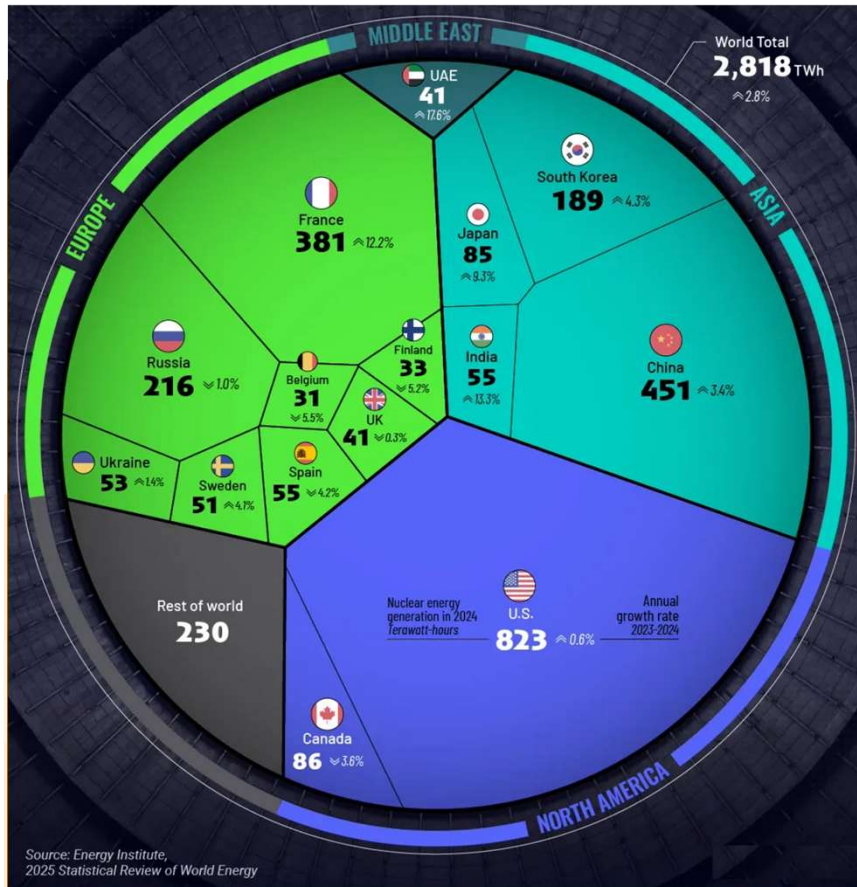


Nuclear Power Generation



The world's largest nuclear power-producing countries in 2024 (TWh):

- U.S. remains the nuclear powerhouse - **823 TWh** or **29.2%** of global nuclear electricity generation;
- China ranks second at **451 TWh** (16%), followed closely by France at **381 TWh** (13.5%);

- Russia, South Korea, and Canada round out the top six, collectively making up nearly **17%** of world nuclear generation.

U.S. Nuclear Energy Policy

- **Capacity expansion:** Targeting 400 GW by 2050 (vs ~100 GW today); 10 new large reactors & 5 GW uprates by 2030.
- The UAE is the fastest growth among major producers, up **17.6% year-over-year**.
- **Licensing:** NRC decisions compressed into 18 months; regulatory review in progress;
- **Advanced reactors:** 3 pilot projects target criticality by mid-2026;
- **Fuel innovation:** ≥20 t HALEU allocated; supply chain expansion, recycling, reprocessing ramped up;
- **Workforce development:** Boosting nuclear apprenticeships, education, and lab access.

Energy Investment

Global energy investment in 2025:

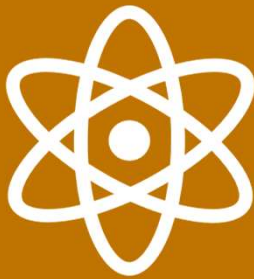
- **Renewables** projected to hit **\$780 billion**, outpacing oil investment by \$237 billion;
- Over the past decade, investment in renewables has surged **109%**.
- Meanwhile, global electrification investment has grown at an even faster rate of **131%** as advancements in **AI fuel demand**.

