



PhD in Information Technology and Electrical Engineering

Università degli Studi di Napoli Federico II

PhD Student: Domenico Perna

XXIX Cycle

Training and Research Activities Report – First Year

I Information

1.1 Name Surname

Domenico Perna , Electrical Engineer – University of Naples “ Federico II ”

1.2 PhD Cycle and University

XXIX Cycle – ITEE University of Naples “ Federico II ”

1.3 Fellowship type

Scholarship supported by AnsaldoBreda s.p.a.

1.4 Tutor

Andrea Del Pizzo



II Study and Training activities

II.1 Courses

- From M.Sc. course - Ingegneria dei materiali : “Misure per l’Ingegneria dei Materiali”
- From M.Sc. course – Ingegneria Elettrica : “ Elettronica industriale di Potenza”
- From Ad hoc Modules – “ Europrogettazione ”

II.2 Seminar

- “State of the art in Power Converters for High Voltage DC Transmission systems”

II.3 External Course

- 15th Edition of the European Ph.D. School : Power Electronics, Electrical Machines, Energy Control & Power Systems .
- 22 total didactics hours for eleven laboratory sessions.

III Research Activity

III .1 Title

“ Electrical drives of railway vehicles equipped with energy storage systems for high energy performance ”

III .2 Study

With reference to railway transportation systems, the attention is particularly focused on energy performance and the integration of energy storage systems, taking into account vehicles equipped either Induction Motor or Permanent Magnet Synchronous Motor Drive .

III .3 Research description

Modern light railways vehicles, equipped with supercapacitors energy storage system, are able to achieve several goals, such as: energy saving , power supply optimization and catenary free operation. In detail, streetcars very often are requested to operate for some distance in catenary-free mode for two main requirements: 1) safety, for moving vehicles to a station in case of catenary line fault ; 2) conservation of old town , avoiding the presence of catenary in the historical places. The attention have been focused to finding a method for optimal sizing of supercapacitors system, given an assigned track in catenary-free operation, which we call “design to range”. An energetic model of the system has been performed and validate through a set of experimental tests executed on a real streetcar .

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IV Credits Summary

	Credits year 1									Credits year 2							Credits year 3							Total	Check	
	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6			Summary
Modules	21	0	3	9	6	6	0	21	15							0	0							0	24	30-70
Seminars	5	0	0	0	0	0	0,4	0,4	5							0	0							0	0,4	10-30
Research	34	10	7	1	4	4	9,6	39	40							0	60							0	36	80-140
	60	10	10	10	10	10	10	60	60	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	60	180

Year	Lecture/Activity	Type	Credits	Certification
1	Europrogettazione	Ad hoc module	3	x
1	Misure per l'Ingegneria dei Materiali	MS Module	9	x
1	Elettronica Industriale di Potenza	MS Module	6	x
1	15th Edition of European PhD School	External Course	3ECTS	x
1	State of the art in Power Converters for High Voltage DC Transmission Systems	Seminar	0,4	x

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