

# CASPOC

Multilevel Modeling and Simulation  
*for the Future!*

# Frontiers of Design

When your company faces the challenges of  
modern Power Electronics design:

*Don't avoid them,  
but beat them with Caspoc*

# CASPOC Multilevel

With CASPOC Multilevel we have redefined  
Modeling and Simulation for Power  
Electronics and Drives

*By combining Power Electronics, Electrical  
Machines, Control and Drives into one  
single user interface*

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# Single level

Spice is only Circuit simulation

- ◆ Good for electronics (like Mosfet Gate drivers)
- ◆ Too slow for larger three-phase systems
- ◆ Convergence problems without snubbers

Simulink is only block diagram

- ◆ Good for control
- ◆ Simulink/Simpower blockset is not satisfactory
  - ◆ Drawing the circuit is very confusing
  - ◆ Each component has internal snubbers

# Caspoc is there for you

Easy-to-use interfaces,  
Flexible model setup,  
Ready-to-use components and samples

*While working on extending Caspoc, we  
keep our customers in mind!*

# Ease your Product Design

CASPOC Multilevel combines the power and versatility required to challenge sophisticated design problems

*Not only for Power Electronics, but for any electrical energy conversion system!*

# Emerging Technologies

Power Electronics does not stand on itself

*It is found in High performance drives,  
Renewable green energy, Home  
appliances, Hybrid cars, Power  
transmission, and many more*

# Multilevel Simulation

Emerging energy conversion systems  
consist of many technologies

*Therefore we have to face the multilevel  
simulation of complete systems*

# Future challenges

How do you make the future work for you?

*by staying one step ahead!*

# Minimizing time to solution

Reduce the complexity of your designs and  
thereby increase the engineering efficiency

*Using efficient Caspoc models speeds up the  
simulation*

# Multilevel is the key solution

CASPOC Multilevel allows you to couple the various techniques into one schematic,

*but is based on various modeling techniques*

Electric Circuit, Block Diagram, Modeling Language,  
Mechanic 1D-MBS, C/C++, State Space, Cscript, Functions,  
Space Vectors, DAE, MNA.....

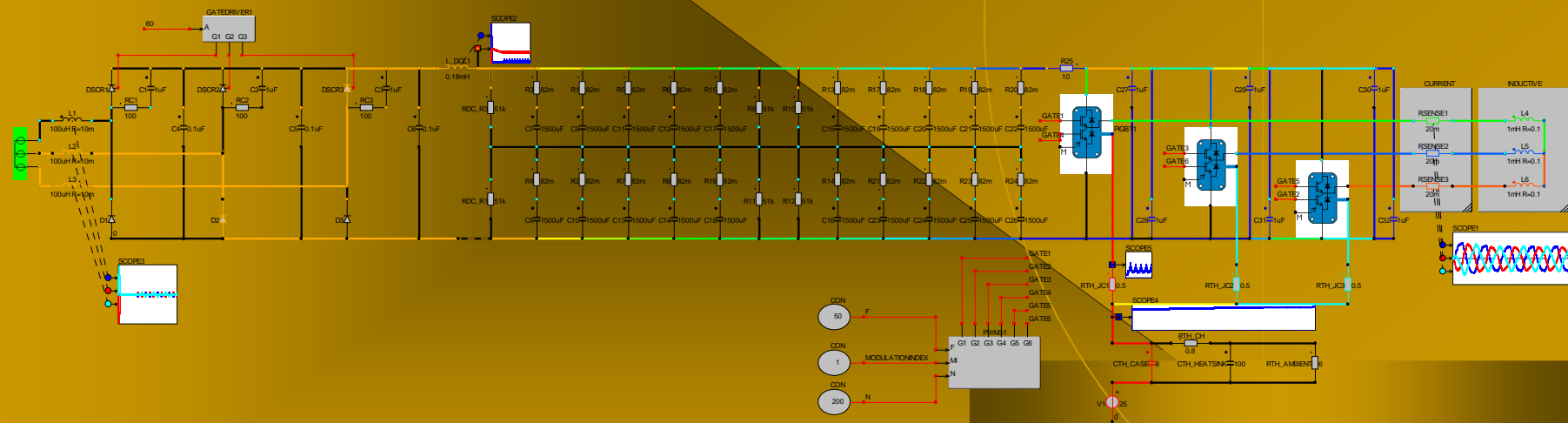
# All in one package

Can your software  
do all this in one  
package?

