

School of Informatics, Computing, and Cyber Systems

NPC Converter for Wind Turbines.

Mohamed Aldihani, Lazim Almutairi,& Abdulelah Alajlan. 2019-2020





Mohamed Aldihani,Team Leader, & Client Contact.



Abdulelah Alajlan, Treasurer.



Lazim Almutairi, Time Scheduler.

Overview:

Mohamed Aldihani

- ➢ Intro: Client and Project.
- Work breakdown structure (WBS).
- > Timeline and responsibilities of all team.
- > The Project Results.

Lazim Almutairi

Client:

Dr. Venkata Yaramasu.

Assistant Professor of Electrical Engineering School of Informatics, Computing and Cyber Systems (SICCS).



Lazim Almutairi



Fig.1 NPC Converter project by team.



Fig.2 Diagram of NPC Converter project.

NPC Converter for Wind Turbines.

Work Breakdown Structure (WBS) for Neutral Point Clamped (NPC) Converter



Timeline and Responsibilities (Mohamed Aldihani).

Timeline:

Duration	Chart	Fieldh	Desides a second	Accienced To	Feb						Mar				Apr		
Duration	Start	Finish	Predecessors	Assigned to	n 26	Feb 2	Feb 9	Feb 16	Feb 23	Mar 1	Mar 8	Mar 15	Mar 22	Mar 29	Apr 5	Apr 12	
48d	02/05/20	04/10/20	6	1.3 Experiments		<u> </u>									1.3 Experi	ments	
17.25d	02/05/20	02/28/20		1.3.1 Connections					1.3.1 Co	nnections							

Fig. 4 Timeline Mohamed Aldihani.

Timeline and Responsibilities (Mohamed Aldihani).

Responsibilities:

Connect all Devices of NPC Converter Project.

≻Protection.



Fig.3 Shaft Coupling 8mm with motor.



Fig.4 Motor With speed sensor (encoder).

Mohamed Aldihani

Video: Shaft Coupling 8mm



Timeline and Responsibilities (Lazim Almutairi).

Timeline:

Duration	Chart	Fields	Development	And and We	Feb Mar										Apr	
Duration	Start	Finish	Predecessors	Assigned to	n 26	Feb 2	Feb 9	Feb 16	Feb 23	Mar 1	Mar 8	Mar 15	Mar 22	Mar 29	Apr 5	Apr 12
48d	02/05/20	04/10/20	6	1.3 Experiments		-		-							Limper	errente:
17.25d	02/05/20	02/28/20		1.3.1 Connections					1.3.1 Co	onnections						
11.75d	02/28/20	03/16/20	12	1.3.2 With Load					1		L 1.3	3.2 With Loa	d			
7.75d	03/17/20	03/26/20	13	1.3.3 With Grid							1		1.3.3 With	Grid		

Fig.7 Timeline Lazim Almutairi.

Timeline and Responsibilities (Lazim Almutairi).

Responsibilities:

≻ Check NPC Converter with load.

≻Check NPC Converter with Grid.



Fig.5 NPC Converter with load.



Fig.6 NPC Converter with Grid.

Timeline and Responsibilities (Abdulelah Alajlan).

Timeline:

Duration	Otract	Fields	Destaura	Applement To		Feb				Mar						Apr
Duration	Start	Finish	Predecessors	Assigned to	n 26	Feb 2	Feb 9	Feb 16	Feb 23	Mar 1	Mar 8	Mar 15	Mar 22	Mar 29	Apr 5	Apr 12
48d	02/05/20	04/10/20	6	1.3 Experiments	-	-									Limpe	in the
17.25d	02/05/20	02/28/20		1.3.1 Connections					1.3.1 Co	onnections						
11.75d	02/28/20	03/16/20	12	1.3.2 With Load					-	_	1.3	.2 With Loa	d			
7.75d	03/17/20	03/26/20	13	1.3.3 With Grid								-	1.3.3 With	Grid		
7.25d	03/26/20	04/06/20	14	1.3.4 With Turbine									•	1.3.4	With Turbi	ne
4d	04/07/20	04/10/20	15	1.3.5 Data Acquisition				1						-	1.3.5 Dat	a Acquisition

Fig. 10 Timeline Abdulelah Alajlan.

Timeline and Responsibilities (Abdulelah Alajlan).

Responsibilities:

≻Parameter NPC Converter via Yaskawa A1000 Drive.

► Data acquisition.



Fig. 7. Parameter Yaskawa A1000 Drive



Fig. 8. Input Output NPC converter Data.

Abdulelah Alajlan

Video: Matlab

Image: Save Imag	K K	Run Section Run and Advance Run and RUN	
rrent Folder	💿 📝 Editor - C:\Users\kgm	88\Desktop\PMSG WECS BTB NPC\Init_Pf	MSG_3LVSC.m
Name +	Init PMSG 3LVSC.m	× +	
Simulation Results	1 84 MATLA	B Commands	
Init PMSG BLVSC.m	2 - clc, pac	k, clear all, close all, way	rning off
Model_PMSG_3LVSC.slx	3 - format 1	ong	
Parameters_PMSG_3LVSC.h	4		
Plots_PMSG_3LVSC.m	5 %% Wind	speed input	
၌ spectrum.m	6 - Pg out	= 0.8;	
] THD_Analysis_PMSG_3LVSC.m	7 - Vw_input	= (Pg_out)^(1/3):	% 0.9283 pu for 0.8 power; 1 pu for 1 pu power
Vectors_PMSG_3LVSI.h	8 - Qg_out	= sqrt(1-(Pg_out*Pg_out))) 2
vectors_PMSG_3LV5K.h	9 %Qg_out	- 07	
	10		
	11 5% Simul	ation Configuration Paramete	ers
	12 - Ts	= 50e-6;	& Control sampling time (sec)
	13 - Tsim	= 2e-6;	% Simulation sample time (sec)
	14 - TC	= Ts*2;	% Carrier frequency (Hz); change faw here
	15 %Tp	= Tc/20;	% Rate transition frequency
	16 - Fsamp	- 1/Ts;	% Control sampling frequency (Hz)
	17		
	18 %% High	Power (3000kW) Wind Turbine	Parameters (Table A.1 Turbine#2)
	19 - PMR.	= -3000e3;	% Turbine output power (W)
	20 - TMR	= -1273.3e3;	% Turbine output torque (N.m)
	21 - nMR	= 22.5;	% Turbine speed (rpm)
	22 - rgb	= 1;	% Gear ratio
	23 - VWR	= 12;	% Rated Wind Speed (m/s)
	24 - TT	= 43.3553;	% Turbine rotor radius (m) (Indigo wind turbine NORWIN 47-ASR-750kW)
	25 - vT	- 12;	% Rated Wind Speed (m/s)
	26 - Area	 pi*rT^2; 	% Area of Swept of Turbine (m=2)
	27 - Rho	= 1.225;	% Air Density (Kg/m^3)
	28 - C1	= 0.3915;	<pre>% Turbine Constant-1</pre>
	29 - C2	= 116;	<pre>% Turpine Constant-2</pre>
	30 - C3	= 0,4;	% Turbine Constant-3
	31 - 64	= 0;	% Turpine Constant=4
	32 - C5	= 5;	% Iurpine Constant-5
	33 - 66	- 21:	<pre>% lutpine Constant-6</pre>

Matlab: Output NPC Converter for Wind Turbine.



Mohamed Aldihani

Conclusion.

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