

Case Study: Micro-Transfer Printing Tool Integration Brings Photonics Display Components to Life

X Display Company (XDC) is a global leader in cutting-edge Micro-Transfer Printing (μ TP) technology based in Ireland with a U.S. subsidiary in Raleigh, North Carolina. XDC focuses solely on the display applications of μ TP and microLED technology and develops μ TP tools for both R&D and industrial-scale manufacturing. End products include high-tech components that are used in consumer products.

While there are many applications for μ TP tools, they are not yet widely manufactured or in use, according to Justin Brown, the executive vice president of operations and equipment at XDC.

To successfully develop their tools, XDC partnered with Owens Design for their design, manufacturing and procurement expertise that included having an extensive supply chain network, the outsourcing of which saves XDC thousands of dollars per year.

The Challenges

Niche Technology

In simple terms, μ TP technology allows for the heterogeneous integration of micron scale materials onto substrates. The process bears some resemblance to pick and place automation but is far more sophisticated: μ TP can transfer tiny materials (as small as $2 \times 2 \mu\text{m}$) to any substrate with high accuracy and speed (up to 3 million pieces per minute). The resulting integrated substrates can be interconnected to build photonics, LIDAR, lighting and display products. As confirmed by Brown, μ TP tools are highly specialized pieces of equipment that not many manufacturers have experience building.



XDC had built and designed a number of prior generation tools but sought a partner with more automation and system level integration experience. After a search, the team found there isn't anyone in the Raleigh area with semiconductor experience, so they expanded their search and found Owens Design who had exactly the experience they needed, from design through manufacturing.

Lean Team & Limited Space

The XDC team is relatively lean, and their facility doesn't have the space needed to integrate the tools in-house.

Had they the space – and the desire to build the tools without external assistance – it would have required the team to hire additional mechanical engineers, assemblers, and, perhaps, a procurement professional – equivalent to over \$450,000 in salary and payroll taxes (not including benefits).

In addition to onboarding new staff, building the tools internally would have required the team to pull existing employees, including both mechanical design and system engineers, away from other responsibilities.

Supplier Dilemmas

In the past, Brown and his team sometimes found it difficult to establish relationships with large, front-end automation suppliers. "As a small company, we can't get anywhere with them," said Brown. This made sourcing challenging – and taking a DIY approach nearly impossible.

The Solution

About eight years ago, XDC found Owens Design through its chief systems engineer. Because Owens Design has extensive experience designing and building [semiconductor](#) tools with automated handling of thin films, XDC was confident that a partnership would allow them to move forward.

Since their engagement began, Owens Design has been involved in the design and manufacturing process for XDC™ tools, including the MTP-200, MTP-300 and MTP-PanelG4.5. "The final product is heavily influenced by them," said Brown.

Design

According to Brown, Owens Design helps with design from the beginning. When a new tool is in development, the two teams come together to discuss the concept as part of a [Phase 1](#). When Brown and his team need to iron out kinks, they discuss their concerns with Owens in order to come to a resolution. "They have helped make the overall designs to be very functional," said Brown.

Manufacturing

Owens Design is also responsible for the internal setup of each tool according to Brown. XDC and other vendors source and ship parts to Owens Design, who then creates the tool's shell and integrates the internal pieces, including point-to-point wiring and programable logic controller (PLC) coding.

"Owens' flexibility and in- and out-of-house capabilities have been particularly helpful,"

said Brown. "The workmanship is always quite good."

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- Justin Brown

Staffing & Supplier Challenges, Solved

Partnering with Owens Design saved XDC from having to hire additional staff. Brown considers the fact that he "doesn't have to carry the heads" for in-house production, a significant value-add.

With Owens Design, "I'm buying a service – a more seasoned, experienced service," he said. "It's ultimately reflected in our organization. We are more effective at targeting resources and skillsets because Owens takes responsibilities off our plates. Now the team can be more focused because Owens is on inventory, procurement and quality."

Brown also values the ease with which his team can now communicate with suppliers. "Owens has good relationships and a number of engagements," he said. "Now, I get a different level of input and feedback from difficult suppliers."

Whenever issues emerge in their work together, Brown says the Owens Design team addresses and corrects them promptly. "They are a partner, and we have a good, open relationship," he said. "They bring a lot of different skills and capabilities to the table. They add a lot of value to the final package."



About Owens Design

From startups to Fortune 500 manufacturers, you can minimize risk, accelerate time-to-market, and scale high-tech production with custom design, build and turnkey manufacturing from Owens Design. OEMs meet impossible customer demands with production-ready prototypes designed and built with Owens Design. Manufacturers rapidly scale production of new products with custom automation developed by Owens. Since 1983, Owens has designed and built thousands of tools with 100% delivery, through highly experienced engineers, a proven product development process and customer commitment. Owens Design has deep expertise in semiconductors, biomedical, renewable energy, batteries, displays, and emerging technologies.

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