The Energy Investment Landscape in 2025

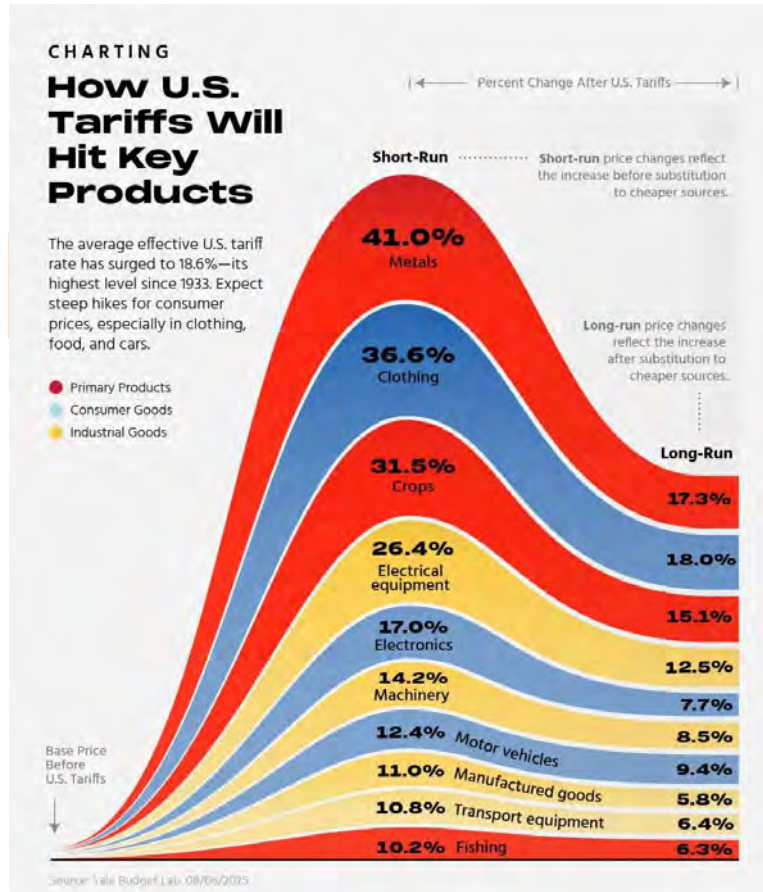
- **Renewables** have overtaken fossil fuels as the top source of energy investment, driven by soaring demand for solar and wind.
- **Nuclear and low-emissions fuels** have seen investment grow in the double-digits over the decade as companies and public entities look to greener alternatives.
- Global oil investment has dropped 34% since 2015, however, it remains the world's top source of energy by a significant margin.



Current Economic and Political Factors



Tariffs for Titanium



Latest U.S. import tariffs for titanium tubes, coils, strips, and similar articles, based on current Harmonized Tariff Schedule (HTSUS) classifications:

Effects Across Key Sectors

- The average effective U.S. tariff rate has soared to 18.6%—the highest level seen since 1933;
- **Titanium Tubes, Pipes (HTS 8108.90.60.6060)**
 - General tariff rate: 15% ad valorem;
 - Special (preferential) rate: Duty-free for select countries and goods, and as a result, short- and long-term price increases are expected across numerous sectors;
- **Titanium Plates, Sheets, Strips, Foil (HTS 8108.90.60.6045)**
 - General tariff rate: 15% ad valorem;
 - Special (preferential) rate: Duty-free for the same set of eligible trade partners.

