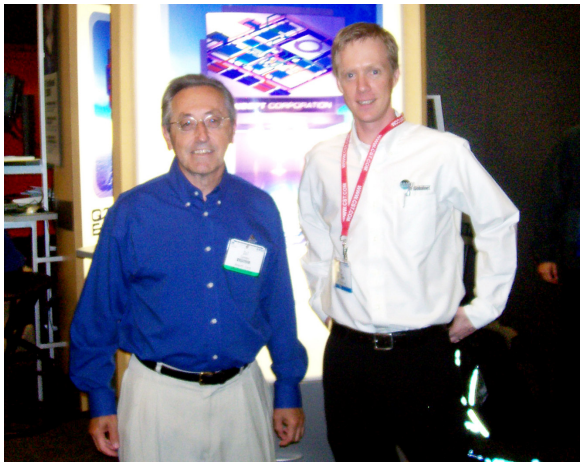
Q&A With Zoltan Cendes, Founder, Chairman, And CTO Of Ansoft Corporation

By Jim Pomager,
Editor in Chief



During IMS 2006, I had the distinct pleasure of spending some time with one of the true pioneers of the RF/microwave industry, Dr. Zoltan Cendes of Ansoft Corporation. Dr. Cendes' early research helped solve the "spurious modes" problem in finite element modeling of electromagnetic (EM) devices, opening the door for the finite element method (FEM) to be employed in electrical engineering applications. This breakthrough also paved the way for Dr. Cendes to launch his own electronic design automation (EDA) software company and – combined with subsequent innovations – enabled him to develop products like Ansoft's widely used EM simulator HFSS.

Dr. Cendes currently serves as chairman and chief technology officer (CTO) for Ansoft, managing the company's research and development efforts and plotting the course for its technology and products. He also is an adjunct professor at Carnegie Mellon University.

During our conversation, Dr. Cendes told me about the events that led to the founding of Ansoft, as well as the unexpected role that Hewlett-Packard played in the young company's development. We explored the consistent, if not increasing, need for good electromagnetics in an electronic design landscape that has changed drastically during the past 20 years. We also discussed whether interoperability is really necessary among EDA vendors and talked about Ansoft's plans for the future.

As seen in the October 10, 2006 edition of the RF Globalnet (www.rfglobalnet.com) newsletter.

RF Globalnet (RFG): How did Ansoft get started?

Zoltan Cendes (ZC): I've been working in finite element methods for my entire professional career, ever since my graduate student days at McGill University during the 1970s. In 1982, I joined the faculty at Carnegie Mellon University where I conducted research on Delaunay mesh generation. This is a very powerful method where you take complicated shapes and break them up into finite elements – triangles in 2-D and tetrahedrons in 3-D. At the time, people did this sort of process manually (I guess there are some people who still do), which is very difficult and time consuming.

So, my colleagues and I decided to develop an algorithm for mesh generation based on the Delaunay method. By 1984 we had a technology that we thought we could turn into a business. We were confident that electromagnetics was being underutilized and that there was a big opportunity – no software existed that could do this sort of thing. Also, in those days, it was relatively easy to get venture capital, so we started Ansoft.

RFG: What were those early days at Ansoft like?

ZC: For one, we were very much on a shoestring budget. I had to act as both salesman and developer, and I had some previous students working for me. It took us a few years to get things up and running. Once people realized that our technology could help them solve their modeling problems without having to manually produce a mesh, the product essentially sold itself.

RFG: What came next?

Our original programs were low-frequency magnetic and electrostatic field computations. Later in the 1980s, we started doing research on high-frequency microwave fields. People had attempted to apply the finite element method to high-frequency designs before; in fact, I even tried it in my master's thesis years earlier. But numerical instabilities in the procedure, called spurious modes, prevented these early efforts from succeeding. Ansoft developed new types of elements – called edge elements – that ultimately helped us eliminate spurious modes.

So mesh generation is what got us started, but the edge elements, the stable finite elements, really helped us take off. It was a brand new invention. Nobody had it, and yet we were able to sell it – even before much was published – right through the world-leading company at that time in this area. That was a big step for us.

RFG: When you say you sold it through the "world-leading company," I presume you're talking about Hewlett-Packard. How did HP enter the picture?

ZC: I'm not quite sure how HP heard of us. We were planning to create a new product based on our edge element work, but the research was still very preliminary. Then one day, they called me up out of the blue and said, "Can you come and talk to us about what

you're doing?" So I went out to Santa Rosa, California, and gave a presentation on edge elements, and after some discussions, we decided to sign a contract with them.

The agreement called for Ansoft to develop the technology and HP to market and sell it under the name HFSS. They were also very helpful in the development process. HP had a lot of microwave engineers, and they gave us feedback on what they needed in a high-frequency simulator. HP's involvement definitely helped speed the development of HFSS along.

RFG: How long did the partnership last?

ZC: Under our original agreement (1989), HP had the exclusive worldwide distribution rights to HFSS. Ansoft could sell HFSS as long as it was bundled with other products, so we packaged it with Q3D Extractor, the 3-D RLGC (resistance, inductance, conductance, and capacitances) parasitic extractor that we developed, and sold it that way for a while. In 1996, HP began selling its internally developed version of HFSS and decided to stop distributing ours. I guess it didn't like that we were getting into the circuit simulation business as well. We went our separate ways and became competitors.

