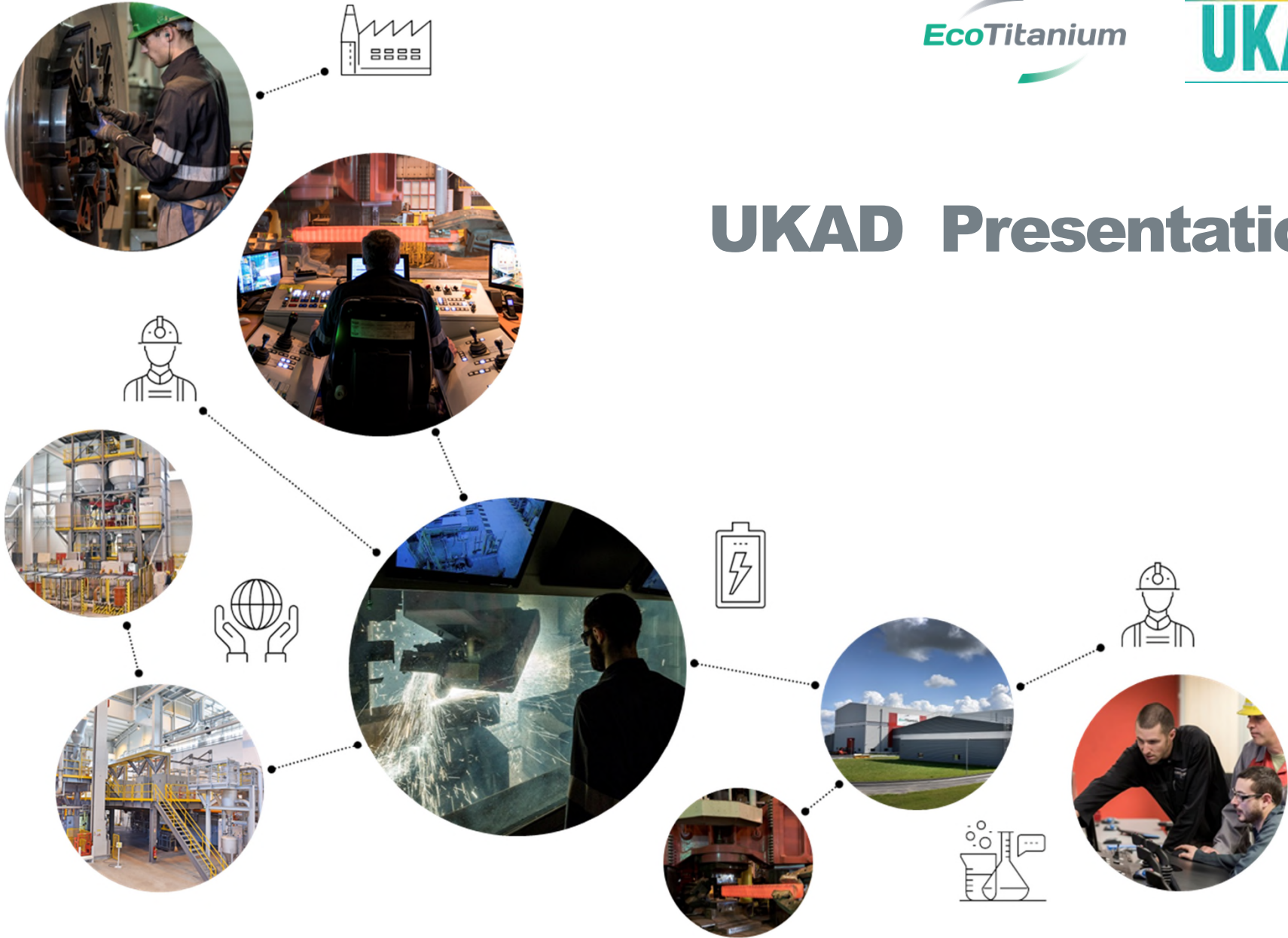


UKAD Presentation



• Safety Rules

In order to guarantee an enjoyable visit, thanks to follow these few safety rules in the production hall :

SAFETY

- Wear personal protective equipment (helmet, eyewear, earplugs, safety shoes and reflective jacket).



- Be careful at the handling devices and travelling forklifts.



- Do not cross safety fences.
- Do not touch products (danger of getting burned and/or cut).

If you see an accident, please warn ASAP a first-aid worker. They are easy to recognize thanks to a green helmet.



SHARED VIGILANCE

If you see an hazardous situation, feel free to inform us.

QUALITY PRODUCT

Do not used source of tungsten pollution : ballpoint pen, filament lamp, drill tools...

ENVIRONMENTAL

- Save energy (water and electricity).
- If you see a leakage, please inform us ASAP.

EVACUATION

If you hear the emergency alert system, follow your guide to **the meeting point** situated near the entrance.



• Safety Rules

- It is forbidden to take pictures .



- Switch off your mobile devices.



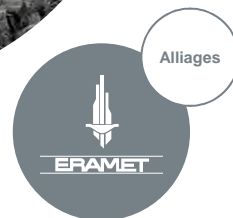
- It is forbidden to smoke in walking areas.



- Using pen (or any other thing) containing tungsten is absolutely forbidden in the EcoTitanium shop. Only use EcoTitanium pen.



1 TITANIUM STREAM



- Over the 2012/2020 period, **global titanium demand** is set to grow by more than **50% to total 100 Kt of ingots**, mainly to meet the needs of the **industry and aviation sectors**.
- The **aeronautic market** but also the **medical, energy and defense** markets should grow by **5%** per year.

2011



ERAMET Group, its subsidiary Aubert & Duval and its partner UKTMP inaugurated **UKAD** forging plant



2016



MECACHROME and Aubert & Duval inaugurated **MKAD**, a joint venture specialised in machining and finishing aeronautical-grade titanium parts



2017



UKAD, ADEME and Crédit Agricole Centre France inaugurated **EcoTitanium**, the first plant in Europe to produce aeronautical-grade titanium by recycling



SHAREHOLDERS committed in UKAD and EcoTitanium



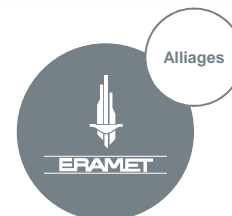
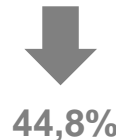
Aubert & Duval, an ERAMET Group subsidiary, specialized in high value added metallurgy is a world leader in high performance steels, superalloys, titanium and aluminum.

Aubert & Duval designs and makes cutting-edge metallurgical solutions for aerospace, energy, motor racing, nuclear and medical sectors.



