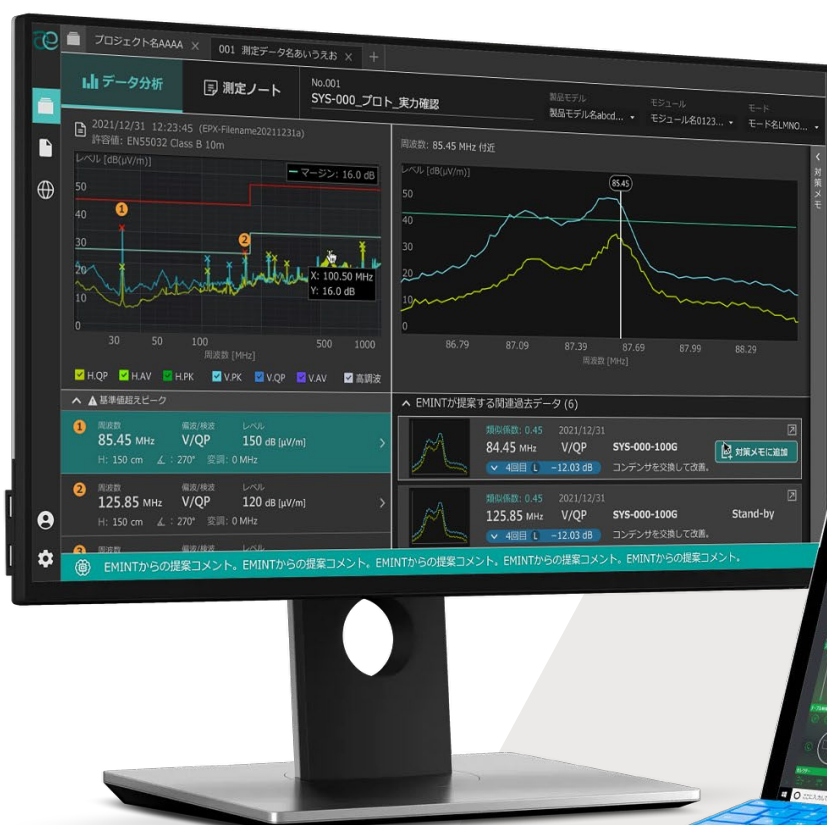


Power of “Visualization” for EMC Countermeasures — “EMINT” – Innovative Tool Selected by Roland DG



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With the widespread use of electronic devices and an increasing number of products being introduced to the market in rapid cycles, the efficiency of EMC testing and EMC countermeasures has become a challenge for many manufacturers.

TOYO Corporation, which has been providing EMC testing systems for over 40 years, developed the AI-powered EMI countermeasure assistance software “EMINT” with the aim of solving such common challenges faced by many customers using the latest technology

In this interview, we spoke with Mr. Hirai of Roland DG Corporation, a user of “EMINT,” about the reasons for adopting the software, its effects after introduction, and future prospects.

Roland DG Corporation



About Roland DG Corporation

With the purpose of “To Empower Creativity and Excitement Worldwide,” Roland DG Corporation strives to bring new opportunities to society through digital solutions that make it easy for anyone to create things. The company’s inkjet printers and printer/cutters are widely used in a variety of visual communication fields, including signage and interior decoration. In the digital fabrication field, our inkjet printers, cutting machines, and 3D digital fabrication tools enable the personalization and customization of items tailored to individual customer needs. By adopting a high-mix, low-volume, on-demand approach, Roland DG aims to create new applications. Recently, Roland DG has further expanded the digital transformation frontier. The company provides a cloud-based service to enhance customers’ printing operations and profitability and a cloud-based production improvement solution offering the expertise of its proprietary production support system for small and medium-sized manufacturers.

Mission Supporting Global Expansion and Stable Supply of Products

Please tell us about the role of your department.

My department handles regulatory compliance for our products. Our company manufactures commercial inkjet printers and 3D manufacturing tools. For these products, we ensure compliance with regulations covering EMC, wireless communications, safety, and environmental standards. Since our products are distributed globally, we also monitor regulatory developments in each region in coordination with our overseas offices to ensure stable product supply.



Toward Resolving EMC Measurement Challenges Unique to Printers

Are there any particularly difficult aspects or challenges in the EMC testing for Roland DG products?

Our wide range of in-house designed and manufactured products undergo extensive testing. For printers specifically, which contain both electronic and mechanical components, there exists noise unique to such products. This includes intermittent and impulse noise. Conventional measurement methods often failed to detect this noise promptly due to timing mismatches. Furthermore, identifying such noise — which is not always clearly visible — required varying amounts of time per engineer, leading to the challenge of knowledge being tied to specific individuals.

What have you done to address such challenges?

