Overview of the Machine Assembly Contract Strategy Implementation

• Machine Assembly Contract Strategy
• Tendering Phase Outcomes (2018 – 2021)
• Implementation and Major Achievements
• Major Challenges
• Next Steps
Machine Assembly Contract Strategy

- Worksite Area approach
- Well Defined Scopes for each contracts
- Progressive Assignment of Works
- First Of A Kind Assembly and Nuclear Environment
- Redundancy of skills and competencies for Tokamak Machine Assembly and Tokamak Complex
- Multiple Contracts with manageable size
Worksite Areas

Worksite 1 – Major Contracts
- A0: Lower Cryostat Early Works
- TAC-1: In-Cryostat/Ex-Vessel & Feeders
- TAC-2: Vacuum Vessel Assembly
- VVW2P: Vacuum Vessel Welding
- A6-I: In-Vessel Components Phase I

Worksite 2 – Major Contracts
- TCC-0: Tokamak Complex Early Works
- TCC-1: B11 Diagnostics, Fuel, Vac, Cubicle, PRVR, and B14/15/74
- TCC-2: TCWS, VVPSS, TBM, B14 Valve Room, VAC
Worksite 1 Contracts

A7: Pre-Assembly

A4: Metrology Activity

A2: Sector-Sub Assembly

A5-U

A6

A5-S

A5-L

In-Gallery Feeders

VV Welding

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Worksite 2 Contracts

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- TCC-0: Early Works
- TCC-1: B11 Diagnostics, Fuel, Vac, Cubicle, PRVR, and B14/15/74
- TCC-2: TCWS, VVPSS, TBM, B14 Valve Room, VAC
Tendering Phase Outcomes

- General overview
  - 4 Contracts signed and started for Worksite 1: A0, TAC-1, TAC-2 and VVW2P
  - 3 Contracts signed and started for Worksite 2: TCC-0, TCC-1 and TCC-2
  - FIDIC General Conditions based Works Contracts
  - MOMENTUM SNC as Construction-Management-as-Agent / FIDIC Engineer
  - Good level of competition based on Call for Tender with Negotiated Procedure in some cases
  - Tendering not started for In-Vessel Assembly (A6)
Tendering Phase Outcomes

Focus on Worksite 1

**A0 Contract**
- Tokamak Assembly Early Works
- Signed in July 2018 with CNIM/MAN
- > 50,000 man.hours
- Start / End: 2018 / 2021

**TAC-1**
- Tokamak Assembly Works Lot 1 (A1/A5-L/A5-U/ A7/Magnet Feeders)
- Signed in September 2019 with CNPE Consortium*
- > 1,800,000 man.hours
- Start / End: 2019 / 2026

**TAC-2**
- Tokamak Assembly Works Lot 2 (A2/A3/A4/A5-S)
- Signed in July 2019 with DYNAMIC SNC**
- > 1,100,000 man.hours
- Start / End: 2019 / 2026

**VVW2P**
- Vacuum Vessel Welding Production Phase
- Signed in October 2020 with ENSA
- > 650,000 man.hours
- Start / End: 2020 / 2026

* CNPE Consortium: CNPE (leader), Framatome, CNI23, ASIPP, SWIP
** DYNAMIC SNC: Ansaldo Nucleare, Ansaldo Energia, ENDEL, ORYS, SIMIC, Leading Metal Solutions
Tendering Phase Outcomes

Focus on Worksite 2

**TCC-0**
- Tokamak Complex Early Works
- Signed in Dec 2018 with ENDEL-ENGIE Consortium *
- > 100,000 man.hours
- Start / End : 2019 / 2022

**TCC-1**
- Tokamak Complex Works Lot 1 (B11 Diag, Fuel, Vac, Cubicle, PRVR, and B14/15/74)
- Signed in Dec 2019 with FINCANTIERI Consortium **
- < 1,000,000 man.hours
- Start / End : 2020 / 2026

**TCC-2**
- Tokamak Complex Works Lot 2 (TCWS, VVPSS, TBM, B14 Valve Room, VAC)
- Signed in March 2021 with META SNC ***
- < 1,000,000 man.hours
- Start / End : 2021 / 2026

* ENDEL-ENGIE Consortium : Endel Engie (Leader), Engie Axima, Orys Ortec
** FINCANTIERI consortium : FINCANTIERI (Leader), FINCANTIERI SI, Delta-ti Impianti, Comes
*** META SNC : Ponticelli Frères (Leader), Cobra Instalaciones y Servicios, and Empresarios Agrupados Internacional
Contract Implementation

- Preparation Periods initially foreseen for Machine Assembly Contracts were completed on TAC-1 and TAC-2 and is started for VVW2P

- Site Facilities have been mobilized including large Machining Workshops for TAC Contracts
Contract Implementation

- Progressive work instruction to date (2620 CWP for full Phase I Assembly):
  - 216 CWP instructed
  - 145 CWP effectively in progress or completed

- Training, Qualifications and Tests: SSAT Training / Upending Tool tests / Sector Lifting Tool tests / Special Processes (Feeder Related) / etc.
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- Ramping-up Site Mobilization (2020-2021):

On-site TAC & TCC Contractor Mobilization (FTE)

In spite of pandemics remarkable adaptation was made: Construction Site kept open and business continuity plans were set by industrial partners. Key operations were performed with very minor impact while development of works could be run under new working schemes (teleworking for back office and sanitary measures increment) which demonstrated very good productivity outputs.

