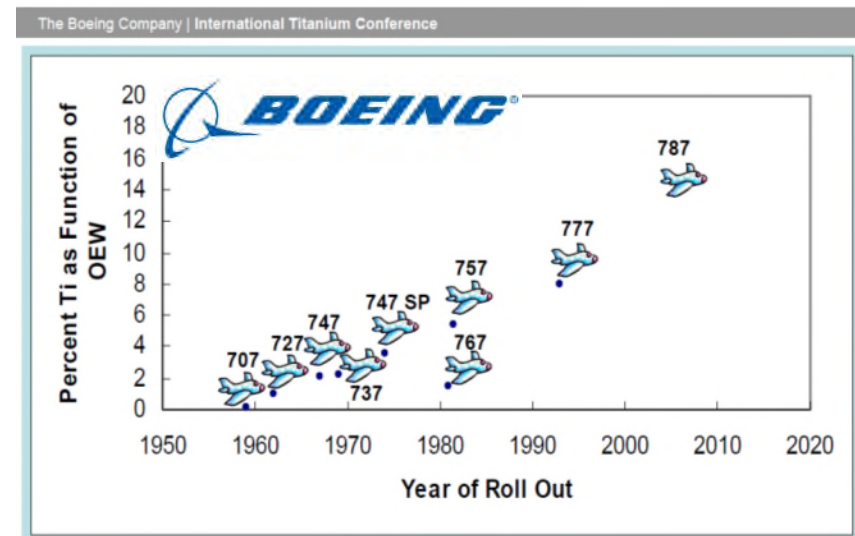
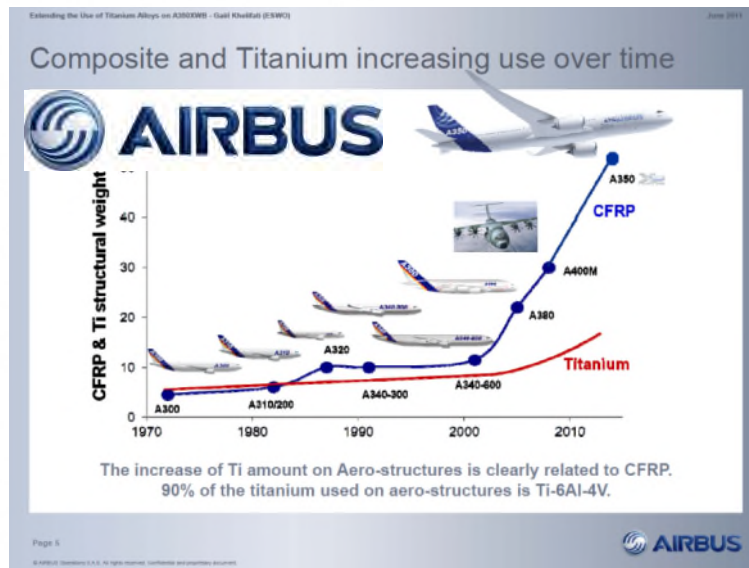




**Juillet 2017**  
**UKAD and EcoTitanium**

The creation of **UKAD** was allowed by :

- the increase of Ti material in airplane structures



The creation of **UKAD** was allowed 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 **Airbus** support with a 10 years sales agreement
- the french local authorities support

