

# The Social Impact Potential of Immersive Learning in Small Business



CORPORATE  
SOLUTIONS

*A case study on BOMAG, a small manufacturing business with high levels of motivation and strategic leadership that discovered what augmented reality could do for it and its workers.*

PRESENTED TO FACEBOOK

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In an increasingly demanding economy—one in which the challenges facing small businesses have multiplied since the onset of the COVID pandemic—augmented reality (AR) represents a cost-effective strategic tool that high-growth small businesses can use to compete with larger rivals, help their employees advance professionally, and have a positive impact on their communities.

This case study presents the story of how one small manufacturing business, with high levels of motivation and strategic leadership, discovered how AR could benefit its operations and its workers through a trial implementation that yielded short-term quality improvements and planted the seeds for initiatives that could deliver longer-term social value.

That company, BOMAG, was one of eight businesses that participated in a 10-week AR pilot project managed by JFF. The project’s goal was to learn more about augmented reality’s potential and its limitations in small businesses by introducing small manufacturers to the technology and helping them deploy and use it.

The project’s broader goals included assessing the technology’s potential to have an impact and advancing equity and diversity. These priorities align strongly

with JFF’s core mission of driving economic advancement for all. The effort to implement AR technology in small businesses represented a new perspective for JFF’s work in that it focused both on small businesses and their workers, allowing us to evaluate the social value AR could have with two separate yet interdependent populations. Accordingly, impact, diversity, and equity were at the forefront of the initial research that determined what industry the pilot would focus on, the conversations with partners and businesses regarding participation in the pilot, and in all data collection instruments.



# What role can AR play in manufacturing today?

Business use of augmented reality tools is reaching new heights, and investments in the technology have grown in recent years, especially since the start of the COVID-19 pandemic. The unpredictability of the labor market and demand for technologies that support and enable remote work have shifted perceptions of AR. Once regarded as a technology that added value to existing operations, AR is starting to be seen as an essential business solution. Large enterprises are pushing the limits of its potential as an interactive communication, training, and sales marketing tool. Until recently, AR deployments had been limited to technical and process-oriented work, but now, makers of immersive software and hardware tools are racing to harness the technology's full potential. High costs and the need for sophisticated technology infrastructures have kept the most innovative AR-driven systems out of the reach of consumers and small businesses, but the results of the 10 week pilot indicate that even technical and process-oriented AR systems can help improve communication and soft skill development

in the workforce. This unexpected and encouraging finding offers an indication of how AR, and the broader spectrum of immersive technologies, could benefit small businesses, their employees, and their communities in the not-so-distant future.

## BOMAG's Story

Based in Fairfield County, South Carolina, BOMAG manufactures paving equipment and sells finished machinery directly to other businesses. It's a "high mix, low volume" operation, meaning it tailors most of the equipment it makes to the specific needs and requests of customers and produces fewer units as a result. Although it's a subsidiary of France-based Fayat group, BOMAG has its own in-house operations team and sees itself as an independent organization.



BOMAG has about 130 employees, of whom approximately 50 percent are Black, reflecting the demographic makeup of the surrounding community. The company has a flat organizational structure with minimal layers of hierarchy, and it is very metric-driven. Brady Umberger, Director of Operations, is the business champion who JFF partnered with for this pilot, and is a self-described “younger guy who is not aloof to technology.” With a bachelor’s degree in organizational development, Brady is receptive to innovation, extremely proactive, and well organized. Like his employer, he operates flexibly and is open to change, all factors that we believe contributed to BOMAG’s success in this pilot.

## Why now?

JFF was introduced to BOMAG through the South Carolina Manufacturing Extension Partnership (MEP). The company had already taken some critical steps towards more digitization and systematic integration with a robust SAP enterprise resource planning system, a do-it-yourself digital work instruction platform, heavily documented processes in Excel, and TVs to view work instructions on the manufacturing floors. These steps had already resulted in big efficiency and productivity gains for the company.

Umberger knew that AR technology was the logical next step in BOMAG’s digital journey; stronger processes and communication across the organization would decrease errors and waste, and deliver a more consistent product. They wanted to take their relationships with customers, vendors and other stakeholders to a new level.

Umberger had already looked into options for integration, but found the cost estimates for a preliminary pilot too high. In his very first conversation with JFF, he made it clear that AR technology was about quality control for BOMAG, not efficiency or productivity gains. In his words, a no-risk pilot with tablets and support was “a no brainer.” He would have the chance to bring AR to BOMAG at the cost of only his time. This was a low-risk way to prove to upper management and other departments that AR could be a significant benefit to the company.

