

X-ray Inspection Supports Quality in Component Procurement

By Kathryn Cramer



Cofactr, a logistics and supply chain technology company, uses Glenbrook Technologies' Jewel Box 90T real-time X-ray inspection system in its quality assurance program, to ensure the authenticity of components before releasing them to electronics manufacturers.

Starting a new venture is always challenging; starting one in 2021, when worldwide supply chain issues disrupted the entire electronics assembly industry, may have seemed particularly daunting. But for co-founders Matthew Haber (CEO) and Philip Gulley (CRO), it was the right moment to launch Cofactr, a company that allows manufacturers to cut through tangled supply chains while protecting themselves from the current proliferation of counterfeit components.

New York-based Cofactr provides a supply chain platform that automates component sourcing, procurement, warehousing, inventory management and parts delivery. As Haber describes it, the process begins when a customer uploads a BOM (Bill of Materials) to Cofactr's platform. The company's software accesses current data from more than 700 distributors to identify the most optimal way to source parts ranging from standard components to highly complex and expensive chips.

This extensive database provides "deep traceability in a disrupted space," he says, enabling Cofactr to differentiate between reputable and sometimes not-so-reputable "grey market" suppliers, who are often the source of counterfeit components. "Differentiating between the two can be difficult," Haber notes. For added assurance, he

explains, the company does "a lot of supplier vetting upstream to prevent counterfeits" and, in the process, "weed out bad suppliers." During the height of the supply chain crunch, manufacturers without such software and research capabilities could find themselves "in a rough place."

With Cofactr's platform, however, once the manufacturer is ready to purchase its BOM for a particular product run, "they just push a button and the computer issues the purchase orders," Haber says. The materials are delivered to Cofactr's warehouse, where they are subjected to the company's rigorous in-house quality assurance process, including real-time X-ray inspection. Parts from a trustworthy, authorized supplier may be sampled; others, depending on Cofactr's "risk profile" for that supplier, undergo 100 percent inspection, comparing each part to a known good chip.

This step is crucial, since many of Cofactr's customers produce circuit boards used in the aerospace, medical device, robotics, automotive and retail technology industries – "mission-critical hardware," as Haber calls it. "If something goes wrong in a rocket ship or a surgical robot, that's really bad." No manufacturer wants to waste time or money assembling a run of boards with even one bad

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component, especially when there's a possibility that a malfunctioning end product could have life-threatening consequences. Comprehensive inspection ensures that faulty or counterfeit components won't endanger outcomes for manufacturers, in effect "de-risking" the procurement process, according to Haber.

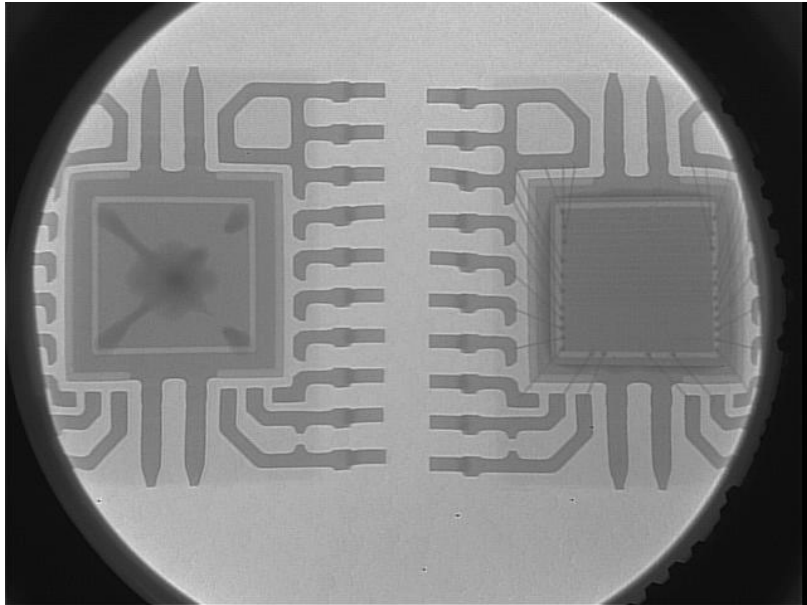
After a manufacturer's parts pass inspection, they are stored in the company's ESD- and climate-controlled warehouse until the customer is ready to take delivery. The process assures manufacturers that they are receiving authentic parts while eliminating the need for them to maintain their own logistics and inventory management capabilities, as one satisfied Cofactr customer has stated:

"Once a design is shipped to a vendor, it could take 2-3 days to find and source a single missing component. Across 10 designs, this already adds up to a month of wasted time per year. One of these designs can have

150 pieces. As a startup without a massive logistics department, you either suck all your engineer's time away managing inventory or accept that you will have mistakes. Or you talk to Cofactr," says James Miller, Head of Avionics at Stoke Space, a Seattle-based rocket launch company.

Another Cofactr customer, California-based Domatic, which produces intelligent power systems for energy-efficient and sustainable living spaces, had been struggling with lengthy production delays when chips they had ordered did not work as expected – or didn't work at all – until they discovered Cofactr's automated supply chain solution. "Cofactr saves us a full-time job's worth of time," says Gladys Wong, Domatic's co-founder and COO. "Thanks to them, I didn't have to hire another person only to monitor inventory and logistics. We also eliminated the procurement-related bottlenecks we used to have."

While supply chain issues have eased somewhat in recent months, says Haber, the problem – and the issue of counterfeit components – continues for manufacturers of all sizes, and he anticipates that it will take several years for component suppliers to meet the industry's growing and changing needs. This is nothing new, he notes; there have been issues for decades, as technology has evolved. "When VCRs came on the market, assemblers needed those chips right away," he explains, and it took a



Observing two apparently identical components side-by-side, under real-time X-ray inspection, reveals that the counterfeit part (left) has no wire bonds, a different die size than the good component (right) and a defective die.

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while for suppliers to catch up. Even with multiple new fabrication foundries in the works, those enterprises can take several years to build and equip.

VCRs may now be history, but sourcing chips for today's products still poses similar challenges. "Maybe one in 50 purchases are made on the grey market," Haber estimates. "If there are 100 different parts on a board, and 20 percent of them are critical chips, one quarter of those, or five, may have to be bought on the grey market." As a result, "it's incredibly important for us to do 100 percent non-destructive inspection on parts that do not come from an authorized supplier."



Images of components undergoing real-time X-ray inspection are displayed in high resolution and captured by the image processing software included in Glenbrook Technologies' Jewel Box 90T system.

Cofactr relies on a [JewelBox-90T](#) real-time X-ray inspection system supplied by Glenbrook Technologies of Randolph, New Jersey, to ensure component authenticity. The unit provides magnification from 7X to 2000X, using patented X-ray camera technology, with resolution of 100 line pairs per millimeter. The camera's sensitivity allows imaging of low-density materials, as well as very small parts, while the system's powerful 90kV micro-focus X-ray tube ensures deep penetration of dense materials. A five-axis manipulator provides 360-degree rotation and 45-degree tilt, while an image processing workstation includes software to view, capture and archive images. In addition, Cofactr's Jewel Box 90T has a reel-to-reel accessory that allows tape-mounted components to be counted as they are inspected.

Initially, "we chose the [Glenbrook system](#) because of the quality-to-price ratio: it had the capabilities we wanted at a price that worked for us," Haber says. He adds that the unit has performed well and proven to be both adaptable and customizable. Using in-house engineering capabilities, Cofactr has integrated a custom microscope camera into the system to capture the printing on top of each component while it is being X-rayed, providing a second level of digital documentation that can be maintained in perpetuity along with the X-ray images. Glenbrook was "open to our customizing the unit to meet our needs," Haber notes. Enhancing cost-efficiency for Cofactr, adding the camera to the X-ray system has eliminated the need for a second, labor-intensive photographic process.

"Having in-house X-ray inspection is a non-negotiable requirement" for Cofactr, Haber says of Glenbrook's Jewel Box 90T. "It enables us to serve our customers responsibly and efficiently. We wouldn't put our name on a report to a rocket or surgical robot supplier if we didn't have the capabilities of this machine."

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