We have begun to use the EMI receiver “PXE”, featuring an advanced time-domain scan, and TOYO Corporation’s emissions measurement software “EPX” to maximize its capabilities. This shift allows us to move from measuring the noise level at individual frequency to observing waveforms across a defined frequency bandwidth. With conventional sweep method measurements, intermittent noise or impulse noise could sometimes be captured and sometimes not, depending on timing, making accurate waveform comparison impossible. Using the “PXE” and “EPX”, however, allows QP detection measurement results to be visualized as waveforms across a wide bandwidth simultaneously, enabling waveform-based comparison. A specific bandwidth of the entire measurement band is continuously observed, visualizing not only the target frequency but also the impact on other frequencies. Furthermore, when we verify countermeasures with “EPX,” even if impulse noise is present, before-and-after comparisons are easily made using the QP detection waveform, making the effectiveness of countermeasures immediately apparent. This solution, which reliably captures noise that was previously difficult to measure and delivers consistent results regardless of the test engineer, has led to the resolution of a major challenge.

< Memo >

What does “failed to detect noise due to timing mismatch” mean?

: Find an answer to this question in the A-TDS video below

<https://youtu.be/jr0NKN4pWTo?si=ZUUknwRRr17SHRyM>

*1 : Typically, “waveform” refers to a graph representing the temporal variation of a physical quantity. However, in this context, we use the term “waveform” to describe a shape of the spectrum across a specific frequency band as displayed on the EMI receiver’s screen.

To address the challenge, you first introduced time-domain scan technology starting with conducted emissions measurements. What was the reason for this?

First, the frequency range to be measured was narrower compared to radiated emissions measurements, which also meant it was a smaller-scale start. More importantly, however, we envisioned that adopting time-domain scan measurements for conducted emissions could reduce man-hours to about one-fourth compared to sweep method measurements. As expected, we confirmed its usefulness for intermittent noise and the reduction in measurement time.

When attempting to measure intermittent noise using the sweep method, we sometimes need to conduct measurements multiple times. However, after changing the measurement method, measurements that previously took 15 to 30 minutes now complete in under 5 minutes. It’s no exaggeration to say measurement time was reduced not just to a quarter, but to a fifth.

Having confirmed the effectiveness of using time-domain scan for conducted emissions measurements, we continued to move on to the next step: utilizing the EMI receiver “PXE” equipped with an advanced time-domain scan feature and TOYO’s software “EPX” for radiated emissions measurements as well.

New tool “EMINT” – Best Match for New Measurement Method – Simplifying Waveform Comparison

While utilizing “PXE” and “EPX,” you also introduced the EMI Countermeasure Assistance Software “EMINT.” Could you tell us what promoted this introduction?

Introducing “PXE” and “EPX” enabled us to perform gapless noise measurements and display waveforms across the entire measurement frequency band. Comparing results using waveforms became standard practice. This led us to start thinking we needed a tool for waveform comparison. When we

learned about “EMINT,” which has a function to search for similar waveforms at the same frequency from past data using these visualized QP detection waveforms, we thought, “This is a really good approach,” and began considering its introduction.

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What expectation did you have regarding the effectiveness of “EMINT,” when it was introduced?

I thought it would allow us to quickly access necessary information when needed, since it could find similar waveforms from past data measured at the same frequency. I also believed all data could be centrally managed in “EMINT” as a record of countermeasures. Design engineers create countermeasure records for each project. When encountering a similar waveform, I would think, “We’ve seen this before, right?” but it took time to locate the actual relevant data. I hoped the “EMINT” would allow immediate access to the desired data even in such cases.

What was the process like at Roland DG when you started using the “EMINT”? How is it currently being used?

When we launched a project to introduce the “EMINT,” the project team consisted of two engineers - another engineer on the same team and myself. As we purchased a node-locked license, we opted for two users to allow time to get familiar with the UI.

Before introduction, we had a demo of “EMINT.” Both the project members and design engineers participated. I remember gaining a clear sense of how to use it during that demo and simultaneously feeling it could be very useful. There was also concern that if the design team used it, the usage period would be limited, and a gap in time before the next development project could occur, potentially causing them to forget how to use the tool. Therefore, we decided to make our department the primary users. Currently, the project members input the measurement and countermeasure records left by the design team into the “EMINT.”

What was the internal reaction when it was introduced?

The design team has not started using it yet, and so we are still waiting for their feedback.

Do you plan to expand its use to the design team in the future?

Yes. We intend to encourage its widespread use. Currently, we are in the data accumulation phase. We believe usage will increase as the design team gains successful experiences with it. To achieve this, we are inputting data and verifying usability to improve the hit rate for desired similar waveforms and enable such experiences. We ask for your continued support to deliver results that will convince the design team.

Have you actually achieved the effects expected at the time of introduction?