## What happened?

The two AR solutions implemented, digital work instructions (DWI) and remote assistance, were delivered through Augmentir, a third party vendor focused primarily on small manufacturing businesses. With Umberger's leadership, BOMAG chose to focus the pilot and resources that came along with it, such as free tablets, troubleshooting and support, in one department, where he anticipated low resistance and high use-case potential. This allowed BOMAG to pick optimal initial use cases and move quickly through the adoption phases. By week four of the pilot, BOMAG had built and was training end users in multiple use cases and seeing results. The operations team had already started to see a reduction in errors and an uptick in quality. By the end of the ten weeks, BOMAG was well on its way to moving AR into other departments and had already built the DWI to move into training new and existing employees. BOMAG signed a three-year agreement with Augmentir at the end of the pilot and will begin integrating Augmentir with other systems to maximize outcomes.

### AR Contributed to These Functions

- Delivery
- Inspection
- Shipping
- Packaging
- Audits

## The Business Benefits of AR

### AR Contributes to the Bottom Line

BOMAG's primary goal for this pilot was to improve the quality of their final products. According to Umberger, the cost of Augmentir is minimal compared to the quality gains he has seen in his department since the implementation of the technology. AR has enabled the department to more effectively record and organize information, manage document control, lower errors and waste, increase transparency, and increase accountability and employee engagement, all of which contribute directly to the company's bottom line.

**6 out of 6  
end users  
agreed  
that this  
technology  
helped  
them to do  
their jobs.**



“ We were able to [take] shipping audits to the next level by providing a process that can not be deviated from. We also benefit from the automatic reports used in freight claim processes for both the company and our customers. ”

- BOMAG Manager

### **Improves Employee Experience, Communication, and Engagement**

Though BOMAG did not have specific goals related to employee engagement, their team saw leading indicators that showed an improvement in communication and experience.

*AR improved collaboration.* Though not a specific goal or use case for this pilot, employees cited improved collaboration and communication via the technology. Final inspections and audits were completed virtually and results were shared with management immediately, increasing the speed of feedback and the opportunity for frontline employees and managers to work together to problem solve.



**3 out of 4** decision makers agreed that BOMAG could realize cost savings from this solution by improving quality control, facilitating faster training, and making communications easier.

**9 out of 10** survey respondents felt confident and/or excited about using AR technology in their jobs.

**3 out of 4** decision makers agreed that this pilot has increased learning and training opportunities at their company.

*AR could reduce turnover and increase engagement.* “We lose a lot of people in the first couple days because it’s a lot of information at one time, especially on the paver lines,” said a BOMAG employee. This technology could enable new employees to be better supported through onboarding by providing a step-by-step overview of relevant processes. Companies that focus on developing internal talent see higher rates of productivity, engagement, and retention than their competitors. Umberger believes that in the future, this technology will enable employees to be onboarded and trained faster and that it will give them the opportunity to do their jobs more effectively, which will lead to advancement opportunities within the company.

*AR empowered BOMAG employees to lead.* Not only were hourly employees given an opportunity to own and author processes within Augmentir, but they were also able to build managerial skills. Instead of spending time training new employees individually, experienced employees were able to assign work that could be supported by a tablet and check in with newer employees less frequently, freeing up their time to complete tasks only they could do and improving their ownership and engagement over how they spend their time.



## Pilot Implications and Future Cases

This short pilot paired a motivated and creative champion with an opportunity to investigate AR at a relatively small scale. Though the pilot-use cases were limited by time and capacity, this experience opened the doors to future use cases across the entire business. Umberger believes “transformational gains” from AR technology will be seen when Augmentir is integrated with their other systems, especially the SAP system.

## BOMAG Future Use Cases

- Facilitate training through the development of detailed work instructions
- Integrate with other technologies to facilitate cross-department collaboration
- Improve safety processes via the development of hazardous waste and fire inspections processes and checklists

**Early delegation opportunities foster future leaders, and create ownership over the process and product.**

## What about the workers?

BOMAG has a racially-diverse workforce that includes employees of varying age, education levels, and work experience. There is no typical BOMAG employee profile. Employees are recruited from all walks of life and are advanced based on the merit of their work. The business is intentional about improving diversity, equity, and positive business impact.

“ We are more liberal with who we hire, already. This [pilot] will make it easier to put people into areas that are using AR. ”

- **Brady Umberger**, *Operations Manager and Pilot Business Champion*

The worker experience was largely positive. While one worker interviewed said his work slowed down when using the technology to assist with repetitive and detail-oriented tasks, the majority agreed that the technology largely made their jobs simpler. One mentioned, “It hasn’t changed my job, but it makes it easier. I don’t have to reprint things and waste paper so much, everything is on the

tablet.” The technology enabled workers to keep all the information in one place and collaborate using the tablets, leading to stronger consistency and quality control across different aspects of the work. One user said, “I have to write up any issues or defects... With Augmentir, I can take videos of the issue. For example if a line is leaking, I can take a video of where it is leaking and can prevent it in future.” The ability to document and share frees up time by eliminating paper reports and enables easier communication with the service team via auto-generated emails. This released time allows for increased efficiency, more opportunities to gain managerial skills through delegation, and potentially an opportunity to move up into new roles.

