Welcome to the re-launch of the Cutting Edge newsletter. This issue is devoted to describing the many new features available in the September 2005 Saber release. Future issues of the Cutting Edge will be dedicated to technical updates, customer success stories and FAQs.

At Synopsys, we understand the design challenges facing automotive and aerospace system designers today. The number and complexity of mechatronic systems in each design is increasing. Pressure to meet strict emissions and efficiency requirements is increasing. Quality and safety improvements are expected with each design. All of this while trying to decrease design cycle time, production cost and warranty recalls.

Saber provides the tools needed to design, analyze, and verify any system which is electrically controlled, powered or actuated. Synopsys is committed to making the Saber family of design and analysis tools the industry standard for robust design and verification of mechatronic systems.

Whether you are a longtime Saber user or a new customer, I want to thank you for your continued support of the Saber product line. I hope you will find the Cutting Edge a valuable technical resource. Watch for the next issue in January 2006.
In September, the Saber 2005.09 release will be available for download. We are very excited about the new functionality included in this latest Saber release. That functionality includes; Distributed Iterative Analysis, Monte Carlo and Vary analyses in Saber HDL, additional coverage of the VHDL-AMS language, additions to our model libraries, additions to the Saber Harness tool set and enhancements to a number of our user interfaces including a new Parts Gallery and new Hotkey functionality.

**Distributed Iterative Analysis**
The Saber design environment now supports distributed computing with our new Distributed Iterative Analysis (DIA) for statistical and looping analyses (Monte Carlo and Vary). DIA allows these compute-intensive Saber iterative simulations to be spread across a computer network, taking advantage of idle or more powerful computer resources. DIA works by splitting up statistical and looped analyses into a series of individual simulation runs. Each run is then farmed out on a compute grid by a third party grid manager program. As simulation runs complete, results are reassembled in a common database. Results viewing and analysis is then done in the same way as regular simulation results.

**Model Libraries**
To support Saber's continuing growth as a mixed-technology design tool, a number of new models have been added to the Saber libraries. The Saber 2005.09 release includes a set of more than 25 models used in the design of engine variable valve timing systems. Also, a set of nearly 100 new sensor models is included for use in general system design. Other new mixed-technology models include an improved DC motor model, an improved lead-acid battery model, an automotive transmission model, and a set of planetary gear models.

**VHDL-AMS Support**
The Saber 2005.09 release continues our expansion of language feature coverage and simulation support for the VHDL-AMS modeling language. New supported language features include the following standard packages:

- text i/o
- std_logic_arith
- std_logic_misc
- std_logic_signed,
- std_logic_unsigned

In supporting these packages, we offer improved support for persistent libraries. The 2005.09 release also includes simulation support for statistical (Monte Carlo) and parametric looping (Vary) analyses. Both are important for the in-depth analysis of complicated systems. For more information about our VHDL-AMS support, see the article in this newsletter issue by Saber CAE Andre Jennert.

**Usability Enhancements**
Two important usability enhancements to the 2005.09 release are a new Parts Gallery user interface and hotkey functionality. The new Parts Gallery interface is a dockable window that allows browsing and searching for parts in the Saber model library (See article by Jeremy Poole, Saber CAE, in this newsletter issue). From the new Parts Gallery, placing parts in the schematic is a simple drag-and-drop operation. The new hotkey functionality includes a set of pre-defined hotkeys for common operations, as well as a new hotkey editor for customizing hotkey definitions to suit individual working styles.

**Harness Design**
Saber Harness enhancements for this release include: the Catia V5 integration, the wire harness verification package, and standalone Saber Bundle. The Catia V5 integration provides interactivity between Saber Harness and the recent major Catia release. Our new wire harness verification package couples the power of the Saber simulator with Saber Harness and a set of special models to provide the industry's first full wire harness simulation and verification package. In this release, the Saber Bundle software is now available as a standalone tool so that it can be used without consuming a Saber Harness license.

More information about all the new features and enhancements in this release can be found in the 2005.09 release notes and in the documentation provided with the Saber installation.
In today’s CAD environments, standards are becoming more and more important. Standards facilitate data exchange and reuse of intellectual property inside one company and among different companies.

In system simulation, two standard hardware description languages (HDLs) are used throughout the automotive and aerospace industries: MAST and VHDL-AMS.

MAST was originally developed for the Saber Simulator in 1986. In 2003, MAST became an open source language (see [http://www.openmast.org](http://www.openmast.org)). MAST is the de-facto standard language for model exchange with major automotive OEMs and suppliers.

VHDL-AMS was defined by the IEEE in 1999. It is an enhancement of the VHDL language widely used in digital simulation. The AMS extension adds analog and mixed-signal capabilities to the VHDL language (see [http://www.vhdl.org](http://www.vhdl.org)).

The following analog and digital model examples provide a brief insight into the VHDL-AMS language in direct comparison to the MAST language. Please see examples, Figure 1 on page 4.

With this release of Saber’s VHDL-AMS Add-On, designers have the option of combining both standard HDLs in the familiar Saber Designer environment, using the strengths of each language together in a single design. Existing designs can be enhanced with new VHDL-AMS models. New VHDL-AMS designs can make use of proven MAST models and legacy code.