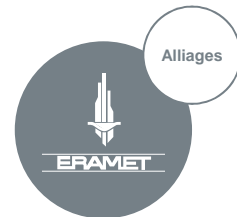
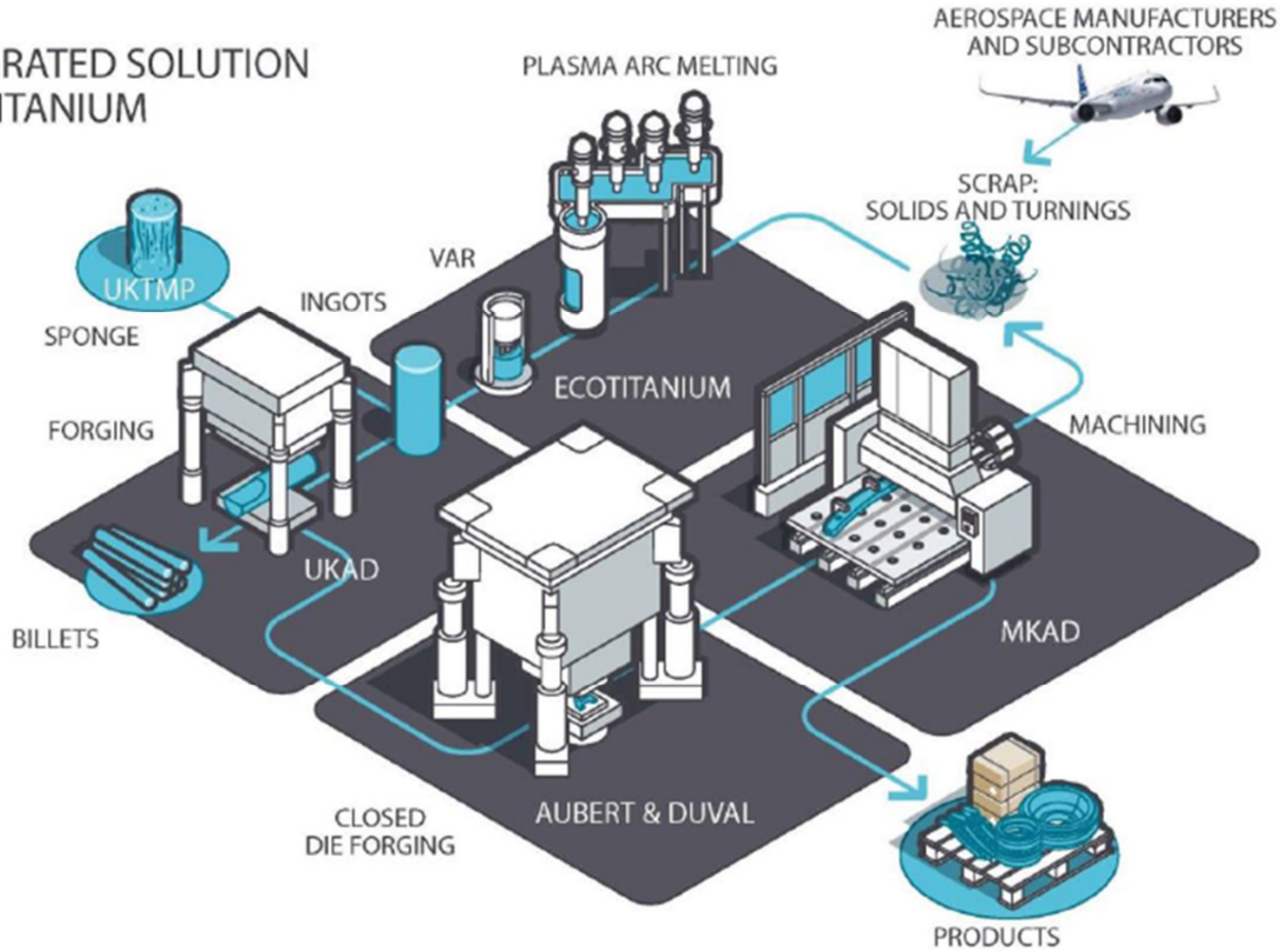
UKTMP is listed on the Kazakhstan stock market. UKTMP produces high quality Titanium sponge from Kroll process and Titanium ingots using VAR furnaces since 2010.

It's one of the world leaders in titanium sponge production.

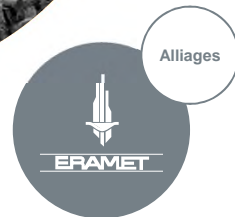


TITANIUM STREAM

INTEGRATED SOLUTION FOR TITANIUM



2 UKAD

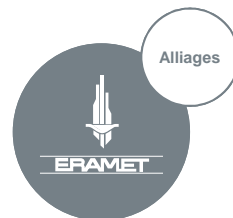
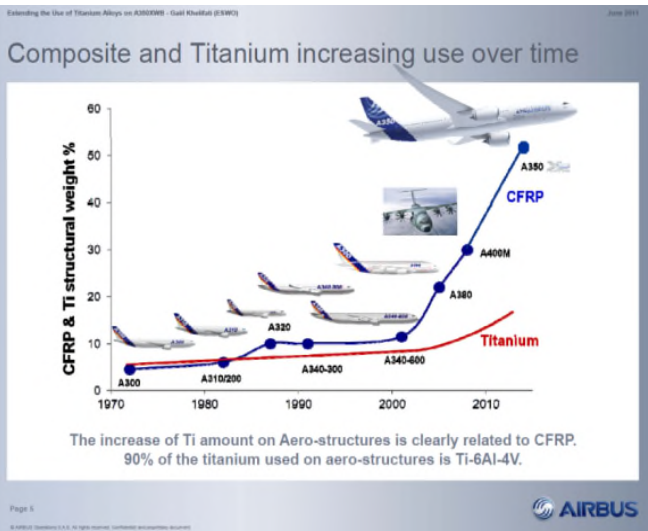


• The Raison d'Etre of UKAD



The creation of UKAD was driven by :

- The increase of Ti material in airplane structures
- The UKTMP strategy with Ti downstream development,
- The Aubert et Duval strategy with Ti upstream development,
- The support of Airbus with a 10 years sales agreement,
- The French local authorities support,



• The Foundation of UKAD



UKAD is a joint-venture which combines, in the titanium market, the strengths of 2 companies :

➤ Aubert & Duval



➤ UKTMP



UKTMP is a Kazakh registered company. Well known for its high level of Titanium sponge quality :