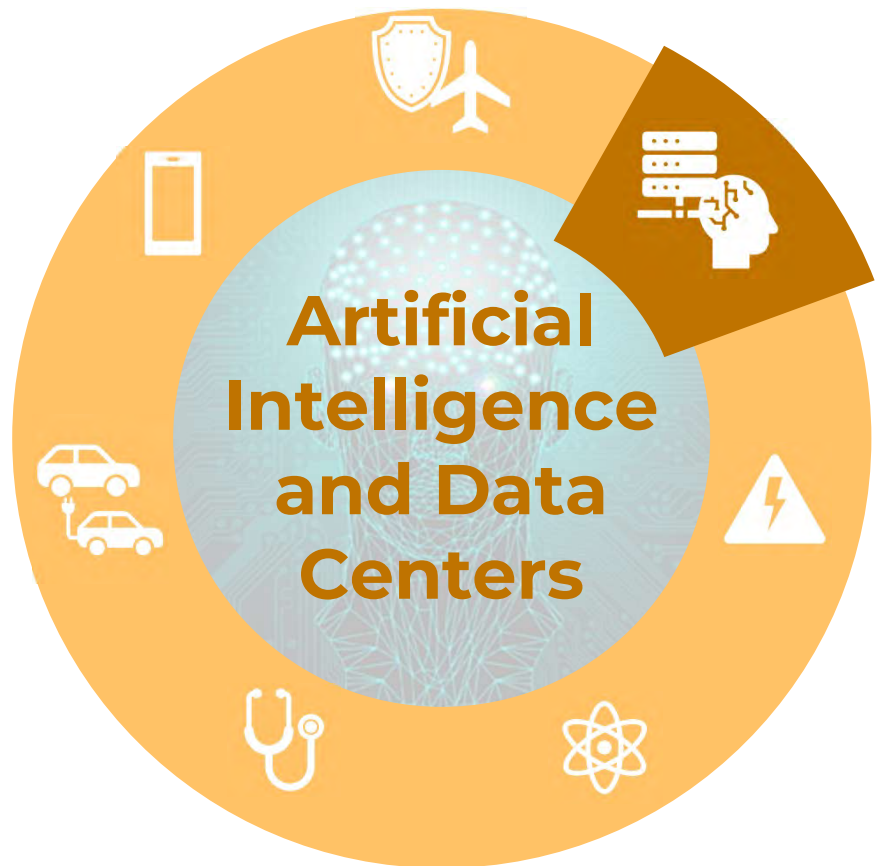
Other Titanium Articles – “Articles of Titanium” (HTS 8108.90.30)

- Includes items such as castings, bars, rods, profiles, and wire.
- General tariff rate: 5.5% ad valorem;
- Special (preferential) rate: Duty-free for qualifying partner countries.

(source: hts.usitc.gov)

* There's no evidence suggesting additional tariffs such as Section 232, Section 301, or “reciprocal tariffs” specifically targeting these titanium categories up to now.

* If you're dealing with titanium imports from countries subject to new or extraordinary tariff actions (e.g., country-specific “reciprocal” tariffs), duties could vary.

