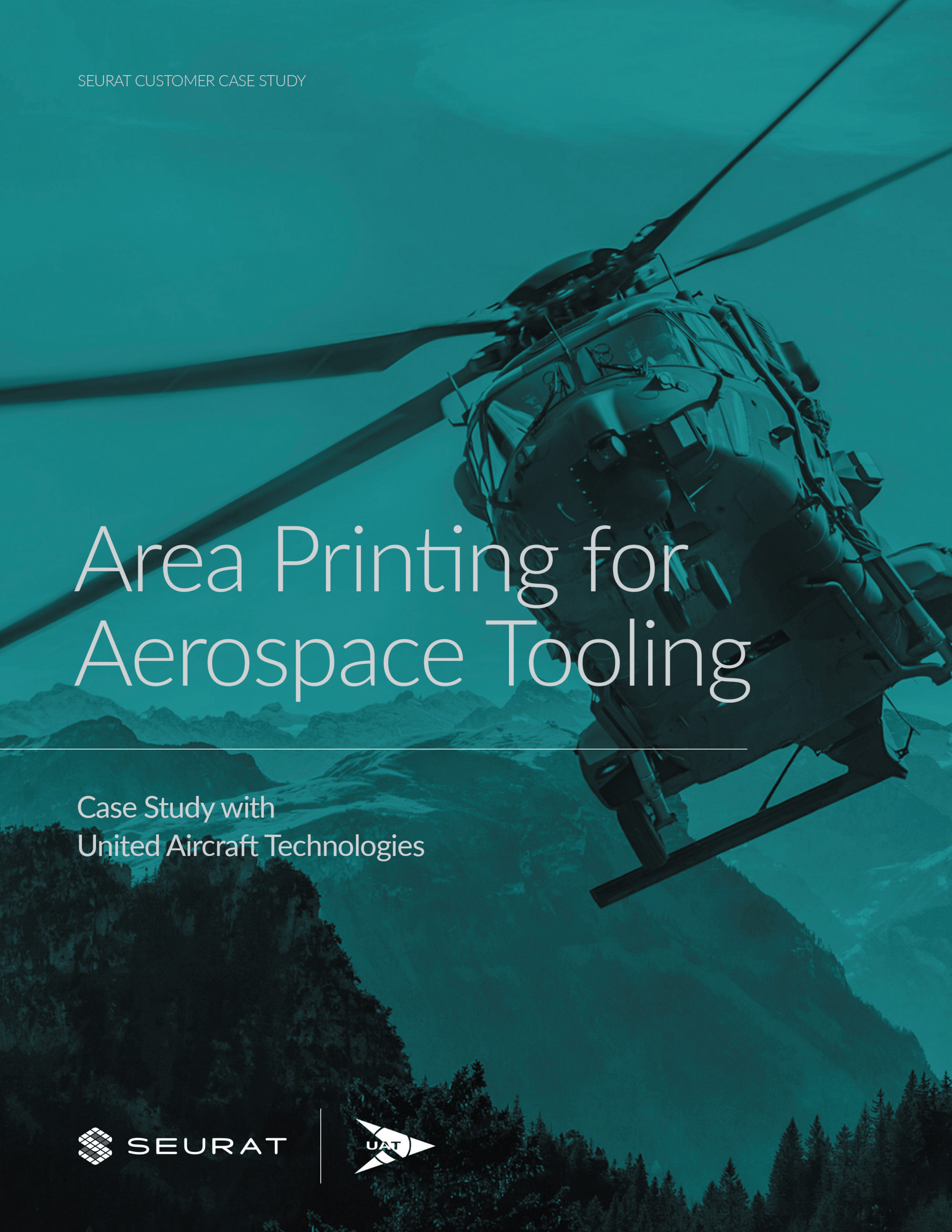
SEURAT CUSTOMER CASE STUDY



Area Printing for Aerospace Tooling

Case Study with United Aircraft Technologies

SEURAT | UAT

Introduction

United Aircraft Technologies (UAT) is a female-led, Latinx-founded aerospace business that is looking to solve an electrifying problem by modernizing electrical maintenance, performance, and safety with the manufacturing of lightweight, ergonomic, sensing clamps designated to hold down aircraft wiring. If successful, these clamps will improve maintenance operations and reduce aircraft weight, which improves payload capacity.

