How Automotive Factories Benefit from Digital Facilities Management

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In the last few years much of the conversation surrounding the global automotive industry has centered on two almost contradictory topics: booming electric vehicle (EV) sales and ongoing supply chain bottlenecks/microchip shortages that are creating market growth headwinds – strong enough that some industry leaders fear potential stalls or even reversals of new customer acquisition for years. That's true for internal combustion engine (ICE) and electric-powered vehicles alike.

The good-news-bad-news split is all the more serious when you consider that even while facing real challenges, the industry remains a bulwark of the world economy, employing around 14 million people and millions more in related sectors. At 3% of global GDP, automotive manufacturing would rank as the 6th largest economy if it were its own country.

However, little time has been spent pulling back the lens to evaluate the manufacturing process itself — and how adopting a digital facilities management

framework might prove an 'electric charge' for an industry striving to re-invent itself as more agile in a post-COVID economy.

Plug into the Promise of Industry 4.0 and the Internet of Things

Digital facilities management involves a constellation of technology-enhanced upgrades. There is no silver

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bullet, no panacea. But there is an overarching theme: the de-siloing of the "digital islands" that exist throughout automotive facilities, and how, through the democratization of data, that information can be shared and used by multiple stakeholders via a single digital platform. After all, a factory is essentially a copying machine. And the facilities manager's task is to make sure that the copying machine works, given the prerequisites handed to him/her — i.e. the mix of products, the production design, the machines at hand, and the production volumes.

By incorporating a digital facilities framework, an automotive factory can stay data-rich, smart building-enabled, flexible to demand and supply chain fluctuations, at least semi-autonomous in its function and self-correcting capabilities, and sustainable in terms of its environmental impact.

Industry 4.0 (I4.0) is a term that speaks to this transformation, centering on the degree to which increasingly sophisticated software, cloud-based remote sensing technologies, and the Internet of Things can better integrate "people, place and process" as the International Facilities Management Association (IFMA) puts it. By enabling the digital automotive factory, facilities managers can expect to realize a variety of efficiency gains, which include a 20% reduction in energy and maintenance costs, waste reduction, new ways of streamlining decision times, and maximizing workforce productivity.

The Key Benefits of Digitizing Automotive Facilities

An automotive factory with a digital facilities upgrade can look forward to the following key benefits:

Enhanced equipment changeover — For original equipment managers (OEMs), this is critical and speaks to changeovers across several horizons, operating in parallel; the maintenance of existing equipment, new vehicle model programs, site production and a new platform perspective. Often, that means entirely new parts, new machines and new tooling. While it's true Tesla is challenging this operational model, functioning more like a software company and less like an automaker, legacy ICE vehicle makers will still need to improve their production agility when it comes to their more traditional new model prep needs. A digital facility is all about a facilities manager having instant access to their current equipment inventory, documentation and history. This is a large advantage over relying on traditional blueprints, enabling better project planning and a greater understanding of how overlapping projects affect each other.

Inventory awareness & having a Plan B — If the pandemic has taught automakers anything, it's that the old way of doing business — maintaining only a small on-site surplus, matching closely with immediate consumer demand — may not always be the most efficient. While that model worked pre-pandemic, future supply chain disruptions can be mitigated in part by having immediate supply on hand. Just imagine if there was a global stockpile of extracted silicon or a reserve of microchips? If that had been the case, then the impact of current supply chain bottlenecks would have been blunted. Even now, according to a December 2021 report by analytics firm IHS Market, US carmakers had only 10 days of production capability, a powerful indicator of just how lean inventory has become.

Space usage maximization — Knowing the layout of a facility is critical if its design is going to change or be improved or swapped for new vehicle construction. Likewise, having an instantly accessible digital design schematic also provides a historical record of previous layouts — layouts that might be difficult to obtain or access when that information was traditionally "hidden" (buried) within another department. There may even be a sudden rush to identify employees who can read a 2D diagram, or to find someone who has the right software to open a layout. With the acceleration of baby boomer retirement, facilities managers are less and less able to turn to a senior colleague and ask, "How was this done before?"

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"Collective brain" enablement — With all this talk about technology, it's important not to lose sight of a digital facilities' human element. Improving human efficiency is important too and can be achieved through several means. One of the most fascinating ways is how digital twins can enable all staff to contribute to future solutions identification. By sharing knowledge and insights, actually talking with colleagues about a shared 3D or 2D model can go a long way toward discovering newfound inspiration. While it's great that the Internet of Things can allow computers to "talk" to each other, digital twins can do the same thing for people too. And better planning means fewer surprise roadblocks and by extension, a less stressed staff compensating for delayed or incomplete planning.

Environmental footprint — Incredibly accurate 2D and 3D modeling will help facilities managers oversee the modification of existing buildings to meet future environmental regulation requirements, not to mention a company's own internal good corporate citizen ambitions. Moreover, such upgrades of older facilities will be essential amidst further brand building around the EV transition. Whether it's identifying the best location to install solar panels on a facility's roof, or the correct positioning of on-site wind turbines, the growing trend toward "clean kilowatt" adoption will also continue to shape the factory of the future.