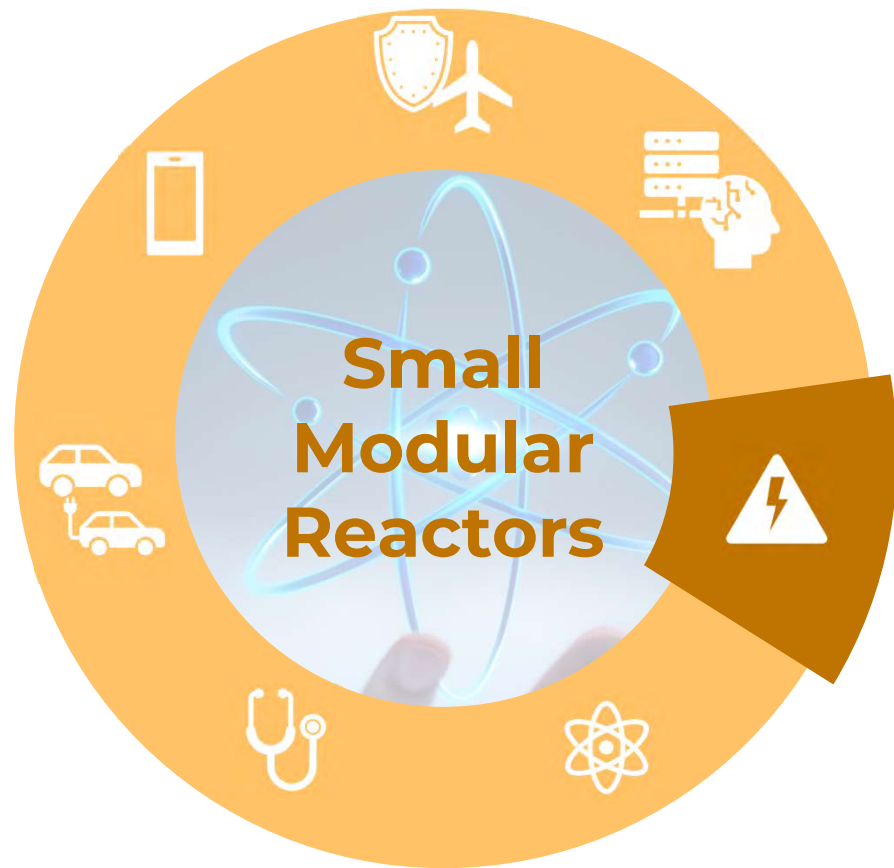


Artificial Intelligence and Data Centers

Trends

Titanium materials in AI data centers are mostly about thermal management, corrosion-proof cooling systems, and advanced energy storage/distribution infrastructure:

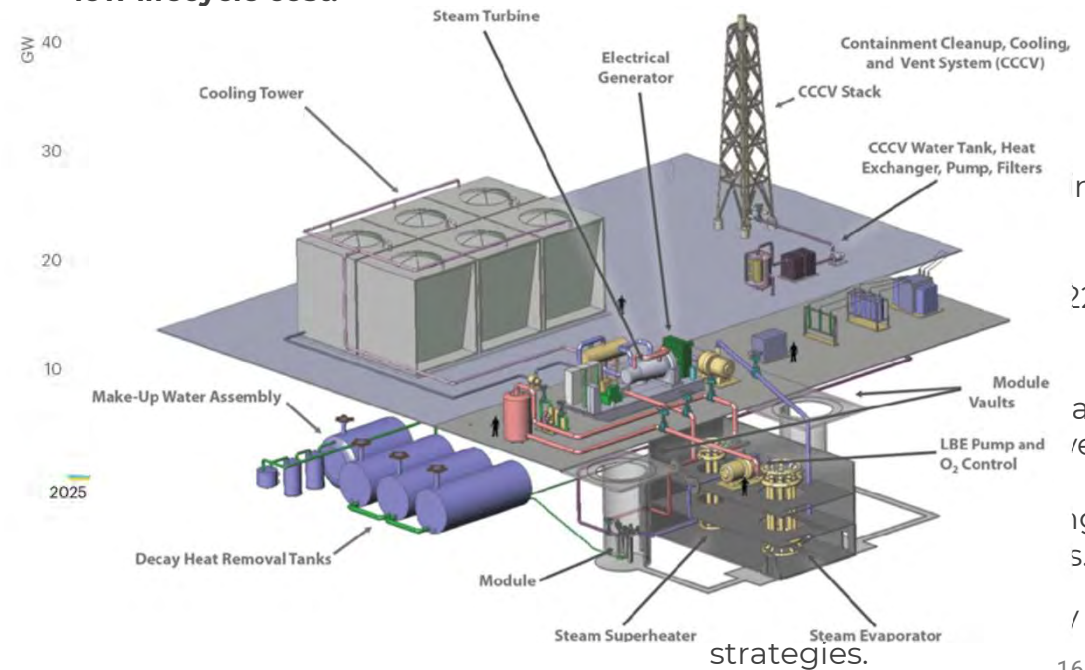
- **Titanium tubing and plates** are used in **heat exchangers, chillers, and condenser systems** where **corrosion resistance** and **long service life** are critical;
- High-efficiency power distribution and backup systems (**transformers, rectifiers, turbines for on-site generation**) use **titanium alloys in tubing, housings, and fasteners** where strength and temperature resistance matter;
- **Racks and enclosures** needing high strength with reduced weight;
- **Battery cooling systems** - titanium tubing is used in **thermal management loops** due to non-reactivity;
- **Fuel cell integration** - titanium serves as a corrosion-resistant **bipolar plate or tubing material**.