The benefits of this engineering solution have been noticed by the U.S. Department of Defense. UAT recently won a Phase II contract from the Army Applied Small Business Innovation Research (SBIR) Program worth $1.1M, among other Defense awards for the next couple of years. In 2020, UAT received a U.S. Air Force contract under the Agility Prime eVTOL Initiative. The focus of the contract is to explore commercial technologies in the emerging eVTOL market for disaster response, humanitarian aid, and logistics missions.

UAT has patented an Interconnecting Clamp (ICC), which re-imagines the future of electrical wire management. Seeking alternatives to address the long lead times and significant capital investment for the injection molds needed to manufacture the ICCs, it found Seurat and its unique metal additive manufacturing technology, Area Printing™.

The Strain of Aerospace Electrical Wire Management

From an evaluation of toolmaking alternatives, Evaguel (Eva) Rhysing, CEO of UAT, said, “We are very impressed with the speed that Seurat can manufacture, and when compared to other 3D printing options, they are the most cost effective.” She continued, “We project that Seurat’s costs can be one-fourth of that for traditionally manufactured mold components.”

The founding objective of UAT was the elimination of injuries resulting from the laborious, repetitive task of installing conventional metal clamps to secure miles of wiring in aircraft. Co-founder and CTO Daryian Rhysing, who was an aircraft electrician for the U.S. Army and Navy for over 14 years, had to end his service when he developed carpal tunnel syndrome. A closely aligned goal, also derived from his experiences during his military service, was to minimize the man-hours and costs of maintaining aircraft.

“Take a large commercial aircraft like the 737 as an example. There are over 30 miles of wiring restrained by 20,000 clamps. Installation takes around six months,” Eva shared. Simple and fast to install, the ICC dramatically reduces the installation time by 50% to accelerate aircraft production. But more importantly for those like Daryian, the ICC eliminates the repetitive motions that induce hand and wrist strain.

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>
> **Eva Rhysing**
> CEO at UAT

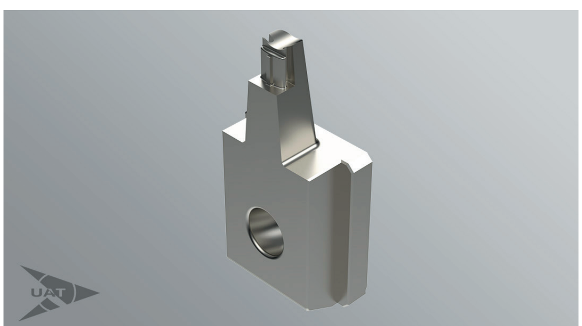
Embedded Efficiency

Beyond occupational health and safety, UAT uncovered and engineered many other advantages. Aircraft will experience less downtime and fewer emergency landings stemming from another repetitive motion that causes wire abrasion. Constant vibrations of wiring against metal clamps during flight lead to electrical shorts, but these faults are eliminated with the thermoplastic ICC.

If an electrical fault does occur, ICCs can expedite repairs. Diagnosing faults and detecting the source can take days or weeks when traversing miles of wiring with a multimeter. To address this, UAT engineered the Smart Interconnecting Clamp (SICC), which has embedded sensors to map, monitor and diagnose electrical systems in real time.

Thermoplastic clamps deliver another advantage, weight reduction. Depending on the application, this can translate to more hardware/payload on an aircraft or reduced fuel consumption for smaller carbon footprints. For a single commercial aircraft, ICCs can reduce the weight by 600 pounds.

The benefits of ICCs are clear, and pilot programs are underway, but UAT now faces the hurdle of high manufacturing startup costs. According to Eva, the lead time for multi-cavity molds will be 16 weeks (or more) and cost between $200,000 and $400,000. "This is a big financial hurdle for UAT, as it is for any startup operation," she said.



3D renderings of the slide core (left) and core pin (right) used in UAT's hardened steel mold to create their standard thermoplastic rivet mount for the ICC clamp.

Scalable Benefits

UAT sampled solutions from leading metal additive manufacturing companies to evaluate the viability of alternatives. It then collaborated with Seurat to manufacture stainless steel (316L) sliding-core pins for trials. Eva said, “At scale, we will need fifteen multi-cavity molds for our product line, and each cavity requires three core pins. So, while it is a small portion of the tool, the economic impact is significant.”

Eva said, “We see the potential Seurat has to revolutionize how businesses like ours can do tooling.” She continued, “Previously, I was doubtful that 3D printing would play a role in production. Now, I am very excited and hopeful for what the future brings for this technology.”

