edaTrend DAC07

Collected EDA essentials in industry and business

Table of Contents and Example

DAC 2007
June 4-8, 2007
San Diego, CA, USA

Imprint

„edaTrend DAC07" was published in July 2007 by edacentrum GmbH.

edacentrum GmbH
Schneiderberg 32
30167 Hannover, Germany

Editor: Ralf Popp
Authors: See page 78
Lecturer: Bill Murray
Design & Layout: Niklas Möller
Printed by Druckerei Hartmann GmbH, Germany

Thanks to all contributors to this report.

About edaTrend DAC07

The "edaTrend DAC07" report summarizes the significant topics and trends at the 44th Design Automation Conference (DAC) in San Diego, California. Because the DAC generates a huge amount of information, the "edaTrend DAC07" report focuses on the essentials – the top events, such as keynotes and panel discussions. The report was compiled by edacentrum representatives, who personally attended these sessions.

The "edaTrend DAC07" report is divided into several sections: the first section contains general information about DAC 2007; the second section discusses the panel sessions in the technical program; and the third covers some DAC Pavilion panel sessions and other interesting meetings/events surrounding DAC. Section four consists of an interview with Bob Gardner, Executive Director of the EDA Consortium. "edaTrend DAC07" concludes with a short commentary and the list of contributors.

Fig. 1: San Diego, California, place of the 44th Design Automation Conference (DAC)

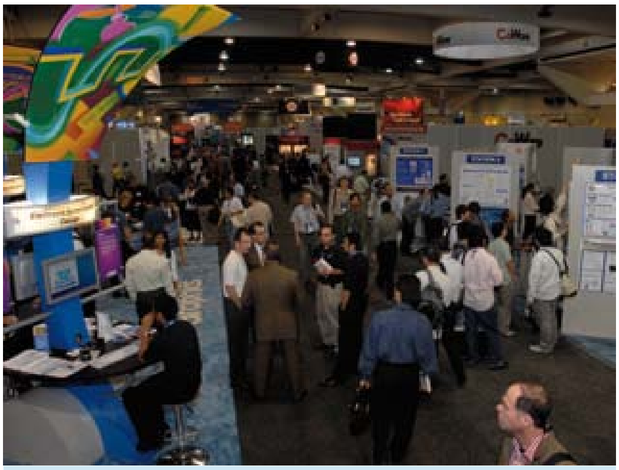
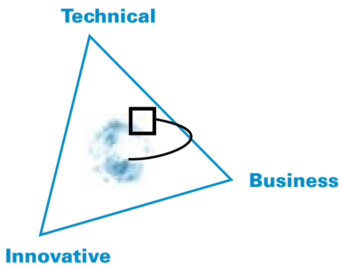


Fig. 2: The exhibition at the 44th DAC was an attraction to the EDA community

Content

Electronic Products with Mechanical Accessories



Automotive needs design automation

PANEL –
Electronics: The New Differential in the Automotive Industry –
6/6/2007 2:00 - 4:00 PM, Room 6B

Keywords: Automotive, MPSoC, green energy

Content

Modern electronics is delivering huge improvements in automobile safety, efficiency and driver experience. The ability is to conceive, design and implement electronic systems now the key competitive differentiator within the automotive industry, rather than traditional factors such as styling or manufacturing excellence?

The panel, which was designed to appeal to experts and non-experts alike, discussed the dramatic impact of future automotive electronic technologies.

The resultant challenges and opportunities presented within EDA were also highlighted.

Panelists

- W. C. Rhines, Mentor Graphics (Chair)
- A. Chien, Ricardo Strategic Consulting
- D. Goel, Formerly Ford Motor Company
- C. Hegarty, Infineon Technologies
- A. Sangiovanni-Vincentelli, UC Berkeley
- F. Winters, Delphi Electronics and Safety

A new Automotive DNA

Car suppliers are in the process of reinventing the automobile. Mechanical features of the past are now implemented in electronic systems, while new, additional electronic features are growing exponentially. Steer-by-wire, brake-by-wire, GSM, GPS, inter-car communication, on-board TV, you name it.

