

Additive manufacturing

Your benefits:

- Safety
- Flexibility & Reliability
- Expertise



The Industry Challenge

Moving from a virtual computer model in 3D to the realization of the physical part, by successively adding layers of materials, this is the challenge made possible by 3D printing or «Additive Manufacturing».

Gases represent only a very small part of the production cost structure, but they **play a crucial role** for safety, process stability and the final quality of products.

Nitrogen, argon, helium operate all along the processes chain including:

- Powder manufacturing, recycling and storage: inerting, plasma,
- Parts building: powder bed, deposition, projection...
- Post treatment: heat treatments, CO₂ cleaning...

Your Solution

Air Liquide offers customized solutions based on a strong experience in 3D Printing such as:

- a supplier of gases, technologies and services,
- a user for its own needs,
- a R&D player through various partnerships.

Air Liquide provides turnkey solutions and services for:

- optimization of concordance between “processes-gas-materials”,
- process gases supply: argon, nitrogen or helium for your production equipments,
- distribution networks and safety equipment (anoxia detection),
- secure and reliable supply and quality control,
- technical expertise associated with audit services.

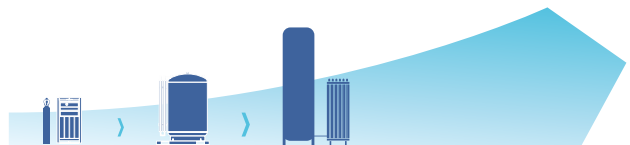
Your advantages

▪ Safety

Air Liquide is your partner to ensure the safety of your installations, and advises you on the implementation of anoxia detection equipment, maintenance services, as well as training on gas usage.

▪ Flexibility and reliability

Air Liquide develops innovative solutions to adapt the supply mode of the gas to the scalability of customers' needs over time, proposes devices ensuring a secure continuous supply for each customer, and the monitoring of the installations.



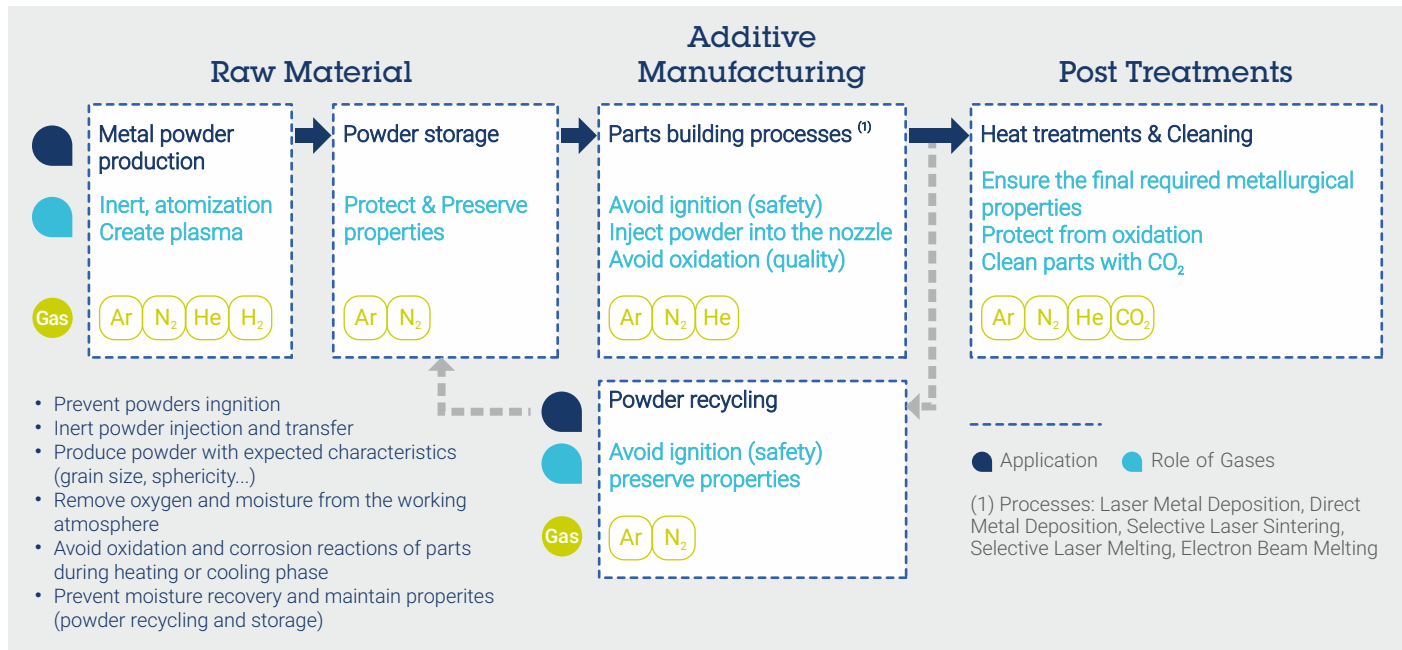
▪ Process expertise and service

Air Liquide application experts provide you with full support at every phase, from the assessment of your equipment needs, to the design of your tailor-made distribution network and safety installations, as well as technical assistance, audit and expertise on gas solutions.

Our engineering teams assist you in the development or innovation all along your processes.

The Air Liquide product catalogue also offers a wide range of innovative solutions such as powder storage.

Role of gases in powder additive manufacturing



Our offer

Argon (Ar), Nitrogen (N₂), Helium (He)

Air Liquide, a leader in gases, technologies and services, provides the gas with required purity for 3D printing processes.

Process type	Process name	Gas	Treated materials
Direct Energy Depositions	LMD, DMD ⁽¹⁾	Argon or Nitrogen	All Materials
Powder bed fusion	SLS ⁽²⁾	Argon or Nitrogen	Titanium, Nickel, other metal alloys
	SLM ⁽³⁾		Plastic, Steel, Chrome Cobalt
	EBM ⁽⁴⁾	Helium	All Materials

(1) Laser Metal Deposition, Direct Metal Deposition – (2) Selective Laser Sintering (3) Selective Laser Melting – (4) Electron Beam Melting

Tailored Packaging

Air Liquide proposes tailored solutions taking into account:

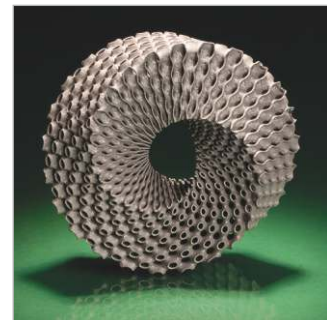
- the scalability customer needs (flexibility),
- to ensure and secure continuous gas supply,
- the most competitive supply mode.

Installation, Equipments & Services

Air Liquide offers you:

- personalized gas distribution piping network: control panels, telemetry, associated maintenance...
- safety installation (anoxia),
- training in gas usage,
- specific equipment for powder storage,
- audit and gas expertise of 3D printing systems.

Applications



- Aeronautics
- Oil and Gas
- Metal Fabrication
- Automotive
- Biotechnologies
- Jewellery
- Tooling
- Dental and Medical

Contact Us

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A world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 75 countries with approximately 66,400 employees and serves more than 3.8 million customers and patients.