Metal Additive Manufacturing and Product Development Partner

breaking
performance
barriers
Solutions for your greatest challenges

Increasingly complex product designs coupled with pressure to minimize energy, raw materials and cost pose challenges for manufacturing companies. AM’s sustainable, cost-effective manufacturing process replaces traditional solutions like casting, forging, machining and opens up new manufacturing possibilities in the demanding power generation, aerospace and automotive sectors, amongst others.

Additive Manufacturing addresses increasing end-user demands for:
- Quality
- Durability
- Performance
- Reduced weight, and
- Cost reduction
Additive Manufacturing benefits

**Enhanced geometric freedom**
Formerly complex or impossible geometry becomes simple when design for AM principles guide you in new designs.

**Fully optimized performance**
Manufacture designs with fewer components, lower mass and additional features to optimize performance for each application.

**Shorter innovation cycles**
Design, develop and test innovative products more quickly by eliminating expensive tooling and prototype fabrication.

**Simpler supply chain**
Streamline production by cutting out supplier, transportation and warehousing costs.

**Easy customization**
Customize manufacturing at lower unit cost, whether small production batches or mass component customization.

**More competitive business models**
Build on demand anywhere in the development cycle, enabling shorter time to market and more competitive business models.
Industrialized AM is today

At Oerlikon AM, we’re integrating and scaling the entire AM value chain to handle your project from beginning to end.

By offering materials and surface technologies, design, production and testing of industrial metal-based components, Oerlikon AM and its global service network across the entire Oerlikon group is uniquely positioned to advance the industrialization of Additive Manufacturing.
Metal Powders
We have high-quality production facilities, a growing portfolio of alloys, and a R&D team committed to developing new alloys that are ideally suited to the manufacturing process.

Design & Application Engineering
We help our customers overcome design challenges, whatever their industry or application requires. Our design and R&D teams can help turn concepts into a qualified production reality.

Additive Component Manufacturing
We have helped AM go from a prototyping tool to a mainstream manufacturing process. We act as the leading AM research hub for academic and industrial partnerships in the EU and the US. We are experienced in Powder Bed Fusion and Direct Energy Deposition technologies.

Post-Processing Expertise
Our global AM centers combine on demand a full scale of post-processing technologies to modify printed surfaces, HIP and/or heat treatment or coat the printed components prior to delivery.

Key Sector Experience
We work in power generation, aerospace, automotive, tooling and general industry – all sectors where precision and quality are vital.
80+ years of materials and engineering experience

We provide the world’s leading metal powder portfolio, offering superior quality, traceability and production performance.

We have a broad range of alloys and are continuously developing more. We know that current solutions in AM cannot answer every production need. Our R&D teams can rapidly design, optimize, and produce new and custom alloy chemistries for pilot atomization and AM validation in our production facilities.