*Decide for yourself!*

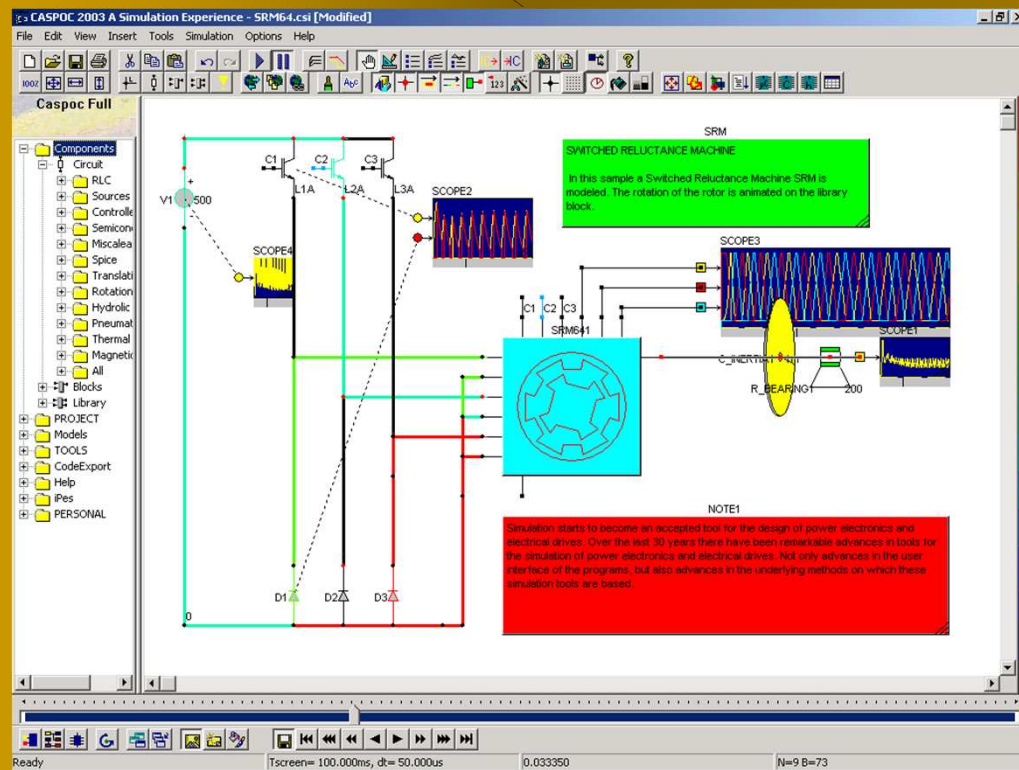
# Complete Drive System

## Losses and Thermal from the start up



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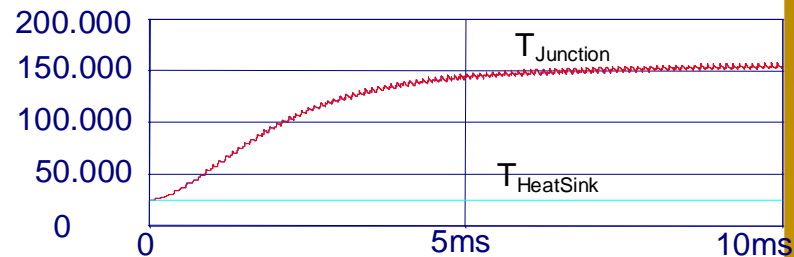
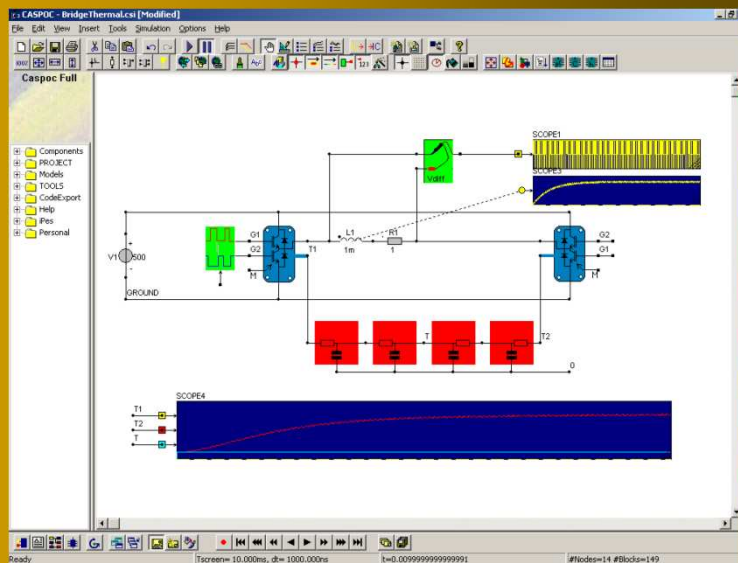
# Animation and Replay