- Ilmenite mining operation
- Titanium slag production
- Titanium tetrachloride and magnesium production
- Titanium sponge production
- Titanium melting facility



UKTMP plant in Kazakhstan

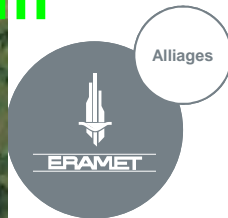
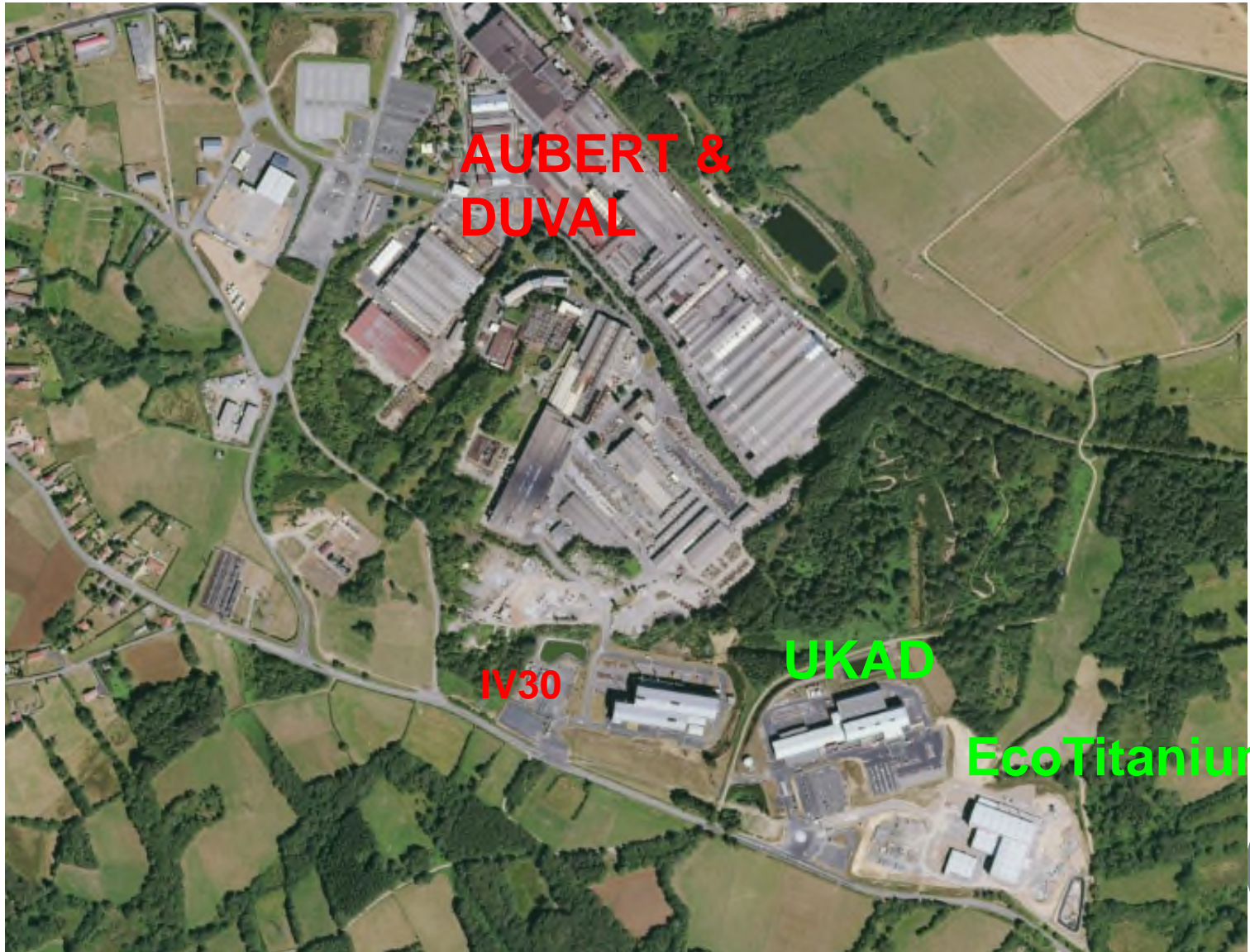


• UKTMP in pictures



Alliages

- **Location**



• The Process of UKAD



Lingots



forging press
4,500 t.

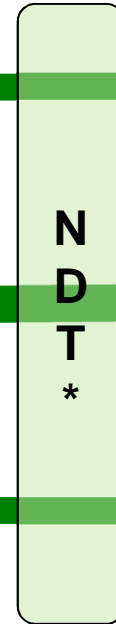
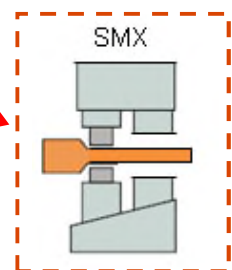
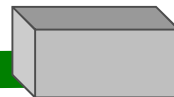
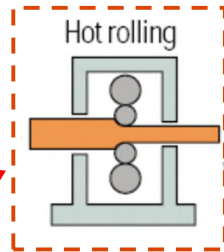


Ingots



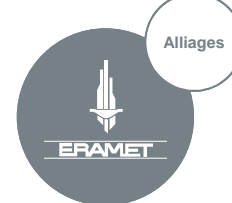
EcoTitanium

→ UKAD



Operations subcontracted to Aubert & Duval

- Ingots from 7 (titanium) to 18 t
- Blooms and billets (round) from 85 to 450 mm in Ø and 4 to 6 m long, rectangular bars.



