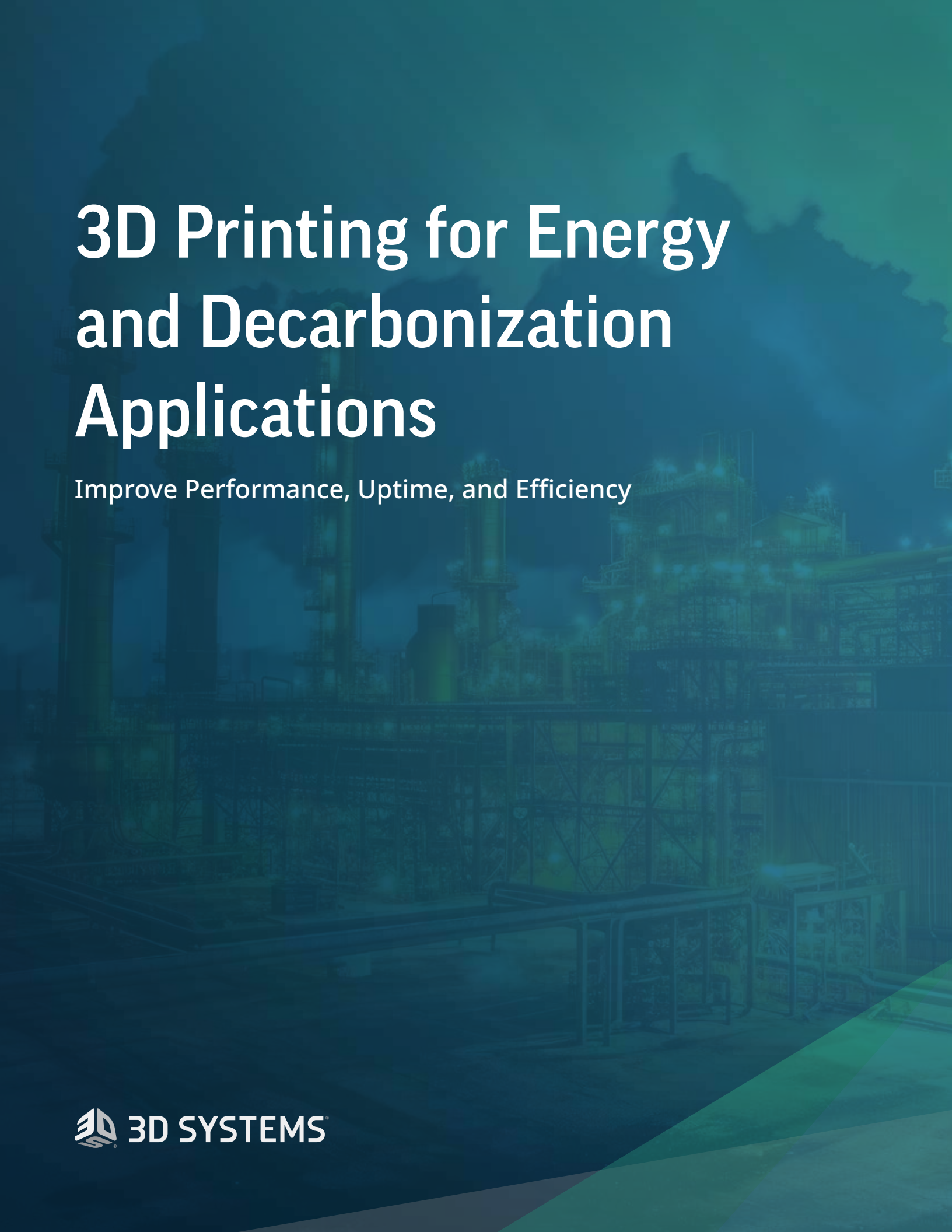
3D Printing for Energy and Decarbonization Applications

Improve Performance, Uptime, and Efficiency



3D SYSTEMS

For over three decades, 3D Systems has worked with companies from the energy sector and, at its ealy stages, with decarbonization technology players on their specific applications.

Whether we're designing components for metal 3D printing or metal casting to optimize equipment's performance and service life, or enabling technology transfer for successful integration, we help manufacturers and suppliers achieve lasting success in critical sectors.

Energy Engineering Innovation Challenges

Ever-increasing global energy demand and accelerating decarbonization efforts are universal challenges for manufacturers of these sectors, resulting in the need for increased performance and efficiency.

Energy Efficiency

The key for energy efficiency resides in the development of optimized components to get more out of the equipment from the least amount of input energy, all within rapidly narrowing environmental standards.

Addressing Obsolescence and Next Gen Technology Requirements

Whether you need to urgently replace a part to get your turbomachinery equipment back up and running or you are developing carbon capture technology for urgent deployment, you need fast turnaround design to manufacturing solutions.