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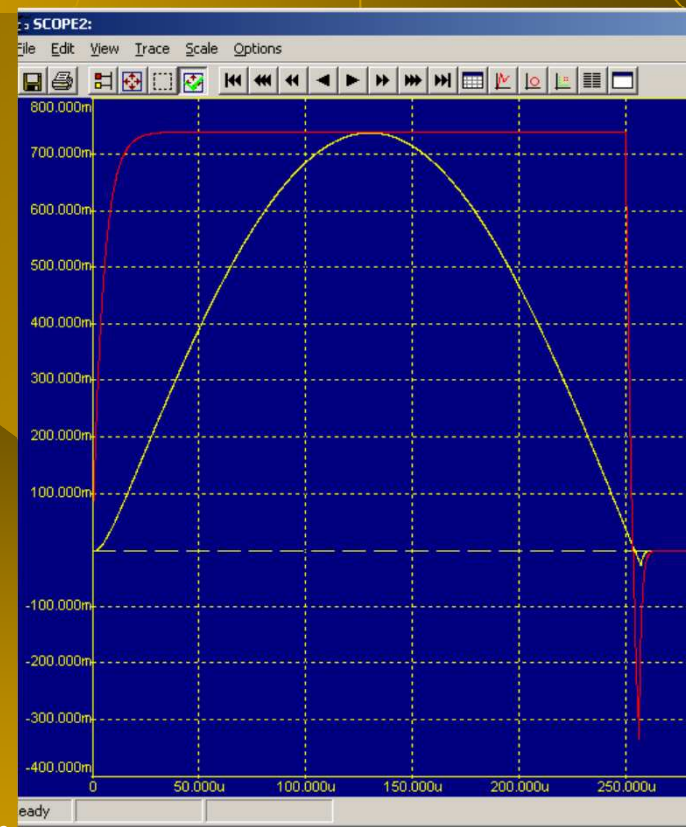
# Losses and Thermal

## Temperature dependent semiconductor models



# Accurate Reverse Recovery

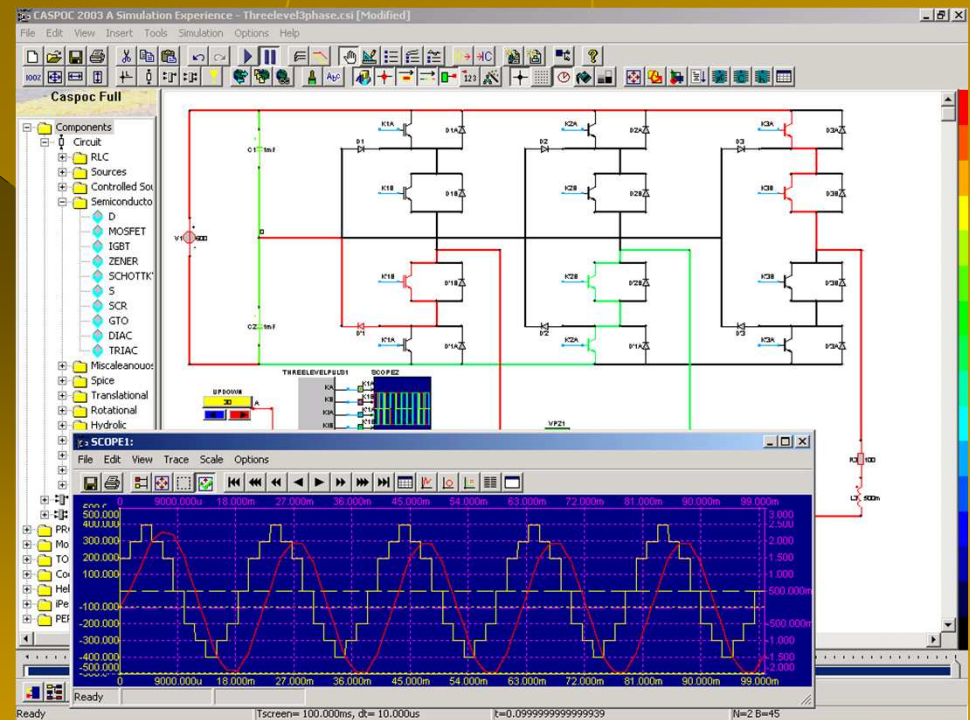
Parameterized  
directly from the  
measurements,  
data sheet or spice