Worldwide Aeronautical Market

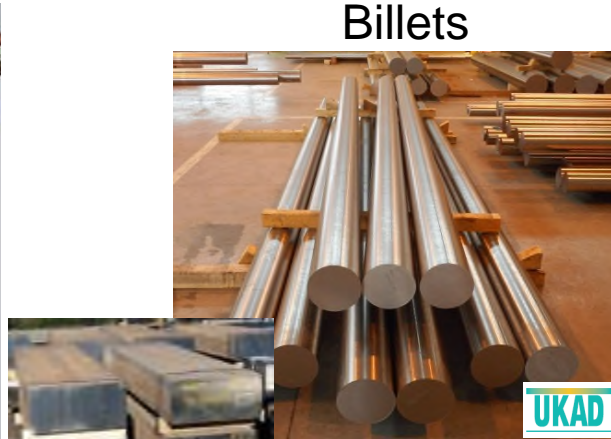


CUSTOMERS

UKTMP



Ti Alloy Ingot



Billets




AIRBUS



BOMBARDIER

l'évolution de la mobilité



SAFRAN

AEROSPACE DEFENCE SECURITY



COMAC

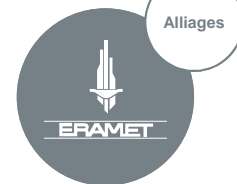
中国商飞



LEONARDO



BOEING



• Fasteners and Medical Market



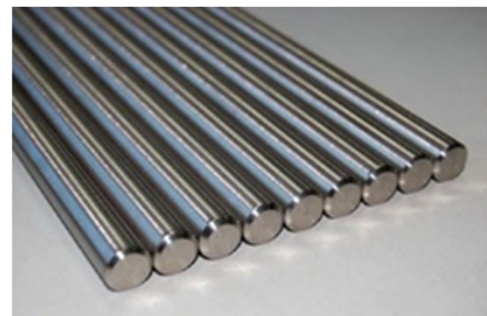
UKTMP

Ingot → Blooms → Bars

CUSTOMERS



Ti Alloy Ingot



**Aeronautical
fastening market**



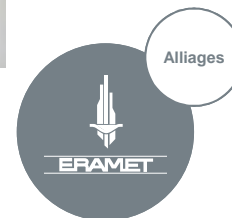
**Orthopedic
Implants**



Knee



Hip



• Oil and Gas, Industrial Market



UKTMP

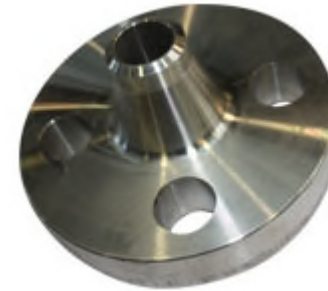


Ti CP or Ti Alloy Ingot

Ingot → Blooms, Billettes



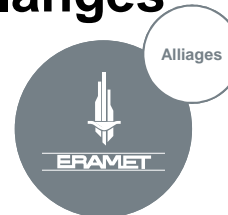
CUSTOMERS



Welding Neck



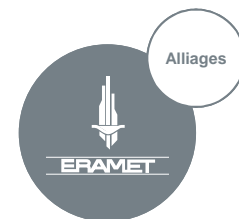
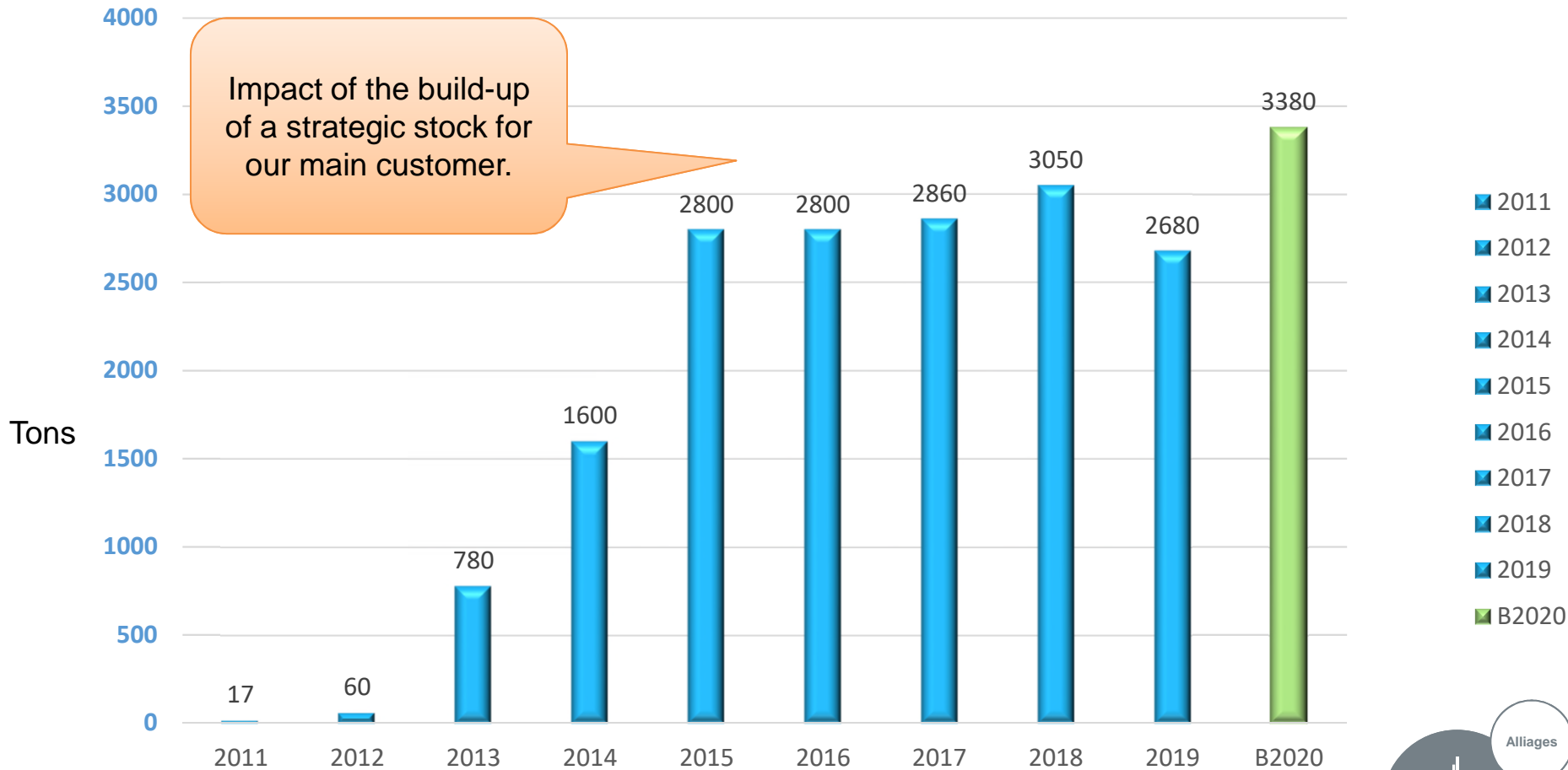
Covers and flanges



• Key Figures



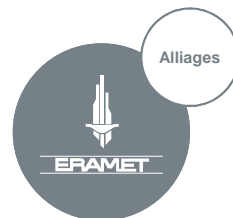
UKAD Deliveries



• UKAD certifications



- ISO 9001 and AS 9100, last approval Dec 2018
- ISO 14 001 and OHSAS 18001, last approval Dec 2018
- Ultra Sonic Nadcap Certification in Dec 2014, confirmed in 2015, 2016 and in April 2018.
- **Airbus :**
 - IPCA Jan 2013 « C » → IPCA+ 28 Jan 2016 « B »
- **UKAD** delivers billets and bars in accordance with **AMS 4928** and Ultra Sonic tested in accordance with **AMS 2631**.