# UKAD

## UKAD

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

➤ **Aubert & Duval**



➤ **UKTMP**

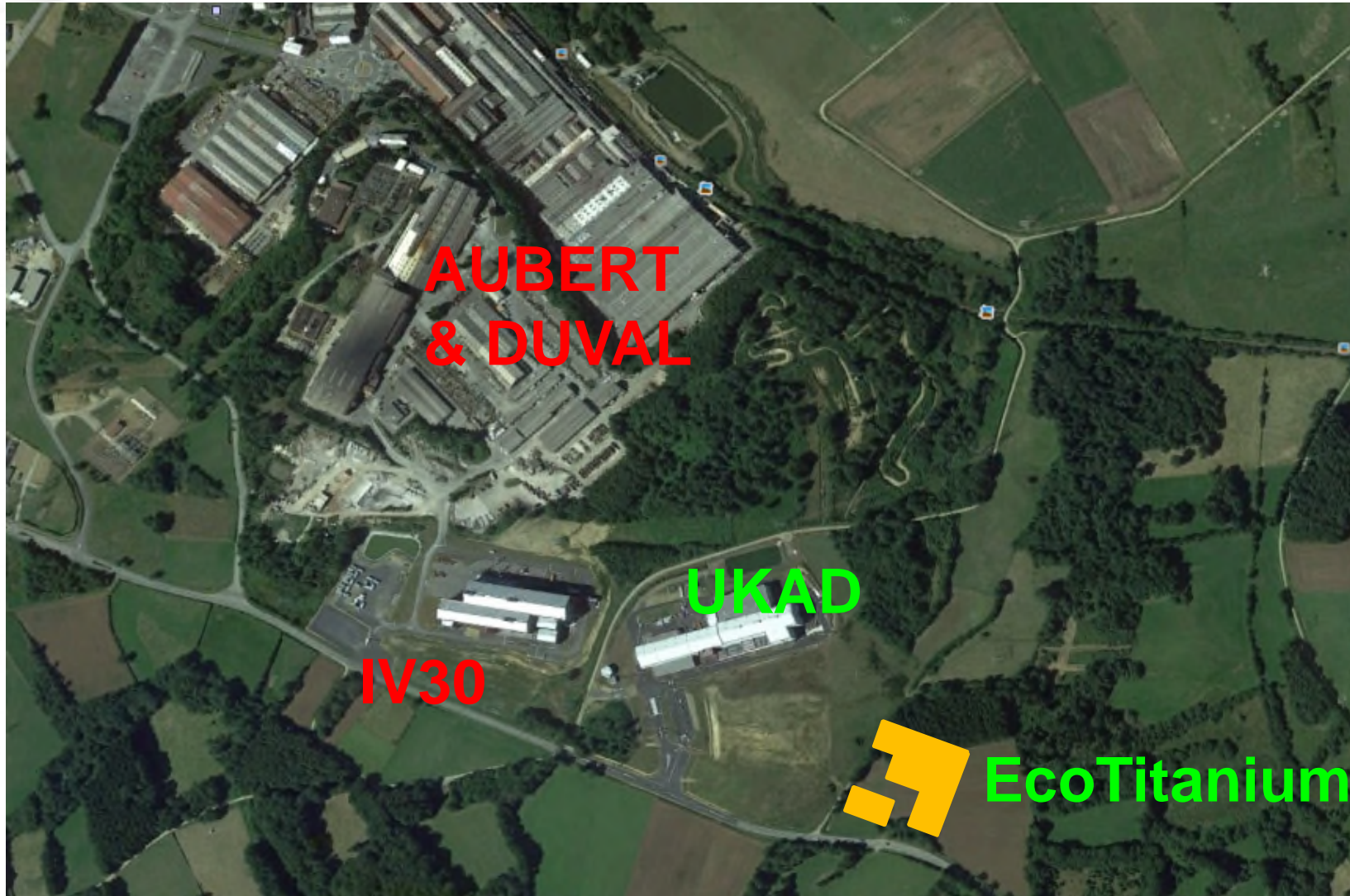


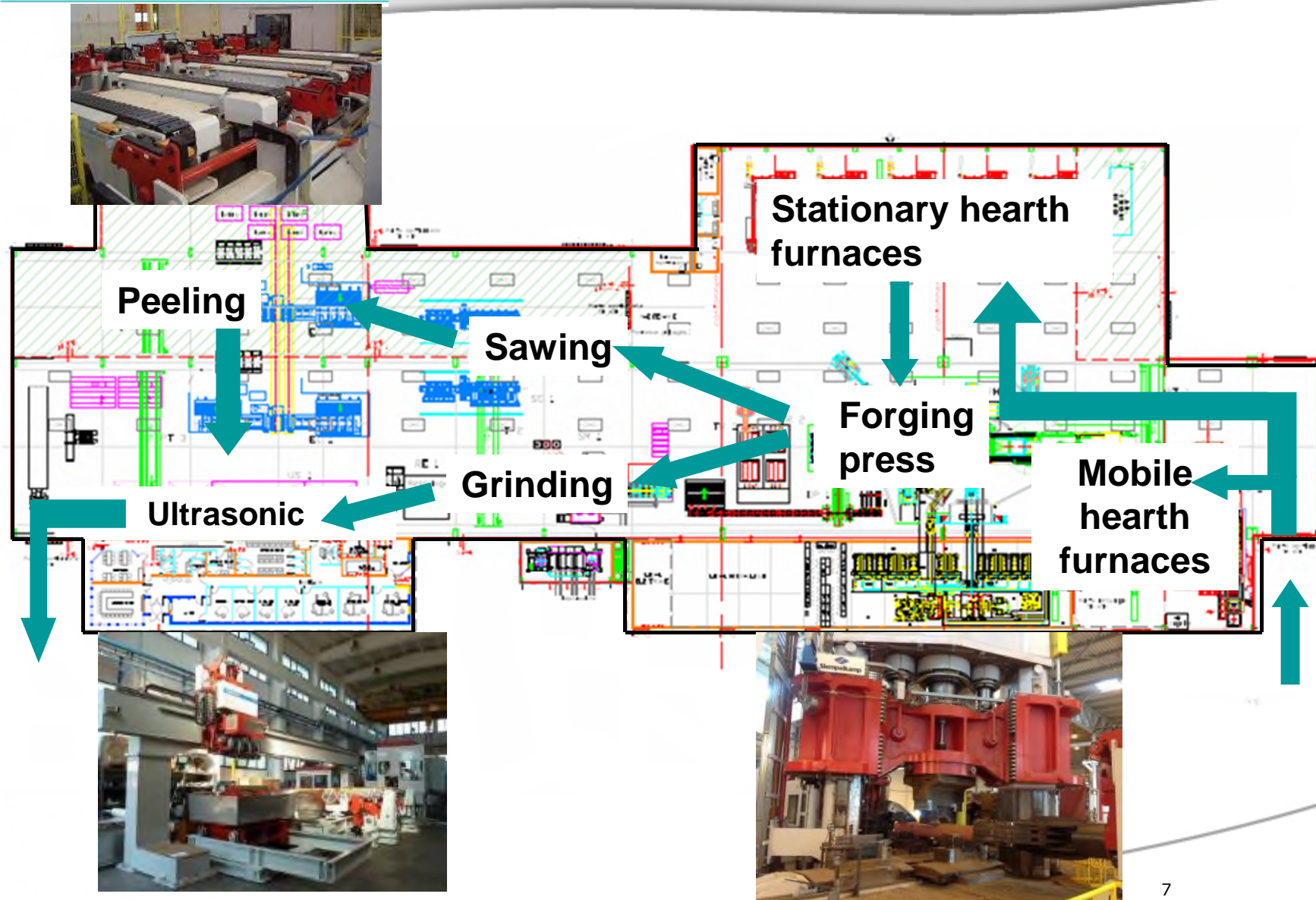
UKTMP is a Kazakh registered company. Well known for its high level of Titanium sponge quality :

