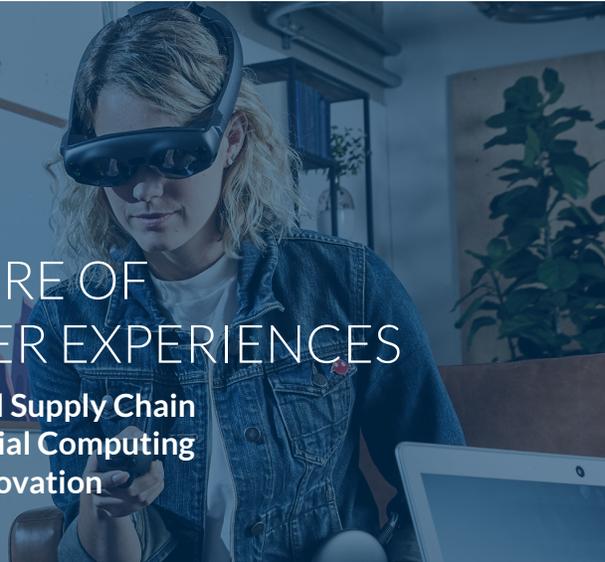




MAGIC LEAP

CATAPULTS THE FUTURE OF COMPUTING AND USER EXPERIENCES

Jabil's Engineering, Manufacturing and Supply Chain Expertise Empowers Mobile Tech Spatial Computing Start-Up to Reach New Heights of Innovation



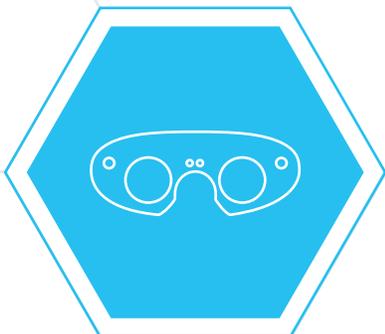
CHALLENGES

- Revolutionary spatial computing product required new technologies that didn't exist previously.
- Advanced optical expertise was needed to guide everything from product design to delivery.
- Extensive business interest in game-changing solution necessitated stringent IP/brand protection.



CASE STUDY

- **Company:** Magic Leap
- **Industry:** Spatial Computing
- **Country:** United States
- **Employees:** 800
- **Websites:** magicleap.com



SOLUTIONS

- Jabil's depth and breadth of technology, supply chain and manufacturing expertise bolstered start-up's go-to-market strategies.
- Jabil's advanced optical systems experience fueled ground-breaking developments.
- Jabil's investments in a new building streamlined and sped product delivery.

BENEFITS

- The successful launch of Magic Leap One introduced a new era of computing.
- Closely aligned teams drive continuous innovation while supporting aggressive technology roadmap.
- Collaboration on remote assistance and operator training broaden appeal of Magic Leap One for new enterprise applications.



Magic Leap, a boundary-breaking technology company based in Plantation, Fla., is anchored by creators, engineers, scientists and artists who are amplifying human creativity and intelligence through spatial computing. With the introduction of the Magic Leap One in August 2018, the company vaulted computing into a completely new era that lets digital content move beyond the confines of today's 2D screens and computers.

"Spatial computing allows digital content to blend seamlessly into the physical world around you," explains Daniel Diez, Chief Marketing and Communications Officer at Magic Leap. "Instead of staring at a tiny screen, you're looking up and around as that content exists in the world where it's most relevant at that moment in time. The digital content augments an experience, making it better in some way by meshing digital and physical together."

For example, spatial computing as defined by Magic Leap can be used to show items viewed online while shopping at a physical store, upskill workers at a faster pace, or superimpose directions and guidance while exploring a new city. "Computing has been evolving for decades—all of which has operated behind screens," adds Omar Kahn, Chief Product Officer at Magic Leap. "We're delivering all of the power of the next generation of computing from an AI, productivity and entertainment perspective but without a screen."

"Everyone is invested in getting our product to market the right way—from product development engineers to operators at manufacturing facilities all the way up to the CEOs on both sides of our organizations."

