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Synchronous Machine Design Software

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Abstract : *The Synchronous machine are which are used to convert mechanical power to ac electrical power. Synchronous generators are the most important source of electrical energy that we consume today. The programming language used in this project is DART, It's a client-optimized language for developing fast apps on any platform. Main goal is to provide most productive language for multi-platform development, with flexible execution runtime for app framework. This project presents design of synchronous machine. Mathematical equations will be used in adjudicating the dimensions electrical parameter and satisfy specification such as rating, speed of machine, etc. as per design. Design calculation can be hectic process manually and errors may occur during some complicated calculations. This software is design in such a way that the user can enter maim specification as per requirement and the software will run the calculations in back end and provide the user with specific result.*

Keywords - *Synchronous machine, Software, DART language, Computer aided, Educational tool.*

I. Introduction

In this review paper, we are going to introduce the easiest way to calculate important parameters required for Designing Synchronous Machine. Main Focus Behind this Project is to Display electrical parameters and dimensions using DART.

Designing a Synchronous Machine is very Complicated Process and might have some error While calculating, so in this article we are presenting the idea of Software that can do this process very accurately and within very less time. While designing a basic Synchronous machine these are the parameters that need to be considered Main dimensions of the stator frame, Length of air gap, Complete details of the stator windings, Design details of the rotor and rotor winding, Design of salient pole and cylindrical pole rotor, Performance details of the machine.

II. METHODOLOGY

2.1 Working

The program is coded to calculate the size and electrical parameter of a machine. Select the type of Rotor and enter the data as per the specified design requirement, if any input is not available the user can use the standard data provided and proceed further. Hence the design parameters are calculated automatically and the values are displayed. Basic idea of this software is to give the user easy way to design a synchronous machine as per requirement.

2.2 Flowchart

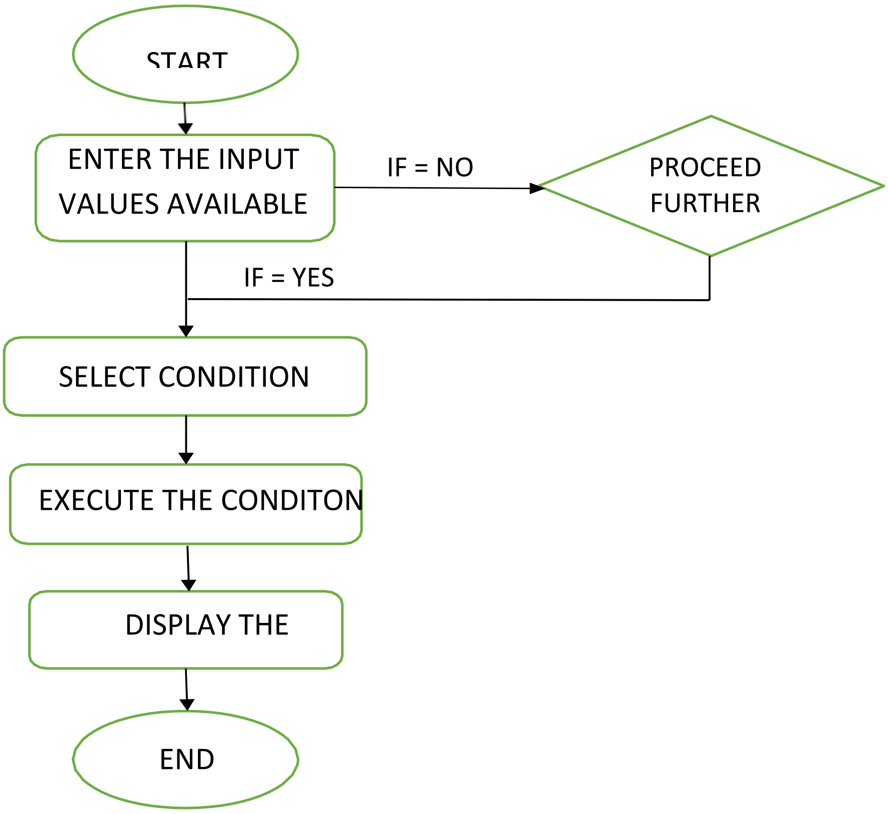

Fig. 1. Flow Chart

2.3 Design of synchronous machine

Synchronous machines designing software are used to obtain the following information:

(i) Main dimensions of the stator frame.

(ii) Design details of the rotor and rotor winding.