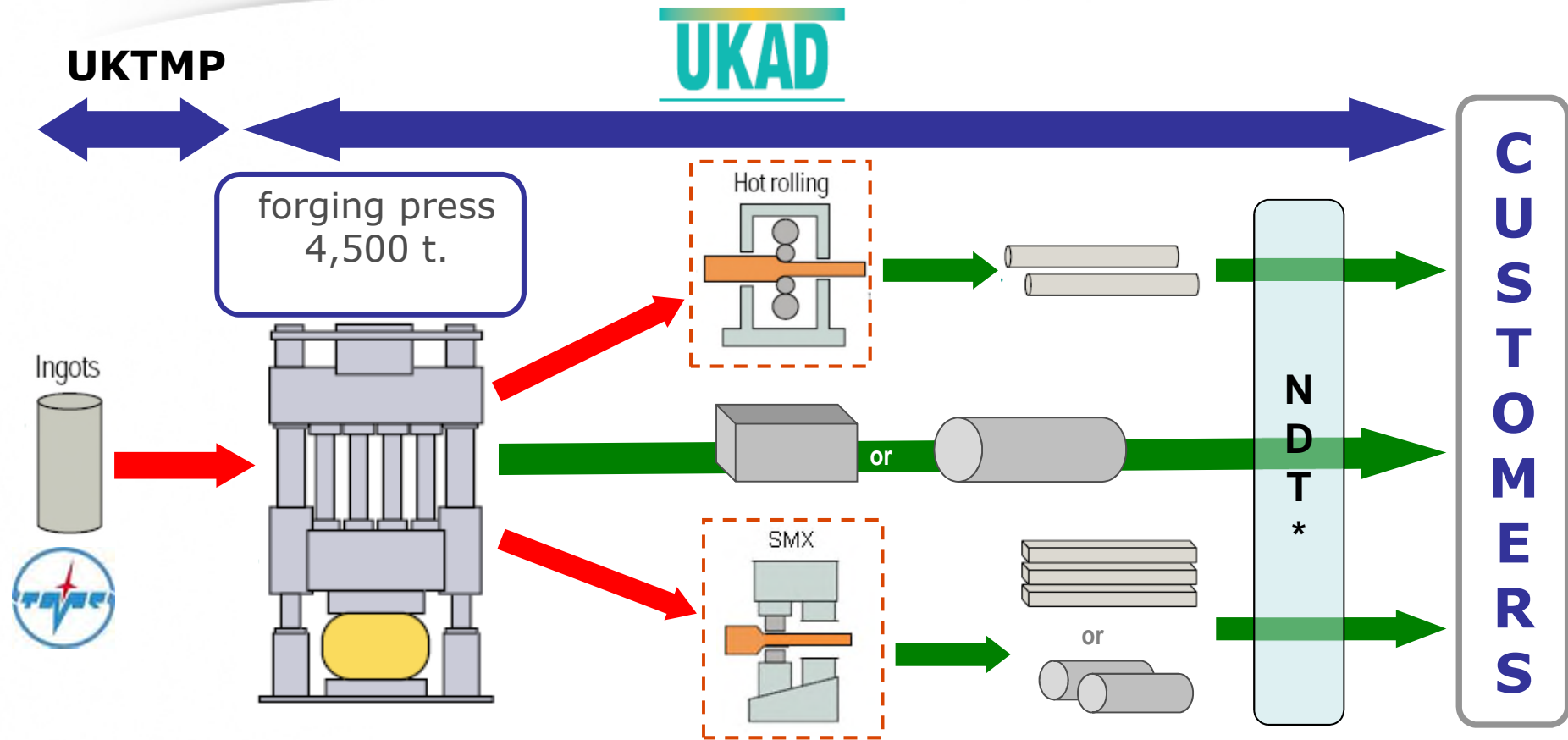
1. Ilmenite mining operation
2. Titanium slag production
3. Titanium tetrachloride and magnesium production
4. Titanium sponge production
5. Titanium melting facility











### → UKAD :

- Ingots from 7 (titanium) to 18 t
- Blooms and billets from 85 to 450 mm in Ø and 4 to 6 m long
- Bars from 55 to 85 mm

\*Non destructive tests (automatic multi-element ultrasonic)

