

COLIBRIUM
ADDITIVE
A GE Aerospace Company

For the ready

Take your company where it hasn't gone before—
with metal additive.



Powered by partnership

There are no shortcuts when
it comes to additive.
No skipping steps.
But for the ready, there is
a way to get there faster.

To accelerate your path from prototype to full production.
To put the people who pioneered full metal additive
production to work for you.

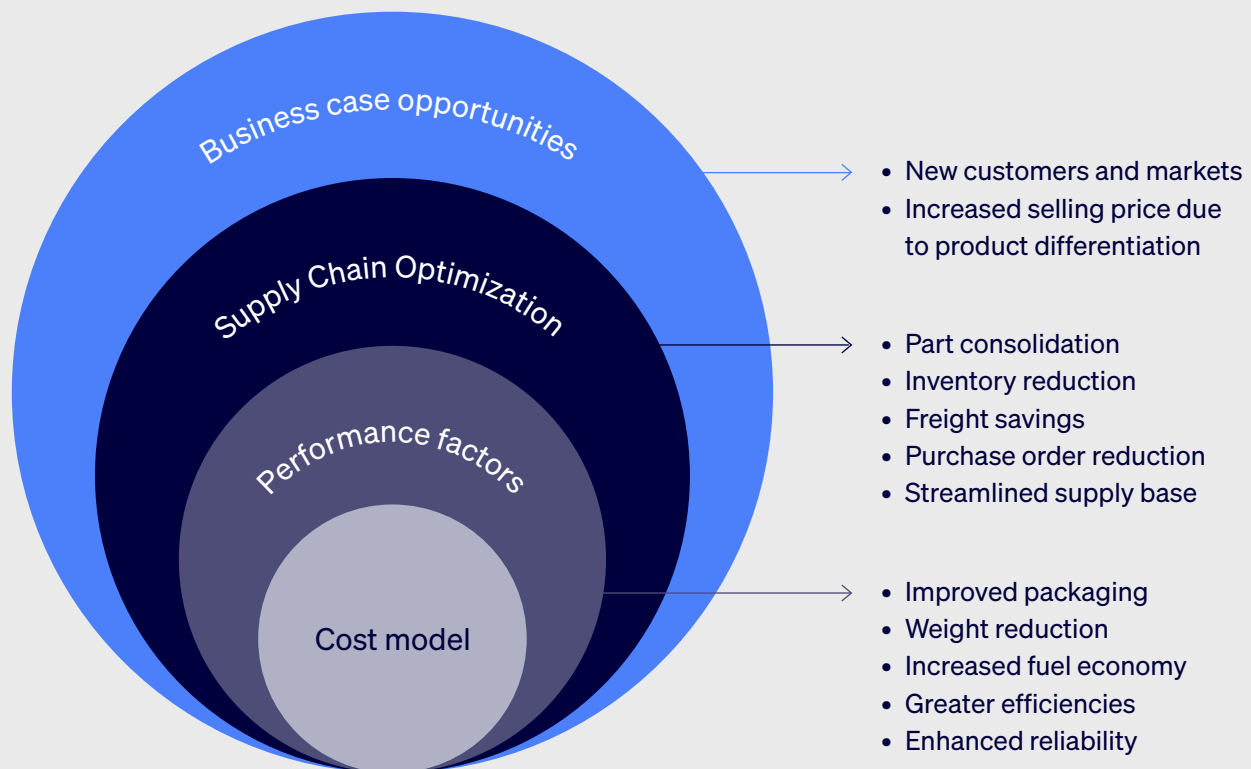
At Colibrium Additive, we have the machines, powders,
and know-how to help you make anything you can imagine.



It's time to realize ROI beyond the cost to make a part.

Now, the ready are evaluating beyond the part and considering how metal additive will benefit the entire system—from part cost to supply chain to potential new market opportunities.

Thinking through the bigger business case



How much further can additive take you?

The time is NOW. To leave molds and dies in the dust.
To transform the way business is done. To find out:
How much further can additive take you?

Consolidate parts

Optisys LLC's antenna for high-performance
aerospace and defense applications

From: 100 parts per antenna

To: 1 part¹

Improve sustainability

Avio Aero turbine blades replaced aluminum
brackets with additively made titanium

