EMA DESIGN AUTOMATION'S MARCANO LOOKS TO THE FUTURE OF PCB EDA

By Rick Nelson, Interim Chief Editor

EMA Design Automation, a full-service provider of electronic design automation (EDA) solutions, celebrated its 30th anniversary in 2019, having begun selling EDA tools in 1989. *EE-Evaluation Engineering* interviewed Manny Marcano, president and CEO, on the past and present of printed-circuit-board EDA.

Rick Nelson: **What prompted you to found EMA Design Automation?**

Manny Marcano: I wanted my freedom and to gain direct rewards for my efforts. CAD on PC was really just getting off the ground, and there looked to be a great opportunity for someone who could help companies make this transition.

RN: **You are a reseller for Cadence tools. What value-add do you provide?**

MM: It began with just plain excellent customer service: pre-sales, installation, training, and post-sales. It evolved to creating IP to solve specific customer problems, which grew into turning those unique apps into products that we sell now. We also acquired IP, which really added to our "value add" proposition.

RN: **You offer several EMA products, including TimingDesigner, Circuitspace, and Ultra Librarian. Could you describe those and explain what's unique about them?**

MM: TimingDesigner was the first IP acquisition. The owner, Forte, decided the product was not strategic, and we were the biggest reseller, so it was a natural addition to our offering.

CircuitSpace was another perfect adjacency that fit into our top-tier Allegro customer base. It is still a great productivity tool and an integral part of some customers' design methodology.

Ultra Librarian has been the best acquisition to date. Our market is starving for content, and Frank Frank's library was the answer we needed to create a competitive edge. We now offer it at no charge to all EDA end users and a small subscription charge to interested OrCAD customers if they want a direct symbol graphic connection to OrCAD Capture.

RN: **What would you consider a key milestone in the history of EMA Design Automation?**

MM: The biggest was earning the North American exclusive contract for OrCAD in 2003. Our growth was incredible, and Cadence supported us completely throughout the process.

RN: **What are your thoughts regarding simulation and virtual prototyping in PCB design?**

MM: This is compelling technology on the horizon! The convergence of mechatronics and virtual prototyping will constitute the best practices going forward.

Consider the creation of a digital twin—older, poorly documented technology converted to a virtual digital twin that can be tested and simulated before a real prototype is made. This leads to vastly improved time to market and dramatically increases the probability of success.

RN: **How does EMA address ECAD/MCAD integration?**

MM: We have wrestled with this the hard way for several years: file out, file in, errors, very clunky—it bordered on being a dysfunctional process.

We will soon be formally announcing a next-generation solution to this problem called CADSync. We designed our approach from the ground up to consider the needs of both the electrical and mechanical users while solving the problems that plague the variety of loose ECAD-MCAD connections that exist today. The initial feedback from our early customers and partners has been extremely positive. It is clear this is a critical issue in the industry, and we are excited to help our customers take full advantage of what a modern, native, and collaborative environment can do for them.

RN: **Looking at the electronics industry in general, we see the emergence of the IoT and IIoT, with billions of sensor nodes. How does the EDA industry need to adapt to support the design of widely dispersed, compact, low-power IoT devices?**

MM: Regardless of the technology, all IoT devices and ideas must be brought into the real world with a PCB. The PCB brings them to life!

RN: **5G is moving consumer electronics out of the realm of sub-6-GHz frequencies and into the millimeter-wave ranges. What changes will the EDA industry need to make to adapt?**

MM: The industry needs to embrace cross-platform collaboration at the RF module, PCB, and IC design level. These technologies are merging into one cross-platform (IC/PKG/PCB) solution to incorporate multiple technologies (CMOS, GaAs, SiC, etc.) into a single module via an interposer for testing and then into a package for mounting onto a PCB or substrate. For this to work you need to understand the parasitics at

every level of the process, and you must have an integrated 3D field solver that works at the IC and system level. This is a tough problem that needs attention to constraints and parasitics across the domains.