Reliability

With the obsolescence of older equipment and high efficiency targets of newer systems, continuous operation with minimal maintenance is essential.

Supply Chain and Economic Viability

To mitigate supply chain risks, accelerate time-to-market and reduce component manufacturing costs, producing locally, on-demand and reducing the number of components to decrease the assembly cost must be part of the equation.

Advance Energy and Decarbonization Efficiency

Cutting-edge additive manufacturing solutions and services advance power generation, fuel performance and decarbonization technologies while increasing uptime and improving supply chain efficiency.

Design for Performance

Design parts for optimized functionality instead of making sacrifices for manufacturability. By enabling features such as conformal cooling channels, novel gas and fluid flow geometries, lattices, and consolidated part assemblies, you can increase performance, reliability, manufacturing yield, and supply chain efficiency, all while reducing labor costs.

Always-On Long Service Life

Increased energy efficiency, longer component lifetime, and improved equipment uptime can have a huge impact on infrastructures' yield. Our additive manufacturing solutions enable the production in alloys that withstand harsh operating conditions while maintaining efficiency over time.

Accelerate Time-to-Market

With no tooling required, 3D printed investment or sand casting patterns and direct metal printing can shrink design cycles by weeks or months, reduce inventory costs, and create new business opportunities.

Partner for Technology Expertise

Our team of experts have extensive experience helping manufacturers choose the right technologies to solve their challenges.

Improve Scalability

3D Systems' advanced manufacturing capabilities can increase your capacity as needed, providing unprecedented flexibility.

Enhance Equipment's Performance and Economics

Incorporating 3D printing solutions into component manufacturing workflows from energy production and oil and gas sector infrastructures to decarbonization technology, enables you to rapidly deliver part designs that maximize the performance, quality, and yield.

Thermal Management with Heat Exchangers

Optimize the Production of Heat Transfer Components to Decrease Lead Times, Reduce Costs, and Increase Performance

≤ 200 µm leak tight wall thickness

≤ 4 µm average roughness (Ra)

> surface-to-volume ratios

- Design complex features for heat transfer structures with vector-level control
- Increase heat-exchanging surface areas while keeping your components small and lightweight
- Alloys available for heat transfer: copper and copper alloys, aluminum, titanium and nickel super alloys

Combustor Components Mixing Efficiency

Increase Fuel Efficiency and Performance with Consolidated Components and Optimized Geometries

20:1 component reduction

$2M average annual fuel savings

2x increase in component lifetime

- Produce complex geometries with direct metal printing, including internal structures in heat-resistant superalloys
- Improve performance and fuel efficiency, increase reliability, and reduce manufacturing costs
- Accelerate time-to-market

Casings and Ducting at Speed

Complex Metal Casings and Ducting, Without Tooling Time and Costs

50% weight reduction in assemblies

23% higher resonant frequency

14:1 part count reduction

- Reduce time and costs using 3D printed investment casting patterns in just a few days
- Improve exhaust efficiency with smoother and more efficient gas flow structures
- Increase reliability and uptime with fewer points of failure from assemblies

Impeller Efficiency

More Efficient Opened and Closed Impellers, Faster and at Lower Cost

Up to 80% material waste reduction

90% cost reduction over conventional wax patterns

30x faster time to market

- Enable new levels of design complexity to improve pump and compressor impeller efficiency
- Optimize impellers for higher gas and fluid performance and reduce weight with topology optimization and lattice structures
- Eliminate tooling lead time and costs with direct metal printing and metal casting patterns, facilitating one-off designs and production

Stator Vane Reliability

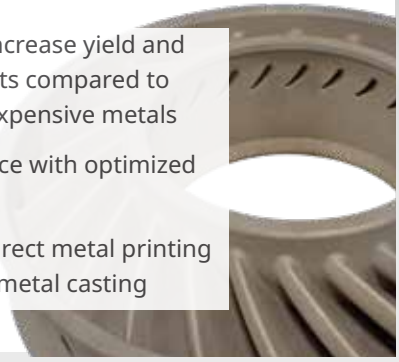
Simplify Manufacturing and Supply Chain with Monolithic Parts

500 mm diameter seamless direct metal printing part size

Up to 200:1 part count reduction

Up to 1600 K operating temperature achieved

- Reduce points of failure to increase yield and reliability while reducing costs compared to machining from billet with expensive metals
- Improve thermal performance with optimized internal cooling channels
- Accelerate lead times with direct metal printing and 3D printed patterns for metal casting



Gas Condenser Chilling Control

Increase efficiency, reduce costs and accelerate production of carbon capture condensers