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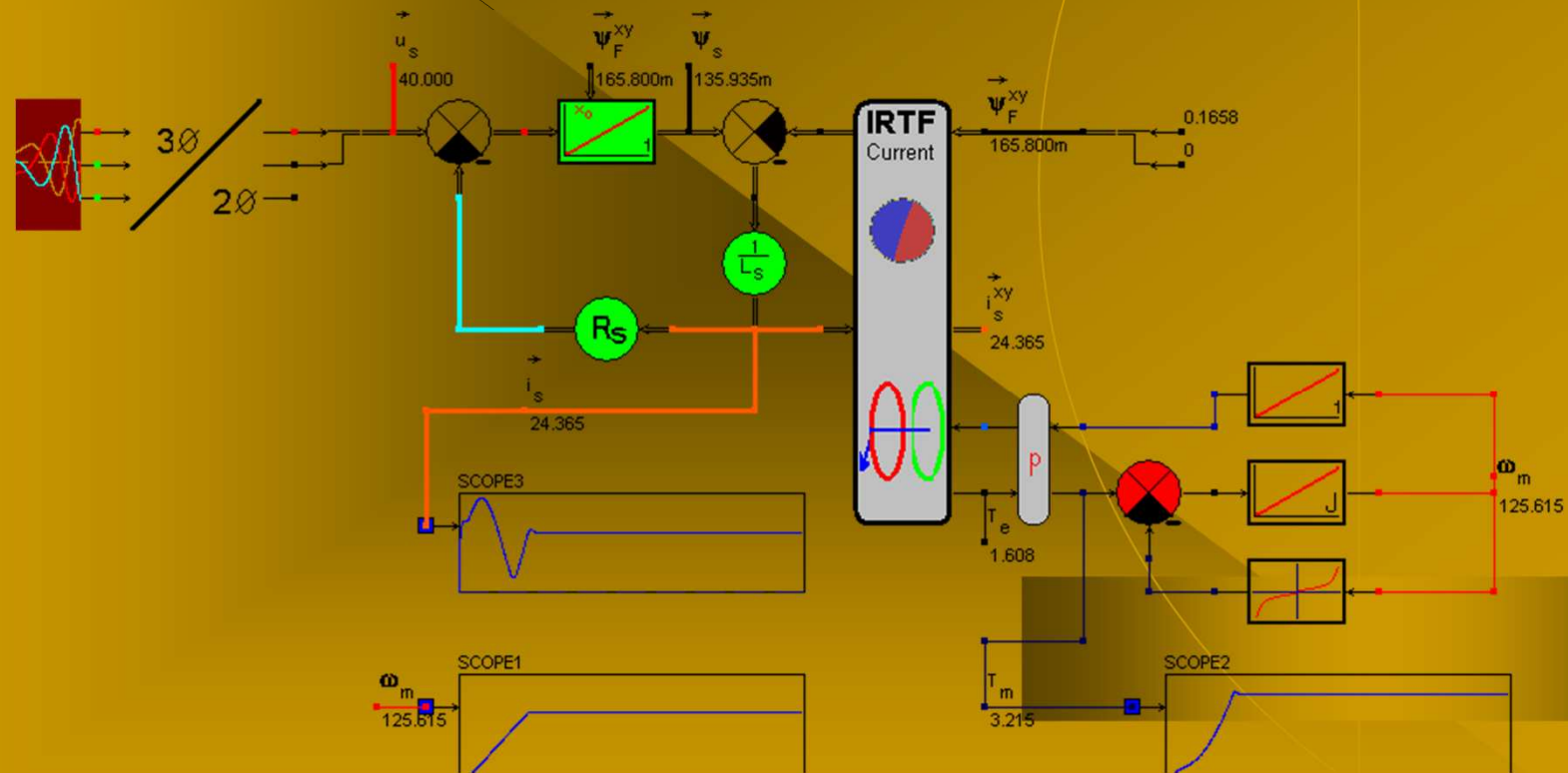
# Complex Power circuits