In 2001, HP decided to exit the HFSS market completely, so it sold its customer list to Ansoft and we switched all HP's customers to our HFSS. Soon thereafter, HP spun out Agilent, and decided to focus on compute technology. Now HP is back to being partners with Ansoft – so much so that it is the worldwide platinum sponsor for our Leading Insight technology workshops.

RFG: You mentioned circuit theory. Why did Ansoft get involved in that space?

ZC: As I mentioned earlier, I have always thought that electromagnetics is vital to component design. In most cases, however, that component is also part of a much larger system design. What engineers really need is to have the electromagnetics integrated within a circuit or system simulator. So, during the past 10 years, we have focused on embedding the electromagnetics in circuits.

For example, we have a capability called Solver on Demand. It allows you to first lay out your design at the higher levels, the circuit and system levels; then, when you're getting closer to finalization, you click a single button to solve the design using full 3-D electromagnetics. If the problem already has been solved, it's in the cache, so you can immediately use the answer. If it hasn't been solved, the software will actually go solve that value, and then come back and use that value within the circuit simulation.

As a result, you can be sure that your device is working the way it should. If you rely on high-level models alone, chances are your final design will be off. You don't know exactly how much it will be off, but it definitely won't be spot on. If, on the other hand, you do the rigorous electromagnetics, you can count on it being accurate.

RFG: Obviously, the HFSS tool is well known in the industry. Is there anything for which Ansoft needs to be better known?

ZC: You're right – most people primarily know us for electromagnetics. But fewer are aware that we also have a high-performance, high-capacity circuit simulator. Our Nexxim simulator is much faster and more powerful than any other circuit simulator out there. As a new technology, it takes time for the word to get out, but we are pleased with how rapidly Nexxim is being adopted in the market.

Circuit simulators have been around forever – everybody has one. In some sense, this makes it challenging. But Nexxim is addressing a completely new problem. For instance, people today are creating higher-performance designs that require more attention to signal integrity. Conventional circuit simulators struggle with signal integrity problems, when you have W-elements and S-parameters that need to be handled in both time and frequency domains. Nexxim, though, handles them very well. Companies come to us with a new design that are bigger than anything they've ever done before. In some cases, their existing circuit simulator can't manage it at all, and that really opens up the opportunity for Nexxim.

RFG: The financial news coming out of Ansoft has been extremely positive as of late. What would you say are the primary factors contributing to the company's growth?

ZC: I think the original factor is probably the biggest factor: that electromagnetics is key to many designs, especially high-performance designs. People are running ordinary cell phones, base stations, and other devices to higher and higher speeds, and you simply can't get the results using traditional circuit simulation alone. You have to include the electromagnetics. We're seeing designs that are at 60 GHz, where circuit tools simply don't have the model accuracy to produce the correct response. You have to have a marriage of electromagnetics and circuits. As performance keeps going up, it provides more opportunities for Ansoft.

Another factor is that we have made electromagnetics really easy, so users can work on the circuit/system level and just press a button to get the detail they need. That's what got us going in mesh generation. We have an easy-to-use interface that gives you electromagnetic accuracy for your circuit with a single button click.

RFG: What capabilities are your customers asking for?

ZC: One thing they're looking for is help with high-speed designs. UMC Corporation, for example, is building devices that are taking the frequency levels up. They needed models for spiral inductors, so we've created a capability to model spirals parametrically. Now, UMC engineers just enter a few parameters and get the accurate model for a spiral.

Or I think of a company like Xilinx, which is making field-programmable gate arrays (FPGAs) that will run at very high speeds. Xilinx will ultimately ship these FPGAs out to hundreds or thousands of design engineers, most of whom won't know quite how to

incorporate them without encountering signal integrity problems. Customers like these have given us feedback on how we can further automate the process of incorporating electromagnetics into their established design flows to enable these designs at high speed.

RFG: What need is there, if any, for interoperability among EDA software vendors?

ZC: My philosophy is that interoperability should be completely customer driven. Our customers primarily ask for interoperability with Cadence, so we've done a lot of work to make sure we're integrated with Cadence. We also are fully integrated with Synopsys, Mentor Graphics, Zuken, and other major EDA players.

Conversely, if a customer hasn't asked for interoperability with a particular vendor, why would we put our efforts there? Integration is customer driven, and our customers want Cadence, Synopsys, and Mentor.

RFG: What are the next steps for Ansoft?

ZC: Our future really lies in exploiting this great opportunity we have. Ansoft is sitting in a beautiful place right now. Many new designers are pushing the performance envelope, and that falls into our sweet spot. So, we must continue to improve our solutions at higher performance levels.

We also have to continue our focus on ease of use and design flow. The people that were working with slower parallel designs are now moving to high-speed serial busses. They need a completely new design flow – the old design flow they had just won't cut it. So that's where we come in, providing the right design flow. I think we have a huge opportunity in that respect.

I think this is only the beginning. Even though Ansoft has been around since 1984, we continue to see more need for our products. There are many people using Cadence, Agilent, or Synopsys who can benefit from the improved design flow, more accurate models, and higher-performance circuit simulation that we provide. For us, the next year will be spent fulfilling those needs. We have a huge opportunity to provide the tools that every high-performance engineer will need.