December 2019

Titanium RFQ 66-C6-5GB0-19-JAR-3679 PIA-2019-3923

Answers to questions

1 WHAT IS THE UKAD PROCESS FOR DETERMINING WHETHER OR NOT THEY CAN SUPPORT THE NEW SOW?

- UKAD has positioned our organization based on technical expertise in melting/converting, quality, competitiveness, and industrialization in support of high production rates.
- Technical / Quality
- Since UKAD's startup date of 2013 UKAD has produced 12 000 tons (metric tons) Ti 6-4 billets:
  - produced according to AMS 4928 and other customers specifications
  - UKAD is qualified by Airbus and Safran.
  - Additionally UKAD produced 2 650 tons (metric tons) blooms for fastening applications towards US companies.
- In 2015 UKAD provided data to Boeing for UKTMP Qualification (see attachment)
  - UKAD and Eco would follow the same methodology. Boeing to clarify full qualification requirements.
  - UKAD would convert UKTMP ingots during the qualification phase of Eco Titanium.
    - Once Eco is qualified, UKAD would utilize ingots from both Eco and UKTMP
    - Risk mitigation
    - Increase in global melt capacity.
- Eco Titanium is in the final phases of qualification with Safran and Airbus.
  - Eco Titanium is presently producing and selling ingots according to AMS 4928: 500 metric tons since our first delivery in 2018.
  - Eco Titanium is a new state of the art melting factory
  - We have taken the global capacity of Eco into consideration in support of Boeing/Safran/Airbus in our offer to Boeing

2 WHAT SKILL FUNCTIONS OF THE ORGANIZATION ARE INVOLVED IN THE PROCESS THAT DETERMINES WHETHER OR NOT UKAD CAN SUPPORT THE NEW SOW?

- UKAD Engineering Process and Quality departments
- Eco Titanium Engineering Process and Quality departments
- Supply Chain departments (Capacity)
- UKAD and Eco Titanium Sales, Aubert & Duval Commercial team including our Seattle office
- Full support of Aubert & Duval: Management, Laboratory, R&D.
- Shareholders for the support and validation of the offer.

3 WHAT OBJECTIVE VERIFIABLE EVIDENCE (*OVE*) DOES UKAD HAVE/USE TO DETERMINE WHETHER OR NOT THEY CAN SUPPORT THE NEW SOW?

a. The OVE we are looking for includes, but is not limited to: (*the more detail, the better*)

i. What data assumptions is UKAD using?

- Supply of billets coming from UKTMP ingots and Eco Titanium ingots.
  - UKAD would initially convert UKTMP ingots during the qualification phase of Eco Titanium
  - Longer term, Eco would act as the primary melter with UKTMP maintained for surge capacity and risk mitigation: Assumption 10 % of UKTMP Ingots, 90 % of Eco Titanium ingots.

ii. What data calculations is UKAD using?

- Quotation based on process used today for AMS4928 productions
  - Capability calculation based on an assumption of 3 M lbs. /year in support of this RFQ.
  - This volume will represent 22 % of the capacity of UKAD.
  - Concerning Eco Titanium, it will represent 40 % of the capacity at the maximum production forecast. This will require an investment of a second VAR furnace.

iii. How are resource requirement estimates generated?

- Engineering (Metallurgical, Industrial) we have the capacity to manage this new production.
- During the qualification phase we will identify a Project team dedicated to this new production / qualification. The team will consist of:
  - A project manager as the focal point for Boeing communication/support
  - One person in supply chain
- We will deploy our current Quality system for new project management as it meets the Boeing quality requirements.
- On industrial basis we use capacity studies based on S&OP.

iv. How will the new SoW affect the capacity of their current operations?

- This new project will begin near or at the end of our two current major qualifications
  - Eco Titanium/UKAD and will use the same structure.
  - The staffing is already in place today. If needed additional professionals from Aubert & Duval are available on an as needed basis.
  - We will have to adjust our Supply chain workforce according to volumes projections and first delivery requirements.

v. What are the current and future equipment requirements?

- Eco Titanium:
  - As this facility is a new investment, the plan is foreseen to use the existing equipment as demonstrated to Boeing during visits this past year.
  - Eco titanium physical infrastructure has taken growth into consideration for an investment of a second VAR furnace.
  - This second VAR furnace is foreseen to be needed for 2023 according volumes projections communicated by our customers and Boeing assumptions. Decision must be made 2 years prior to requirements.

- UKAD:
  - According to the volumes and dimensions to support the Boeing SOW, the possibility is foreseen we could require an additional heating furnace in our forge shop, depending on the total load estimated (Other contractual commitment, forecasts and Boeing RFQ demand).
  - 8 furnaces are running today. Decision must be made one year before the need.
- We will continue to use and reinforce the subcontracting to Aubert et Duval forging or rolling equipment on final step as required for risk mitigation and capacity consideration (SMX forge).

vi. What are the equipment and staffing utilization assumptions?