The VHDL-AMS Add-On is fully integrated in the Saber design environment with full support of:

- Schematic Entry (Sketch and Frameways)
- Simulator and analyses
- Post processing using CosmosScope

For more information about the Saber VHDL-AMS Add-On, go to [http://www.synopsys.com/saber](http://www.synopsys.com/saber) and click on the Saber VHDL-AMS Product link. ❖

Support Spotlight

Author Bios

Andre Jennert joined Synopsys in 2002 as a corporate application engineer. In that capacity, he provides technical support for Saber customers in central and northern Europe. He holds a Diplom-Ingenieur degree from the University of Duisburg, Germany.

Thorsten Gerke joined Synopsys in 2002 as an application engineer and is responsible for supporting several simulation customers in Europe, mainly focusing on automotive applications. He studied mechatronics at the University of Duisburg, Germany.

Jeremy Poole joined Synopsys in 2002 as a Saber applications engineer and is responsible for customer support in North America. He holds a BSEE from Oklahoma Christian University and an MSEE from Stanford University. ❖
library IEEE;
use IEEE.electrical_systems.all;

entity resistor is
generic (res : real := 0.1);
port (terminal p, m : electrical);
end entity resistor;

architecture simple of resistor is
quantity v across i through p to m;
begin
  v == i*res;
end architecture simple;

library IEEE;
use IEEE.electrical_systems.all;

entity inductor is
generic (lnom : real);
port (terminal p, m : electrical);
end entity inductor;

architecture simple of inductor is
quantity v across i through p to m;
begin
  v == lnom * i'dot;
end architecture simple;

library ieee;
use ieee.std_logic_1164.all;

entity clock_src is
generic (ontime : time := 0.5 us;
  offtime : time := 0.5 us;
  init : std_logic := '0';
  delay : time := 0.0 us);
port (output : out std_logic := init);
end entity clock_src;

architecture simple of clock_src is
begin
  p1 : process
    variable clk_int : std_logic := init;
    begin
      wait for delay;
      clk_int := not clk_int;
      loop
        output <= clk_int;  
        if clk_int = '1' or clk_int = '0'
        then
          wait for ontime;
          clk_int := not clk_int;
        elsif clk_int = '0' or
        clk_int = '1'
        then
          wait for offtime;
          clk_int := not clk_int;
        end if;
      end loop;
    end process p1;
  end architecture simple;

MAST

template resistor p m = res
  number res = 0.1
  electrical p, m
  {  
equations
    i(p->m) += v(p,m)/res
  }
}

template inductor p m = lnom
  electrical p, m
  number lnom
  {  
    var : il;
    equations
      i(p->m) += il
      il: v(p)-v(m) = d_by_dt(lnom*il)
  }
}

template clock_src out = half_cycle,
  dutycycle
  state logic 4 out
  number half_cycle, dutycycle
  {  
    state nu wake_up
    when (dc_init) {  
      schedule_event (time, out, l4_1)
    }
    when (time_init) {  
      schedule_event (time, wake_up, 0)
    }
    when (event_on(wake_up)) {  
      schedule_event (time+half_cycle * dutycycle, out, l4_0)
      schedule_event (time+half_cycle, out, l4_1)
      schedule_event (time+half_cycle, wake_up, ~wake_up)
    }
  }

Figure 1
Analog and digital model examples
Thorsten Gerke—CAN Bus Design

To help those designing and simulating In-Vehicle Network systems, an example CAN Bus design is included as part of the 2005.09 release (see Figure 2 for schematic diagram). The schematic shows a simulation model representing a typical CAN network used in many modern vehicles to control body electronics. This particular sample includes 14 ECUs, controlling instrumentation, door modules, etc.

Simulating a CAN system such as this illustrates how all the different components of the network and components connected to the network can be expected to behave. Simulation ensures that the design implementation is correct by analyzing voltage peaks, bit settling time, etc. (sample simulation results are shown in Figure 3). Simulation also allows users to make design adjustments, for example, to controller timing settings. In this example, a report is automatically generated to indicate if the CAN network is behaving correctly.

Details of a CAN Bus structure simulated with Saber and used in a real-world application at Volkswagen can be seen on the Saber web page, http://www.synopsys.com/saber. Development and Verification of In-Vehicle Networks in a Virtual Environment (SAE 2005-01-1534) was presented by Thorsten Gerke at the 100th Anniversary SAE World Congress in April 2005.
Jeremy Poole—Parts Gallery

The 2005.09 Saber release introduces a new and improved Parts Gallery. Based on customer feedback, the updated version of Parts Gallery was created to address specific problems with the old interface. Browsing through the categories was inconvenient and the old Parts Gallery took up a relatively large amount of screen space.

Below is a set of questions and answers to provide users with a better understanding of the Parts Gallery’s new functionality.

Q. In the old Parts Gallery I had the option to perform a parametric search. Can I still do this from the new Parts Gallery?

A. Yes. To open the parametric search form, right click in a white space of the Parts Gallery to bring up the Parts Gallery menu and select Parametric Search as shown in Figure 4.