• UKAD Awards



Best Improver Award

For three years running, UKAD was awarded by Airbus :

Best Improver Award 2014, 2015, 2018.

Best Performer Award 2019.

UKAD

For demonstrated improvement of performance in 2015,
Strong continuous improvement and customer-oriented approach,
In line with Airbus targets and expectations.

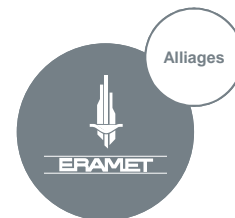


Klaus RICHTER
Chief Procurement
Officer AIRBUS Group
& AIRBUS

Olivier CAUQUIL
Senior VP,
Head of Material and
Parts Procurement
Chairman of the Airbus
Group Material board

Thomas MOIK
Senior VP,
Head of Procurement
Operations

Thierry VUILLEQUEZ
VP Supply
Chain & Quality
Procurement Operations
Material & Parts



3 EcoTitanium



• Why EcoTitanium

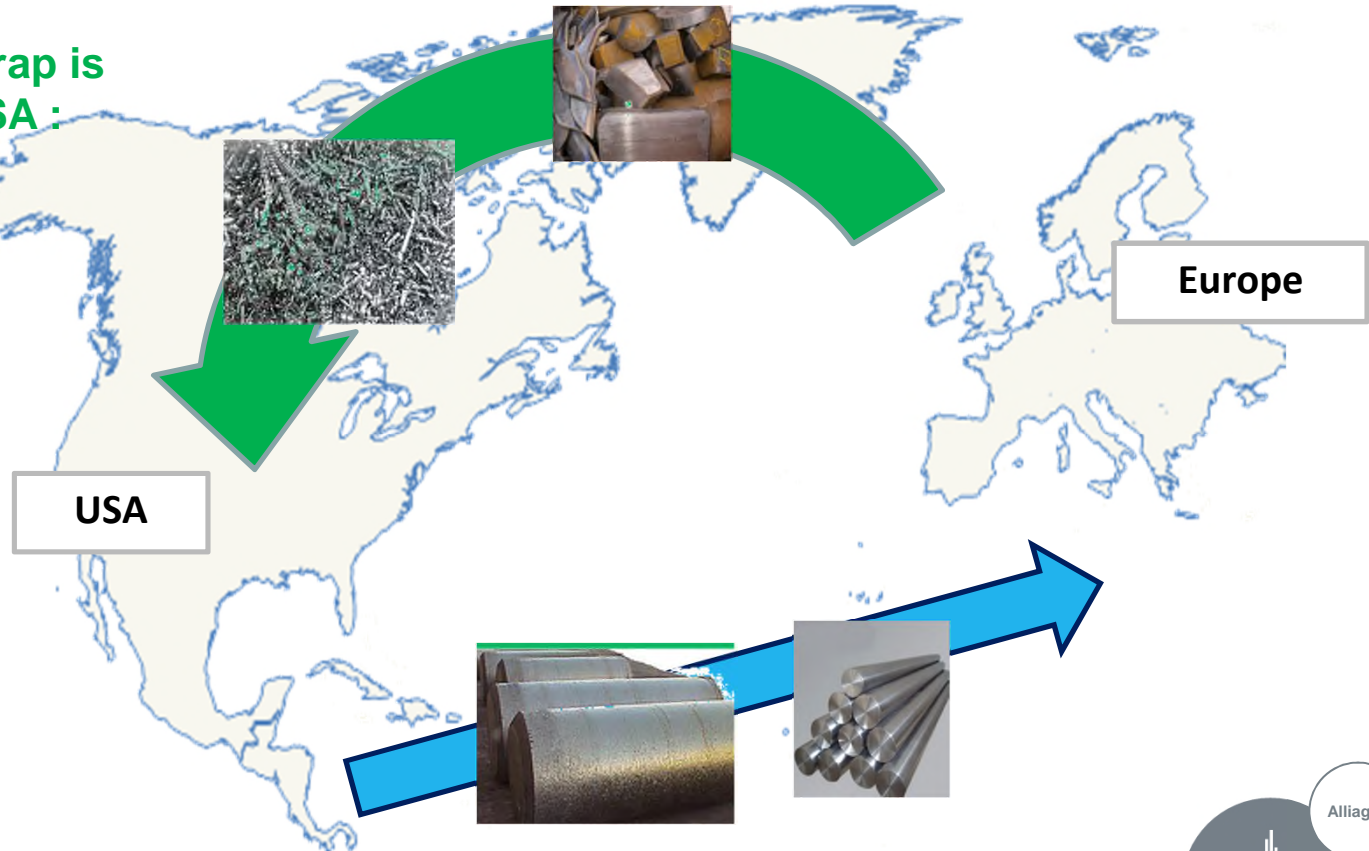


□ Scrap generated in Europe is a key for competitiveness of US titanium melters:

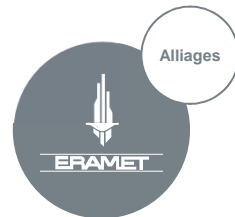
European titanium scrap is mainly exported to USA :

* 10500 tons en 2016

* 16 000 tons en 2018.



US ingots are mainly produced from titanium scrap, which represents more than 60 % of the total consumption Scrap + Sponge.