According to Wally Rhines, electronic content will account for 40 % of vehicle cost by 2010.

"The car will become an electronic product with mechanical accessories"
Alberto Sangiovanni-Vincentelli from the UC Berkeley

What we are currently facing is the design of complex, electronic systems-of-systems, where life-critical functionality converges with entertainment features. And this is the point where EDA technology is desperately required.

The complexity of the development task must be made more manageable. And this requires that the specification, design, verification and test of an electronic system-of-systems must be supported through a consistent design methodology and tool flow.

The electronic sub-systems of such a system-of-systems already include one or more processors and memory system(s), together with several layers of system and application software. Rhines indicated that the new BMW 7-series will incorporate about 80 electronic control units (ECU).

The integration of these sub-systems into the top-level electronic system that will control the automobile of the future is a highly sophisticated challenge. It requires a shift from the mechanical car design platform of the past to electronic platforms that support the analysis, partitioning, design and verification of multi-processor systems. The ability to execute several software layers on these systems will be a key success factor. In this context, Rhines stressed the importance of the AUTOSAR project (see background box).

But what about the business side of the coin?

Goel, speaking from the original equipment manufacturers (OEM) perspective, indicated that the major customer buy decisions are styling, entertainment, communication, and safety. Apart from styling, all other items are enabled by electronics. The value of the optional features

Overall impression

★★★★½

Lively discussion covering the whole value chain.

that the customer can order already breaks down into $ 5,000 for electronic features compared to $ 500 for mechanical ones, assuming a total car cost of $ 30k.

Hegarty stated that Infineon, a Tier 2 supplier (i.e. an IC vendor) already provides an average of 25 chips for a new car. So, assuming that the compound annual growth rate (CAGR) from 2004 to 2010 for OEMs is 2.8 %, 5.4 % for Tier 1 suppliers (i.e. the electronic system providers) and 10 % for Tier 2 suppliers (as indicated by Alberto Sangiovanni-Vincentelli), there is a huge market potential.

But also new markets do have a significant influence on business. Chien pointed out that China on the one hand will be an enormous source of growth, but on the other hand will very shortly become a new competitor. The Chinese market is thus both an opportunity and a threat.

"We are building a new automotive DNA"

Lawrence D. Burns from General Motors, in his keynote address

In addition to all of this, combustion engine construction will undergo dramatic changes: car emissions have attracted enormous political attention, and petroleum reserves are limited. 'Green Energy' is an enormous source of marketing buzz.

Therefore, car manufacturers are investing heavily in research into alternative areas such as hybrid- and fuel-cell technologies. This implies the need for even more highly sophisticated electronic sub-systems for energy generation, storage, management and control, etc.

Background: AUTOSAR

AUTOSAR is an open standards organization created to provide an open automotive architecture standard for developing vehicular software, user interfaces and management. Core members include BMW, DaimlerChrysler, Ford Motor Company, General Motors, PSA Peugeot Citroën, Volkswagen, and automotive parts suppliers Bosch, Continental and Siemens VDO.

The organization's stated goal is to achieve the modularity, scalability, transferability and re-usability of functions to provide a standardized platform for automotive systems. This will enable system-wide configuration and optimization to meet the runtime requirements of automotive devices. [1]

The challenges, however, are as huge as the market potential. We currently observe a major shift to multi-processor systems-on-chip (MPSoC) in many electronic systems. Indeed, at this year's DATE, DAC's European sister conference, the main topic was the development of heterogeneous MPSoC [2]. The software executing on these MPSoCs will increasingly become the product's sole differentiator.

This will also prove true for the Tier 1 suppliers in automotive. Very shortly, OEMs will need more electronic design and software development engineers to integrate these systems than they will have mechanical engineers to actually design the car. Consequently, car construction will change significantly.

"Correct-by-Construction instead of Test, Find & Fix"

Deepak Goel, formerly Ford Motor Campany

The V-Diagram has been state-of-the-art in automotive design for many years. It starts with the requirements definition in the upper-left, moves all the way down to the detailed component design, and moves up on the right to component test, integration of other components, and system tests, verifying that the specified requirements were met. Sangiovanni-Vincentelli suggested that this flow is no longer appropriate. System requirements such as functionality, performance, power, thermal dissipation, must be analyzed and verified in a very early phase using virtual prototypes.