50% weight reduction

10% lower fuel consumption

10% decrease in emissions⁵

Simplify supply chain

LEAP fuel nozzle

95% inventory reduction

30% lower costs per component²

Reduce waste

GE Aviation made new brackets using direct metal
laser melting

≤90% reduction in scrap material waste⁶

Reduce production lead time

Jung & Co. Gerätebau GmbH filler valve in a
can-filling plant

From: 8-10 weeks to manufacture

the stainless-steel part

To: 1 week³

Reduce cycle time

Airbus metal cabinet bracket for A350 XWB aircraft

75% shorter time to develop⁷

Enhance performance

Suttrue Ltd.'s automated suturing device for
safer surgeries

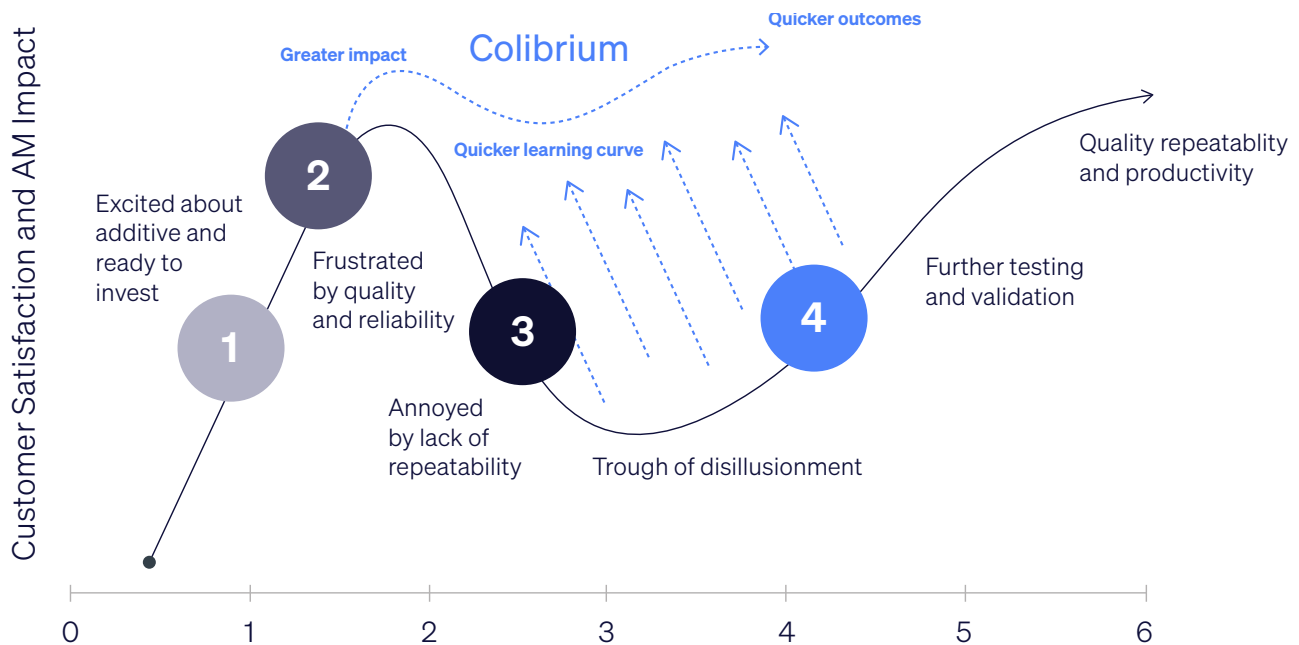
From: 1 stitch per 25 seconds by hand

To: 3 needle rotations per second⁴

Moving toward full production?

Make the move faster and more cost-effective with Colibrium Additive.

Avoid Additive Pitfalls and Save Time and Money



Follow the faster path with Colibrium Additive

Workshops and Consulting

Get help building your business case. Then bridge the talent gap with training from additive and industry experts to expedite the learning curve that comes with adopting new technology or having additive parts certified.

Engineering Services

Engage experienced engineers to design and build the part for you to speed your process as much as possible.

Print Services and Design to Print

Move to production at scale with outsourced printing services or by working with us to build your own supply chains, reducing risk and cost in development of printed parts.

Critical steps to accelerate your path to metal additive success:

1. Build the business case

A business case with a part-centric, narrow scope is dead in the water. Reduce risk and save time and investments by evaluating beyond the part and looking at the whole system, using proven approaches and best practices.

2. Identify the right part

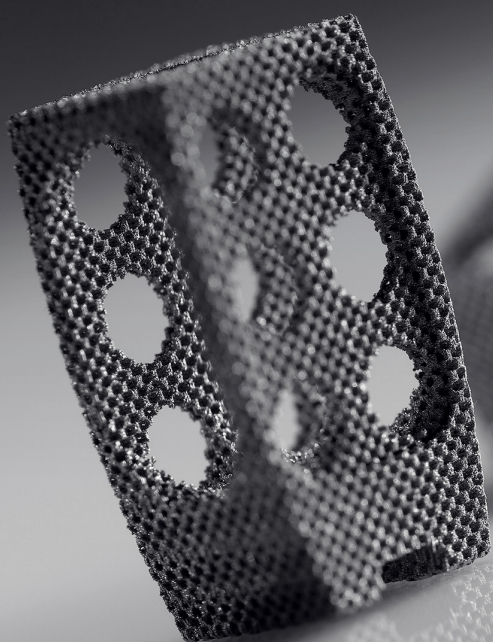
Additive requires a new way of thinking. That simple or costly part may seem like a good place to start, but it may not be the part where you see the best ROI. Find a part that's prime for additive and fits your larger business goals.

3. Design the part for additive

Some companies find holes in their original business case or part selection in this part design phase. They become disillusioned, struggling to see the ROI for their machines, powders and labor. Work through this phase faster by defining your key parameters and processes for additive, knowing they likely will vary from when your part was designed for traditional manufacturing.

