Micro

Innovation Study: Manufacturing without Walls

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Contents

Summary

Recently, we completed construction on a new purpose built Micro facility in Costa Rica. As part of the design process, we lent heavily into the concept of a transparent manufacturing environment, and pursued it as far as we could. We intended to improve quality assurance, create a transparent culture and build even more accountability into our workflow. To date, we've seen no other instance in which a company has achieved what we did. Here's what we learned.

Michael Tucci,
CEO and President

Part I:
The New Micro Facility

Our new building started with a simple idea. I wanted to see the entire factory from the vantage point of my office. I wanted to see everything that was going on at any time, and not just for me, but for everyone. Traditional manufacturing facilities are boxes within boxes – uninspiring places. You build a big shell and within that shell you build smaller controlled environments. also in (smaller) boxes. It's an easy way to solve the issues of creating controlled environments but it doesn't necessarily solve it well because there are many inefficiencies and culture issues that result. Often, these layouts become fixed, and pivoting and changing layout to improve workflow and efficiency becomes impossible. Finally, it's a lot more building, heating, cooling and energy. More importantly though, we felt that with the traditional way of building a manufacturing facility, you don't get a high-level feel for what's going on. You must walk in and out of each room without the overall context of how it all works together.

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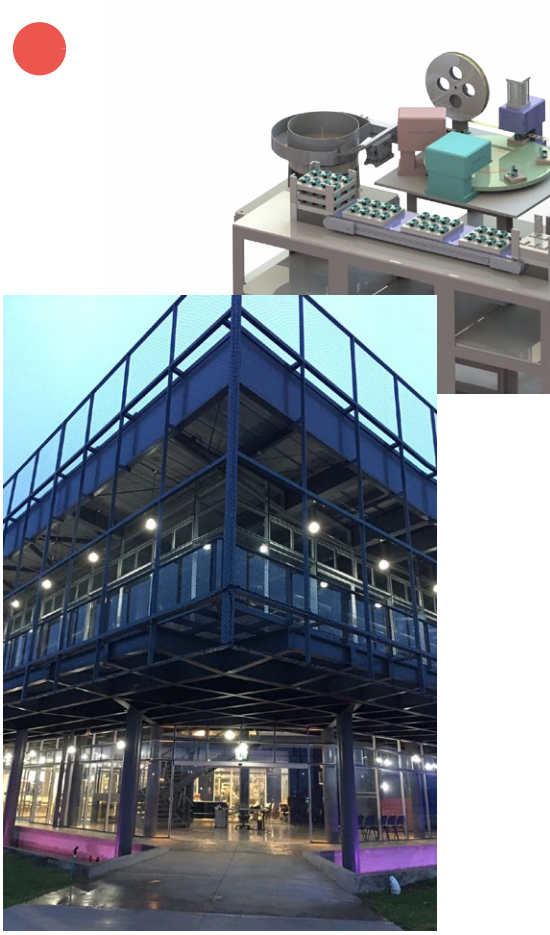
Lean manufacturing emphasizes open workplaces, using tools like green light / red light, shadow boards etc. but even this only goes so far. We wanted to take it even farther. When we designed the new Micro facility, the dream was to look out and see everything going on from a vantage point in the office, all at once, still within a controlled environment. That's where we faced our first challenge. Building an open manufacturing floor whilst remaining a controlled environment.

There were three things we needed to consider

A. **Energy** as it relates to heating and cooling and humidity. You move from an 8-foot ceiling to a 30-foot ceiling, and so you need to address temperature management. Humidity management in a location such as Costa Rica which features drastic fluctuations from season to season.

B. **Retaining cleanliness.**



Part II: A-Energy Management

We approached the problem through the lens of intelligently designing the building itself. The outer shell of the building can't just be an outer shell. It must also be part of the solution. We used our outer shell to mitigate the peaks and valleys of heat and humidity by:

- Investing into a high value insulation jacket.
- Installing a living wall around the building with green vines that would act as a cooling jacket and natural filter.