Three Level  
Inverter with  
digital control



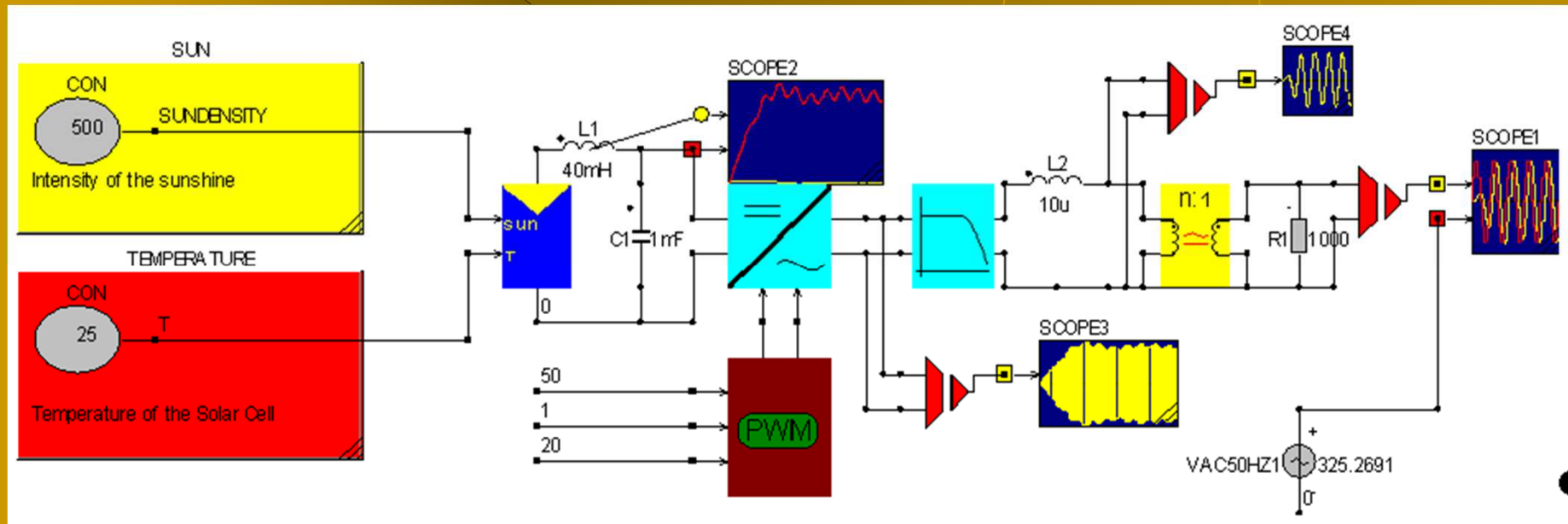
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# Sensorless Control

