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| hovedlogo_eng  **Department of**  **Electric Power Engineering**  Group: Power Technology  Address: 7491 Trondhiem  Phone: 73 59 42 10  Fax: 73 59 42 79 | **TET4120**  **Electric Drives**  **Spring 2018** | | |
| **Project** | **Issue Date:**  26.02.2018 | **Submission Date:**  20.04.2018 |
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**Electric Go-cart**

The company WILD CHASE Ltd. wishes to develop a motor drive for a go-cart and have given you the task to design this drive. They have decided to use a DC motor due to its simpler control.

You are given the following tasks:

* Choose a suitable DC motor in accordance with the given requirements
* Model the motor’s load in Simulink
* Calculate the gear transmission ratio
* Dimension the power electronic converter (battery voltage of 12 or 24 V)
* Design a control system for the motor drive
* Design a control system to manage start, operation, stop, braking, errors etc.
* Simulate the dynamicsystem in Simulink

*Specification of requirements for the go-cart:*

* Shall be able to climb a slope of 20° at a speed of 30 km/h
* Max. speed on level surface and no wind: 40 km/h
* No specific requirements for acceleration
* Total frontal area 2.0 m2
* Go-cart weight (without driver): 100 kg
* Driver weight: 100 kg
* Fixed gear ratio
* Wheel diameter: 25 cm

*Specifications for the load model:*

The motor’s load is the wind resistance and the rolling resistance acting on the go-cart. In addition, the motor inertia and the slope of the hill must be included in the load model. The slope of the hill is in the range of -20º (downhill) and +20º (uphill). The load model should therefore have an input for the electric torque of the motor (in Nm) and the slope of the road (in degrees). Output of the load model should be the speed in revolutions per minute in addition to other parameters you regard as relevant.

* Rolling resistance coefficient: r = 0.01
* Wind resistance coefficient: cw = 0.2
* Air density:  = 1.2 kg/m3
* Gear moment of inertia referred to motor shaft: Jgear = 0.1 kgm2

Electrical motors can be found on ABB’s web pages:

<http://www.abb.com/>

Click: *Products and systems → Products → Motors and generators*

Diods, MOSFETs og IGBTs can be found on these pages:

<http://www.infineon.com/>

<http://www.semikron.com/>

Capacitors can be found on this page:

<http://www.evox-rifa.com/>