Both design solutions would work but it would not be enough. In the building itself, we also needed to shield off the inside, and be careful about humidity and particulates coming in.

Part III: B-Cleanliness Management

In our design, the mezzanine that houses our people above the factory floor is open to the world with big sliding windows to create an indoor/outdoor area. We did this to design a space people would love working in, and to take advantage of the natural climate benefits that Costa Rica offers. For Micro, it also became a competitive labor attraction in designing a workspace people enjoy, especially in comparison to hiring competitors who build standard and uninspiring workspaces. This accentuated the need for cleanliness management.

Mostly, people create clean rooms to segregate things out that need to be clean. You need to build boxes within your building to get these clean rooms active and usable. These means thicker walls, insulated, sealed in and controlled. It also means drilling into the floor and losing the fluidity of the layout that we wanted to use to pivot and improve in the years to come. Once you build these rooms, they never really move.

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The modular workplace model we wanted becomes harder if you must do this, so instead, we segregated the dirty options and built a dirty room. Anything that creates contaminants into the air goes into a dirty room, with its own HVAC system to take it out of the equation. That way, we take dirty out and cleanliness becomes nominal. It then allows us to run more non-clean room production as the norm.

With that said, there were still medical applications that required a separated cleanroom, so we created soft-sided modular clean rooms in the form of clean plastic tents that were movable, easily erectable and completely clean. Plastic is a terrible insulator and not good for humidity so could never be used in a standard factory floor, but because we're dealing with an entire outer envelope that is tempered, we can use these soft sided plastic clean rooms with success, in a modular capacity, whilst still retaining the transparency we planned for in the factory.

Part IV: The Challenges & Benefits

All this has allowed us to begin to create a transparent manufacturing company. It sounds easier than it is. Here's some of the challenges and interesting observations we've faced.

1. We don't have walls – You cannot hide

There's nowhere to hide anything. Even things you want to hide like reams of paper has forced us to begin the journey of going paperless. Interestingly, I'll be in one of these glass rooms looking over the factory and I'll see someone walk out of a meeting onto the floor and correct something they just saw whilst in the meeting. This has by nature enhanced quality control at a whole new level.

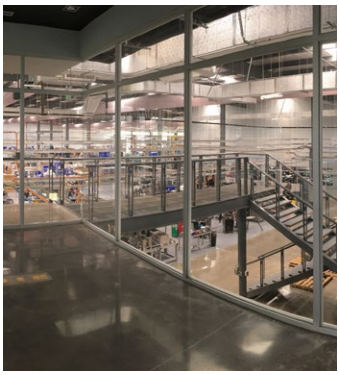
The benefit enables us to increase quality control more efficiently, without building unnecessary new steps into our process, by nature of removing the ability to hide It's a fish bowl in some ways, and the effects of it are already being felt, in a transformative way. By changing the game for our workers, we're building more of a culture of awareness, transparency, immediate corrective action and total accountability. If someone sees something going on, they can correct it right away.

2. Dealing with sound

Instead of sealing off rooms, we've needed to kill sound at the source. Some of the machines put out 95 decibels, so we've built custom sound boxes at the source to lower it, and to get it down to 70 decibels which is on par with our expectations for the room.

3. The impact on culture

Everyone is watching you. There's nowhere to go and just do your thing. Virtually everything is 100% transparent and so I believe there's an adaption that needs to happen. Not everyone likes it, but we're ok with that because what we prioritize is better outcomes, and efficiency in an environment that encourages performance. We believe this is doing that.



Part V: Concluding Thoughts

It's admittedly early on but so far, I'm encouraged. We haven't seen all the problems, or the benefits yet, and we're continually observing, adapting, pivoting and responding to things as they come up. A lot of what is in the factory creates particulates, like cardboard packaging, wooden pallets and more, so it effects our floor and cleanliness need. It means we need to work with clients and come up with innovative solutions to ensure our workflow and environment retains integrity.

Contact us today

Every innovated solution is backed by the uncompromising pursuit of excellence at every phase of our manufacturing process.

We invite you to contact us to learn more about the integrity built into our systems and processes.

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