StrengthMD')
plt.title('Scatter Plots for StrengthMD')
plt.legend()
plt.grid(True)
plt.show()
```



In [42]:
```
plt.figure(figsize=(8, 6))
plt.scatter(df.index, df['StrengthCD'], label='StrengthCD', color='blue', marker='o')
plt.xlabel('Index')
plt.ylabel('StrengthCD')
plt.title('Scatter Plots for StrengthCD')
plt.legend()
plt.grid(True)
plt.show()
```


Scatter Plots for StrengthCD
StrengthCD
StrengthCD
Index
80
75
70
65
60
55
50
0
5
10
15
20
25
30
35
40