# UKAD

## Worldwide Aeronautical Market

### UKTMP



Ti Alloy Ingot

### UKAD

#### Billets



### CUSTOMERS



### UKTMP



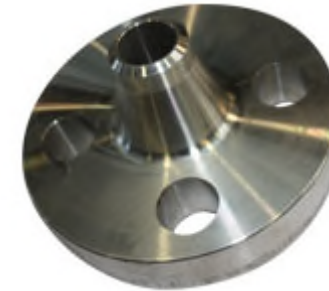
Ti CP or Ti Alloy Ingot

### UKAD

Ingot → Blooms, Billettes



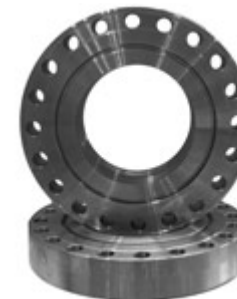
### CUSTOMERS



Welding Neck



Covers and flanges



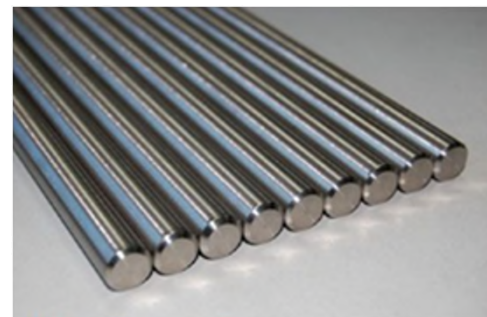
UKTMP



Ti Alloy Ingot

UKAD

Ingot → Blooms → Bars



CUSTOMERS

Aeronautical fastening market



CARPENTER<sup>®</sup>  
Dynamet

Perryman company

Orthopedic Implants



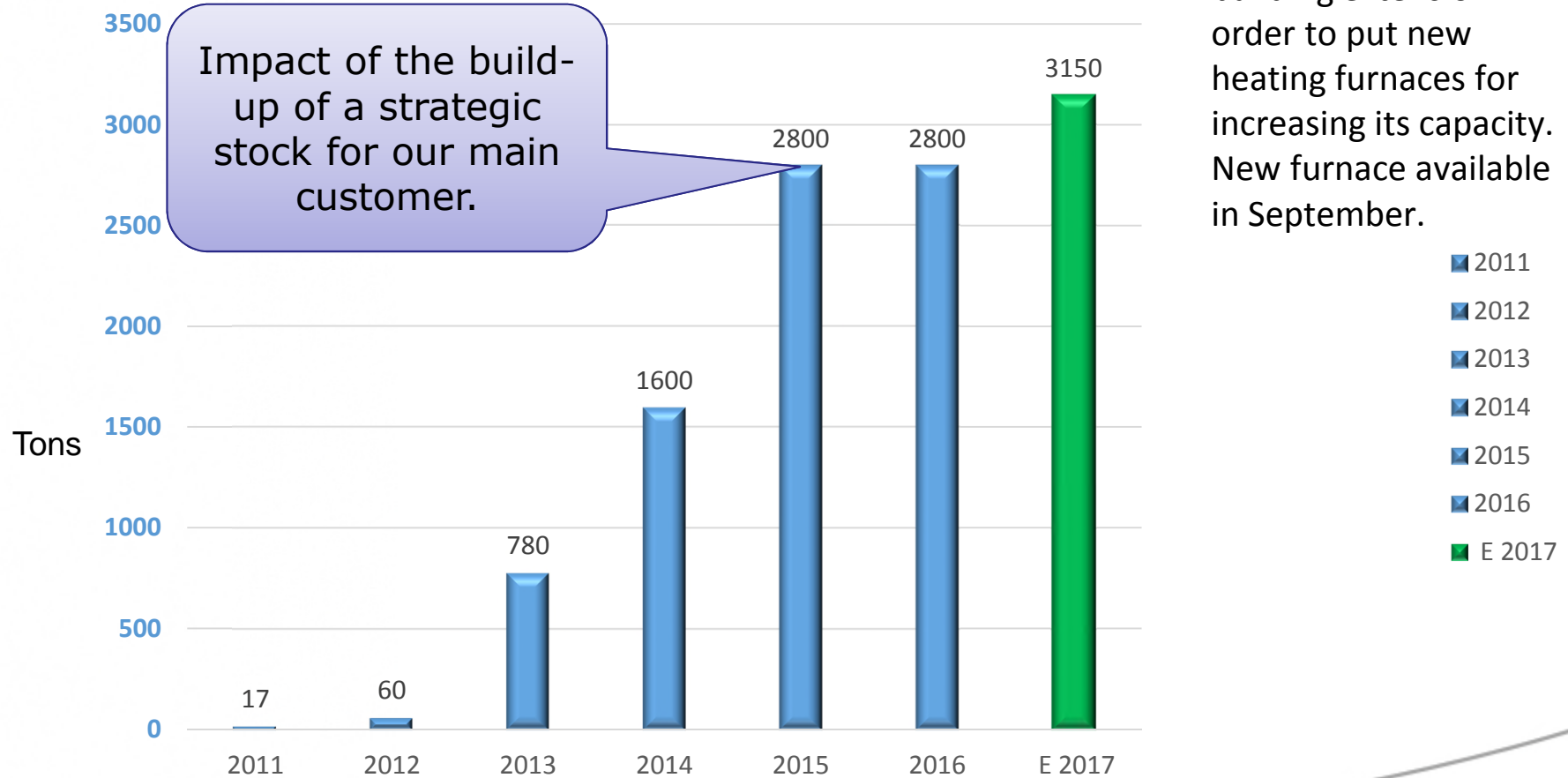
Knee



Hip

**Confidential**

### UKAD Deliveries



UKAD is investing in a building extension in order to put new heating furnaces for increasing its capacity. New furnace available in September.

- ISO 9001 and AS 9100, last approval Nov 2016
- ISO 14 001 and OHSAS 18001, last approval NOV 2016
- Ultra Sonic Nadcap Certification in Dec 2014, confirmed in Nov 2015 and in Dec 2016
- **Airbus :**
  - IPCA Janv 2013 « C » → IPCA+ 28 Janvier 2016 « B »
- **Boeing :**
  - UKTMP has been formally qualified in August 2015.
- **UKAD** delivers billets and bars in accordance with **AMS 4928** and Ultra Sonic tested in accordance with **AMS 2631**.

# UKAD

## UKAD :

For the second year UKAD was awarded by Airbus :

Best Improver Award 2015 .



**Best Improver Award**

### 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

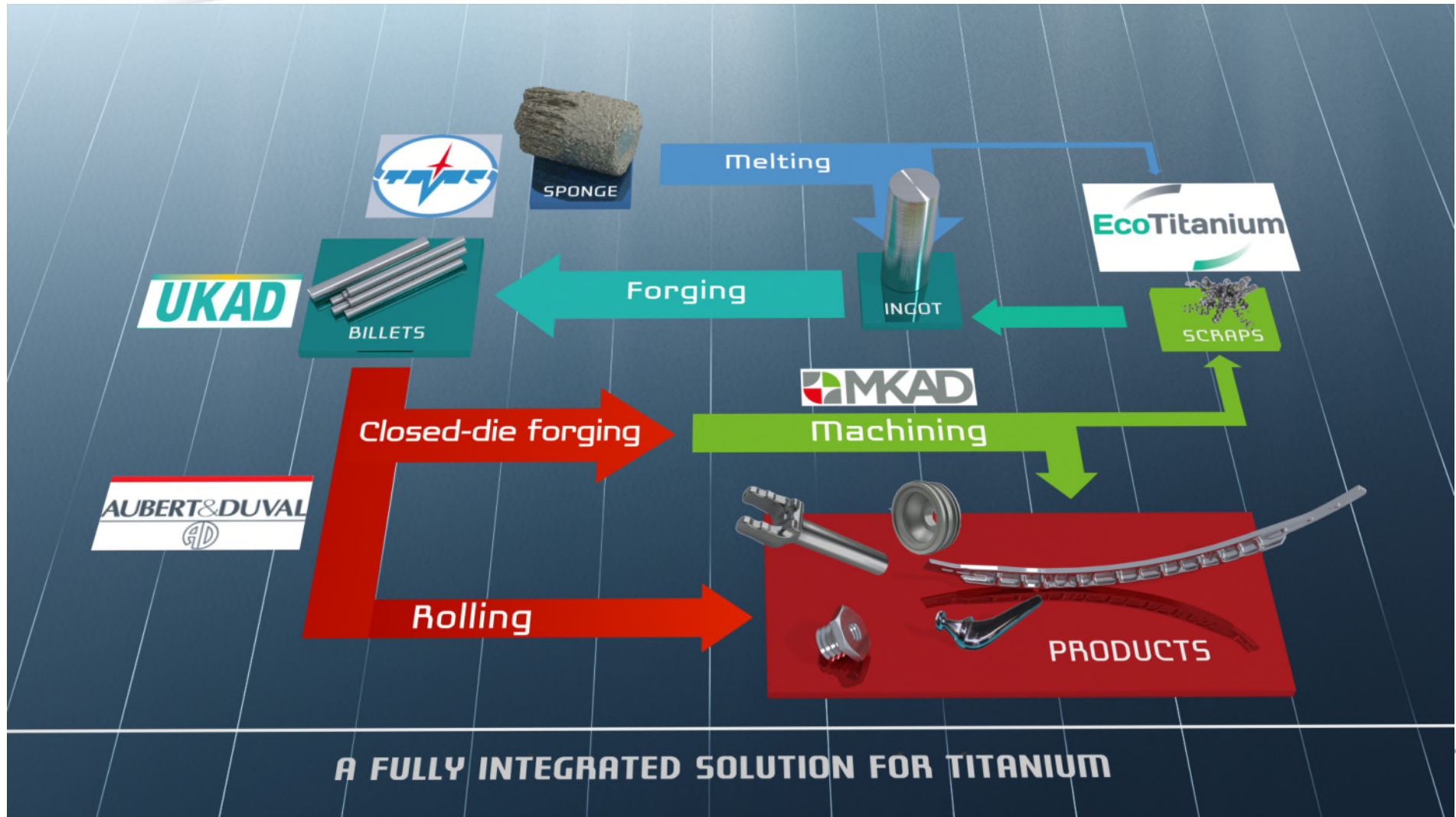
**Thomas MOIK**  
Senior VP,  
Head of Procurement  
Operations