(iii) Complete details of the stator windings.

III. TABLE

Table 1. Synchronous Machine Parameter

Main Dimension	
Output Equation	Q = (11 Bav q Kw x 10^{-3}) D^2L ns
D & L	D^2L = Q/ Cons
Peripheral Velocity	V= πDn_s
Stator Winding Design	
Flux Per Phase	Φ = Bav x πDL/p
Turn Per Phase	Tph = E_{ph} / 4.44 f ΦKw
Current Per Slot	I_{ph} = KVA * 10^3/3*E_{ph}

Stator Slot Design	
Stator Slot Pitch	$Y_s = \pi D$/Numer of stator slots
Width of slot	$b_s(\max) = Y_s - b_t(\min)$
Tooth width	$b_t = \frac{\phi}{(\psi * s/p * Li * 1.8)}$
Rotor Design	**1.SALIENT POLE ROTOR DESIGN**
Sectional Area	$A_P = \phi_P/B_P$ m^2
No load field MMF	$AT_{fo} = SCR\times (2.7\times I_{ph} \times T_{ph} \times Kw)/P$
Height of field winding	$H_f = AT_{fl} / (10^4 \sqrt{(S_f \times d_f \times q_f)})$
Radial length of Pole	$h_{pl} = h_f + h_l + 0.02$ m
	Design of Field Winding
Length of Mean Turn	$L_{mtf} = 2L_m + \pi(b_p+0.01+d_f)$
Voltage Across each field coil	$E_f = [(0.8 \text{ to } 0.85)\ V_e] / P$
Area Of Field Conductor	$a_f = AT_{fl} \times (\varrho\times L_{mtf})/ E_f$
Field Current	$I_f=\delta_f\times a_f$
No of Field Turns	$T_f= AT_{fl} / I_f$
Resistance of Field Winding	$R_f = (\varrho \times L_{mtf} \times T_f) / a_f$
Temperature Rise in Field Winding	$Q= (Q_f \times C_f)/S$
	2. Design of Cylindrical Rotor
Full Load Field MMF	$AT_{fl}=2\times AT_a$
Voltage Across Each Field Coil	$E_f=(0.8 \text{ to } 0.85)V_e/P$
Length of Mean Turn of Filed Winding	$L_{mtf}=2L+2.3\tau+0.24$
Cross Section Area of Field Coil	$a_f= AT_{fl}\times(\varrho\times L_{mtf})/ E_f$
Total no of Field Conductor	$2\times (AT_{fl}\times P)/(\delta_f\times a_f)$
Total No of Field Conductor Per Slot	$2\times (AT_{fl}\times P)/(\delta_f\times a_f\times S_r)$