Authoring duties were delegated to hourly employees from the very beginning. Entry-level employees were responsible for recording best practices and developing central resources. This delegation reflects the trust the company has in its employees, which gave workers a stronger voice and helped build engagement and ownership at all levels. Further, this indicates a prioritization of a positive corporate culture, skill development, and advancement pathways. One person we spoke to, who is now involved in authoring, mentioned they had no previous manufacturing experience prior to joining

the company four years ago but now has this incredible opportunity to learn, delegate, and grow.

**“ It can give us exposure... especially when it comes to delegation. Proof we can delegate, manage our time and others, get all the work done...it shows us in a better light. Part of the reason Brady is trying to do this is he is trying to build people up. It will definitely show us we can do it. ”**

*- BOMAG Worker*

The adoption of AR technology in an already diverse and worker-centric culture accelerated and accentuated the opportunities workers have to learn and grow at BOMAG. Though the pilot was only 10 weeks, several key results and implications emerged for increasing product quality, employee engagement, employee confidence and advancement opportunities, as well as future use cases.

## What does this teach us?

The results of the pilot project indicate that businesses—and business leaders—with certain attributes are more likely than others to make the most of AR technology and explore new possibilities over time. For example, BOMAG had already started its digital journey before the pilot and Umberger had gained the trust of company leaders, who saw him as someone who could find ways to make BOMAG more efficient and productive and then go a step further to improve the quality of its products. The combination of an organizational culture that was receptive to change, existing technological momentum, attainable goals, and leaders who think strategically created ideal circumstances for an AR technology implementation.



The most distinctive feature of BOMAG’s overall strategy was its simplicity. BOMAG was focused on specific goals and chose use cases carefully to ensure that the first few AR deployments had a chance to succeed, and that those deployments could dovetail into future use cases and companywide implementations. This approach helped ensure that the results would be meaningful and easy to identify, even though they may not have been as ambitious as those that other businesses in the AR pilot sought to achieve.

In the initial research for the pilot, we determined that soft skills—the ability to communicate and collaborate effectively, for example—were in high demand at small businesses, but no particular training curriculum, methodology, or technology had been identified as playing an effective role in developing those skills in such settings. Proving that AR technology could be an effective tool for helping people develop technical skills—or “hard skills”—was the anticipated goal of this pilot. BOMAG and other businesses that tested and pushed the limits of AR technology have proved that it can help develop soft skills because of the simple fact that it facilitates the transmission of information in a more digestible and transparent way. This is a significant finding that should lead to further efforts to test AR’s potential as a soft skills development tool.

As for the potential of AR technology to have a positive social impact, BOMAG had already built a culture that promoted diversity, equity, and inclusion prior to the pilot (which was evident in the makeup of its workforce and its efforts to recruit people from the region's predominantly Black community), and it had demonstrated a willingness to hire employees with no manufacturing experience or certifications. What the pilot revealed is that a diverse workforce made up of people with differing life and work experiences can adopt AR technology quickly and successfully, and at the same time find ways to identify and create opportunities for employee advancement. Furthermore, the workers who use AR technology will gain the skills and confidence they need to pursue more advanced career opportunities, both inside and outside of the company, and thereby potentially create economic mobility that benefits the community at large.

Stronger training programs and clear—and more accessible—advancement opportunities set the stage for a better employee experience and increased employee engagement, which lead to improvements in retention rates. The more employees are engaged in the implementation of any new technology, the more likely it is that use of the technology will expand throughout the organization

and improve the company's bottom line. Augmented reality could be the type of technology that employees embrace in that way, and because of its connection to the larger immersive technology spectrum it could have that type of business and social impact. If it improves the operations of businesses and advances the careers of workers in the way this case study suggests it can, AR could help build stronger communities.

While AR hasn't yet delivered that type of payoff for BOMAG and its surrounding community, the results of this preliminary research indicate that it has the potential to do so.

**Stronger training programs and clear—and more accessible—advancement opportunities set the stage for a better employee experience and increased employee engagement, which lead to improvements in retention rates.**



**88 Broad St., 8th Floor, Boston, MA 02110**

122 C St., NW, Suite 280, Washington, DC 20001

505 14th St., Suite 340, Oakland, CA 94612

**TEL** 617.728.4446 **WEB** [www.jff.org](http://www.jff.org)