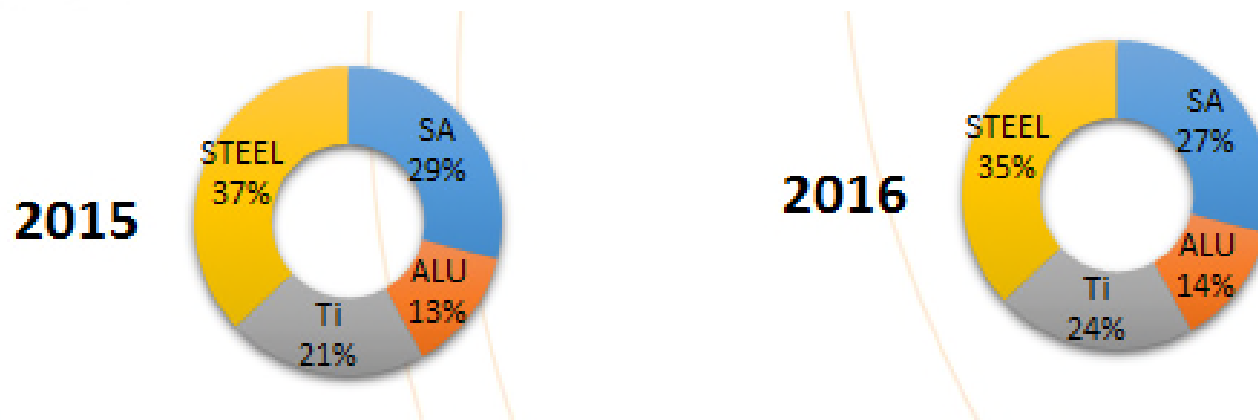
**Thierry VUILLEQUEZ**  
VP Supply  
Chain & Quality  
Procurement Operations  
Material & Parts



© AIRBUS S.A.S. 2015 - photo by Master Films /G. SADONNET

# Partnerships form an integrated Titanium Solution





- Titanium represents **24%** of A&D sales in 2016
- Coming from 18 % in 2014 and 21 % in 2015.