It is, however, at least questionable whether the opportunities can be exploited without the collaboration of OEMs, Tier 1 and Tier 2 suppliers.

Further, automotive management has traditionally focused on mechanical design, which makes it unlikely that the requirements arising from the advance of electronics and software are clearly understood and addressed in a timely fashion, said Sangiovanni-Vincentelli.

And finally, where are the methodologies and tools to design, prototype and integrate these systems-of-systems – and who provides them? The EDA tool vendors are focused on IC design, and system level issues are still pretty much neglected. Hegarty pointed out that whoever wants to enter this market is well advised to hire design know-how across the board.

Summary

The high quality composition of the panel probably made it one of the highlights at DAC.

Representatives of almost all parties involved in car manufacturing were represented: Goel (Ford Motor Company) for the OEMs, Winters (Delphi Electronics) for the Tier 1 suppliers, Hegarty (Infineon) for the Tier 2 suppliers, Rhines (Mentor Graphics) for the EDA vendors, Chien (RSC) for industry consultants, and last, but surely not least, for research, Sangiovanni-Vincentelli (Univ. of California, Berkeley), whose groundbreaking research into electronic system level (ESL) design methodologies has been applied to a number of automotive design challenges.

Starting with the status quo, the panelists conducted a very lively discussion about the market potential for electronics in automotive and the challenges of the requisite design paradigm shift: the car, being a mechanical device today, is on the verge of becoming an electronic device with mechanical features.

The impact this has on blueprinting, virtual prototyping, and actually designing and verifying systems in automotive is enormous. The good news, however, is that the opportunities for the EDA community are correspondingly enormous.

Links

- http://www2.dac.com/data2/44th/44acceptedpapers.nsf/browse, ITEM 26
- http://www.edacentrum.de/edaTrend
- http://videos.dac.com/44th/26/panel26.asx

Sources

[1] www.wikipedia.org
[2] edaTrend DATE07, edacentrum

Author

Peter Neumann, edacentrum

About us

edaTrend authors and edacentrum

Dr. Jürgen Haase is Office Director of edacentrum e. V. since 2001, and CEO of edacentrum GmbH since 2005. Prior to this, he worked for the Institute for Network- and System Theory at the University of Stuttgart; Philips Communications Industry AG in Nürnberg; and Sican GmbH/sciworx GmbH in Hannover, on digital video communications, optical telecommunication systems, and ASIC/SoC design. He has been active in a significant number of international R&D projects, and has managed the design of numerous ASICs for customers based in Europe, the U.S. and Asia. (haase@edacentrum.de)

Dr. Cordula Hansen received her Dipl.-Inf. degree in Computer Science in 1993 from the University of Karlsruhe (TH), Germany. From 1993 to 1995, she worked for the German EDA company ISDATA, where she was responsible for the development of VHDL synthesis tools. From 1996 to 2001, she worked for the Research Center for Information Technologies (FZI) in Karlsruhe and in the Department of Computer Engineering at the University of Tübingen, where she received her Ph.D. in 1999. Her research specialties included high level synthesis and test bench generation. In 2001, Cordula joined edacentrum, where she is responsible for R&D project consulting, product development and process management. (hansen@edacentrum.de)

Peter Neumann holds a B. Eng. (Hons.) degree in Computer and Information Engineering from London South Bank University, and a Dipl. Ing. (FH) in Electronic Engineering from Fachhochschule Bremen. He has worked for more than a decade in industry in various digital design areas, including design flow, IP qualification, chip design and verification, and top-level SoC integration. He has spent the last two years in the field of configurable processors. In 2007, Peter joined edacentrum, where he is responsible for business development. (neumann@edacentrum.de)

