TITANIUM FOR DEMANDING MARKETS
from ingots to finished parts
From sponge through to various conversion processes, surface treatment and testing: by integrating the technical competences and capabilities into one titanium industrial stream we offer to our customers a large array of metallurgical solutions with an enhanced level of expertise and service.

Advantages of our integrated industrial solution for titanium:

- A simplified and controlled supply chain from sponge to finished and tested forgings
- An offer conforming high quality standards
- Circular economy from raw material through melting ingots, processing titanium, recovering & recycling titanium scrap into new titanium ingots of aerospace quality
- A double raw material provision route: ingots from original ilmenite ore and sponge and from recycled titanium scrap

We comply with the most stringent requirements in terms of high-quality sponge production, melting and grade composition, cleanliness and microstructural integrity, fatigue resistance and dimensional tolerances.
A full titanium offer for stringent markets

Titanium’s extraordinary properties of strength, resistance to high temperature and to corrosion, light weight and low coefficient of thermal expansion contribute to higher efficiency with minimum surcharge in the number of critical aerospace, defense and motorsport applications. Thanks to its bio-compatibility combined with light weight and fracture resistance, titanium is used from head to toe in biomedical implants. It is difficult to imagine how current performance levels in the industries we serve could be achieved without titanium.

World leader in forging

For many decades Aubert & Duval has been providing titanium open and closed-die forged solutions, responding to most stringent requirements. Supported by the ingenuity of its people, using with skill the technical capabilities offered by its 22,000, 40,000 and 65,000 metric ton hydraulic presses, hammers and other processing means, Aubert & Duval tailors its processes to manufacture highly performing products, consistent with customers’ needs.

Aubert & Duval’s 40,000 metric ton closed die forging press

Our company develops high-performance metallurgical solutions in titanium, aluminum, superalloy and high-performance steel grades for high-tech industries (aerospace, energy, space, medical, defense,...)

JV between Aubert & Duval and Mecachrome - a single place for aerostructure long-length components for all downstream operations from roughing to final machining and surface treatment
Many components in the aerospace, motorsport and medical industries are manufactured from titanium bars. The initial quality of material is therefore key in the final performance of the product. We offer a wide range of forged billets and bars to better fit our customers’ requirements.

**When environment, innovation and the industry of the future are summarized in one word**

At the forefront of technology, EcoTitanium is among the few to use Plasma Cold Hearth Refining to melt titanium ingots. This process allows the removal of a maximum amount of impurities in order to obtain premium quality ingots meeting requirements of the most critical industries such as aerospace.

CO$_2$ emissions reduced by 100,000 tons thanks to EcoTitanium’s innovative process that consumes 4 times less than the primary melting route using titanium sponge.

80% recycled. This is the rate of titanium scrap used to produce EcoTitanium ingots.

**Strength and reliability upstream**

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UKAD state-of-the-art facility with 4,500 ton forging press and lean manufacturing environment
Pearl® Micro Ti6Al4V powders are the fruit of a technical and commercial collaboration between Aubert & Duval and its Canadian partner PyroGenesis. Manufactured using the Wire Plasma Atomization Process invented by PyroGenesis, these titanium powders are chemically pure, with high flowability and offer different particle size distributions, suitable for various additive manufacturing processes such as LBM, EBM or LMD.

Applying its very thorough knowledge of titanium materials and their behavior in stringent conditions, Aubert & Duval offers its customers new solutions that match the industry of the future.

New performances require new solutions

Titanium powders for additive manufacturing

Advancing in technology and innovation

We support our customers in solving current and future industrial challenges and to improve yield, cost efficiency and material performance through new manufacturing processes, new technologies, new grades.

Our spheres of interest in titanium comprise:

- Optimization of powder materials for additive manufacturing
- Wire for directed energy deposition (DED)
- Enhancement of properties of titanium grades
- Hybrid forging-additive manufacturing technologies for airframe components
- Titanium net-shape forging techniques

We work in collaboration with universities of applied sciences and research institutions on technological advancements in titanium processing. Our research & technology partners are IRT M2P, Metafensch, IRT Saint-Exupéry, AFRC, PPrime …
A full and diverse titanium offer

From billets to forged or rolled bars and near net shape parts, we tailor our processes to satisfy your requirements. Whether it is the choice of the alloy, development of a new material, forging process design, study of grain flow or the method of non-destructive testing, our expertise covers the full scope of the alloys and their processing.

Our titanium offer

<table>
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<tr>
<th>Products</th>
<th>Dimensional range</th>
<th>Titanium grades</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billets and forged bars</td>
<td>Ø 150 – 430mm (6 – 17in)</td>
<td>TA6V, TA6V ELI, Ti1023, T40</td>
<td>aerospace, defense, marine, oil &amp; gas, general engineering</td>
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<tr>
<td>Rolled bars</td>
<td>Ø 20 – 150mm (0.9 – 6in)</td>
<td>TA6V, TA6V ELI</td>
<td>aerospace, defense, marine, oil &amp; gas, mechanical engineering, prosthetics, internal fixation and inner body device</td>
</tr>
<tr>
<td>Open-die forgings</td>
<td>Custom dimensions Weight up to 3t (6600lb)</td>
<td>TA6V, TA6V ELI, T40</td>
<td>marine, defense, petrochemical, oil &amp; gas</td>
</tr>
<tr>
<td>Closed-die forged</td>
<td>Length up to 8000mm (314in) Weight up to 3t (6600lb)</td>
<td>TA6V, TA6V ELI, Ti5553, Ti6242, Ti1023</td>
<td>Fuselage, undercarriage, wings, spacecraft, helicopter transmission components, marine and defense</td>
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<tr>
<td>structural parts</td>
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<tr>
<td>Closed-die forged</td>
<td>Ø up to 2000mm (79in)</td>
<td>TA6V, TA6V ELI, Ti5553, Ti6242, Ti1023, Ti17, Ti6246</td>
<td>aeroengine, industrial turbine, helicopter</td>
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<td>rotating parts</td>
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<tr>
<td>Finished machined parts</td>
<td>Length up to 6000mm (236in) Weight up to 1,700t (3748lb)</td>
<td>TA6V, TA6V ELI</td>
<td>Large airframe components</td>
</tr>
<tr>
<td>Powders for AM</td>
<td>20-53 μm 45-106 μm</td>
<td>Pearl® Micro Ti6Al4V ELI</td>
<td>LBM, EBM, LMD</td>
</tr>
</tbody>
</table>
Specialized in high performance materials and parts

Whether operating at temperatures from subzero to 600°C, or supporting stress up to 1200MPa, many aircraft, spacecraft and helicopter parts come from Aubert & Duval's forging shops. Aubert & Duval offers the full range of services, from definition of a forged part design and the appropriate manufacturing process to mechanical pre-machining of large-area forgings and support for post-processing operations.

**Aerostructure:**
- Fuselage parts
- Wing box parts
- Engine pylon parts

**Aeroengine:**
- Fan disks
- Boosters
- Compressor disks
- Impellers

**Landing gear:**
- Sliding tubes
- Bogie beams
- Arms
- Torque links

**Spacecraft:**
- Engine parts
- Propellant tanks
- Helium pressurization tanks

**Helicopter:**
- Engine parts
- Rotor components
- Main fittings
The information and the data presented herein are typical or average values and are not a guarantee of maximum or minimum values. Applications specifically suggested for material described herein are made solely for the purpose of illustration to enable the reader to make his own evaluation and are not intended as warranties, either express or implied, of fitness for these or other purposes. Aubert & Duval’s liability shall not extend, under any circumstances, to the choice of the Product and its consequences.