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MPD's View from the Top with Quantic PMI's Dave Durbin

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Content

Quantic PMI's Dave Durbin, Director of Engineering and Vice President, is featured in **Microwave Product Digest**'s annual View from the Top.

Here's what Dave had to say...

MPD: If your company serves defense applications including electronic warfare, SIGINT, radar, communications, or counter UAS, please describe advances in RF and microwave technology you believe will be most needed for DoD in the coming years.

DD:

Two advances in RF and microwave technology will be most needed for the Department of Defense (DoD) in the coming years. The first advance is continuously increasing the electrical performance of RF and microwave components such as higher, broadband solid-state transmit power levels, faster switching speeds and higher frequency direct analog-to-digital conversions with finer resolutions. Second, the DoD must be able to upgrade systems quickly to keep up with emerging threats.

Propelling innovation forward for the DoD requires taking a software approach to hardware. Software evolves quickly and easily because there is a standard foundation to work from, a programming language. With everyone working in the same language, programs can be written and implemented without changing the entire infrastructure. Quantic Electronics is building components and subsystems on analogous hardware foundations.

Quantic PMI (Planar Monolithics) standardizes manufacturing custom, mission-critical, highly reliable products. Easily swappable hardware subsystems achieve the need to stay ahead of the ever-changing electronic warfare environment. We are designing modular subsystems on the 3U OpenVPX platform which SOSA aligned products are being developed on. Plug-and-play hardware modules like these equip system architects with the tools to reconfigure systems on the fly.

For prototyping, Quantic X-Microwave developed X-blocks, a grid-based, Lego-inspired platform allowing system designers to rapidly build a hardware chain of components and swap any device company’s product affording users the ability to design for performance without redesigning to accommodate different manufacturers.

Across Quantic Electronics, we create novel products taking advantage of the latest chips and devices on the market. Threats in the world are morphing faster than design cycles. Disrupting these traditional design cycles, we employ a vertically integrated manufacturing environment built on hardware foundations and driven by automation to quickly implement new designs. Designing hardware systems

as quickly as software can be rewritten will completely disrupt the electronic warfare, SIGINT, radar, communications and counter UAS markets.

MPD: In the last few years, two markets—fixed wireless access and “commercial space”—have created significant opportunities for the RF and microwave industry. Please describe your efforts if your company participates in one or both of these applications.

DD:

Both fixed wireless access and commercial space are areas needing highly reliable RF and microwave hardware. These markets count on technologies that have been developed for the DoD to keep data moving continuously with no interruptions. Data migration to the cloud requires non-stop internet connectivity in order to keep businesses running and people entertained. Previously, content was created by companies and pushed out to customers meaning that the end users had a need for fast downloads without the need to upload data quickly. Now every connection on the network, whether a corporation or a person in their own home, is a content creator with the need to be able to upload and download data to and from these large data centers that make up the cloud. RF and microwave transceivers have broad received and transmit bandwidths making it perfect hardware for keeping data moving.

Quantic PMI develops smaller, lighter components and transceiver subsystems using highly reliable processes available in hermetically sealed aerospace products. These products are designed with Mean Time Between Failure (MTBF) rates in extreme environments longer than the expected lifetimes of Low Earth Orbit (LEO) satellites used for commercial space communications. Utilizing processes that have already been qualified for mission critical systems helps speed up the procurement timeline for commercial space and saves additional qualification testing. For fixed wireless access applications, the plug-and-play foundational hardware architecture is a perfect fit. This architecture allows for systems to be upgraded easily in the ever-changing, fast-paced commercial environment.

Quantic Electronics is investing in the future of RF and microwave through manufacturing equipment, automation and state-of-the-art processes. Scaling Quantic PMI’s manufacturing capabilities to higher volume applications benefits both the commercial and military worlds.

MPD: Please describe what you consider to be your company’s most significant technological achievements in 2024.

DD:

In 2024, we’ve developed high speed digital power detectors furthering our analog to digital conversion capabilities. Known for producing all of the components and subsystems behind a system’s antenna and in front of its digitizer, Quantic PMI sees the opportunity to provide our customers with more digital features. In the case of detector log video amplifiers (DLVAs), read-only memory carrying the model number, serial number, parameters such as output slope and intercept values as well as change in slope and intercept coefficients over temperature are instantly accessible.

This capability allows systems to automatically read a product to pull in valuable calibration information as well as serial number identification. The prepared system quickly swaps one unit for another without the downtime needed to fully re-calibrate the entire system. Incorporating a pre-calibrated component which reports its parameters allows for automated repairs and real time optimization. Quantic PMI and Quantic Electronics are leading the way towards a more intelligent EW system environment.

Picture a scenario where an autonomous drone powered by artificial intelligence can download the expected output of a component with a known input. Next, it can test and automatically detect that the component is failing. The system can then report to the closest repair depot that it is coming to replace the component. An autonomous inventory system can collect spares from stock and have it wait for

the drone when it arrives. Changing the component, reading the configuration file and confirming the performance autonomously allows the drone to return to service quickly.

Take this scenario one step further. The drone may be faced with a new threat previously unencountered. AI communicates to an upgrade depot that it has a component with a certain configuration and specifications but now it needs a component with another set of specifications such as switching out a component with a moderate noise figure and high output power for a component with a lower noise figure sacrificing output power. Instead of designing a high-cost electronic warfare system to anticipate every possible configuration which will be expensive, heavy, and power hungry, the system can have alternative components ready to be swapped out at a moment's notice. The upgrade depot can autonomously search the inventory for a component matching the system's needs and have it ready for replacement or even send a delivery drone to swap the components.

It is clear the future of EW is going to be dominated by whichever side can adapt to situations and threats more quickly. Quantic PMI and Quantic Electronics are helping create that future.

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Aerospace & Defense, AI (Artificial Intelligence), Automation, Electronic Warfare, Industrial Applications, Military, Radar, RF, Satellite, Semiconductors, Test & Measurement, Wireless Infrastructure

About Us:

Heading : About PMI

Planar Monolithics Industries (PMI) was founded on November 11, 1989 by Dr. Ashok (Ash) Gorwara and quickly became a leading supplier of high-reliability radio frequency (RF), microwave, and millimeter-wave components and subsystems for mission-critical applications in military, aerospace, communications, commercial, and industrial markets.

PMI offers a broad portfolio of state-of-the-art RF and microwave products, including hybrid MMIC components, modules, and integrated subsystems. The company's product range encompasses thousands of commercial-off-the-shelf (COTS) models with detailed specifications such as S-parameters and 3D models available on demand.

The company operates ISO 9001:2015 and AS9100D certified facilities in Frederick, Maryland and El Dorado Hills, California, USA, and its products are built to rigorous military and industrial standards for reliability and performance.

In March 2021, Quantic™ Electronics — a portfolio company of Arcline Investment Management — acquired PMI, and since then the business has been branded as Quantic PMI (Planar Monolithics). Under the Quantic umbrella, PMI continues to expand its engineering and manufacturing capabilities and support for RF/microwave technologies across defense, aerospace, industrial, and commercial sectors.

PMI emphasizes robust engineering design, rigorous testing, and extensive supply chain support, enabling the company to deliver tailored and high-performance RF and microwave solutions from DC up to millimeter-wave frequencies.