TE CONNECTIVITY (TE) CONNECTS DIGITAL PARTNERS FOR NETWORKED INNOVATION

TE takes the initiative, and orchestrates software partners, to develop a cutting-edge, integrated measurement and optimization solution for plastic injection molding.

The lure and the challenge of end-to-end digitization

To keep up with ever-accelerating innovation cycles and a fast-moving competitive environment, players need to boost speed, efficiency and quality simultaneously. It is, by now, commonplace wisdom that digitization, if done right, can help you achieve these goals. As the marketplace matures, there are many sophisticated, specialized solutions out there, each of which addresses a portion of what you need. But the value you can extract depends critically on how well your digital value chain integrates end-to-end.

The question is, how do you accomplish that to achieve a seamless, revised process that works for you?

Let's take a look at how leading connector and sensor maker TE Connectivity (TE) has approached this challenge and optimized their design process for plastic parts and molds. The key to rapid progress was to orchestrate the right partners and engineer an innovative, interconnected measurement and optimization solution.

Recognizing an opportunity in quality management

In mid-2019, Patrick Bertram, Principal Engineer of Molding Simulation at TE Connectivity, took stock of the current ways of working, and recognized an opportunity.

> *"We were working with two powerful solutions for different parts of our design process. We used Volume Graphics' solution, VGMETROLOGY, to measure part quality. The advantage here is that you can apply PMI (Product Manufacturing Information) measures directly from CAD to real-world CT data from physical parts for quality control. And, as a separate part of quality management, we applied SIMCON's simulation and optimization solution VARIMOS to optimize the part, mold and injection molding parameters. This helped minimize shrinkage and warpage before molds were physically built."*

The problem was that the two solutions were separate. In particular, quality measures had to be defined twice, doubling the amount of work. The first set of quality measures were defined during CAD part design, in the form of PMI measures. These formed the basis for physical part geometry measurements during sampling and quality control, using VGMETROLOGY, Volume Graphics' software package for the analysis of 3D measuring data from industrial CT.

A second set of quality measures was defined in order to provide optimization goals. This was needed so that VARIMOS's artificial intelligence knew what to optimize. This led to the question: Why not use the exact same measures that had already been defined in PMI? But there was no easy way to do that.

> *"In a way, this was not a digital twin, but digital triplets. We wanted to know: is there a way that we can unify these solutions, avoid redundant work, and use an integrated, consistent set of quality measures, end to end?"*

Orchestrating a network to get it done

Having identified the opportunity, Patrick Bertram took the initiative. He convened his counterparts at Volume Graphics and SIMCON and orchestrated a collaborative search for a joint solution. Together the three parties agreed to develop the capability to use PMI measures end-to-end. This made it possible to apply VARIMOS' powerful simulation-optimization algorithm to the same set of measures that would be used later to measure the final part. Technically, this required developing an automated interface between Volume Graphics and SIMCON software.

Practical development began quickly, working in iterative sprints. During regular user meetings, TE engineers provided ongoing feedback on the usability of the evolving solution. And in a matter of months, a custom-developed solution was finalized for TE.

The result: a faster, simpler, leaner process for TE Connectivity

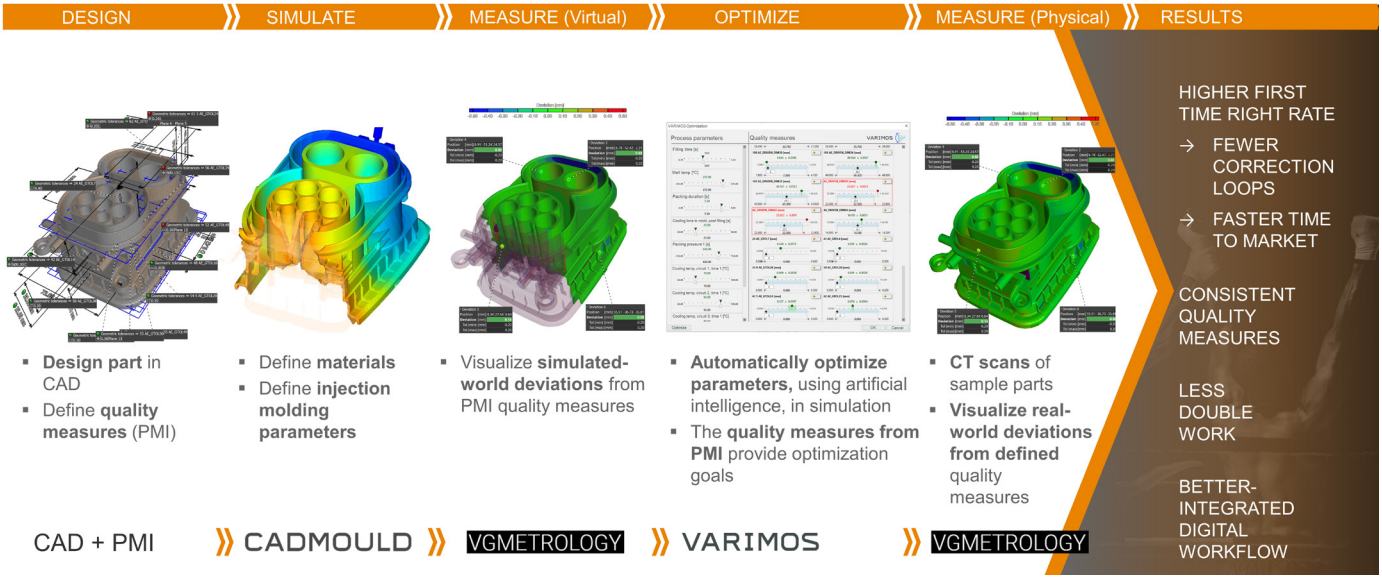
For TE, there are three main advantages to the new, integrated digital solution.