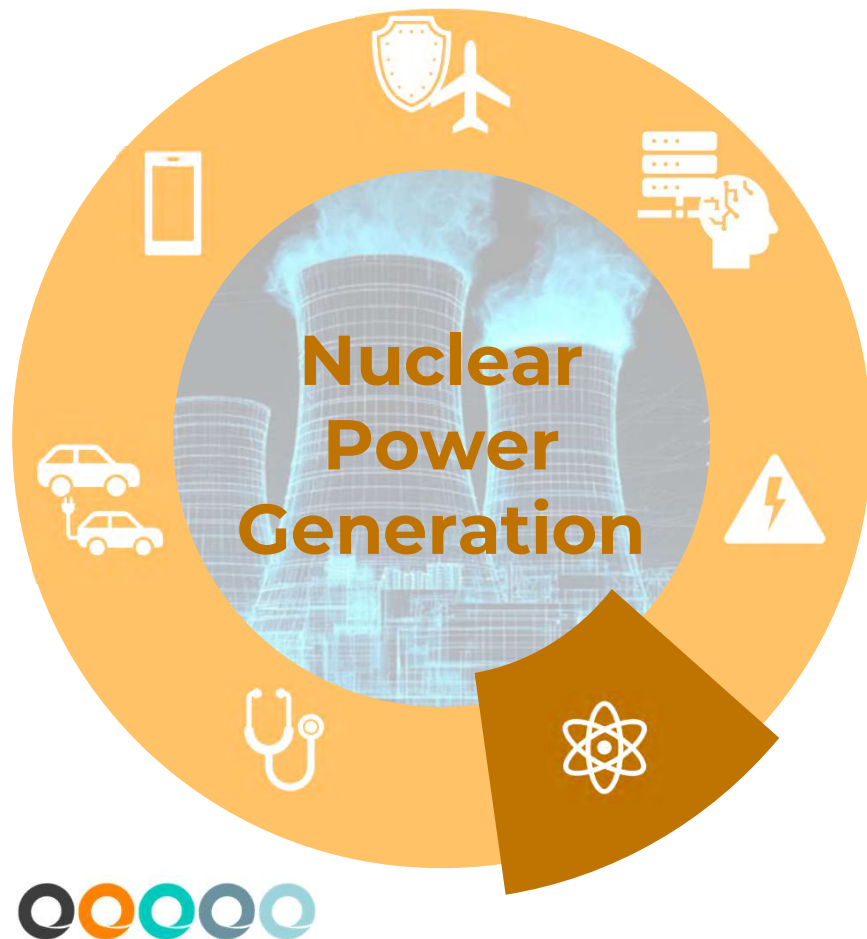


Trends

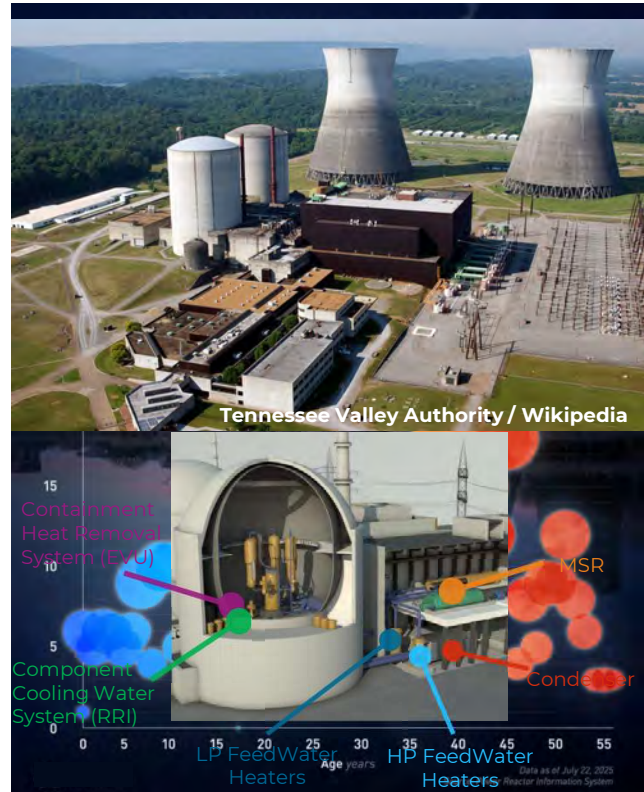
Titanium tubes and plates in SMRs and their power plants:

- **Heat transfer and cooling reliability;**
- **Condenser tubing, steam generator tubes, and seawater cooling systems;**
- **Thermal efficiency, long-term durability, corrosion resistance, and low lifecycle cost.**