# Production generates significant volume of scrap

Titanium closed die parts generate huge volume of scrap

**Billet 200kg**



**Closed Die Part 150kg**



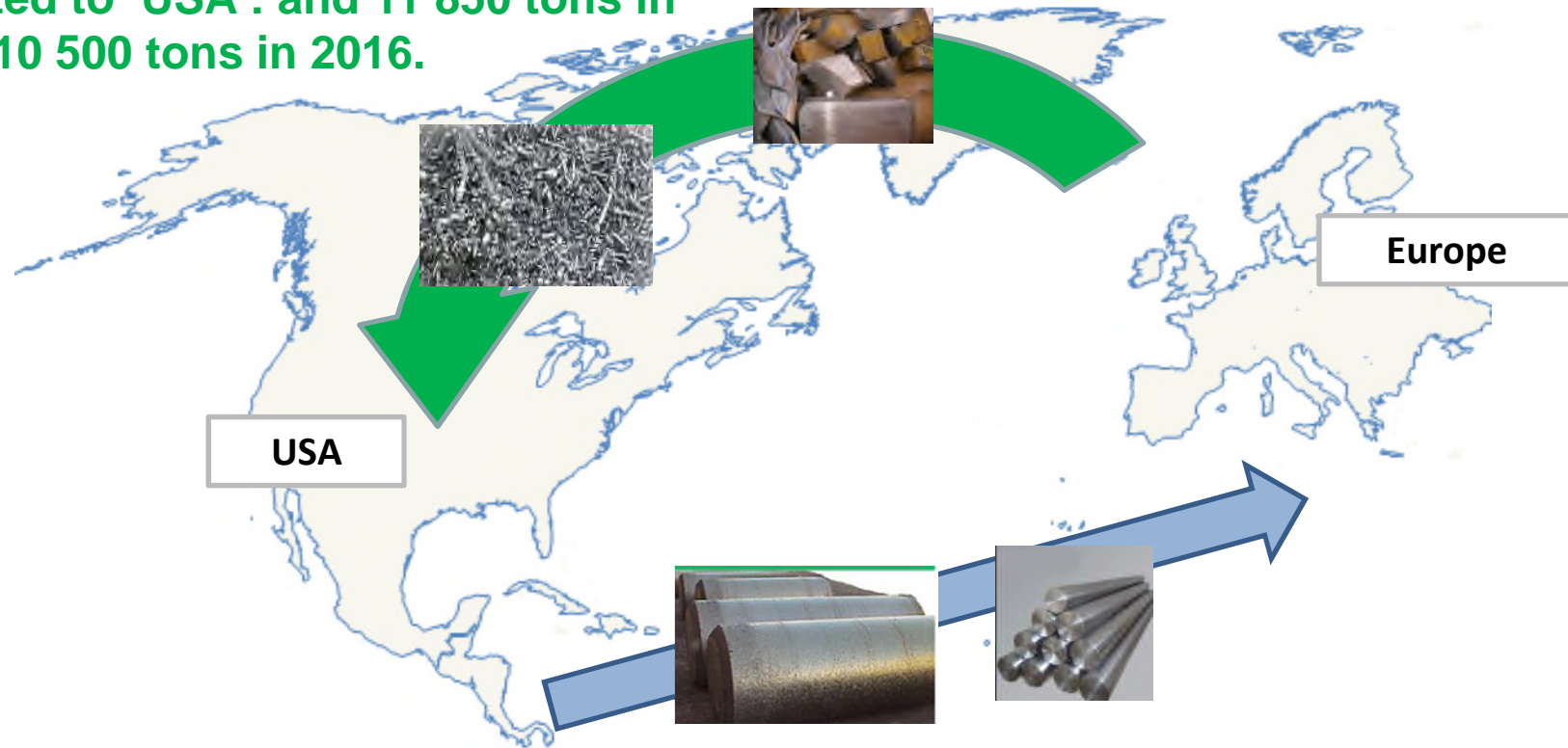
**Finished Part 20kg**



**Ratio Buy to Fly : 10**

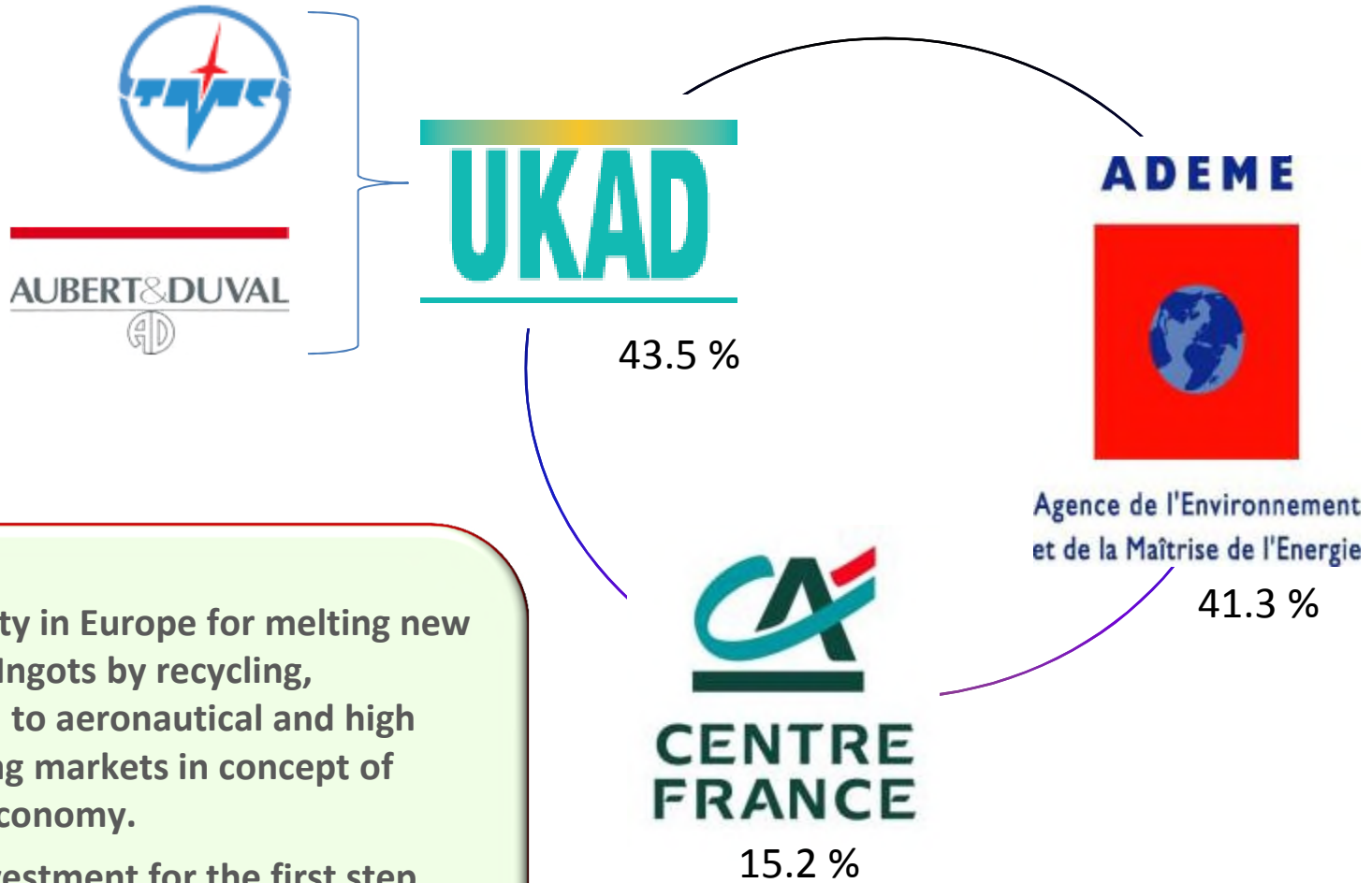
# Scrap generated in Europe is a key for competitiveness of US titanium melters

European titanium scrap is mainly exported to USA : and 11 850 tons in 2015, 10 500 tons in 2016.



US ingots were mainly produced from titanium scrap in 2014, 2015 and 2016, more than 60 % of the total consumption Scrap + Sponge.

## Committed shareholders in EcoTitanium



- First facility in Europe for melting new Titanium Ingots by recycling, dedicated to aeronautical and high demanding markets in concept of Circular Economy.
- 49 M€ investment for the first step.
- 63 direct employees
- 7 000 m<sup>2</sup>