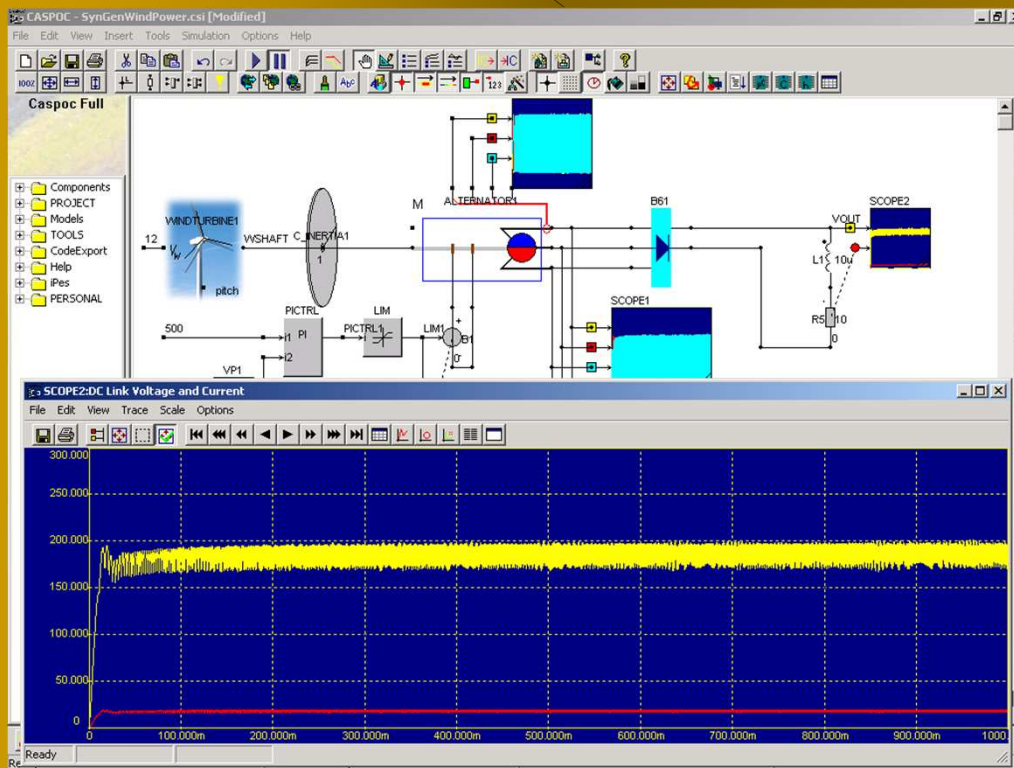


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# Solar power

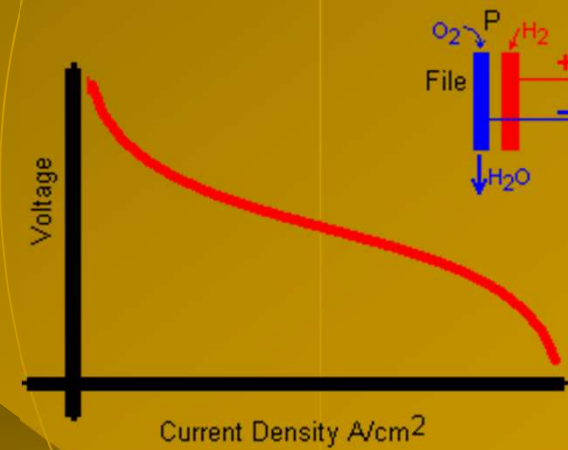
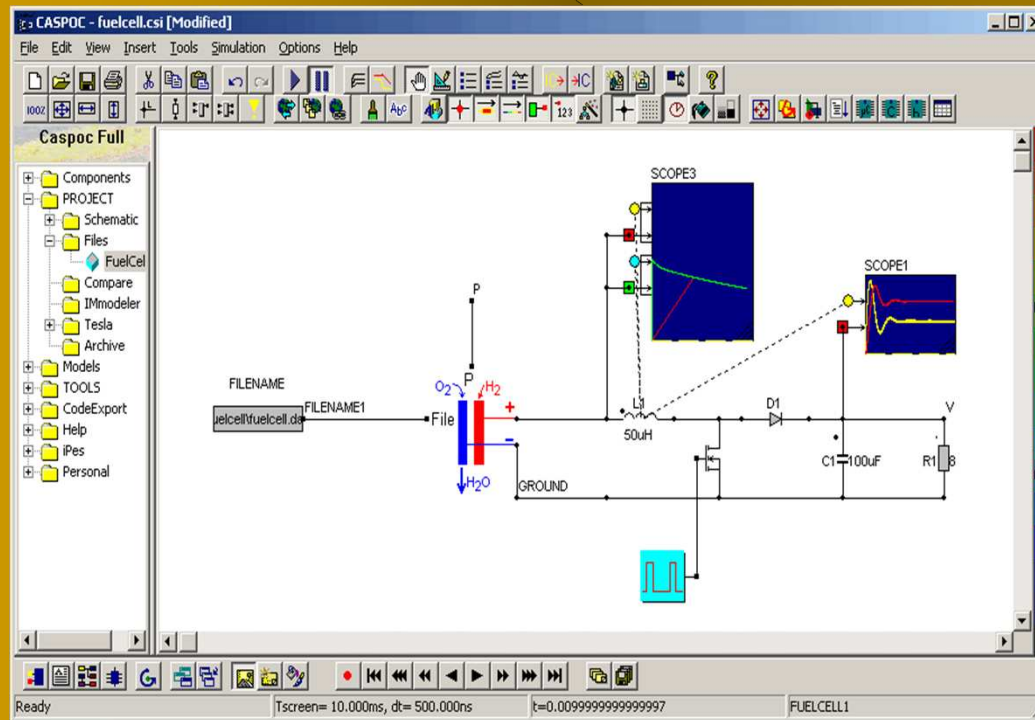