8x reduction in process column height

4 seconds to stable chilling

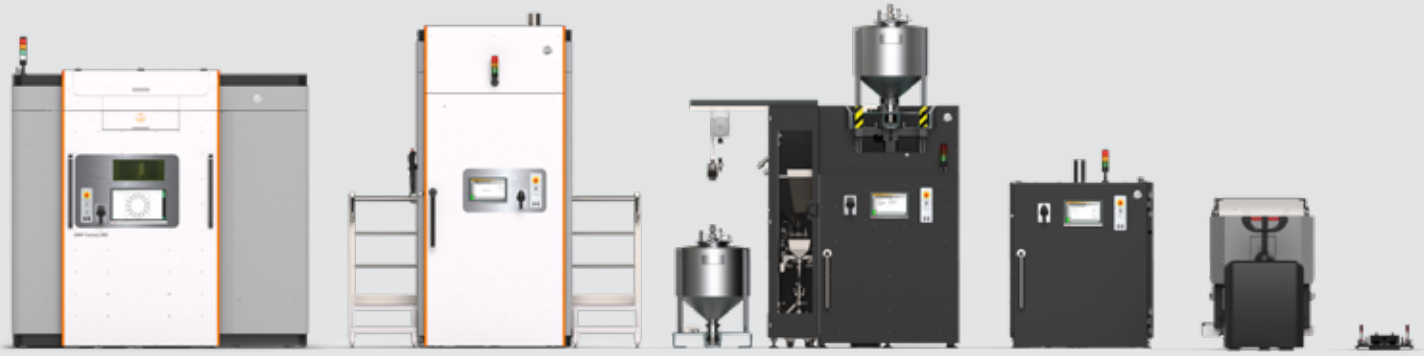
30:1 part count reduction

- Increase by over 4x the surface area over commercial structured packing
- Maximize surface coating efficiency with tunable surface finish
- Accelerate development to production lead time

Your Path to Advanced Metal Parts

Create More Complex Metal Casting Patterns Faster

3D Systems has decades of expertise in metal casting solutions development. While investment casting foundries have been using 3D printing to produce casting patterns for decades, sand casting shops have been taking advantage of additive manufacturing in the recent years. In both cases, we have developed specific and integrated additive manufacturing (AM) solutions that maximize your productivity, reliability, flexibility, and yield – delivering high quality patterns, from micro to extra-large, while reducing total cost of ownership (TCO).



Unmatched Performance with DMP

3D Systems' Direct Metal Printing (DMP) solution provides an integrated metal additive manufacturing solution that delivers superior digital production with optimal throughput, efficiency, capacity, and flexibility.

With its unique vacuum chamber technology that enables best-in-class low oxygen atmosphere (<25 ppm), DMP technology delivers strong parts of high chemical purity in advanced metal materials for every application, including nickel-based superalloys, titanium, stainless steel, and aluminum.

An End-to-End Partnership

With the combination of our Application Innovation Group (AIG) expert teams, manufacturing facilities, equipment, software, and materials, 3D Systems helps the world's premier energy OEMs and components suppliers establish their own metal additive capabilities that reduce costs and ramp times.

Through training, consultation, and the transfer of prequalified manufacturing processes to your site, our dedicated team works with you across every step, from part design to post-processing.

The Turbo Pump Housing Workflow Case

Cost-effective, **from 12 to 3 weeks lead time** compared to investment casting.

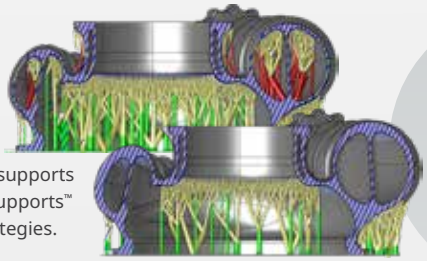
Explore

Strategic consulting to identify customer needs.

Design & Validation

Joint applications development and design for additive manufacturing (DfAM), and validation.

10 DAYS



69% less supports with NoSupports™ build strategies.

Build Preparation & Simulation

3DXpert software to prepare, optimize, simulate process, and 3D print.

4 HOURS

14% faster print time with less supports.

Production

Diameter of 445 mm, printed seamless in LaserForm Ni718 alloy.

75 HOURS

69% labor cost reduction with less supports.

Post-processing

Wire EDM and glass bead blasting.

6 HOURS

Scale

Scale up and technology transfer.

Advance Energy and Decarbonization Efficiency with 3D Systems' Additive Manufacturing Solutions

Additive manufacturing can empower manufacturers and components suppliers to design for performance and improve energy efficiency, design to manufacturing workflows, reliability, supply chain and economical viability. Our 3D printing solutions and technology expertise can help you build better parts, faster.

Learn how 3D Systems can help you today.

For questions/sales:

 03-25

3dsystems.com