

September 20, 2022

# NavCad<sup>®</sup> Electric Motor Features: FAQ

## About NavCad's electric drive motor features for Propulsion simulation

### Q: What can NavCad tell me about performance of a vessel driven by an electric motor?

A: NavCad is a tool for hydrodynamic and propulsion system simulation. It is built around the *Vessel-Propulsor-Drive* system, and NavCad now supports DC and AC electric motors as a *Drive* option. For all *Drive* types, NavCad predicts the mechanical shaft power for the simulation objectives and components. However, whereas NavCad predicts fuel rate for IC engines, it predicts electrical power, current draw, and motor-specific efficiencies with an electric motor – all of which can be used for battery budget or range predictions.

SPEED COEFS			PRIME MOVER			ELEC DEMAND PER MOTOR		
SPEED [kt]	FV	FNB	RPM [RPM]	PMECH [kW]	LOADPCT [% max]	PELEC [kW]	CURRENT [A]	EFFMTR
5.00	0.687	0.591	998.1	9.7	17.3	11.5	32.6	0.841
10.00	1.374	1.181	1402	21.1	37.8	24.1	68.2	0.875
15.00	2.061	1.772	1733	34.2	61.3	38.3	108.5	0.893
16.00	2.198	1.890	1792	36.6	65.6	40.9	115.9	0.894
17.00	2.335	2.008	1852	39.1	70.0	43.6	123.6	0.895
18.00	2.473	2.126	1914	41.7	74.7	46.5	131.7	0.896
20.00	2.748	2.363	2041	47.4	85.0	52.8	149.6	0.898
22.00	3.022	2.599	2175	54.2	97.2	60.2	170.5	0.900
24.00	3.297	2.835	2315	62.3	111.7	69.1	195.8	0.901
25.00	3.434	2.953	2387	66.9	120.0	74.2	210.2	0.902

### Q: What types of electric motors are currently supported in NavCad?

A: NavCad natively supports DC motors and three-phase AC motors of induction type (NEMA AB) or permanent magnet type (PMAC).

### Q: Why are electric drives handled differently than internal combustion (IC) engines?

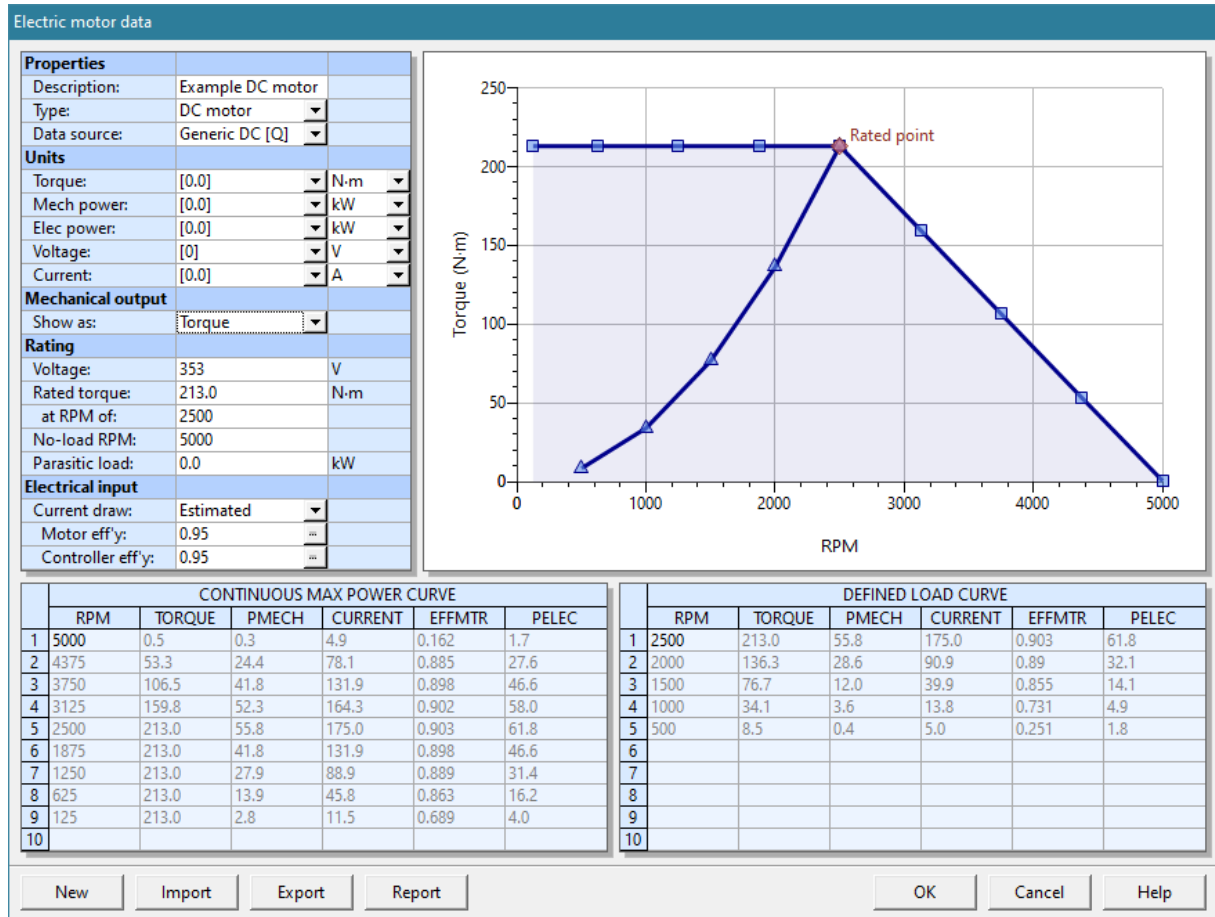
A: Aside from the obvious differences in their “fuel”, electric motors have torque and power curves significantly different from those of IC engines. Further, the way electric motor and IC engine performance data is communicated is also typically very different, and NavCad provides data forms that are specific to the way motor curves are presented. It also provides “generic” models and estimates for things like torque curve shapes and partial load efficiency for popular model types (such as the “constant torque, constant power” type that employs phase advance or field weakening).

### Q: How does the use of an electric motor drive affect propulsor design?

A: While the use of an electric motor drive doesn't directly impact propeller design, proper consideration should be taken in the selection of the design point, to ensure that the unique properties of electric motors are being used to an advantage.

**Q: How much data do I need to define an electric motor in NavCad?**

A: Very little, in fact! While a full set of motor data can be explicitly defined, NavCad also provides “generic” data builders for popular models (PMSM, PMAC, NEMA AB). These help to define torque and power curves plus their motor-specific efficiencies based on a few data items: generic type, voltage, rated torque/power and RPM, no-load RPM, and appropriate peak efficiencies. NavCad handles everything else!



**Q: How can NavCad be used to aid in retrofitting an existing vessel with an electric motor?**

A: NavCad can be used for several essential calculations when retrofitting a vessel with an electric motor, including prediction of resistance for a new displacement, propeller sizing for a new design point, and calculation of motor load and current demand.

**Watch the video**



[bit.ly/3S57VLh](https://bit.ly/3S57VLh)

**For more information, please contact:**

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