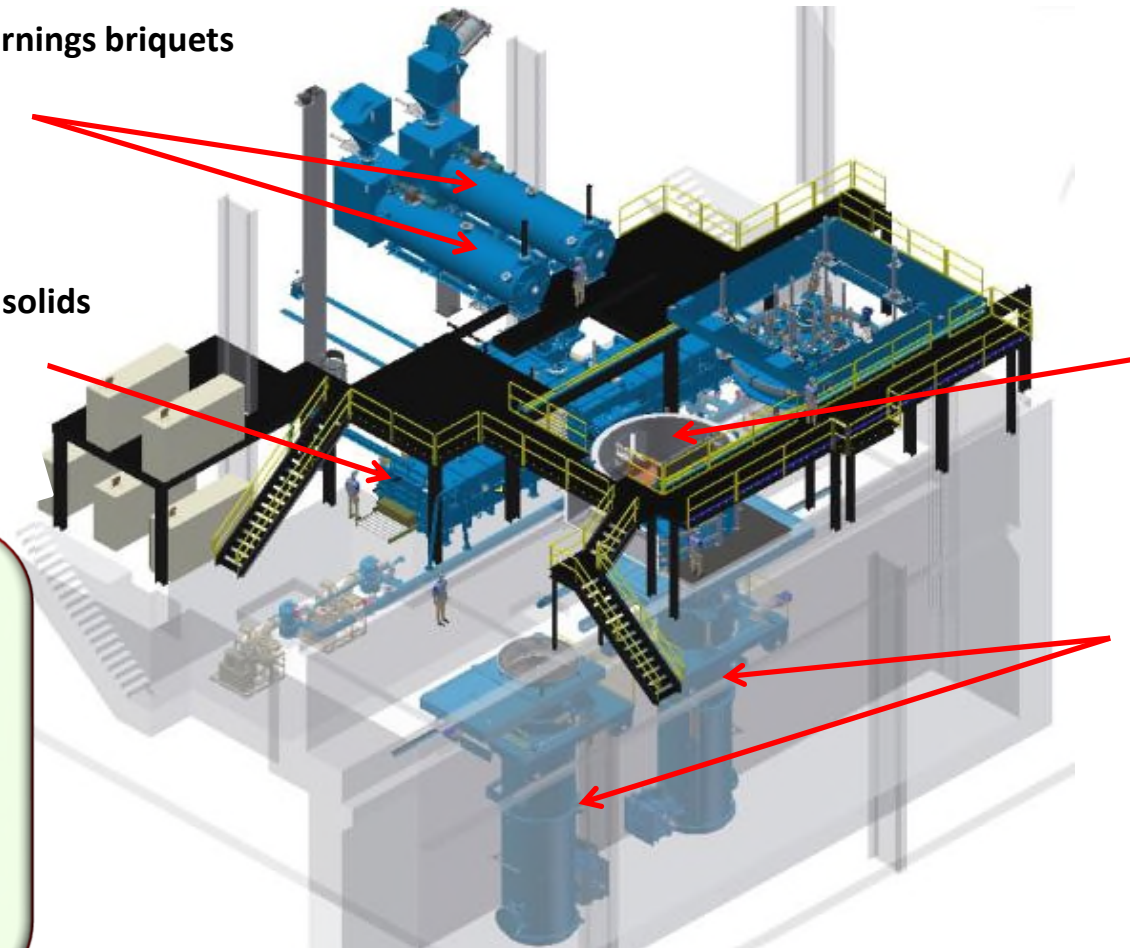
• Main Equipment : PAM-CHR



Plasma Arc Melting Furnace with Cold Hearth Refining System

Loading system for turnings briquets

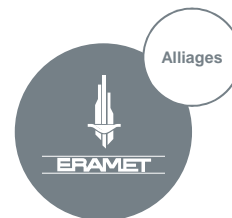
Loading system for solids



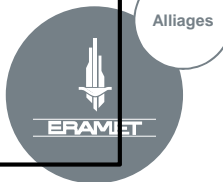
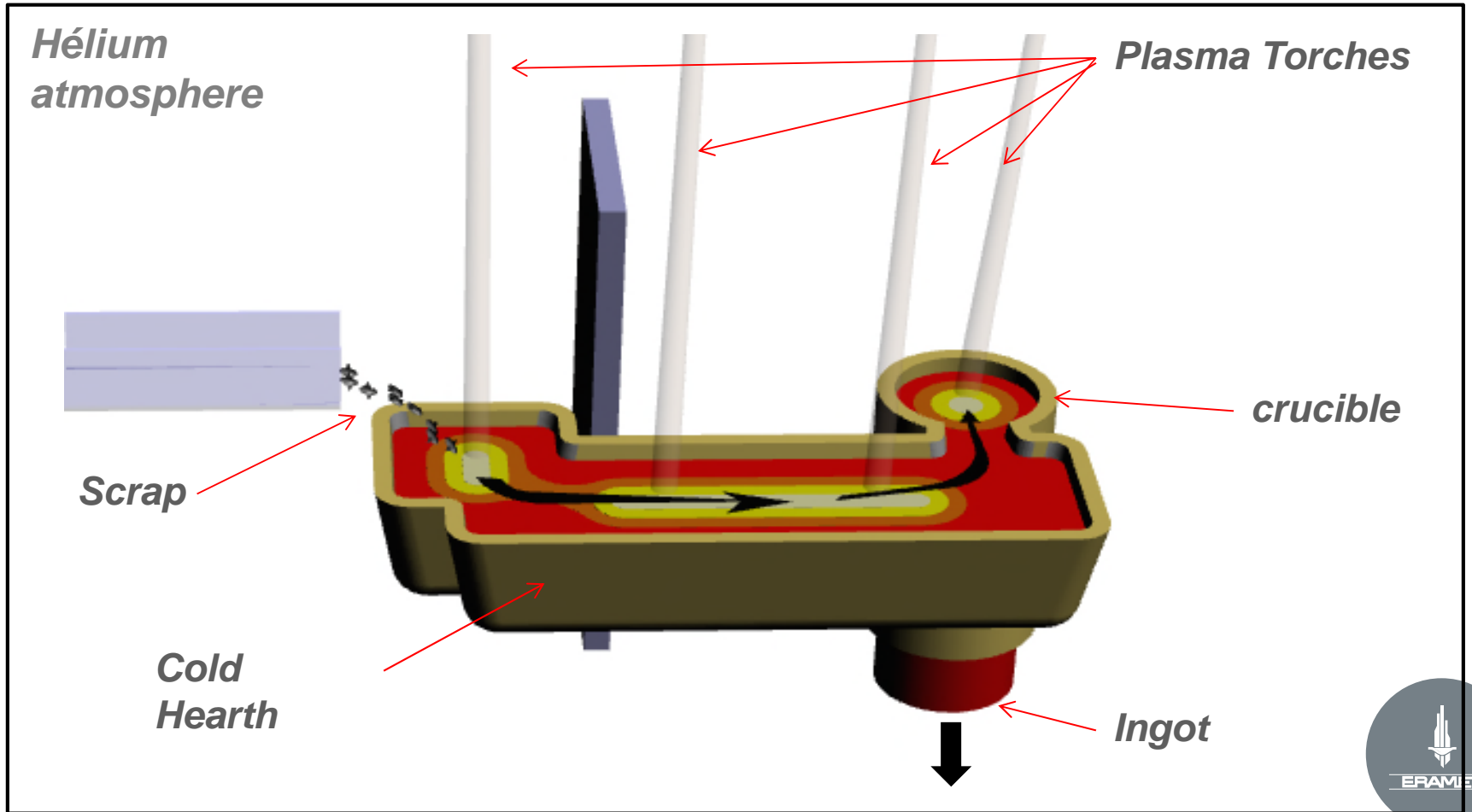
Melting Chamber