# Wind power



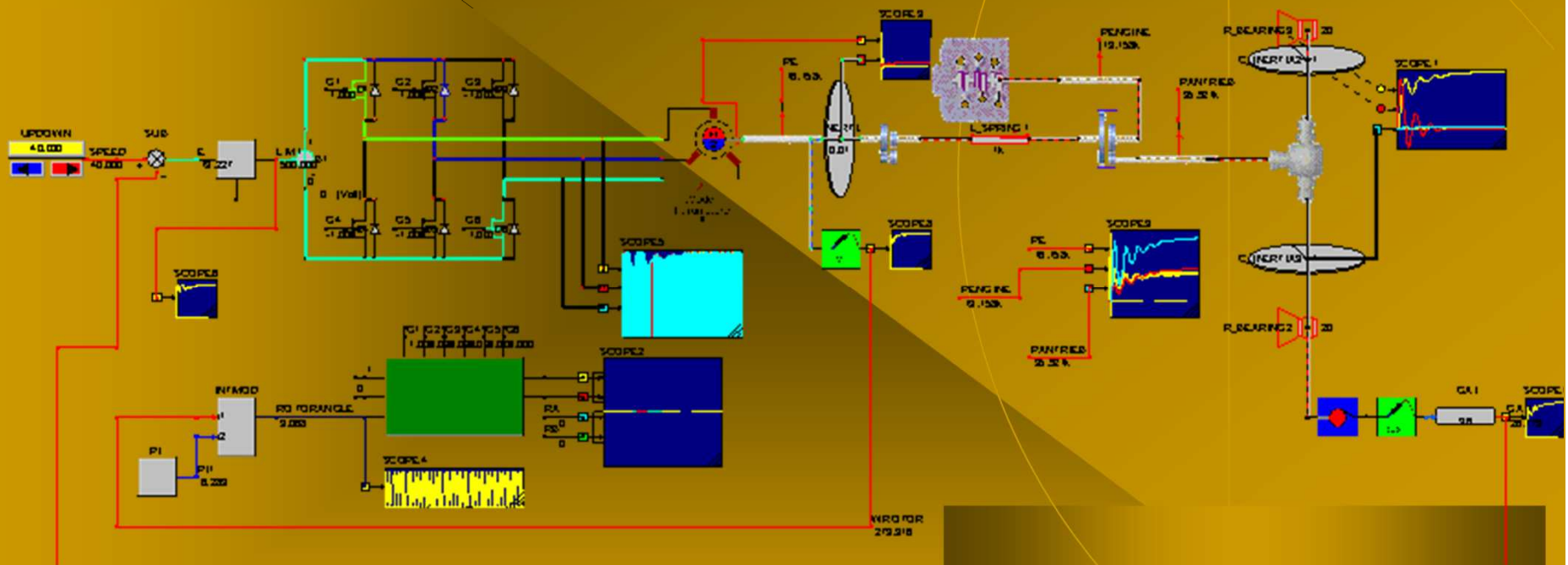
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# Fuel Cell



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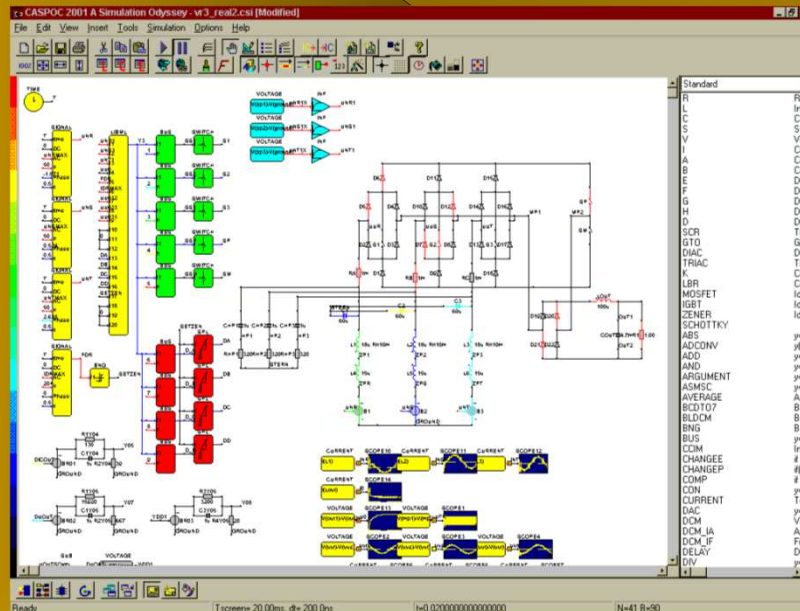
# Hybrid cars



