Control of Electrical Drives

or

Power Electronic Control

Industrial Electrical Engineering and Automation
Lund University, Sweden

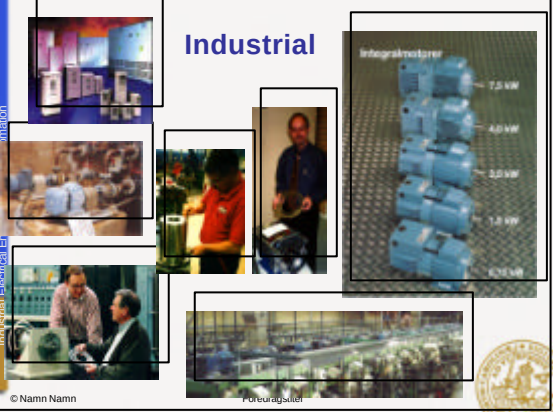
Why Power Electronic Control?

- Fast dynamics
- Low losses
- High accuracy
- Long life time
- Low cost
- Strong potential for development

Application areas

- Industrial
- Domestic
- IT
- Power System
- Automotive
- Traction
- ...

Industrial



Domestic

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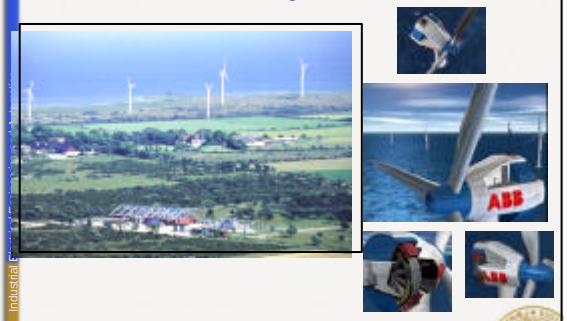
Power System



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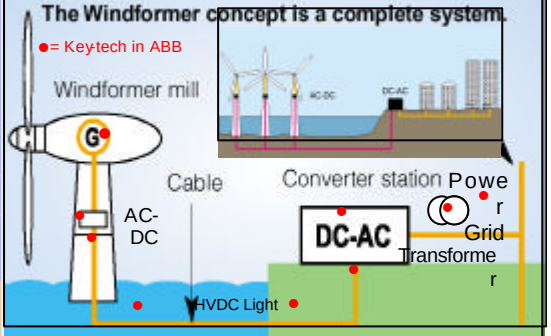
The Windformer concept is a complete system.

●= Key-tech in ABB



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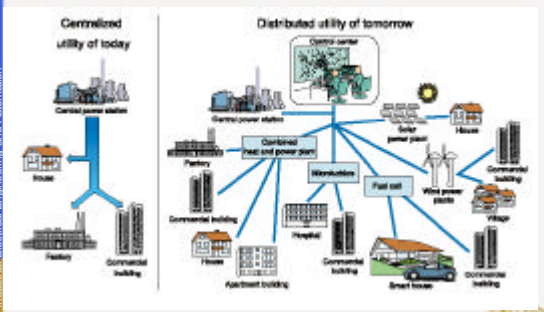
Power System



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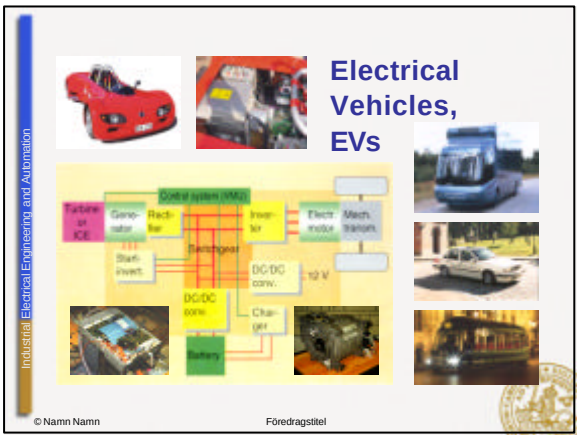
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Electrical Vehicles, EVs
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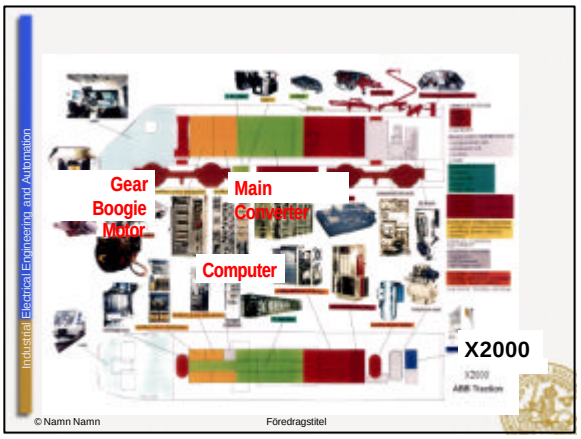
Industrial Electrical Engineering and Automation
Gear
Boogie
Motor
Main
Converter
Computer
X2000
© Namn Namn
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Common for all ...
• ... Power Electronic Control!
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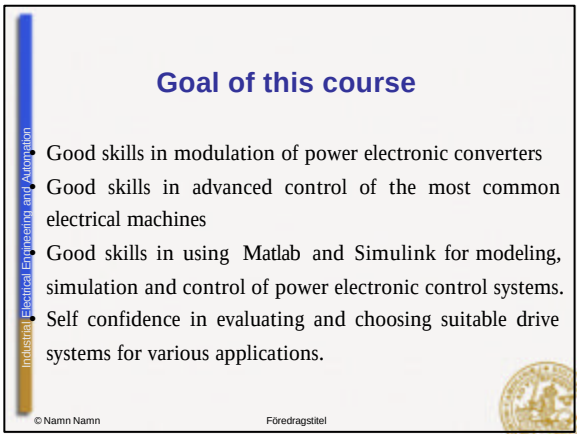
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Goal of this course
• Good skills in modulation of power electronic converters
• Good skills in advanced control of the most common electrical machines
• Good skills in using Matlab and Simulink for modeling, simulation and control of power electronic control systems.
• Self confidence in evaluating and choosing suitable drive systems for various applications.
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Contents

- Position and Speed Control
- Modulation methods
- Current control of generic load with both DC and AC drives
- Advanced control of DC and AC machines

Structure

- 14 lectures
- 18 execise support sessions
- 3 home assignments
  - Includes hand calculus and simulation work
  - A written report expected – you will get feed back.
- 3 laboratory exercises
  - Follow up on the home assignments. Individula real time software development.

Requirements

There are 2 ways to pass the course:

1. All laboratory tasks done + assignment reports passed + a written exam. In this way it is possible to get the highest grade 5, based on the result of the written exam.
2. All laboratory tasks done + assignment reports passed. In this way grade 3 will be given. For a higher grade the written exam must be taken.

Plan

Calender week	Study period	Study week	Lecture	Assigments	Lab
44	2	1	L+L1, L2	A1 out	
45	2	2	L3, L4	A1 in	
46	2	3	L5, L6	A2 out	L1
47	2	4	L7, L8	A2 in *)	
48	2	5	L9, L10	A3 out	L2
49	2	6	L11, L12	A3 in	
50	2	7	L13, L14		L3

*) A2 can be handed in on Monday evening in week 47

Week schedule

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Laboratory exercises

L1: Speed Control with a DC machine and a 4-quadrant DC converter.

L2: Control of active and reactive power with a grid connected 3-phase converter with vector methods.

L3: Control of torque and flux in a PM Synchronous Machine with vector methods.

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Home assignments

- **Extended preparation of the lab sessions.**

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