Having produced the sliding-core pins with Area Printing, UAT envisions manufacturing more components of future molds, or perhaps complete tool sets, as Seurat progresses through its technology roadmap. Eva said, “And this will be important even after we are fully operational. With potential demand for one million clamps per month for just one aircraft model, we will need to add more capacity and replace worn tooling.”

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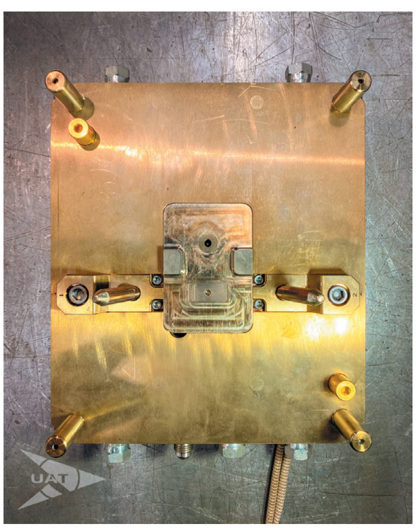
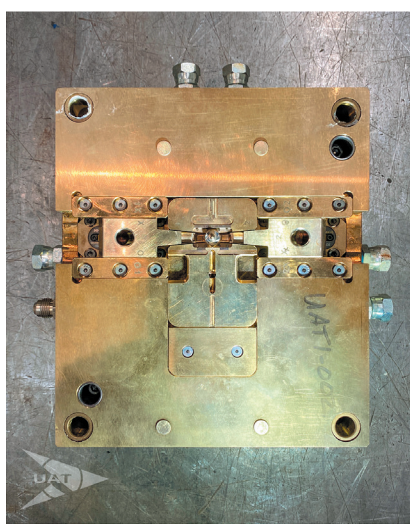
Eva Rhysing
CEO at UAT



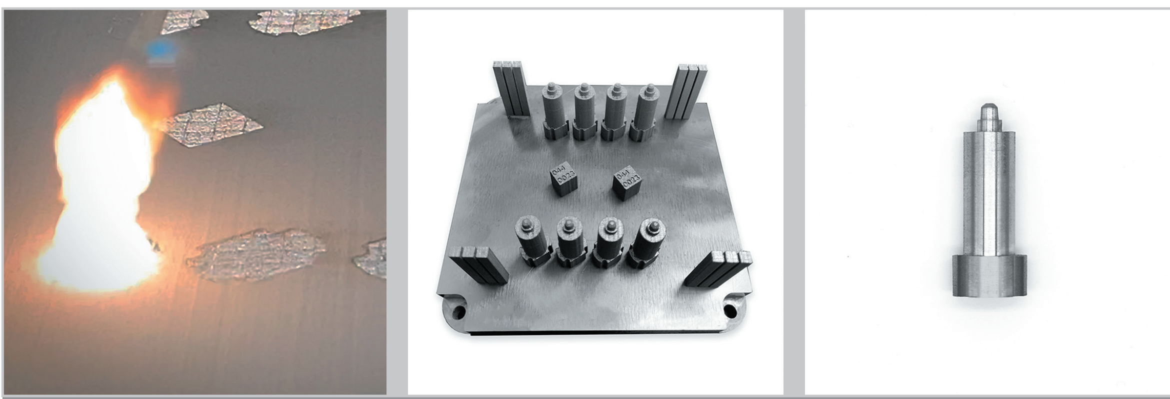


Functional prototype of the ICC clamp tool. A-Side (left) and B-Side (right) combine to form the complete single cavity mold of UAT’s tooling. Each tool has multiple sliding cores and core pins. UAT anticipates to produce north of 300K ICC clamps/year once fully commercialized.

Area Printing's Advantage

Seurat's target markets are high-volume applications found in consumer electronics, automotive, energy, and other industrial markets. From a cost perspective, their Gen 1 platform will be very competitive with machining, and Gen 2 will make additive manufacturing an attractive alternative to casting.

Based on this engagement with UAT, Seurat is encouraged and interested in the toolmaking market and hopes to support more mold makers. Eva shares, "Their openness to see and tackle other applications for their technology made us want to continue supporting them and help them achieve that not only for our sake but for the sake of other entrepreneurs that I know are struggling a lot with tooling."