### AM Metal Powder Portfolio

<table>
<thead>
<tr>
<th>Product</th>
<th>Nominal Chemistry</th>
<th>Nominal Particle Size (Distribution [μm])</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nickel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetcoAdd 718C</td>
<td>Ni 18Cr 18Fe 5(Nb+Ta) 3Mo 1Ti 0.6Al</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd 718E</td>
<td></td>
<td>-63 +20</td>
</tr>
<tr>
<td>MetcoAdd 718F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetcoAdd 718 API C</td>
<td>Fe 53Ni 18Cr 5(Nb+Ta) 3Mo 1Ti 0.5Al</td>
<td>-106 +45</td>
</tr>
<tr>
<td>MetcoAdd 718 API F</td>
<td></td>
<td>-63 +16</td>
</tr>
<tr>
<td>MetcoAdd 738LC-A</td>
<td>Ni 16Cr 7(Al+Ti) 9Co 0.1C 2Mo 1.5Ta 0.06Zr</td>
<td>-106 +45</td>
</tr>
<tr>
<td>MetcoAdd 625A</td>
<td>Ni 21Cr 9Mo 4Fe 4(Nb+Ta) 0.4Al 0.4Ti</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd HX-A</td>
<td>Ni 21Cr 18Fe 9Mo</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd HX-D a</td>
<td></td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd H23X-A</td>
<td>Ni 22Cr 2Mo 14W 0.35Al 0.03La</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd 6022A</td>
<td>Ni 22Cr 14Mo 3Fe 3W 2.4Co 0.5Mn</td>
<td>-45 +15</td>
</tr>
<tr>
<td><strong>Cobalt</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetcoAdd 75A</td>
<td>Co 28Cr 6Mo</td>
<td>-45 +10</td>
</tr>
<tr>
<td>MetcoAdd 76A</td>
<td></td>
<td>-45 +15</td>
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<tr>
<td>MetcoAdd H188-A</td>
<td>Co 22Ni 22Cr 14.5W</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd MM509-A</td>
<td>Co 10Ni 24Cr 7W</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd 316L-A</td>
<td>Fe 18Cr 12Ni 2Mo</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd 316L-D</td>
<td></td>
<td>-106 +45</td>
</tr>
<tr>
<td>MetcoAdd 415F</td>
<td>Fe 13Cr 4Ni 0.8Mn 0.6Mo 0.5Si 0.03C</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd 415G</td>
<td></td>
<td>-106 +45</td>
</tr>
<tr>
<td>MetcoAdd 17-4PH-A</td>
<td>Fe 17Cr 4.5Ni 4Cu 0.3(Nb+Ta) 0.07C</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd 17-4PH-D</td>
<td></td>
<td>-106 +45</td>
</tr>
<tr>
<td>MetcoAdd 15-5PH-A</td>
<td>Fe 15Cr 4.5Ni 3.5Cu 0.3Nb 0.07C</td>
<td>-45 +15</td>
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<tr>
<td>MetcoAdd 15-5PH-B</td>
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<td>-90 +45</td>
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<tr>
<td>MetcoAdd C300-A</td>
<td>Fe 18Ni 9Co 5Mo</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd H11-A</td>
<td>Fe 5Cr 1Mo 1Si 0.5V 0.4C</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd H13-A</td>
<td>Fe 5Cr 1Mo 1Si 1V 0.4C</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd H13-B</td>
<td></td>
<td>-90 +45</td>
</tr>
<tr>
<td><strong>Iron</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Titanium</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MetcoAdd Ti-64 G23-A</td>
<td>Ti-6Al-4V</td>
<td>-45 +15</td>
</tr>
<tr>
<td>MetcoAdd Ti-64 G23-D</td>
<td></td>
<td>-63 +20</td>
</tr>
<tr>
<td>MetcoAdd Ti-64 G23-E</td>
<td></td>
<td>-106 +42</td>
</tr>
</tbody>
</table>

* Premium product with reduced carbon content and more tightly controlled trace elements and entrained gases
### Production Technology and Capabilities

**Our custom metal powder development and production is located in two facilities in Michigan, US.**

**Troy**
- Inert Gas Atomizers (IGA) for Ni, Co and Fe-based powders (argon atomization gases)
- NADCAP certified QA facility
- Proprietary labeling / packaging capabilities

**Plymouth**
- Vacuum Inert Gas Atomizer (VIGA) for Ni, Co and Fe powders (nitrogen & argon atomization gases)
- EIGA for titanium powders – Grades 5 and 23 (argon only)
- Dedicated R&D Atomizer: up to 250 kg heat sizes (argon only)
- Onsite QA capabilities, packaging and R&D development

### Distribution Centers

- Regionally positioned (Westbury, NY, USA; Raunheim, Germany; Singapore; Australia; Shanghai; Nagoya, Japan)
- ISO, OHS certified
- Over 6 million units moved through network

### Metal Powder R&D

- R&D centers in Munich (Germany) & Charlotte, North Carolina, (USA) for testing and process parameter optimization on a variety of metal AM machines.
- Pilot atomizers available for R&D powder development / analysis with up to 500 lb. maximum melt capacities. Oerlikon Scoperta provides computational Rapid Alloy Development (RAD) tools to create new alloys and improve existing ones.
If you can imagine it, we can build it

Our expertise and extensive AM equipment options allow us to serve you in any advanced way you need: prototyping, pre-series and volume production, integrated full-service provider or product development partner. We can help you achieve the functionality, geometric accuracy and mechanical characteristics your application demands.