IV. RESULT

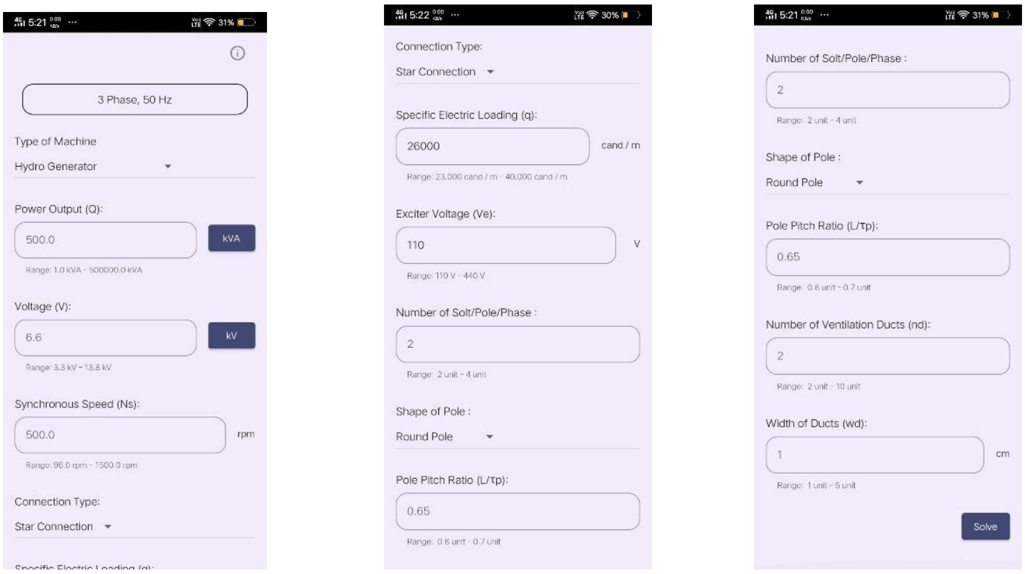

Fig. 2. Input Page

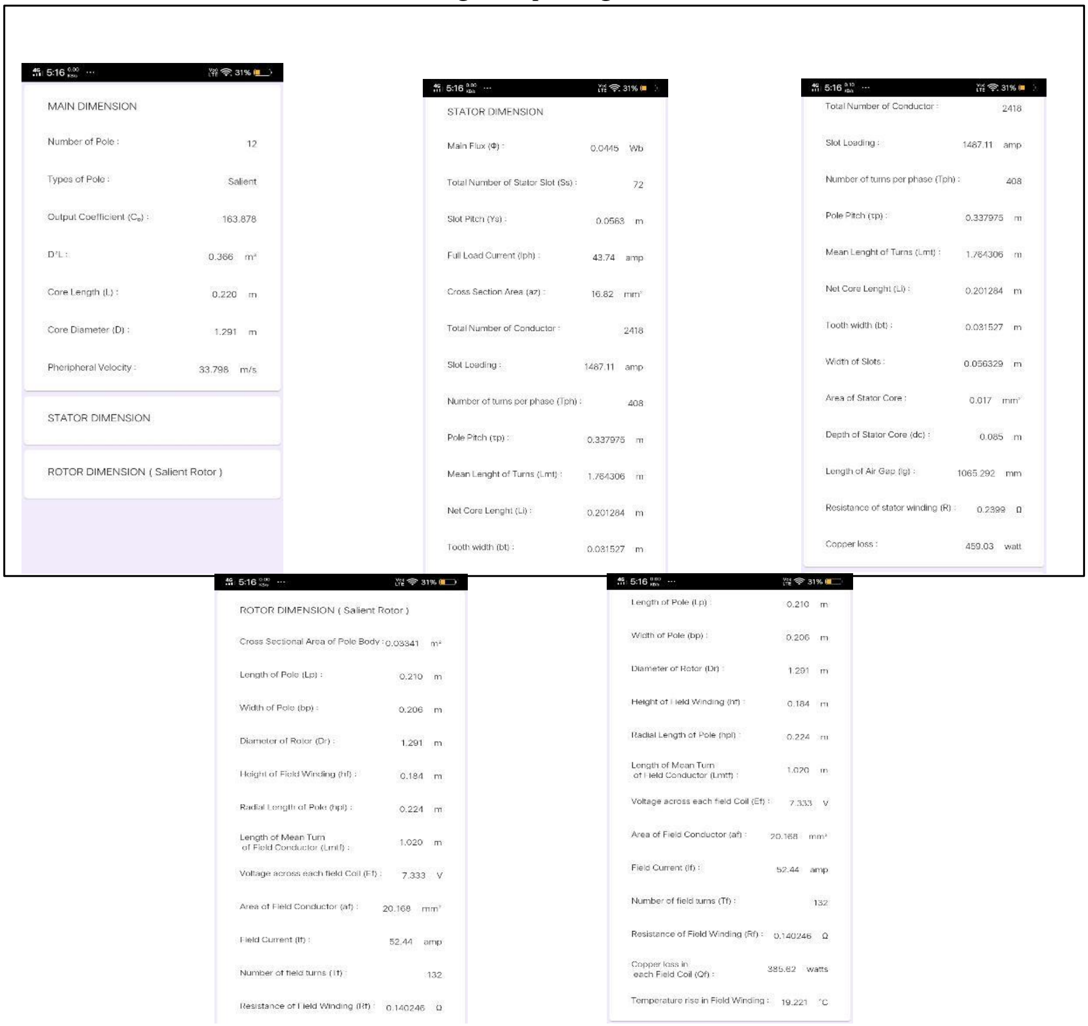

Fig. 3. Output Page

V. CONCLUSION

Hence, we have designed the project to determine the dimensions and electrical parameters of Synchronous machine efficiently. To analyse the Synchronous machine parameter coding is done in software. This Software is reliable and efficient for Designing Synchronous Machine all parameters will be calculated easily if all the necessary data is available. This method provides faster results and minimizes the errors that are likely to occur when calculated manually therefore providing us with accurate results. This will also reduce physical work and mental strains occurs while calculating required parameters. Using Designing Software will save the time. The mere purpose of the project is to use it as an educational tool.

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