Electrodes erection chamber

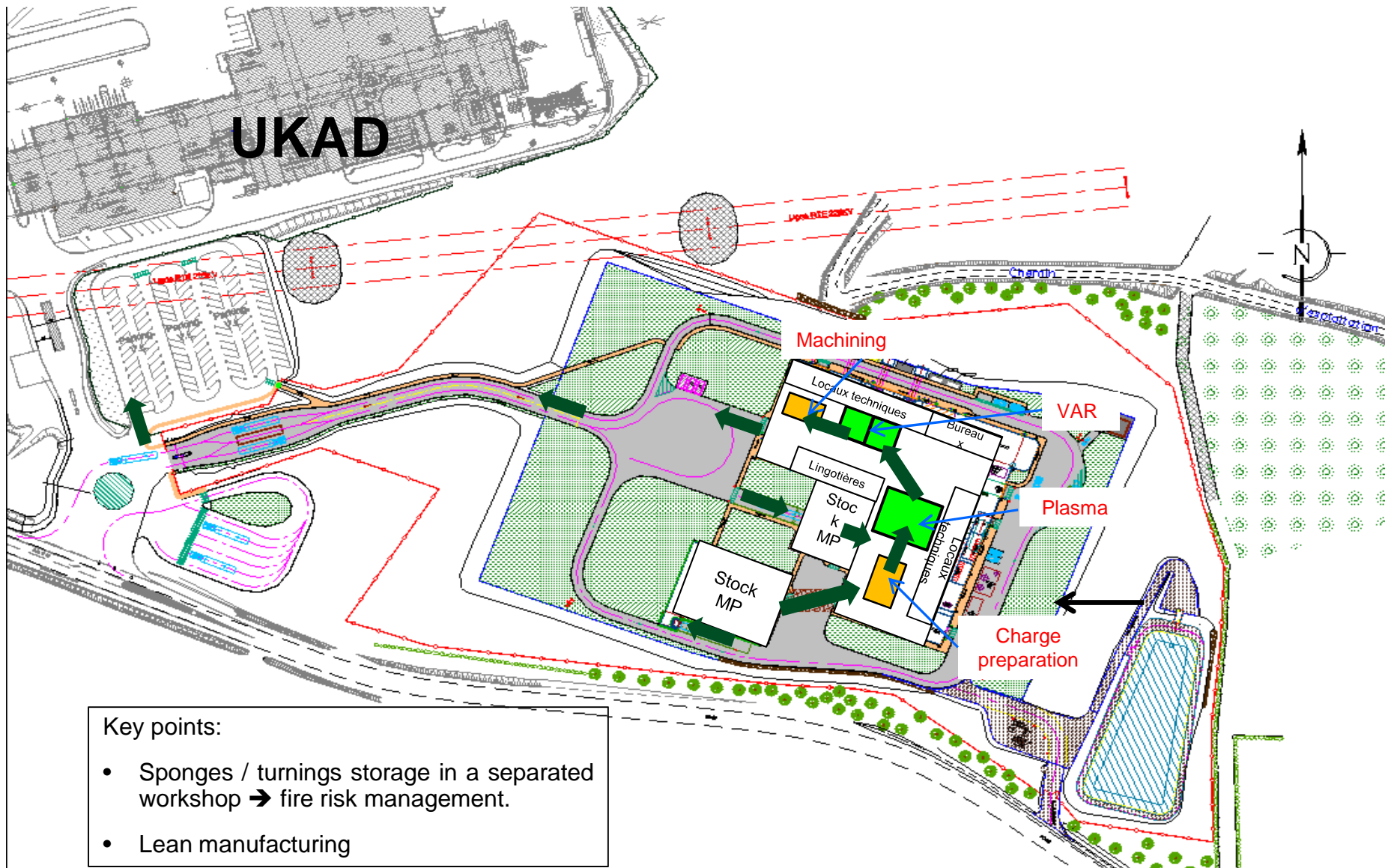
- Plasma melting is followed by VAR remelting in EcoTitanium facility.
- All equipment available in Ecotitanium for preparation of melting and remelting, and sample collection for chemical analysis.



• PAM – CHR Principle



Layout & flow process



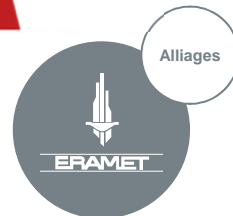
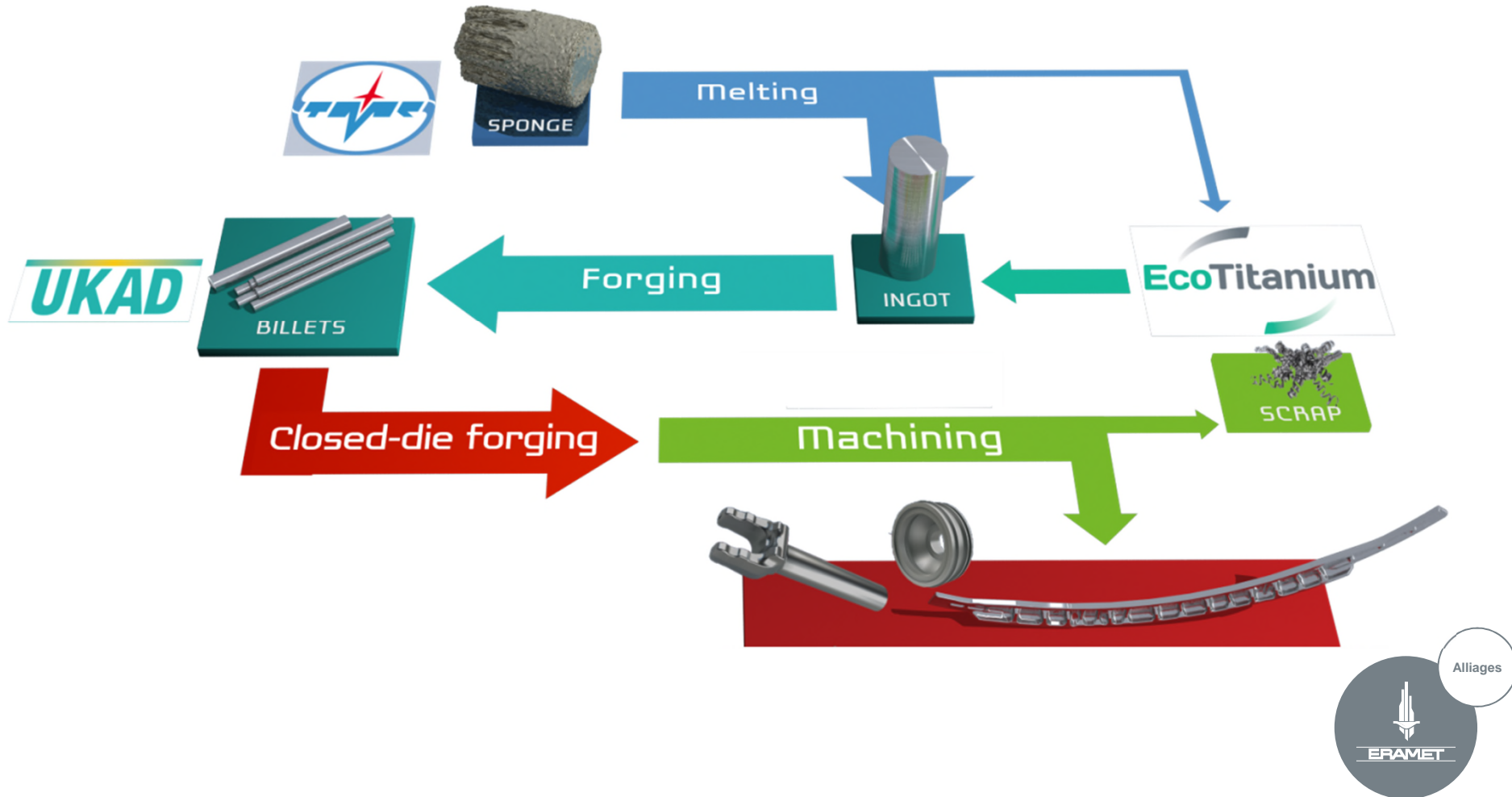
Key points:

- Sponges / turnings storage in a separated workshop → fire risk management.
- Lean manufacturing

• Integrated solution for titanium



- An open Solution for all UKAD Customers: The revert loop will be available for all UKAD's customers (forgers, extruders), based on circular Economy.



• General roadmap

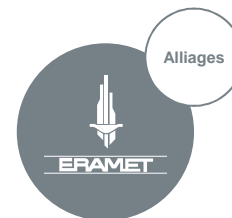


2010:
Reflection and
project
structuring.

2015:
Building
construction.

2017:
Production
and
qualification
start-up.

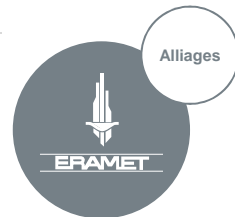
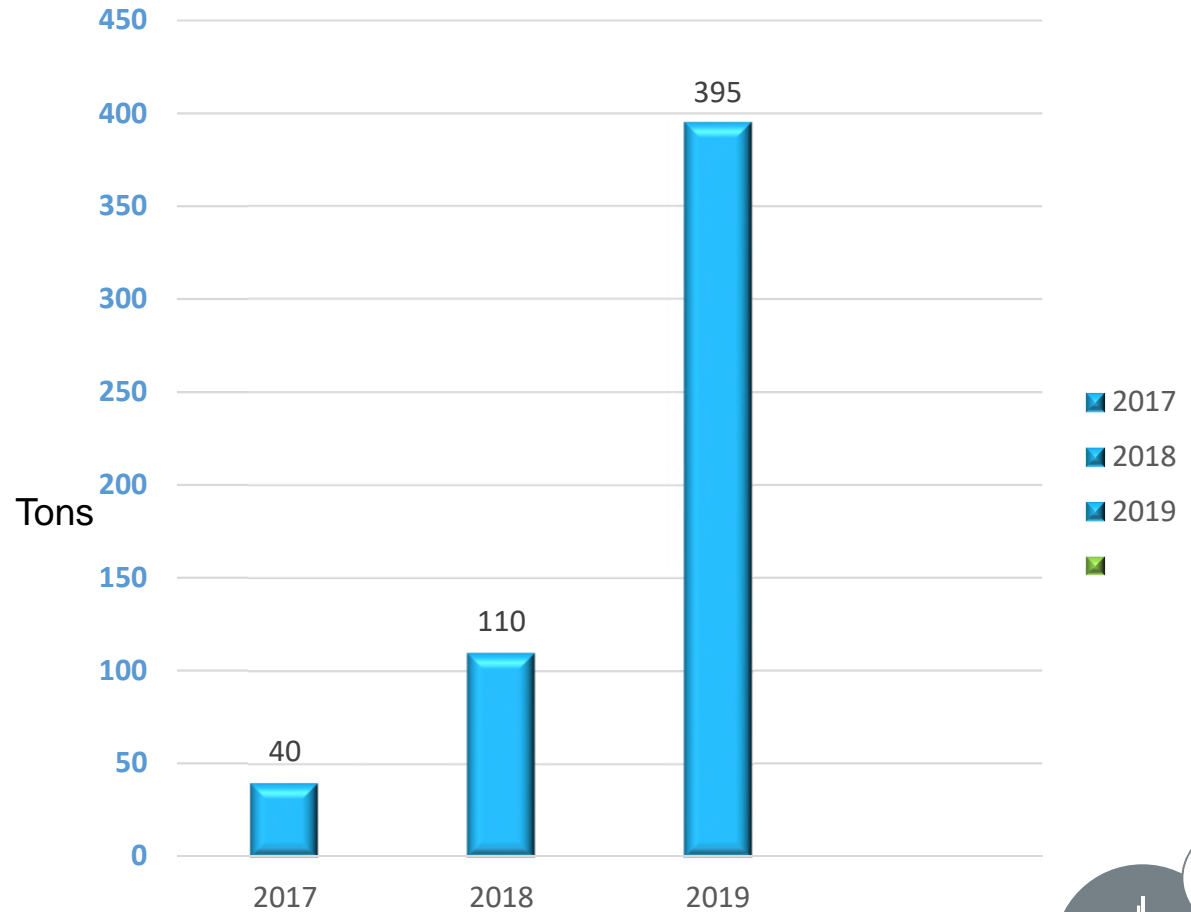
2022:
Full maturity.



• Key Figures



EcoTitanium Deliveries





Patrick DELABORDE

patrick.delaborde@eramet-aubertduval.com

+ 33 4 73 33 46 11