Our Europe and US-based application engineers provide swift in-house design and can work with a wide range of design files and equipment. Their capabilities and the experience of our R&D team allow us to advise you on the best possible combination of materials, design, production methods and post-processing for your project.

Prototyping
We provide a broad range of material and machine options to suit the needs of each prototyping application. We specialize in rapid prototyping of end-use components in metals. Furthermore, we have experience and equipment to cover your polymer prototyping needs.

Series Production
We make series production components for many industries, including aerospace, power generation and automotive. We can help you move from prototyping to production.

Design & Applications Engineering
We can help our customers overcome even the most demanding design challenge, regardless of industry or application. We select the right process, machine and material to make parts manufacturable.

Post-Processing
We can provide finished parts using our in-house post-processing capabilities and expertise in surface engineering. Offerings include hot isostatic pressing, vacuum heat treatment, CNC machining and coating.
AM Metal Component Manufacturing
EU / USA

**Materials**

<table>
<thead>
<tr>
<th>Metal</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>AlSi9Cu3&lt;sup&gt;EU&lt;/sup&gt;, AlSi7Mg&lt;sup&gt;EU&lt;/sup&gt;, AlSi10Mg, AlMgSc (Scalmalloy) &lt;sup&gt;EU&lt;/sup&gt;, 6061 RAM 2&lt;sup&gt;EU&lt;/sup&gt;, A205&lt;sup&gt;EU&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ni</td>
<td>Alloy 718 (2.4668), Alloy 625 (2.4856), Alloy X (2.4665), Alloy 230&lt;sup&gt;L&lt;/sup&gt;, Haynes 282, C22&lt;sup&gt;EU&lt;/sup&gt;</td>
</tr>
<tr>
<td>Co</td>
<td>CoCrMo (F75)</td>
</tr>
<tr>
<td>Fe</td>
<td>18 Ni Maraging Steel (1.2709), 316L (1.4404), 1.4859&lt;sup&gt;EU&lt;/sup&gt;, 1.4308&lt;sup&gt;EU&lt;/sup&gt; (CF8), H11 (1.2343)&lt;sup&gt;L&lt;/sup&gt;, H13 (1.2344)&lt;sup&gt;L&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ti</td>
<td>Ti-6Al-4V</td>
</tr>
<tr>
<td>Cu</td>
<td>CuNi2SiCr&lt;sup&gt;EU&lt;/sup&gt;, CuCr1Zr&lt;sup&gt;EU&lt;/sup&gt;, CuCr2&lt;sup&gt;EU&lt;/sup&gt;</td>
</tr>
</tbody>
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**Laser Powder Bed Fusion of Metals (PBF-LB/M), also known as SLM**

<table>
<thead>
<tr>
<th>Laser Powder Bed Fusion of Metals (PBF-LB/M), also known as SLM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concept Laser</strong></td>
</tr>
<tr>
<td>1x Concept Laser M2 (1kW)</td>
</tr>
<tr>
<td>5x Concept Laser M2 Dual UP1 (2x 400W)</td>
</tr>
<tr>
<td><strong>EOS</strong></td>
</tr>
<tr>
<td>1x EOS M270 (200W)</td>
</tr>
<tr>
<td>3x EOS M280 (400W)</td>
</tr>
<tr>
<td>12x EOS M290 (400W)</td>
</tr>
<tr>
<td>8x EOS M400 (1kW)</td>
</tr>
<tr>
<td><strong>Renishaw</strong></td>
</tr>
<tr>
<td>1x RenAM 500Q (4x 500W)</td>
</tr>
<tr>
<td><strong>Trumpf</strong></td>
</tr>
<tr>
<td>4x Trumpf TruPrint 1000 (200W)</td>
</tr>
<tr>
<td>3x Trumpf TruPrint 3000 (500W)</td>
</tr>
<tr>
<td>1x Trumpf TruPrint 3000 Dual (2x 500W)</td>
</tr>
<tr>
<td>2x Trumpf TruPrint 5000 (3x 500W)</td>
</tr>
<tr>
<td><strong>3D Systems + GF</strong></td>
</tr>
<tr>
<td>2x DMP Factory 500 (3x 500W)</td>
</tr>
</tbody>
</table>