# Main Equipment : A Plasma Furnace Cold Hearth Refining

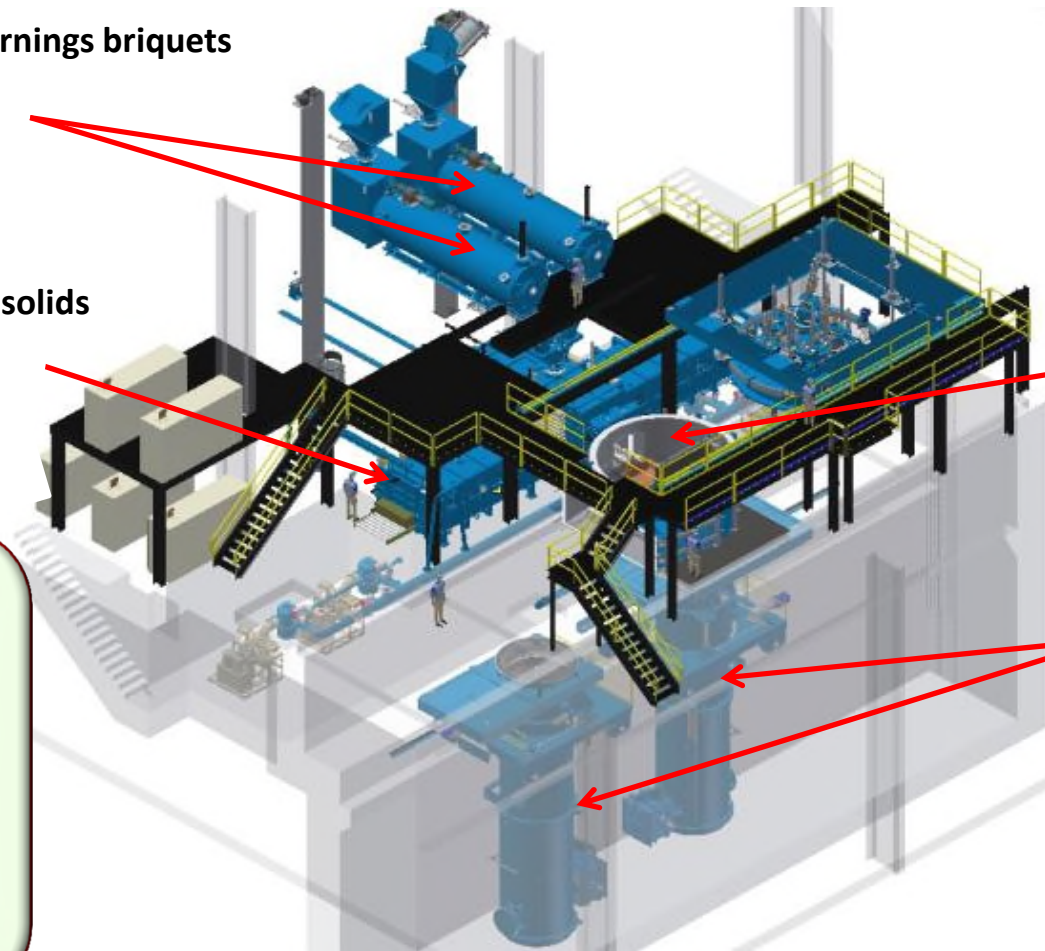
Loading system for turnings briquets

Loadind system for solids

Melting Chamber

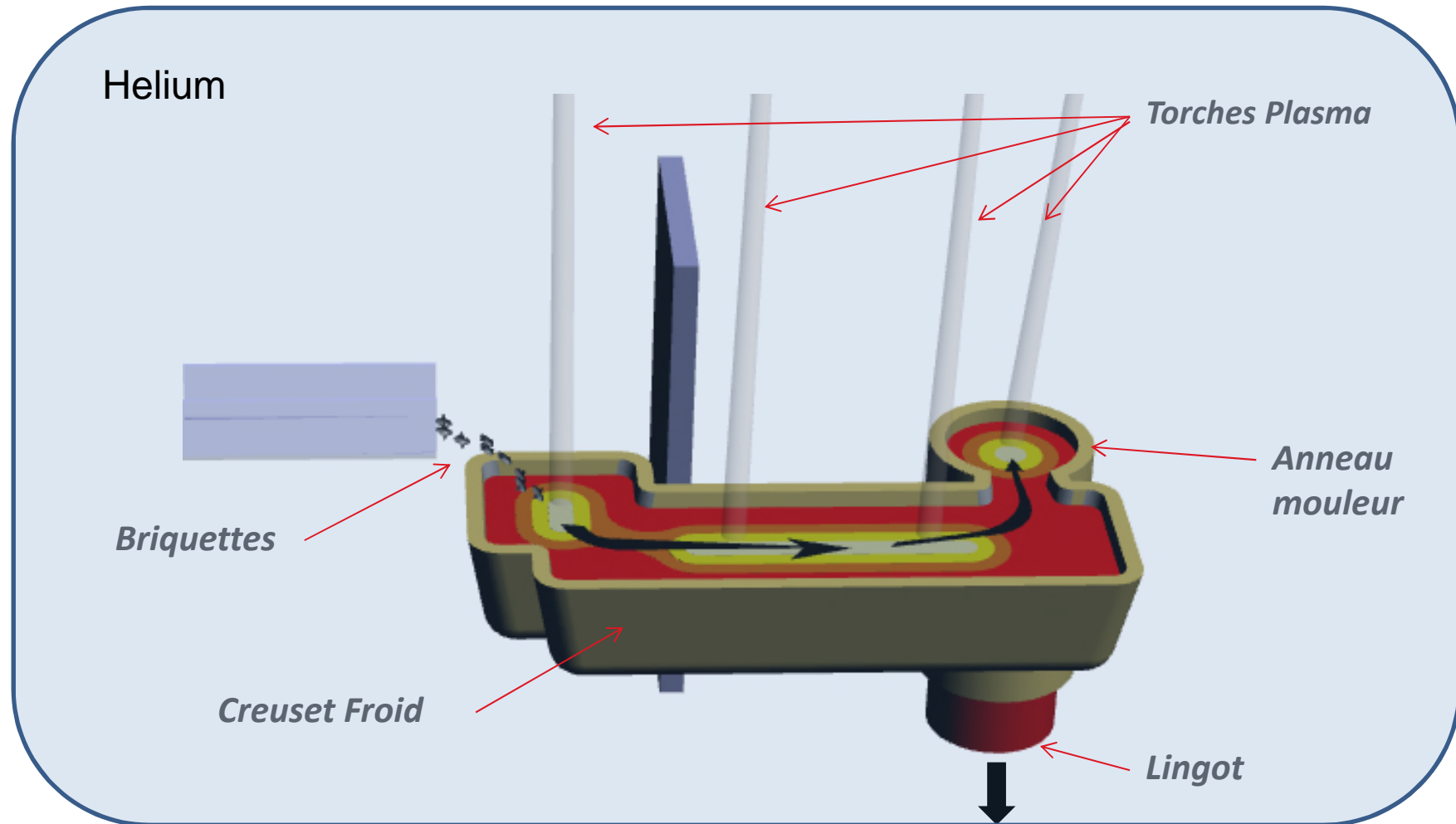
Electrods erection chamber

- 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.