4. Enable full production

As you invest in more machines, discover what you need to do to maximize machine productivity, achieve print repeatability and optimize for production. If you're in an industry with certifications, you must document repeatability and prove material quality of your additive parts. Coupling advanced analytics and testing can get you there faster.



Smooth your path to production. We're ready.

As the world's leading power user of additive technologies, we've seen firsthand how powerful this technology can be to an organization's top and bottom lines. Minimize your learning curve with these proven solutions to common challenges.



Challenge 1

Returning Investment Profit

Sometimes manufacturers won't see a positive ROI of additive if they look only at the cost to make a part. Then they lose out on the larger ROI additive can enable while competitors forge ahead with innovation.

Fast Track: Assess how additive will impact the whole process, from part performance to efficiency to supply chain, when designing your business plan. You'll uncover all the opportunities for ROI. GE offers ways for you to invest with easy, flexible pricing models and proven solutions to get to production faster.

Challenge 2

Experience Gap/Talent or Resource Shortage

"Lack of adequate skill sets is an industry issue," according to an estimated three in four business executives.

Fast Track: Leverage GE's expertise, based on our own additive challenges and successes. Get consulting and training on designing for additive moving to full production and more from the global Colibrium Additive AddWorks team of 200-plus engineers and specialists.

Challenge 3

Supply Chain Issues and Replacement Parts

Additive streamlines the supply chain for part production and replacement.

Fast Track: For the ready, that's great news. GE helps you devise a strategy to consolidate your supply chain by reducing part counts or by printing spare parts on demand, in-house, using additive. This cost-effective, small-volume production enables mass customization, such as patient-specific implants or zero-inventory, on-demand spares.

Challenge 4

Cultural Resistance to Change

Manufacturing with additive is a cultural (and foundational) change for engineers and business leaders.

Fast Track: Bridge the workforce's knowledge gap and foster excitement around the broader business opportunities of additive, amplifying your strong business case for additive so everyone in your organization can rally behind it. Workshops and consulting with GE experts can help your company along the path to change.

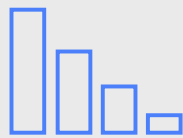
Go. Just say the word.

When you're ready to transform the way business is done—to go from one-off parts to full metal additive production—Colibrium Additive has the products, solutions and expertise to help.



Accelerate innovation

Leverage GE's global supply network of additive partners and diverse business experts to innovate at scale.



Reduce risk

Lean on GE's experience with qualifying additively made parts in highly regulated industries and our unparalleled level of material science.



Lower costs

Invest in additive with GE's easy, flexible pricing models while shortening the iterative process of making a metal additive part.



Transform your business

Take advantage of GE's unparalleled level of material science and application expertise to rewrite the rules of manufacturing and disrupt the supply chain.

“Additive manufacturing makes it possible to produce geometries that cannot be achieved using traditional manufacturing methods. In addition, the parts have greater performance capacity or functional precision, or else they are extremely delicate or small.”

– **Alex Berry**

Director and shareholder at Sutru Ltd.





Leverage our advanced, end-to-end solutions for your success.

Wherever you are in your additive process, we have the expertise and solutions to accelerate your speed to market with additive technology.

Machines

GE offers specialty machines with low machine-to-machine variance to meet your industry requirements and scale production. Our machines:

- Direct metal laser melting
- EBM, electron beam melting
- Binder Jet, faster 3D metal printing with binding agents

Powders

We create certified, high-performing powders for every metal additive need, taking into account a variety of mechanical behavior design data and material science.

- Advanced AP&C powders, spherical metal powders designed for additive manufacturing at competitive prices
- Colibrium Additive's powders, sourced and optimized powders specifically for Colibrium Additive machines for an end-to-end solution

AddWorks from Colibrium

Our global team of engineers and manufacturing specialists can support your team and accelerate additive adoption anywhere in the process.

- Workshops and training
- Consulting services
- Engineering services



Are you ready?

To hit the production floor running.

To turn complex into a competitive advantage.

To turn a business case into a full-scale production
at the speed of today.

To look forward, not back.

**When you're ready to revolutionize your business
with metal additive, the people who pioneered its full
production are ready to help.**

Let's go. Talk to Colibrium Additive today.
colibriumadditive.com

1The additive journey: THE TIME IS NOW, Industry in 3D, TBDURL.COM (accessed TBD Date 2020).

2Colibrium Additive Production Playbook. Nov. 2019, TBDURL.COM (accessed TBD Date 2020).

3The additive journey: THE TIME IS NOW, Industry in 3D, TBDURL.COM (accessed TBD Date 2020).

4The additive journey: THE TIME IS NOW, Industry in 3D, TBDURL.COM (accessed TBD Date 2020).

5Colibrium Additive Production Playbook. Nov. 2019, TBDURL.COM (accessed TBD Date 2020).

6Colibrium Additive Production Playbook. Nov. 2019, TBDURL.COM (accessed TBD Date 2020).

7The additive journey: THE TIME IS NOW, Industry in 3D, TBDURL.COM (accessed TBD Date 2020).