AM Polymer Production
EU only

**Laser Powder Bed Fusion of Polymers (PBF-LB/P) also known as SLS**

<table>
<thead>
<tr>
<th>Laser Powder Bed Fusion of Polymers (PBF-LB/P) also known as SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EOS</strong></td>
</tr>
<tr>
<td>1x EOS P100</td>
</tr>
<tr>
<td>1x EOS P110</td>
</tr>
<tr>
<td>2x EOS P396</td>
</tr>
</tbody>
</table>

**Materials:** PA12, PA12-GB, PA12-CF and TPU

**Vat Photopolymerization (VPP) also known as CLIP**

<table>
<thead>
<tr>
<th>Vat Photopolymerization (VPP) also known as CLIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x Carbon M2</td>
</tr>
</tbody>
</table>

**Materials:** EPU40 (similar to TPU), RPU70 (similar to ABS), CE221 (similar to glass filled nylon), SIL30 (similar to TPE), EPX82 (similar to 20% glass filled PBT), EPX86 FR (flame resistant) and IND405 (transparent)
Aerospace & Space

Making aircraft safer, lighter and more efficient

The aerospace industry requires quality, traceability, affordability, reliability, and optimized weight and performance. AM can deliver on all these metrics in a cost-competitive framework.

Choose us as your aerospace partner

Our AM specialists have extensive expertise in aerospace and defense.

- AS9100, ITAR registered, full spectrum AM capabilities for quality control and traceability, and affordability
- Powder atomization, R&D and production are delivered in-house
- Aerospace-specific applications engineering in areas like generative design/light weighting, highly customized parts, weld elimination, reverse engineering and replacement of obsolete parts
- Support for material and component qualification
- Collaboration opportunities: Material development, data set/design allowables, R&D, application engineering, series production and prototypes
- Aerospace partnership examples: Boeing partnership to create standard processes for 3D-printed structural titanium aerospace parts Lufthansa Technik partnership to establish replicable AM processes and standards for MRO applications

Applications

- RF antenna
- Heat exchanger
- Bracket
- Pump housings
- Rocket nozzle
- Impeller

Applications

- RF antenna
- Heat exchanger
- Bracket
- Pump housings
- Rocket nozzle
- Impeller
Increasing performance and efficiency for the automotive industry

AM offers the perfect balance of unique part construction and ergonomics, dynamic mass reduction, enhanced cooling, part count reduction and fast delivery.

It helps car manufacturers meet new efficiency targets and to ramp up innovative technologies.

Choose us as your automotive partner

The Oerlikon AM’s team has extensive expertise in automotive engineering.