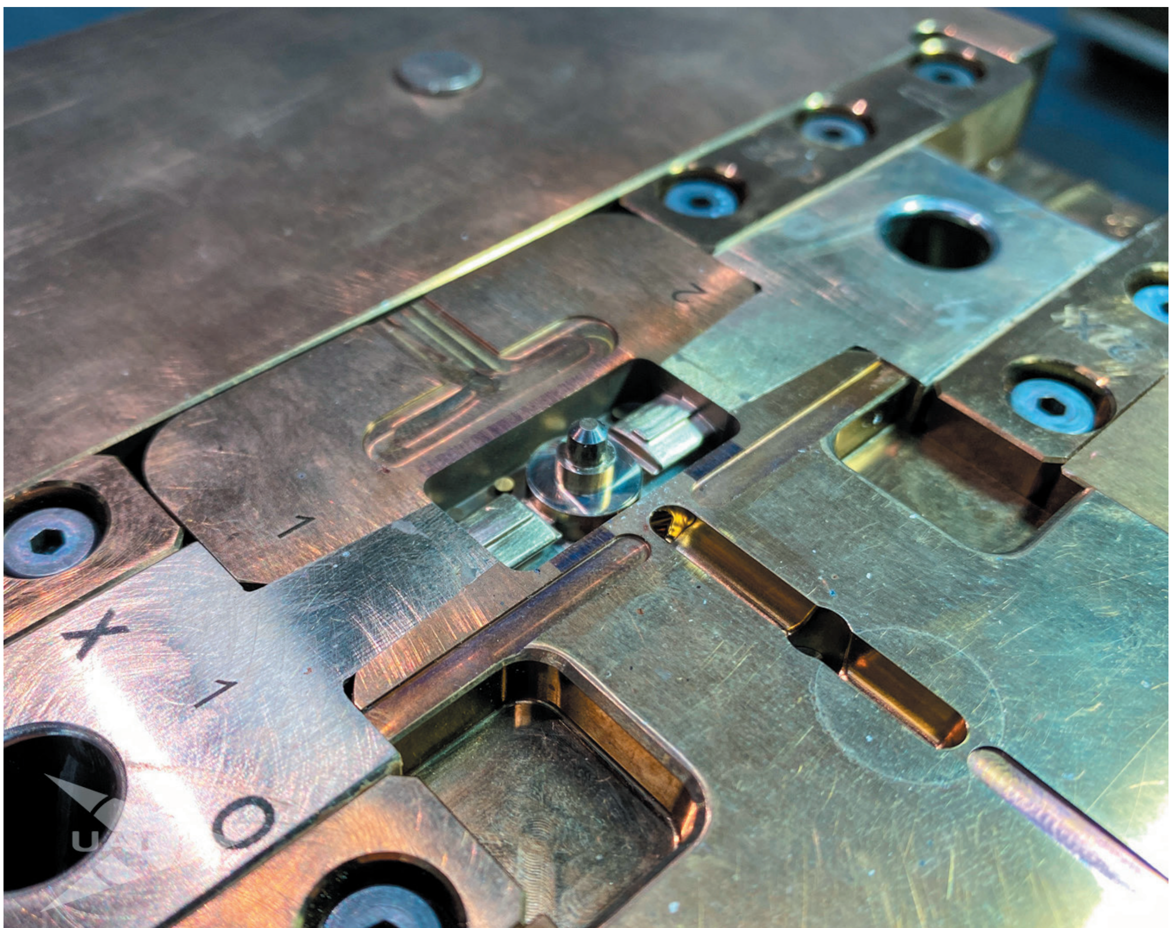


Left: Area Printing melts powder to form one of the steel core pins for UAT's ICC clamp. Center is 8 core pins (4 in the front, 4 in the back) with tensile bars and test cubes also on the build plate. Right showcases the finished part, which is a single core pin, printed in SS 316.

SS 316 Density test cubes taken with long exposure.

Looking Forward

UAT is on the cusp of commercializing a solution that addresses the cornerstone of its founding, while minimizing man hours and costs in the maintenance process. As UAT's founding team mentions, "We are at the age of electrification where UAT is modernizing electrical maintenance for the future." Likewise, Seurat is poised to deliver a solution which is democratizing metal additive manufacturing such that it is no longer limited by speed, quality, and cost.



Close-up of the steel core pin

About Seurat

Seurat has built the only 3D metal printing process that can compete with the volumes, quality, and price points of traditional manufacturing. In addition, Seurat's technology will help offset carbon emissions and is helping the world achieve net-zero emissions by 2050. Seurat is the only Additive Manufacturing Technology that can scale to meet the production rate, quality, and economic targets demanded by conventional manufacturing.

Please contact us to learn more.

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