Trends

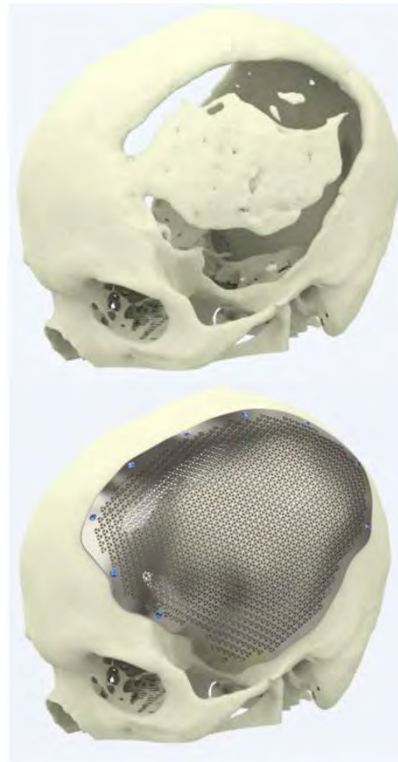


Global Nuclear landscape of **416 nuclear reactors**

- 2025 – 2030 (IEA), spending on new nuclear plants and refurbishments is projected to **surpass USD 70 billion** per year. This reflects a 50% increase from 2015.
- Aging fleet with more than two-thirds of the world's nuclear reactors over 30 years old;
- **By 2050, Morgan Stanley** estimates that total nuclear value chain could reach **USD 2.2 trillion**. It in the last 10 years have a higher average TWh annual capacity most critical in **condenser and heat exchanger systems** of nuclear power plants—especially those using seawater cooling operations they offer a chance for **corrosion resistance, lifespan, and efficiency** under aggressive conditions.



Trends



Titanium is **biocompatible, lightweight, strong, corrosion-resistant**, and integrates well with human tissue.

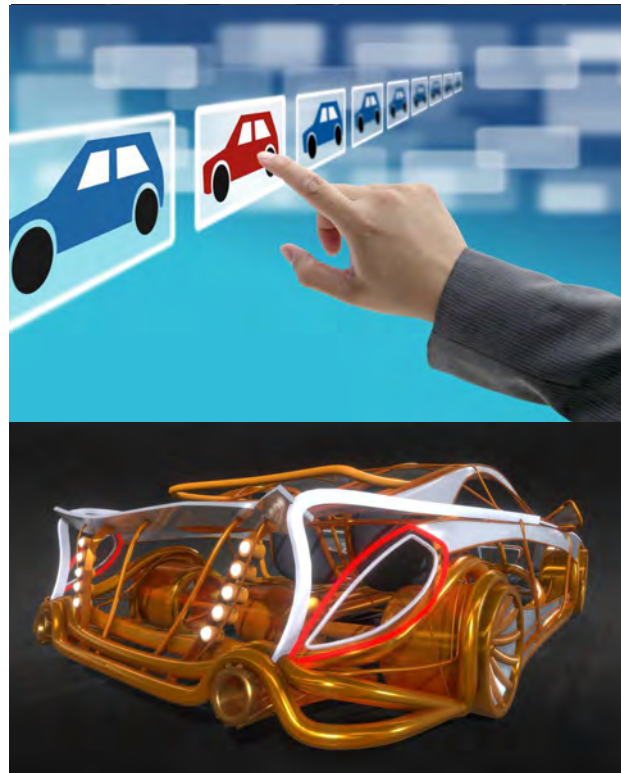
Commonly used from **orthopedics and dentistry to cardiovascular, neurosurgery, prosthetics, and even nanotech applications**, making it one of the most critical materials advancing human health today.

Global investment in Medical Applications:

- **Titanium Alloy for Medical Market** - 2030 forecast: over **USD 1 billion**;
- **Broader Medical-Grade Titanium Materials** - 2033 forecast: over **USD 935 million**;
- Fast-growing segment projected to nearly **double in size over the next 5–8 years**;
- Drivers: aging populations, rise in orthopedic/dental surgeries, and advances in additive manufacturing and implant surface technologies.



Trends



Investments in titanium products for automotive/EV are still relatively modest compared to aerospace or nuclear, but they're accelerating as EV makers push for **range, thermal stability, and safety**.

- Expect strong growth in **battery cooling tubes, fuel cell plates, fasteners, and suspension parts** over the next decade.
- **Small but fast-growing share** of this market with over USD 1.5 billion by 2030.