Yes. There have been cases where it led to countermeasures. “EMINT” automatically searches past data for noise with waveforms similar to the targeted noise and displays the daily trend on the day this similar waveform was acquired. By checking this, we can immediately identify measurement data of effective countermeasures at that time, and in some cases, comments linked to that measurement data led to appropriate countermeasures against the targeted noise.

Regarding data utilization, the feature that allows notes to be added per project enables us to accumulate records. For instance, we summarize findings at the top part of each project and include links to compiled documents.

Additionally, by registering clock lists, we have been able to quickly identify clocks in the high-frequency band suspected as noise sources.

Leverage Insights Gained from “EMINT” in Early Stages of Development

What are your expectations for “EMINT” going forward?

I hope it can be used as an input tool in the early stages of development. I also hope for features that integrate with the measurement software “EPX,” and that the “EMINT” can be used directly within the “EPX” interface. Furthermore, incorporating technologies like interactive AI within the tool would be ideal, enabling more accurate waveform filtering.

Since we plan to use this tool long-term, we hope for continued support for as long as possible.

What are your future prospects?

We aim to front-load development that enables smoother processes with fewer reworks. By leveraging insights and trends from accumulated measurement data of past models in the “EMINT,” we plan to collaborate with the design team to reduce countermeasure workloads during development of similar models.

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Reliable and Trusted Business Partner

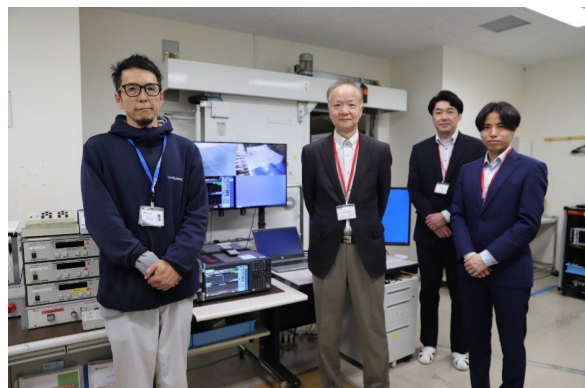
The solution introduced today has been installed by TOYO.

What kind of partner is TOYO for you?

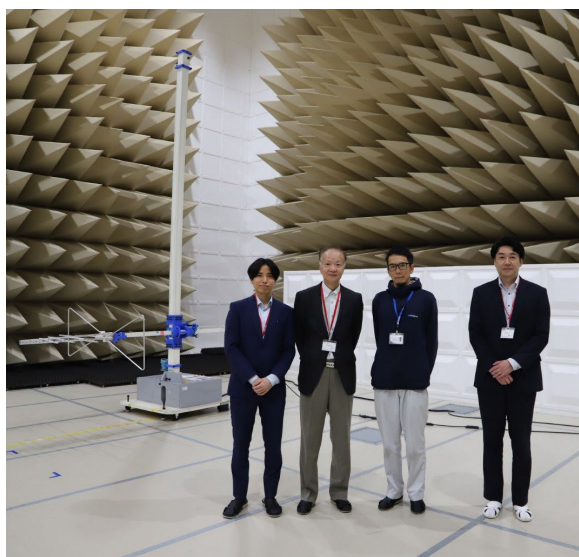
When introducing EMC measurement equipment, which can be costly, we want to ensure it can be used long-term. TOYO is a highly reliable and trustworthy partner in this regard. They have a deep understanding of standards and their evolving trends, and their knowledge of the equipment is as detailed as that of the manufacturers themselves. Their engineers are highly skilled, and during the evaluation phase, they provided thorough answers to various questions, which was extremely helpful.

Finally, could you share a message for those considering introducing “EMINT”?

I truly believe the “EMINT” is a tool with great potential, so I encourage everyone to introduce it and make the most of it.



From left: Mr. Hirai of Roland DG, EMINT development members and EMC system sales engineer



Anechoic chamber for EMC test at Roland DG

< Developer Comments >

The “EMINT” is EMC countermeasure support software born from an entirely new concept unlike anything seen before. As a developer, I am truly delighted that Mr. Hirai understands its concept and is actively utilizing the features we have prepared. We really appreciate it.

Through daily interactions with our customers, we have come to understand that design and development teams, along with the quality assurance teams supporting them, share common challenges that often go unspoken. We believe many will resonate with the insights shared by Mr. Hirai in this interview.

While “EMINT” utilizes AI, we constantly focus on improving what we call the “hit rate” to ensure users can quickly find the information they need right now. To achieve this, feedback from actual users is indispensable. We sincerely hope everyone involved in EMC testing will consider introducing it and join the circle of users helping us grow the “EMINT” together.

Please note that all learned content remains entirely within each customer’s environment, and no information leaks outside. You can use it with complete peace of mind.