- First, it enables **faster time to market**. Time-consuming double work is avoided because measures only have to be defined once, and because the integrated virtual optimization enables a **higher first-time-right rate**.
- Second, there is a clear **simplification**, since now quality measures are **uniformly applicable** throughout the entire design cycle, from CAD[1)] all the way to CT[2)] measurements of samples.
- And third, it **optimizes resource use.** The integrated solution permits a more consistent virtual optimization of the part, before the mold is built. This reduces the amount of sampling needed, and reduces expenses associated with late-stage adjustments.

[1)] CAD = Computer-Aided Design is a way to use computers in the creation, modification, analysis or optimization of a design.

[2)] CT = Computed Tomography is a way to scan a physical part, using x-ray technology. It permits very precise, nondestructive physical analysis of part dimensions, as well as internal features and structures of produced parts.

Together, we built an integrated digital design, optimization and measurement workflow



User-led development is the gold standard

Walter Rauhaus, Vice President, Engineering Global Automotive for TE, sees the TE DNA of excellence and entrepreneurialism reflected in the initiative taken:

> *"At TE, we are committed to excellence based on several technology value drivers like time to market, engineering efficiency and innovation. Our competitive advantage is based on innovation, to maintain and grow our technology leadership. Sometimes you realize that what you need does not yet exist in the market. And so, at TE, we take the leadership on initiatives to collaborate with the right partners, to drive the change that we need in order to serve our customers better."*

TE's software partners consider this approach a real win-win. Stefan Rieth-Hoerst, Head of Global Key Account Management at Volume Graphics explains:

> *"We think this is an excellent example of user-led digital innovation. Working directly with the engineers at TE has helped us to make sure our solutions are maximally useful in practice and provide substantial value. Working with TE and SIMCON to make this happen has been very productive and forward-thinking."*

User-led advances are a recurring theme in the current evolution of the market. There are many excellent, but specialized, solutions that cover crucial parts of a company's process very well. But there can still be friction in-between those steps. What's needed is a workflow that is seamless end to end. As Angela Kriescher, Head of Product Management at SIMCON, puts it:

> *"If you, the user, are working with flexible and nimble software partners, and you have a good working relationship, then you can take the initiative and orchestrate them to get a better integrated, tailored solution that really works for your process. You are the one who is going to work with the solution, integrating all of the different threads into a cohesive end-to-end process. So, you know the requirements best. And you're at the center of all the institutional relationships that you need to make it happen. That's why we love this kind of network collaboration with innovative partners like TE, who take the initiative. We've seen it work really well for our customers!"*

This model of network-based collaboration can serve as a blueprint worth repeating and emulating for others, as well. The challenges and opportunities that arise with digital innovation resonate with many companies. They have identified concrete opportunities to stay ahead of the competition, and want to implement them, rapidly. But they find that it is not trivial to realize them in practice, particularly in times where the market for digital talent is swept clean. This example shows how collaboration with a network of specialized partners can bring together the right capabilities quickly, and the result is a genuine win-win for all parties involved.

Thus, a network of excellent partners can be a crucial asset for innovation – but such networks do not materialize automatically. Building trust-based relationships means going beyond the merely transactional level. In the end, it is human relationships that make your mix of vision, entrepreneurialism and initiative contagious, and inspire coordinated action. That is what creates results that are larger than the sum of their parts.

About TE Connectivity

TE Connectivity is a $13 billion global industrial technology leader creating a safer, sustainable, productive, and connected future. Our broad range of connectivity and sensor solutions, proven in the harshest environments, enable advancements in transportation, industrial applications, medical technology, energy, data communications, and the home. With nearly 80,000 employees, including more than 8,000 engineers, working alongside customers in approximately 150 countries, TE ensures that EVERY CONNECTION COUNTS. Learn more at www.te.com and on LinkedIn, Facebook, WeChat and Twitter.

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