Geometric Digital Twins to the 'Digital Bureaucracy' Rescue

It's true that one of the challenges of enabling the automotive factory of the future is that digital facilities management can sometimes feel disjointed. With competing digital platforms and a variety of third-party vendors to deal with, OEMs and their facilities managers might find themselves a bit overwhelmed. After all, a confusing array of digital "solutions" starts to feel less like a problem-solving measure and more like a sucker punch if those technologies increase instead of decrease "digital bureaucracy."

This is where the concept of geometric digital twins can come to the "digital bureaucracy" rescue. The great value of a digital twin, aside from its ability to create an exact 3D replica of a physical asset and provide real-time feedback on any changes detected, is that once implemented in a factory setting, it can provide something of a "missing link" to other digital platforms. Through its visual interface, a digital twin acts as a common denominator, uniting different systems and data sets, ensuring all digital assets relate to that denominator for everyone to interpret and work with.

If 90% of the information transmitted to the brain is visual, and the human brain processes images 60,000 times faster than text, imagine what a visual interface would do to the text and structure-based information residing in legacy facilities management systems?

The Democratization of Data

The ability to share, comment on, and manage enormous data sets anywhere in the world, is what enables the positive externalities that come from this form of groupthink. This isn't authoritarianism run amok; it's creativity *capitalized*. And traditionally it's a facilities management advantage tool many automotive facilities managers fail to fully benefit from.

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By employing 3D reality capture and laser scanning as part of a geometric digital twin, every component of an automotive facility can be scanned through 360-degree image capture, which is then re-created in a virtual space, creating a digital representation of the physical infrastructure. And with auto assembly machines and the building itself fitted with remote sensor technology, digital twins become "living documents," documents whose up-to-date accuracy requires little, if any, human input.

For facilities managers, who are often tasked with overseeing multiple facilities, the advantages of using 3D data visualization, instead of the intended 2D layout, cannot be overstated. Sharing accurate 3D reality capture data in a remotely accessible visual interface makes planning, re-planning, collaborating around rapid changes, and bringing in experts from anywhere in the world, far easier.

For all the current concerns over chip shortages and supply chain shortfalls, none of these specific problems will last forever. However, that doesn't mean new challenges won't arise in the years ahead. Natural disasters, political instability, financial meltdowns, war, engineering snags or production setbacks, can all throw a proverbial monkey wrench into global supply chains.

But if there's any overriding takeaway, it's that no one is thinking in terms of business as usual anymore. Instead of the "new normal" as some are apt to call it, other pundits are describing what happens in the years ahead as the "next normal." In this next normal, digital twin's automotive factory value will only increase.

As demonstrated by Tesla, expertly built, smartly priced, and properly incentivized electric vehicles are attractive to consumers. And legacy automakers like GM, Ford and Volkswagen, are pledging to follow suit. Ford, for example, already has a new EV on the road, the Mustang Mach-E, and its F-150 Lightning pickup and E-Transit commercial van aren't far behind. Likewise, the company is also ramping up its lithium-ion battery production and recycling capabilities. And with any luck, Ford will produce some 600,000 EVs per year by 2023. While that's only a drop in the Tesla bucket (60% of their capacity), it's a strong start.
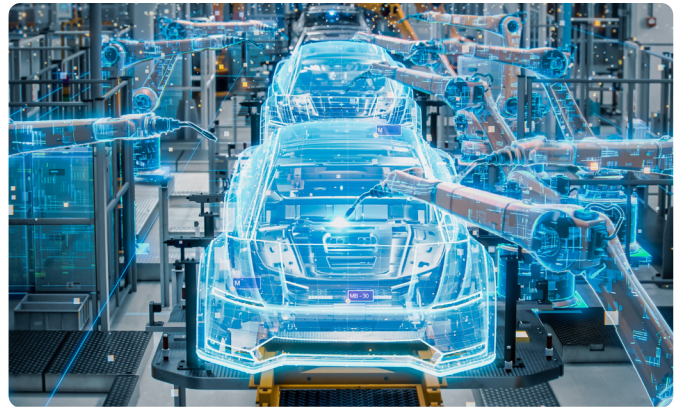
The Future Awaits

For facilities managers and the fully digital automotive factories of the future, next-generation digital twins might prove highly effective in discovering to what extent legacy carmakers can convert part of their assembly plants into EV manufacturing — without the need to build more plants and increase their physical and their carbon footprints. Incorporating interchangeable parts between EVs and ICE vehicles in the same factory, on a partially shared assembly line, will be yet another milestone in the automotive industry's long-held desire to be "part of the engine that powers the world."

It's innovations like this that have the most forward-looking facilities managers rejecting pessimism over the market growth headwinds of today, and instead, counting the days until the digital facility of the future finally arrives.

As General Dwight Eisenhower once said:

> "plans are useless, but planning is indispensable."

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Rearview Rewind

When investigating digital facilities management for the automotive environment, it helps to identify the many pain points this technology solves. Here are five advantages of digital twin and why it's fast becoming a data de-siloing lynchpin:

1. Creation of a shared visual interface to secure joint understanding

2. Real-time representation of accurate data that overcomes 2D layout updating challenges

3. The ability to compare facilities without relying on individual memory or the dated or inaccurate institutional knowledge of someone else

4. Validation of new projects, concepts, implementations in the context of what a project actually looks like

5. Minimizes "surprises" when the facilities manager arrives on site for that maintenance work

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