- ECO Titanium
  - Based on capacity (S&OP) studies we will continue to increase our workforce:
    - Increased capacity is available by hiring and increasing number of shifts as needed per equipment.
    - We continue our ramp up plan by recruiting continuously new employees. We proactively train them in the melting shop before the real need. Eco Titanium is seen as a desirable employer in this area of France.

- UKAD
  - Forge shop: We foresee adding one shift more in weekend in order to be able to work on 5 shifts.
    - The global capacity
      - 70% by increasing capacity in forge shop
      - 30% by increasing use of subcontracting in Aubert et Duval Equipment, SMX Forge machine, straightening.
      - The eventual investment in a new heating furnace will allow reducing A&D subcontracting to less than 15 %.
  - On finishing line, peeling and US inspection, we could increase by 1 or 2 shifts more:
    - Peeling: Currently we used our equipment at 3 to 4 shifts/week, partially loaded (70 %). The plan is to increase to 5 shifts loaded at 85%. This will increase peeling capacity by 50%.

- US inspection: Presently at 2 shifts working, we plan to increase with an additional 1 shift. The impact of this will increase capacity 50%.

- For the capacity of the equipment, we used demonstrated capacity:
  - Nominal capacity affected by maintenance, unplanned stoppages, etc. This presently runs at 80%. This is used as our baseline 100% capacity metric.
  - We have a detailed plan of productivity improvement for the next years (lean principals, investments, maintenance) to improve this available planned capacity.

vii. What are the current and future headcount requirements?

UKAD		
	2019	2023-24
Managers	8	7
Engineering	27	26
Direct labor	43	58
TOTAL	78	91

ECOTITANIUM		
	2019	2023-24
Managers	5	6
Engineering	17	24
Direct labor	26	51
TOTAL	48	81

viii. Does UKAD have enough staffing to support the new SoW or is more required?

- Staffing levels provided in the charts takes into consideration our growth plans at each facility in support of current contracts and new Boeing's SOW assumptions.
- UKAD has full support of Aubert et Duval, for sales, financial, laboratory, HR, R&D.
- Our staffing is managed in order to train and qualify people before the real need.
  - In 2019 the staffing of Eco Titanium is managed to assure the volumes planned in 2020, and so on…
  - For information:
    - 2018: we recruited 16 permanent employees, 28 temporary employees, 6 managers, 9 engineers, 29 direct labor.
    - 2019: we recruited 18 permanent employees, 37 temporary employees, 3 managers, 12 engineers, 40 direct labor.

ix. What is the expected output yield of this new SoW?

- The output expected is between 75% and 80% according dimensions and improvement plans.

x. What learning curve is factored into UKAD's ramp-up plan?

- We have an improvement plan on many subjects, yield included. The effect of this plan is included in our offer over the years. We apply the average effects on the quotation from 2023 to 2028.

- According our planned ramp up phases as a relatively new company, we anticipated to be at 1 M lbs. in 2023, 2 M lbs. in 2024 and 3 M lbs. from beginning of 2025 and for following years.
- We understood that we could have opportunity to begin the Boeing qualification phase before the contract would begin. During the pre-contract ramp up phase, we would like to discuss the full requirements of qualification in 2020, first low rate production in 2021, and intermediate volumes in 2022 (50 % of 2023). We encourage an open dialogue with Boeing in developing a road map for qualification and ramp up.
- We expect to use same basis/process as current productions. We are confident in the consistency of our proposal to meet Boeing requirements.

xi. Is there any other new Boeing work entering production during this same period of performance and how will that affect resource capacity for the subject SoW?

- Presently UKAD does not support any internal Aubert & Duval requirements in support of their current contracts with Boeing.
- Aubert & Duval has recently submitted a large proposal to Boeing in support of Boeing's recent large RFQ beginning 2022. This RFQ includes some forging in titanium in which we submitted an unsolicited proposal using UKAD billets (6-4 titanium). The advantage to the Boeing Company is a reduction of approximately six (6) months in lead time for new products and Re-Order Lead Time (ROLT) in comparison to the total lead time TMX+ Aubert et Duval.
- UKAD and Aubert et Duval Teams currently work together to develop full integrated solutions. We believe the synergy of Aubert Duval and UKAD working together provides a significant advantage in terms of agility.
- The Boeing/Aubert & Duval forging proposal was not taken into consideration in our analysis in support of this RFQ.

Joined to this note, you will get the excel files of data provided by UKAD in 2015 for the qualification of UKTMP source. This is in relation with our last call, in order to simplify UKAD Qualification. Except chemistry coming from UKTMP, all mechanical properties data had been provided by UKAD on billets after UKAD forging.