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# Application Examples

## Three phase Power Factor Controller



Developed by TUWIEN - A, IXYS - USA  
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IXYS Module



Vienna Rectifier  
3ph + PFC

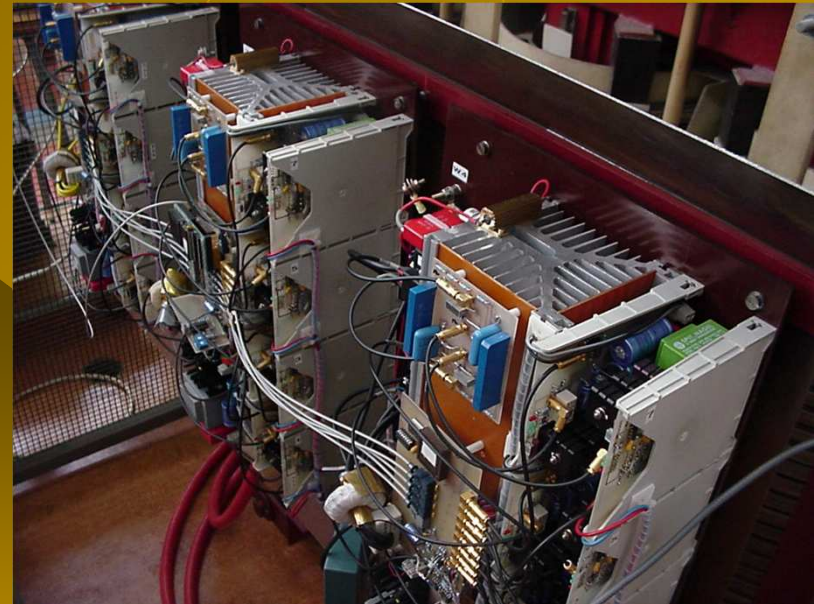
# Application Examples

Three Phase Power Factor  
Controller in 10kV Power System  
Electronic transformer TAP-  
Changer

Developed by:

TUDELFT - NL

KEMA - NL



# Application Examples

## MRI Scanner Very High Current Rise

Developed by:

Philips - NL



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# Application Examples

- ◆ Other application areas(1):
  - ◆ Domestic appliances - Philips - NL
  - ◆ Washing machines - Miele - D
  - ◆ Hybrid cars - BMW - D
  - ◆ Satellite Power converters - Austrian Aerospace - A
  - ◆ Military Tank-firing guidance - Dutch Army - NL
  - ◆ Military aircraft Generator system - AirForce - CZ
  - ◆ Traction (Trains / Trams) -Ganz - H
  - ◆ Power Network stabilization - KEMA - NL

# Application Examples

- ◆ Other applications areas(2):
  - ◆ High performance Injection system - BMW - D
  - ◆ Electronic Ballast - Philips - NL
  - ◆ Roller coaster - GTI - NL
  - ◆ Welding equipment. - Heuser - D
  - ◆ EI. Drives - ABB - FIN
  - ◆ Power Converters - Traxis - USA
  - ◆ Positioning systems - Trimerics - D

# Application Examples

- ◆ Other applications areas(3):
  - ◆ Conversion to High speed trains - Dutch railways - NL
  - ◆ Telecom power converters- Bartonics -USA
  - ◆ Automotive - Trimirics - D
  - ◆ Optical Particle research - Synchrotrone - I
  - ◆ Moscow Metro Trains - Spectremont - R
  - ◆ Food conservation - TNO -NL
  - ◆ DCDC Converters - Comaintel - USA

# CASPOC

New development challenges require  
an open mind,

*You also need a tool that supports it!*