Ralf Popp received his Dipl.-Ing. degree in Electrical Engineering in 1996 from the University of Hannover, Germany. From 1997 to 2002, he worked at the Institute of Microelectronic Systems, University of Hannover, in the computer-aided design of analog circuits. His primary specializations were the symbolic analysis, behavioral modeling and simulation of analog and mixed-signal circuits, a field in which he is currently writing his Ph.D. thesis. In 2002, Ralf joined edacentrum, where he is responsible for technical analyses, public relations and marketing. (popp@edacentrum.de)

Susanne Sass received her Dipl.-Ing. in Electrical Engineering with a specialization in technical computer science/computer engineering in 2006, from the University of Hannover, Germany. Her diploma thesis focussed on developing a hardware/software environment to analyze the status of a real-time operating system. In 2007, Susanne joined edacentrum, where she is responsible for comprehensive tasks in project management. (sass@edacentrum.de)

Dr. Dieter Treytnar received his Ph.D. in Electrical Engineering in 2005 from the University of Hannover, Germany. His thesis was entitled „The influence of parasitic effects in nanometer interconnect systems on the digital test pattern quality". From 1997 to 2002, he worked at the Institute of Electromagnetic Theory and Microwave Technique, University of Hannover, on the problems of signal integrity and test of deep submicron design arising from the interconnect between cores. In 2002, Dieter joined edacentrum, where he is working in public relations and marketing and is responsible for the management of EDA research projects. (treytnar@edacentrum.de)

Dr. Andreas Vörg received his Dipl.-Ing. in Electrical Engineering with a specialization in technical information processing in 2000, from the University of Karlsruhe, Germany. He received his Ph.D. in Computer Science in 2005 from the University of Tübingen, Germany. Since 2000, his primary field of interest has been the automated qualification and delivery of reusable intellectual property (IP) components. In 2005, Andreas joined edacentrum, where he is responsible for EDA consulting services and the management of EDA research projects. (voerg@edacentrum.de)

Bill Murray received his B.Sc (Hons.) degree in Applied Physics from Sussex University, UK, in 1971, and his M.Sc. in Applied Solid State Physics from Brighton Polytechnic, UK, in 1972. He has held diverse engineering, technical marketing and business positions spanning the British Post Office (Telecom), the British Scientific Civil Service, Cadence, Texas Instruments, and VLSI Technology, in Germany, the U.K. and the U.S. Based in Santa Clara, California, Bill is an independent consultant to semiconductor, EDA software and embedded system design companies. (billmurray@ieee.org).

Dr. Michael Siegel has 16 years of experience as a scientist and R&D manager in the field of formal verification. Michael holds a Ph.D. in Computer Science from Kiel University, Germany. He has worked as a senior scientist at the Weizmann Institute of Science, Israel, and as R&D manager at Siemens and Infineon. From 2001 to 2003, he was a member of the Accellera committee responsible for the definition of the property specification language (PSL) standard, and is now a member of the Accellera committee responsible for the establishment of a unified coverage interoperability standard (UCIS). In 2006, he joined OneSpin Solutions, where he is product marketing manager.