Q. I cannot find the Units Converter or Nspitos in the new Parts Gallery. How do I access these two tools?

A. Since these two tools are not related to the Parts Gallery, they have been moved to the Model Architect suite of tools. To open Nspitos, open the Model Architect window and select Tools -> Nspitos as shown in Figure 5. The Unit Converter can be opened in a similar manner.

Q. In the old Parts Gallery, I was able to see additional information about the selected part, such as the category, symbol name, template name, and the required license. I do not see this information in the new Parts Gallery. Is this information still available?

A. Yes. To view this information, click on the info button at the top of the Parts Gallery window as indicated in Figure 6 on page 7.
Q. In the new Parts Gallery, the Part Preview box is too small. Is there any way to enlarge the symbol preview box?

A. Yes. To enlarge the Part Preview box, right click in the box and select Size -> Enlarge. See Figure 7.

Q. When I added new parts to the old Parts Gallery, an XPM image had to be created in order for the part preview to work. Is this still true for the new Parts Gallery?

A. No, the new Parts Gallery in Saber Sketch does not require an XPM image in order to preview a symbol. The new Parts Gallery in Saber Sketch will automatically generate the preview image from the symbol file.

Q. I would prefer that the Parts Gallery not be docked on the left side of the screen. Is there a way to move the Parts Gallery window so that it is either floating or docked on the right side of the screen?

A. Yes. By clicking on the horizontal lines in the title bar (see Figure 8 on page 8) the Parts Gallery window can be dragged to the desired location. The Parts Gallery window can also be dragged to the right side of the screen where it will automatically dock.
Q. I used the search tab to find a part. Is there an easy way to locate where this part is located in my hierarchical category listing?

A. Yes. After searching for a part in the Search tab, select the part, right click on the part, and select Find in Hierarchy. See Figure 9.
Q. Although the new Parts Gallery has many nice features, I prefer the old Parts Gallery. Can I still use the old Parts Gallery?

A. Yes. To use the old Parts Gallery interface, a Parts Gallery preference must be changed. To open the Parts Gallery Preferences either right click in a white space of the Parts Gallery and select Preferences or select Edit -> Parts Gallery Preferences in the Saber Sketch window. In the General tab of the Preference form, uncheck the box labeled "Use latest User Interface (post 2004.12)". See Figure 10.

Figure 10

SNUG Invitation

You are cordially invited to attend SNUG Saber 2005, the North American Saber Users Group Meeting in Southfield, Michigan.

Thursday, September 22, 2005
8:30am – 4:30pm
Westin Hotel Southfield
1500 Town Center
Southfield, Michigan

The day-long program will feature presentations from users about their successful application of the Saber tools, as well as product updates from the Saber team. Lunch and refreshments will be provided. Please join us for the opportunity to share your experiences with fellow Saber users and Synopsys staff.

To register, please visit http://www.snug-universal.org/northamerica/nadetroit.htm

We look forward to seeing you there!
Coming Events—Continued

IAEC Conference in Paris (October 2-5)
Synopsys has been invited to speak at a workshop during the International Automotive Electronics Congress (IAEC) in Paris on October 5th. This conference is highly respected in Europe and brings together management from many of the top Automotive OEMs and Suppliers. Conference topics include market trends and technical development with a focus on powertrain, safety, body controls, and infotainment. Special attention will be paid to quality challenges in automotive electronics including testing, diagnostics, failure, new technology introduction, and life cycle management.

The Saber team will present during the Powertrain technical workshop track (Powertrain: From diesels to gasoline-electric hybrids to fuel cells). We will examine how Robust Design technologies will be applied to Alternative Fuel Vehicle design.

The conference is from Oct 3-5 and will be held at Sèvres Hotel in Paris. Get more information at http://www.automotive-electronics-congress.com

Elektronik 2005 Baden-Baden

12th Annual Electronic Systems for Vehicles International Conference in Baden-Baden, Germany
Synopsys will participate at one of the most influential automotive conferences in Europe, Elektronik 2005 in Baden-Baden. This year, conference emphasis will be upon achieving vehicle reliability, safety, and regulatory goals through the extended use of electronics. Specific topics include sensor safety systems, electronics in driver assistance (parking support, improved active and passive protection for vehicle occupants, braking, etc.), hybrid and start-stop systems, digital mobility, electrical system architecture, driver environment, and a special section on testing and field diagnostics.

We invite you to come by our booth at the conference and discuss how Saber can help meet the goals discussed at this important conference.

The conference is sponsored by VDI and will be held October 6-7.

Get more information at http://www.vdi.de/autoelectronics2005

Contacts

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Or call toll free 866.898.6700 in the US

Synopsys website: http://www.synopsys.com

Synopsys University Program website:
http://www.synopsys.com/partners/university

Access to web-based problem resolution support service:
http://www.SolvNET.synopsys.com

Scheduled Saber related training classes:
http://www.synopsys.com/support/suppor

If you would like to submit an FAQ or a Saber Success story for future publication, please contact Lois Meddock at loism@synopsys.com or call 503.547.6366.