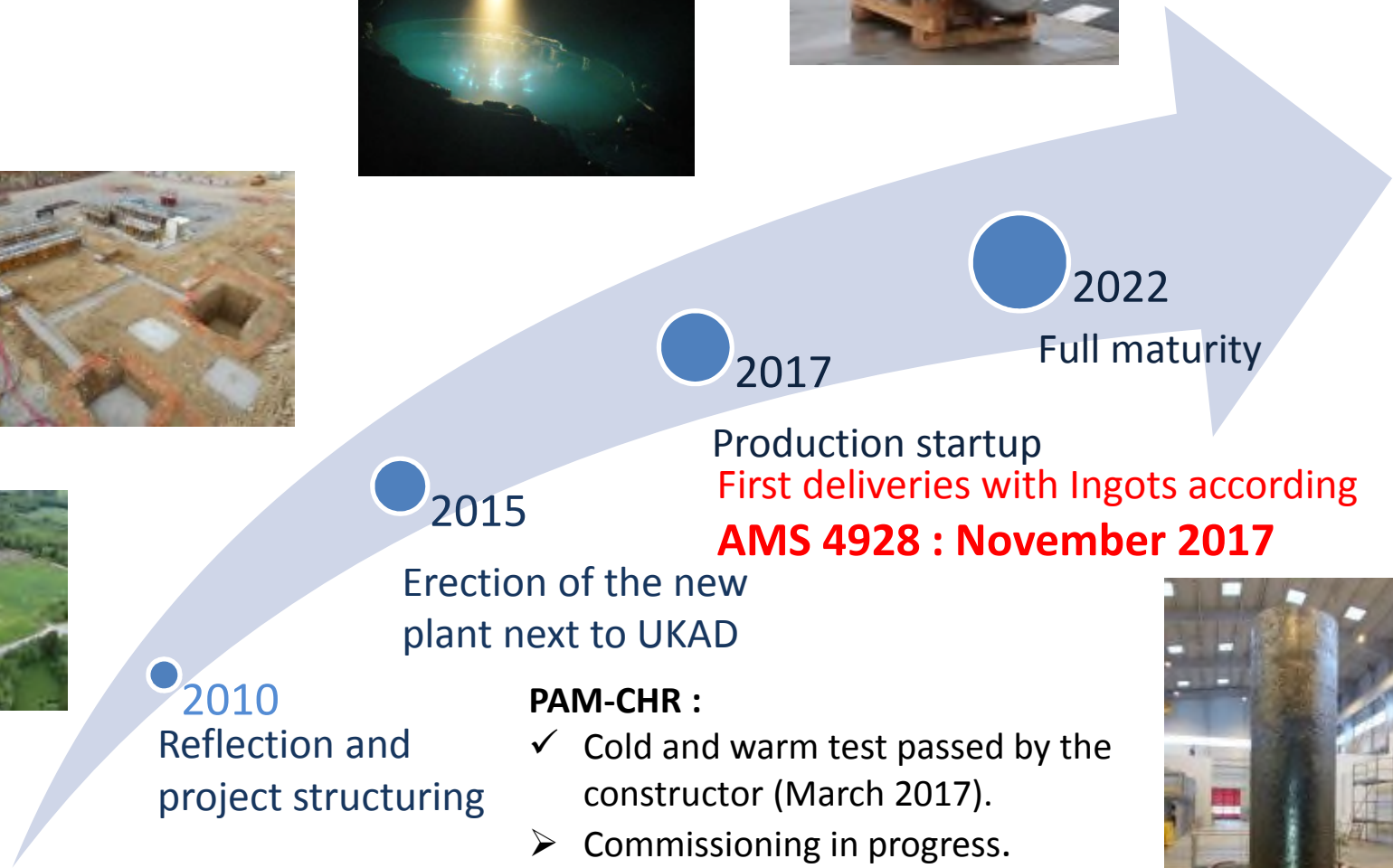


# Principle

Principle of a PAMCHR furnace.



Melting 1700 °C



2010  
Reflection and  
project structuring

2015  
Erection of the new  
plant next to UKAD

2017  
Production startup  
First deliveries with Ingots according  
**AMS 4928 : November 2017**

2022  
Full maturity

- PAM-CHR :**
- ✓ Cold and warm test passed by the constructor (March 2017).
  - Commissioning in progress.

- VAR :**
- Beginning of warm tests in June.

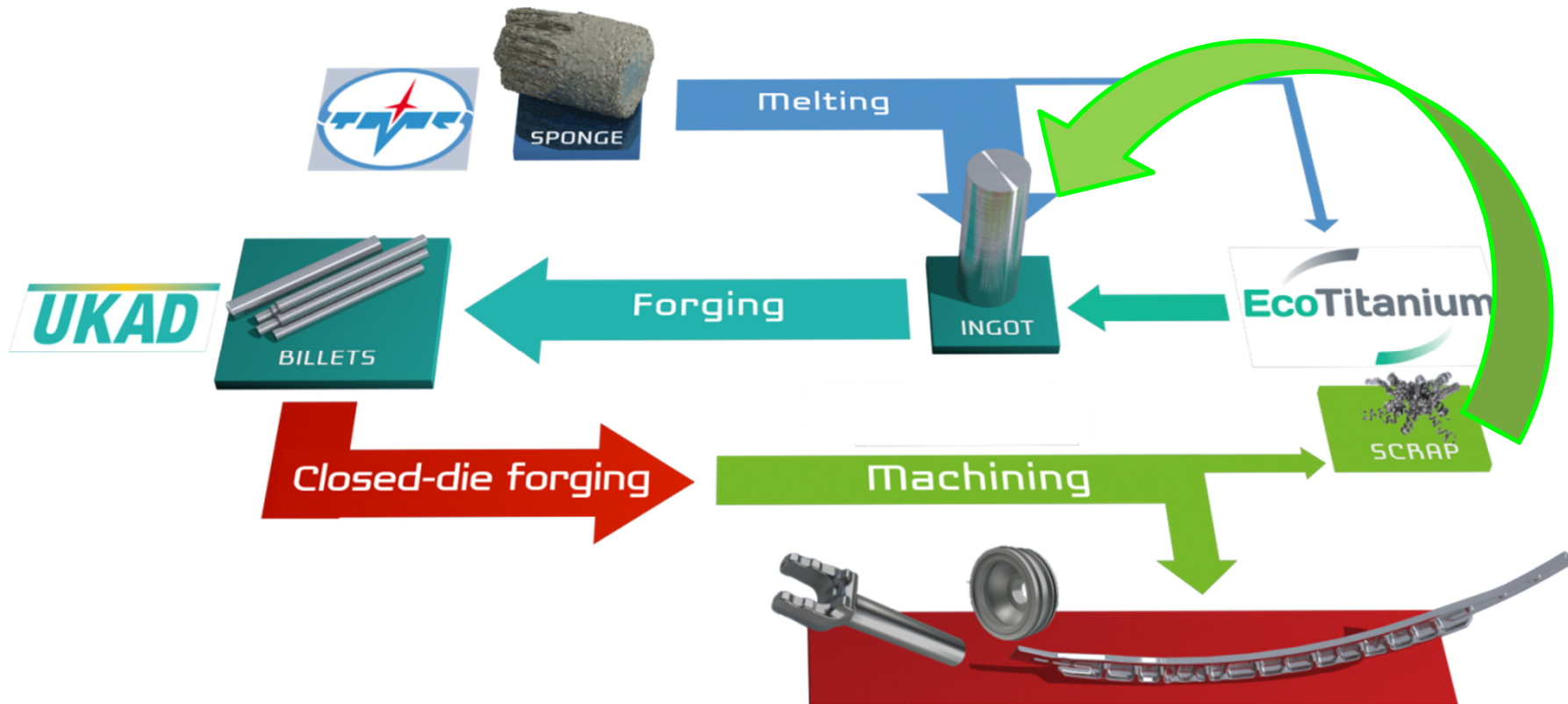


# EcoTitanium planning



# An open Solution for all UKAD Customers

The revert loop will be available for all UKAD's customers (forgers, extruders,...), based on circular Economy.



**EcoTitanium reserves a large part of its capacity for all forgers, in the concept of circular economy.**



**Thank you for your attention**