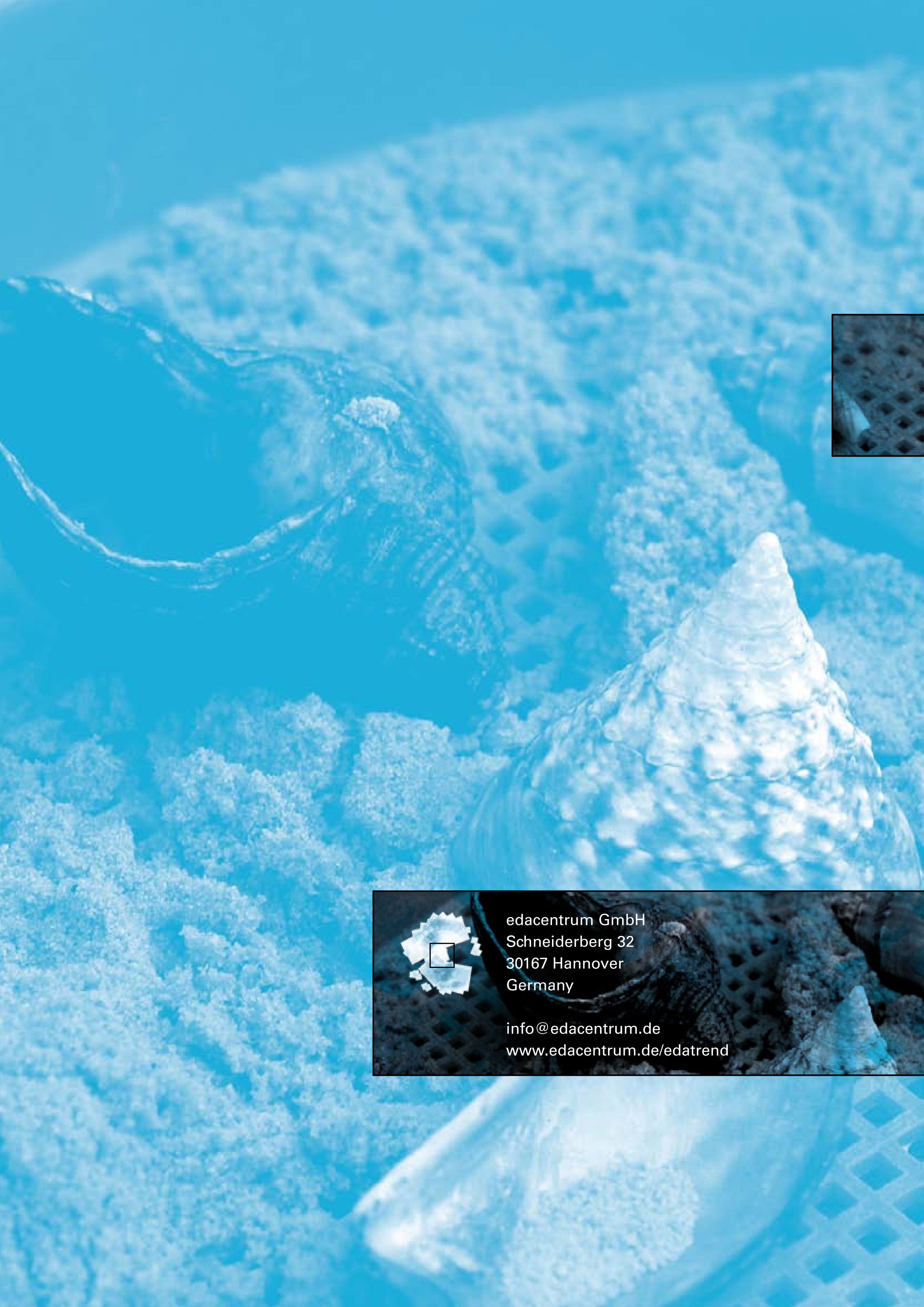
We also thank the Fabless Semiconductor Association, namely Lisa Tafoya, and the Virtual Socket Interface Alliance, namely Jim Lipmann, for their contribution to this edaTrend DAC07 report.

The edacentrum is an independent organization dedicated to the promotion of research and development in the area of electronic design automation (EDA). Its main role is to initiate, evaluate and supervise industry driven EDA R&D projects and to provide individual services in the EDA sector. Further by encouraging cluster research projects and EDA networks, it bundles and reinforces the EDA expertise of universities and research institutes.

The edacentrum provides individual services in the EDA sector, including consulting, project management, the organization of trainings, workshops and networking events and provides a communication platform to the EDA community.

The edacentrum actively engages in public relations in order to sensitize higher management levels, the public and the political arena about the central importance of design automation in solving the system and silicon complexity problems in microelectronics.

The edacentrum consists of an association (edacentrum e.V.) and a company (edacentrum GmbH). The association operates on behalf of its members and the projects supported by it and actively engages in public relations for EDA. The company provides individual services in the EDA sector. At present more than 50 companies are member of the edacentrum e.V. The association is open to all persons and legal entities.



edacentrum GmbH
Schneiderberg 32
30167 Hannover
Germany

info@edacentrum.de
www.edacentrum.de/edatrend