You also need to support RF routing, shielding, and structures (parameterized elements) at the PCB level and stitch the models across the platforms. You need an integrated cross-platform solution to accomplish this. 5G is just one driver for this type of technology and methodology, but certainly a very strong one. So, in a way, technologies like this help to bring the design disciplines together, as operating independently is no longer feasible at this level.

RN: **Do you see other industry trends that will have an impact on the EDA industry in the coming years?**

MM: 3D printed-circuit boards constitute the next wave of prototype capability. I envision an engineer completing a design and pushing the print button in their CAD tool.

RN: **What challenges to the EDA industry will techniques like in-mold electronics present?**

MM: I think this is another example of how intertwined electrical and mechanical are becoming. In this instance, the case is the "board." Finding the best way to design, verify, and build these introduces whole new processes to be addressed. From a challenges standpoint it will mean new design methodologies and new manufacturing ones as well.

RN: **What are your thoughts on the 3D printing of PCBs in regards to the EDA industry?**

MM: Having conductive traces on a 3D device is becoming common. "Printing" passive devices is feasible, but the placement and soldering of active components is way over the horizon.

RN: **How will the industry adapt to the increasingly interdependent aspects of electrical, mechanical, EMC, and thermal design?**

MM: Through virtual prototyping that will bring all the data and models together that can be simulated on a platform. Dassault 3D Experience is a good example of this.

RN: **Testability has always been an issue, and EMA has partners in the design-for-test space. What can the EDA industry do to help support design-for-test and design-for-manufacturing in the future?**

MM: A lot of this can be helped with education and in-tool support. We need to make design for test and design for manufacturing part of the design flow, not a side process. The more we can push upstream into design, the more predicable the design process will be and the higher chance for ultimate success. Part of this is educating the engineering community on the value and need to understand these flows up front. Just as ECAD and MCAD are converging into mechatronics, design and manufacturing are converging as well. These processes are becoming very interdependent as we continue to push the boundaries of technology forward.

RN: **The semiconductor industry has been following Moore's law for decades, with densities doubling every 18 to 24 months. But as one industry expert put it, "We are running out of atoms," putting a fundamental limit on planar transistor density. Is the PCB industry facing similar limitations, and what can the PCB EDA industry do to support PCB manufacturers?**

MM: There will always be those that are pushing the limits of what is possible. From a PCB perspective, the tools are very capable and can (in theory) let you design in CAD what may not be effectively manufactured using existing processes. I think we will see more focus on manufacturing process-driven design—something like a PDK (process design kit) for PCB.

The manufacturing process really influences so much of what is possible from a design perspective and because of this, it needs to be an inherent part of the design process. The manufacturing technology will come along just as it has with the IC. It may not be linear scaling in terms of feature size, but the industry will find a way to meet the technology needs. Our objective is to help make sure the tools and flows are there to support the user in a way that is in connection with all the other downstream processes (procurement, manufacturing, PLM, etc.).

RN: **Given the potential slowdown or end to Moore's law, the electronics industry is pursuing heterogeneous integration (sometimes referred to as "more than Moore"), which involves the integration of perhaps CMOS devices and devices fabricated in other processes. What problem does this present for semiconductor EDA tools or for PCB EDA tools? Do you foresee a blurring of what once were clear lines between semiconductor EDA and PCB EDA?**

MM: I don't see this as a problem as much as an opportunity. We are clearly hitting some limitations in scaling combined with the fact that the primary drivers are not just speed anymore. Power consumption and cost are also key factors in the equation. This leads to a new way of thinking about what leading-edge is and what problems it solves.

As you stated the package is becoming more PCB-like as these kinds of hybrid technologies evolve. I think there is a lot for the IC community to take from the PCB community now that these types of heterogenous devices are gaining momentum. In general, this will mean more integration and communication is needed across the chip, package, and board to drive optimal system operation.

RN: **When I got my first job as an electrical engineer (admittedly a little more than 30 years ago), PCB design was accomplished using mylar, tape, and an X-acto knife. Obviously, the industry has come a long way since then. Where will we be 30 or more years from now?**

MM: We will be printing PCBs on demand, and it will happen long before 2050. EE