- Integrated services, from prototyping to production, delivering AM solutions for mass-market automotive applications
- Components with properties superior to conventional solutions
- Designs previously impossible to manufacture
- Consolidation of multiple parts, reducing weight and simplify the supply chain
- Expertise in materials – from metal alloys to plastics
- New powder development – tailored and custom alloys designed and atomized in-house for tooling and component manufacturing
- R&D facilities to support your product development

Applications

- Fuel cell systems
- E-axle components
- Battery systems
- Thermal management
- Exhaust components

Brake disc
Exhaust collector
Throttle and brake pedals
Oil filter housing
Wheel carrier
Hollow valves
Gear box housing
Compressor wheel
IAV Heavy duty piston head
INDUSTRIAL APPLICATIONS

Power Generation & Oil/Gas

Choose us as your partner
We provide:

• AM design for higher functional integration within components (manifolds, cooling ducts, molds with conformal cooling, semiconductor equipment and heat exchangers)

• AM design for structural, heat-resistant and high-performance components (swirlers, burners and fuel supply systems)

• Complete component manufacturing in our facilities: material manufacturing, part printing, heat treating, stress relief, HIP, machining and finishing – providing you with complete control of all processes

• Expertise in materials – from metal alloys to plastics and new powder development – tailored and custom alloys designed and atomized in-house for tooling and component manufacturing

• R&D facilities to support your own product development

Applications

• Burners, swirlers
• Compressor
• Turbine blades
• Impellers
• Micro combustion chambers
• Drill bits

General Industries & Tooling
Case Study
Collaboration between bicycle maker Urwahn and Oerlikon AM

Turning dreams into reality

What happens when you introduce a visionary creator of bicycles in Germany to Oerlikon’s creative and passionate additive manufacturing team? You come up with a one-of-a-kind bicycle unmatched by any competitor and a dream for bicycle enthusiasts who want a comfortable and safe bike while riding in nature.

Urwahn and Oerlikon worked together from concept creation to materials selection to product development and engineering, to final 3-D printing of a unique bicycle.

Oerlikon’s Balzer’s group added a protective BALINIT CROMA PLUS coating in the color rainbow, because cool bikes need to look cool too.

Mobility and transportation is an innovative and rapidly developing industry well suited for additive manufacturing, which can print complex metal components.

Watch the full story behind:

1. Fast re-design, fast production of housings
2. Production on-demand within days
3. Robust materials
4. Comfortable riding qualities
5. Excentric in lightweight design
6. Integrated range of functions and modular design
7. Corrosion protection, scratch resistance and ultra-individualization
8. Reduced weight
9. Organic form language with integrated functions
Our AM offering extends across the globe

We provide end-to-end AM services from facilities in the US, Europe and China.
Oerlikon’s unique offering for manufacturing and coatings

1. Materials
   Delivery of Coating Materials
   - Full range of Oerlikon standards and customized coating materials
   - In-house R&D and manufacturing

2. Additive Manufacturing
   AM Industrialization
   - Metal powders
   - Material innovation
   - Co-engineering/part development
   - Additive component manufacturing
     - Laser Powder Bed Fusion
     - Direct Energy Deposition

3. Component Manufacturing
   Production of Turbine Components
   - State of the art facilities with conventional and non-conventional machining capabilities and sheet metal fabrication

4. Equipment
   Delivery of Coating Equipment for thin and medium thickness coatings
   - Turnkey equipment solutions
   - Upgrades of existing machines
   - Comprehensive scope of different thermal spray and laser cladding processes

5. Coating Services
   Coating Facilities for PVD, CVD, Thermal Spray coating and laser cladding
   - Targeted process development
   - Widest range of coating technology
   - Application of coating solutions on an industrial scale (in-house)
Oerlikon is a global innovation powerhouse for surface engineering, polymer processing and additive manufacturing. The Group’s solutions and comprehensive services, together with its advanced materials, improve and maximize performance, function, design and sustainability of its customer’s products and manufacturing processes in key industries. Headquartered in Pfäffikon, Switzerland, the Group has a global footprint of more than 10 600 employees at 179 locations in 37 countries and generated sales of CHF 2.3 billion in 2020.

We’ll never stop expanding our capabilities

When you’re an industry disruptor, you can never rest on your laurels. We’re constantly developing our innovation and production sites to serve you with the latest technology.

Why not see what our experience and expertise in application-tailored solutions and materials developments could do for your business?

If you can imagine it, we can build it.

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am@oerlikon.com
www.oerlikon.com/am