**Paul Greco, Senior Vice President,
Hardware Engineering & Programs
at Magic Leap**

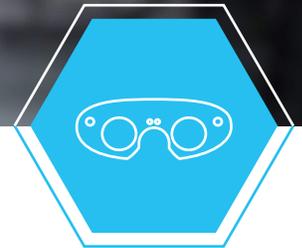
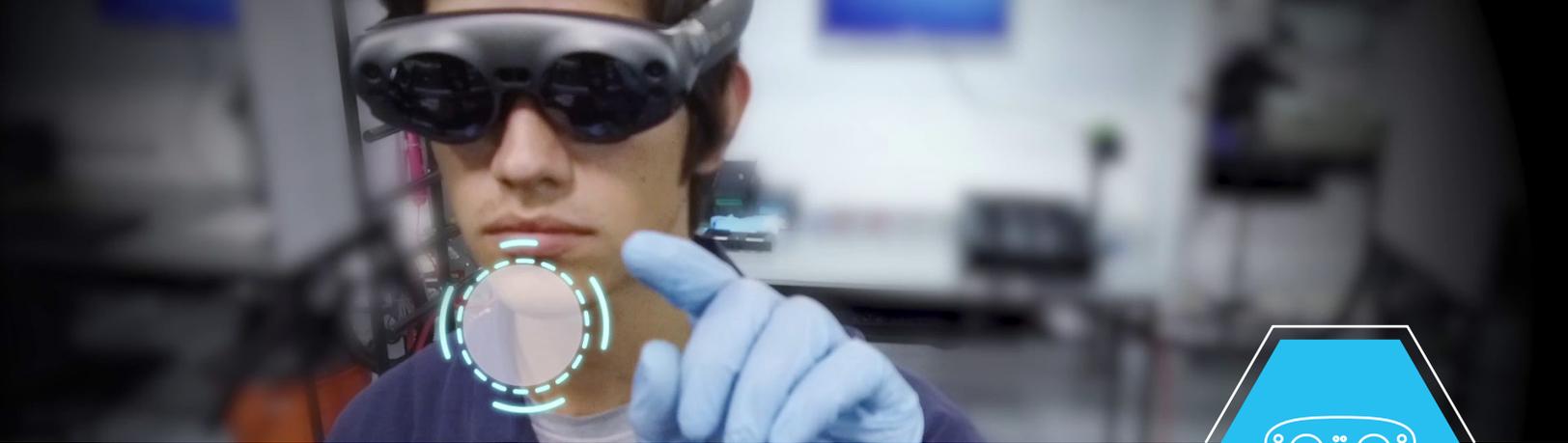
MARVEL OF ENGINEERING

Magic Leap delivers game-changing, spatial computing experiences using its head-mounted digital lightfield display called Lightwear and a portable Lightpack sensing and computing device that holds the headset's processors. A small, one-handed Control includes buttons, a touchpad and motion control capabilities. Magic Leap's spatial computing platform uses a proprietary Digital Lightfield, which works naturally with the human eye-brain system to integrate digital content in the physical world through additive light.

"One of the things we founded the company on was making sure the lightfield could be consumed by the user in a very natural way," says Paul Greco, Senior Vice President, Hardware Engineering & Programs at Magic Leap. Using the latest in machine learning, computer vision, sensors and human-centered AI, Magic Leap set out to completely change the way people consume digital information.

Bringing Magic Leap's mission to market required a marvel of engineering, including the latest advancements in AI, spatial light modulation, optics, sensors, projection systems and precision mechanics. Another overriding challenge was that most existing technology roadmaps weren't optimized for building a spatial computer. "We didn't have the luxury of being an integrator," adds Kahn. "We have to innovate on many of the processes and technologies in terms of what it takes to bring our products to market and get users engaged with them."

In particular, Magic Leap faced some innovative optical challenges, especially in addressing the optics that feed the lightfield. In addition to custom sensors required for mapping and tracking the environment, the team needed to leverage cutting-edge optical technologies to drive new and compelling user experiences. "It's not easy as this is brand-new technology," says Diez. "We're inventing new things every day."



CONTINUUM OF CAPABILITIES

To navigate uncharted tech territory, Magic Leap sought a partner with an ideal combination of engineering, manufacturing and supply chain expertise. In particular, they needed a company that could complement Magic Leap's internal production and manufacturing capabilities while providing the advanced optical experience needed to ensure precision mass production.

The sheer complexities of Magic Leap's New Product Introduction (NPI) phase necessitated both broad and deep experience as the company pushed limits on multiple technologies. This required new solutions and performance levels that didn't exist previously.

In surveying the manufacturing services landscape, Jabil stood out for its successful track record of intricate and in-depth knowledge of optical systems and technologies. Jabil's optics expertise spans the globe, encompassing an Optics Technology Innovation Center in Israel, world-renown optics capabilities in Jena, Germany, and advanced active alignment automation in Boston. This optical leadership is complemented by extensive process development/materials sciences expertise in Silicon Valley, along with world-class manufacturing facilities around the world.

