

Motor Test Results and Analysis

Date: 2023-08-17

Author: Jonas Wagner

Test done with a new motor which started at 50rpm and ended in a stall after 3.5ish min.

This is likely due to the higher loading and lower RPM then is ideal for the motor.

Data ingested from 20230817_161823_1.mp4 using dataIngest.m

```
clear
close all
T =
readtable("data\motorTestData_20230817_161823_1.csv", "VariableNamingRule", "preserve"
);
T = fillmissing(T, "nearest");
T.omega = (2*pi/60).*T.RPM;
T.P_in_W = T.("Voltage (V)") .* T.("Current (A)");
T.P_out_W = T.("Torque (Nm)") .* T.omega;
T.eta = T.P_out_W ./ T.P_in_W
```

T = 6118x9 table

| | Time (s) | Current (A) | Voltage (V) | Torque (Nm) | RPM | omega |
|----|----------|-------------|-------------|-------------|-----|--------|
| 1 | 0.3333 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 2 | 0.3666 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 3 | 0.3999 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 4 | 0.4332 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 5 | 0.4666 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 6 | 0.4999 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 7 | 0.5332 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 8 | 0.5665 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 9 | 0.5998 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 10 | 0.6332 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 11 | 0.6665 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 12 | 0.6998 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 13 | 0.7332 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |
| 14 | 0.7665 | 0.7200 | 24.8900 | 0.5000 | 51 | 5.3407 |

⋮

```
% Energy (J) = Power (W) * Time (s)
E_total_in = sum(10*T.P_in_W);
E_total_out = sum(10*T.P_out_W);
```

```

eta_total = E_total_out/E_total_in;
fprintf('Total Energy In: %0d W\n',round(E_total_in)); fprintf('Total Energy Out: %0d W\n',round(E_total_out)); fprintf('Total Efficiency: %.2f%%',100*eta_total)

```

```

Total Energy In: 940771 W
Total Energy Out: 91890 W
Total Efficiency: 9.77%

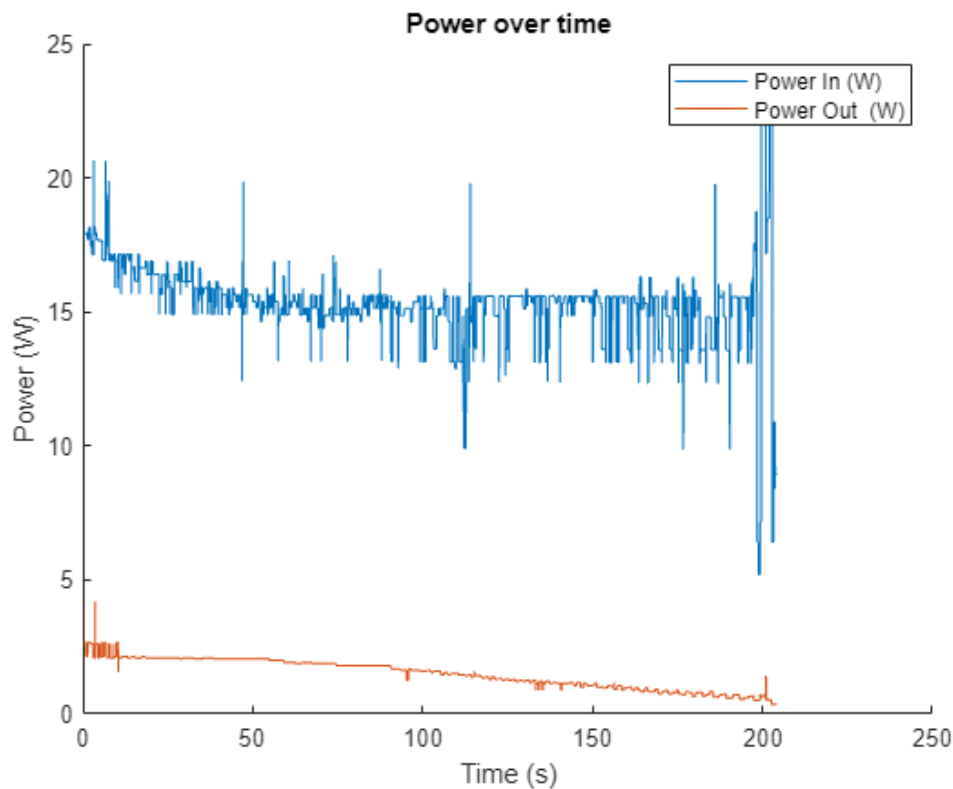
```

Plots

```

figure
hold on
plot(T.("Time (s)"), T.P_in_W, DisplayName = "Power In (W)")
plot(T.("Time (s)"), T.P_out_W, DisplayName = "Power Out (W)")
title('Power over time')
xlabel('Time (s)')
ylabel('Power (W)')
legend

```



```

figure
plot(T.("Time (s)"), T.eta, DisplayName="Efficiency")
title('Efficiency over Time')
xlabel('Time (s)')
ylabel('Efficiency')
legend

```