Trends



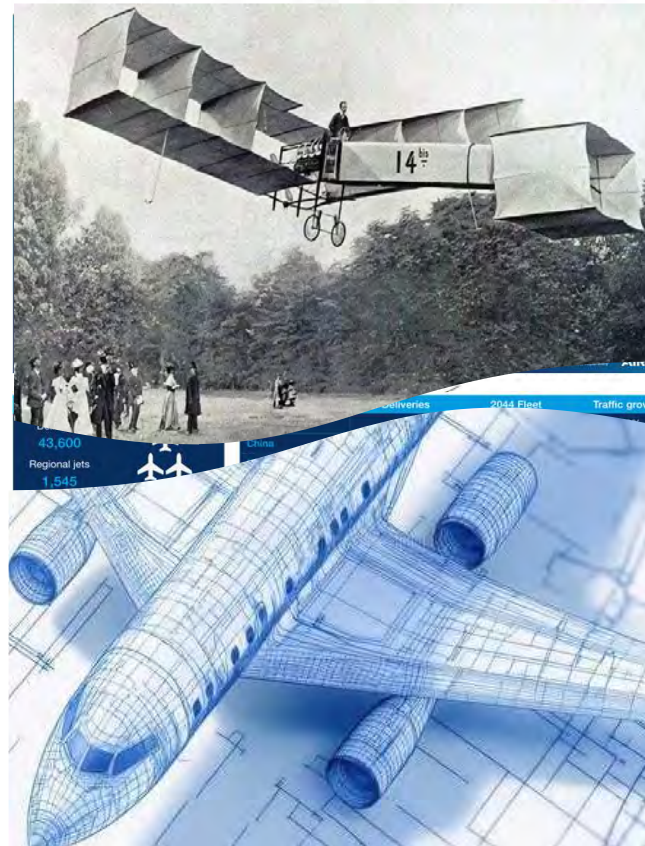
Model	Titanium Use	Year Introduced
Samsung Galaxy S24 Ultra	Titanium frame	2024
Samsung Galaxy S25 Ultra	Titanium body and frame	2025
Samsung Galaxy S25 Edge	Titanium design	2025
Huawei Mate 70 (Base)	Titanium casing	2024

Estimated Titanium phones sold in 2024:

- Apple: ~105 million;
- Samsung: ~20 million;
- Huawei: ~1.8 million.

Why Titanium Matters?

- **Smartphone demand is on the rise.** High-end models are increasingly using titanium frames for strength, durability, and premium appeal.
- **Designs are embracing recycled trends, and 3D printing to manage costs and improve sustainability.**
- **Supply chain dynamics matter.** With production concentrated among a few players and geopolitical instability, supply constraints and premiums could drive price volatility.



• **Intelligence** has increased in his
 New passenger aircraft
 demand for 2025-2027 1500
 regional aircraft for 2025-2027 1500
 performance and durability, long
 life, weight, and corrosion resis-
 tance in the six second-
 place China, 1500 space and
 military applications, about US\$
 1.5-2.0 billion per aircraft,
 protection.

- [illegible]

Applications of up to 2" OD

1. Aerospace & Defense

- Hydraulic and pneumatic systems (landing gear, flight control, fuel lines);
- Heat exchangers in aircraft engines and auxiliary power units;
- Missile and defense systems requiring lightweight, corrosion-resistant tubing.

2. Power Generation (Nuclear & Fossil)

- Nuclear steam generator tubing (secondary side, heat exchangers);
- Condenser and feedwater heaters where seawater or brackish water is used for cooling;
- Gas turbine cooling and instrumentation lines.

3. Chemical & Petrochemical Processing

- Heat exchangers in corrosive environments (chlorides, acids, brines);
- Instrumentation and process tubing in offshore and onshore chemical plants;
- Hydrocarbon processing lines requiring long life and low maintenance.

4. Marine & Offshore

- Seawater cooling systems on ships and offshore platforms;
- Ballast water and fire-suppression systems;
- Desalination plants (evaporators, multi-stage flash, multi-effect distillation).

5. Automotive & High-Performance Vehicles

- Racing and motorsport applications (lightweight hydraulic, brake, and exhaust tubing);
- Heat exchangers and intercoolers in specialty vehicles.

GET IN TOUCH

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