"What really differentiated Jabil is the fact that they are both broad and deep," says Lonnie Bernardoni, Corporate Vice President, Supply Chain at Magic Leap. "In terms of breadth, Jabil helps us conceive of new manufacturing process technologies and apply advanced research all the way through productization and delivery. Jabil's optical expertise goes really deep too, as does their willingness to make big investments we both need to be successful."

In bringing this product breakthrough to market, Jabil engaged with Magic Leap teams across multiple facilities around the world. In addition to Jabil's world-class optical capabilities, the company provided industry-leading process and test development, tooling and precision mechanics as well as highly automated production processes as part of a complete Final Assembly, Test and Pack Out (FATP) solution.

IP/BRAND PROTECTION

In developing its inaugural product, Magic Leap amassed thousands of technology patents to address how its various cameras, sensors, speakers and optical relay worked together with the superpowered processor in the Lightpack. As word spread about Magic Leap's potential to revolutionize computing from AI, productivity, enterprise, entertainment and training perspectives, it became increasingly important to ensure that no product details were released prematurely.

"We've been very impressed with Jabil's capabilities working with what we call the 'black box,' which is our process for building prototypes where only a limited number of people know what we're doing," continues Bernardoni. "We felt very comfortable that we could build our product at a Jabil facility and protect our brand."

In finalizing elements of the product design, Magic Leap completed more than 8,000 prototypes, all of which were administered according to strict IP/brand protection guidelines. "Brand protection was a critical parameter for us in terms of making a decision about a launch partner," says Greco. "We've been extremely pleased that there's been absolutely no IP leakage since we've been working with Jabil."

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COMMITMENT TO INNOVATION

Another critical area where Jabil shines is in keeping pace with Magic Leap's agile product development methodology, which applies flexible processes to turn over complex optical electrical systems at a very fast rate. "Jabil has been able to keep up with our rapid cycle times to speed product development and delivery," notes Greco. "Together, we've implemented best practices and value-added steps around early supplier involvements and cross-functional team engagement."

The ability to take advantage of Jabil's global supply chain and long-standing supplier relationships has been invaluable in attaining the best components at the lowest prices. "Jabil's supply chain has really helped us; they're a well-established company with a tremendous amount of relationships," says Bernardoni. "We actually looked like a much larger entity, which enabled us to get better pricing and faster supply guarantees."

Moreover, Magic Leap leverages Jabil's Intelligent Digital Supply Chain (IDSC) to gain real-time insights into events that could impact parts availability or pricing. As a result, Magic Leap's team can make better decisions while taking advantage of a much more mature supply chain than could feasibly be built as a start-up.

"We can demonstrate the true meaning of partnership through Magic Leap's relationship with Jabil," adds Greco. "Everyone is invested in getting our product to market the right way—from product development engineers to operators at manufacturing facilities all the way up to the CEOs on both sides of our organizations."

This close cultural alignment was exemplified when Jabil made an important investment that was needed to further streamline and speed Magic Leap One productization. After experiencing space constraints at a manufacturing facility, Jabil quickly authorized a new building to support Magic Leap's burgeoning production demands. In short order, a full-scale production facility was up and running, with SMT and assembly lines, as well as optical test capabilities and stringent quality control processes.

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MAKING THE IMPOSSIBLE POSSIBLE

"They helped pull all these different operations and organizations together with a singular focus that we're going to essentially bring what was impossible five minutes ago to market today," says Bernardoni. This united approach is fueling Magic Leap's technology roadmap while identifying new opportunities and applications.

For instance, Magic Leap is working with Jabil on a special project to use the Magic Leap One to train production-line operators and support them through complex operations. "This concept of training and remote assistance—to have an instruction set overlaid at scale to help people understand what they're doing—is very powerful," says Kahn.

This new application, along with a growing list of enterprise, entertainment, productivity, collaboration and 3D visualization applications, is testament to the endless possibilities that can be facilitated by Magic Leap. "We're really excited about the future of spatial computing," concludes Greco. "We feel that it's going to change how individuals and companies consume digital information, every day, all day and everywhere they go. Jabil will play a big part in helping us drive innovation and achieve our mission, while making future products smaller, more affordable and increasingly powerful."

Jabil (NYSE: JBL) is a manufacturing solutions provider that delivers comprehensive design, manufacturing, supply chain and product management services. Leveraging the power of over 200,000 people across 100 sites strategically located around the world, Jabil simplifies complexity and delivers value in a broad range of industries, enabling innovation, growth and customer success. For more information, visit jabil.com.