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| **The original version of this electric machine dimensioning Matlab tool is developed in VTT’s previous projects before the SIMPRO project and is thus background material for the SIMPRO project. For further use of the tool outside the SIMPRO project, please, contact Aino Manninen (**[**aino.manninen@vtt.fi**](mailto:aino.manninen@vtt.fi)**) or Kari Tammi (**[**kari.tammi@vtt.fi**](mailto:kari.tammi@vtt.fi)**).** |

# Multiobjective design algorithm for surface mounted permanent magnet synchronous generators

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Notes on the electric machine dimensioning Matlab tool:

* The tool takes 14 input parameters and defines the geometric dimensions, winding dimensions, and performance of a permanent magnet synchronous generator
* Inputs:
  + pole pair number p: [20 … 80]
  + desired linear current density A\_a (A/m): [35000 … 65000]
  + desired current density J (A/m^2): [2000000 … 6000000]
  + air-gap (m): [0.001 … 0.05]
  + rotor outer diameter/stack length : [0.8 … 5]
  + relative magnet width : [0.6 … 0.95]
  + tangential stress (): [21000 … 48000]
  + Rotor yoke flux density (T): [1.3 … 1.6]
  + number of slots per pole per phase : [1 … 3]
  + relative stator outer diameter : [0.8 … 0.99]
  + relative slot opening : [0.25 … 0.75]
  + relative slot width 2 : [0.75 … 0.95]
  + relative slot height 1 : [0.01 … 0.1]
  + relative slot height 2 : [0.01 … 0.1]
* Outputs:
  + 1: Pout, output power, target value 3MW
  + 2: torque\_density, torque density, should be maximised
  + 3: mass, should be minimised
  + 4: efficiency, should be maximised
  + 5: cos\_phi, power factor, should be maximised
  + 6: cost, should be minimised
* Constraints:
  + 1: , should be > 0
  + 2: , should be ≥ 1
  + 3: temperature of permanent magnets (°C), should be < 100
* An example of how to run the code is in the file example.m