- Cumulated Direct Field 360 kmhrs since 2018
Major Achievements
Cryostat Base Lifting

Weight/Size: 1250 Tons / Diam 29 meters

Date: 20 May 2020

Contract: TAC1 – CNPE Consortium
Cryostat Lower Cylinder Lifting

Weight/Size: 660 Tons / Diam 29 meters

Date: 02 September 2020

Contract: TAC1 – CNPE Consortium
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Lower Cryostat Thermal Shield Lifting

Weight/Size: 40 Tons / Diam 20 meters
Date: 15 January 2021
Contract: TAC1 – CNPE Consortium
In-Gallery Feeder TF12/13 CTB Lift

Weight/Size: 25 Tons / Length 11 meters

Date: 26 January 2021

Contract: TAC1 – CNPE Consortium
TF Coil 12 and 13 Preparation

Weight/Size: 312 Tons / 16.5x9.2x3.7 m.

Date: 20 May 2020

Contract: TAC2 – DYN Consortium
Upending Tool Testing
(Vacuum Vessel Config.)

Date: January 2021

Contract: TAC2 – DYN Consortium
VV Sector 6 Preparation

Weight/Size: 440 Tons / 12.3x6.6x6.7 m.

Date: 16 November 2020

Contract: TAC2 – DYN Consortium
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VVTS Sector 6 Outboards in SSAT#2

Weight/Size: 10 Tons / 12.3x3.3x5.9 m

Date: 12 February 2021

Contract: TAC2 – DYN Consortium
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TCC0 Installation Works at B15 L2/L3

Date: February 2021

Contract: ENDEL/ORYS Consortium
A0 PHTS Installation Works

Quantity: 18 Port Cells Penetrations for TCWS system

Date: May 2020 to Date

Contract: CNIM / MAN
Major Challenges

- Master Schedule, Cost and Quality in a Complex Execution Environment
- Work together IO/CMA/Contractors
- Management of “First Of A Kind” installation and Learning Curve
- Co-activity Management
- Nuclear Safety Culture
- On-site response to COVID 19
Next Steps

- A6-I: In-Vessel Components Assembly for Assembly Phase I.
  ⇒ Call For Nomination foreseen before end 2021

- A6-II: In-Vessel Components Assembly for Assembly Phase II
  ⇒ Strategy under development with Call For Nomination foreseen in 2023
Other opportunities (1/5):

- Sub-contractors of TAC/TCC prime contractors (see contact points in next slide)

- Various small / medium manufacturing / installation contracts (looking for agility, reactivity, specialized services / works)

- Various special supply contracts for construction such as:
  - Supply of High Performance Insulation Materials for Tokamak Cooling Water Systems piping and valves,
  - Supply of Upper Cryostat Bellows,
  - Supply of Magnet Instrumentation Pressure Transducers,
  - Supply of Lower Penetration Pipes and Supports,
  - Supply of CS Pre-Tensioning Tooling,
  - Etc ...

⇒ More information @ https://www.iter.org/org/team/adm/proc/overview
Other opportunities (2/5):

- TAC/TCC prime contractors points of contact:
  
  - TAC-1 - CNPE Cons.: Chunyu ZHANG - Contract Manager - zhangcyb@eu.cnpe.cc
  
  - TAC-2 - DYNAMIC SNC: Enrico SAVOLDI - Project Director - enrico.savoldi@dynamic-iter.com, Julien BERTHET - Deputy Project Director - julien.berthet@dynamic-iter.com
  
  - VVW2P - ENSA: Luis BLANCO - Project Manager - blanco.luis@ensa.es
  
  - TCC-0 – ENDEL Cons.: Jonathan PARRA – Project Director jonathan.parra@engie.com
  
  - TCC-1 - FINCANTIERI Cons.: Fabio Marchesi - Proposal Manager - fabio.marchesi@fincantierisi.it
  
  - TCC-2 -META SNC: David Maucorps - Project Director - dmaucorps@ponticelli.com
Other opportunities (3/5):

- TAC/TCC subcontracting / supplies main needs:

  ➢ **TAC-1 (CNPE Cons.):**
    1. Custom machining and special tools manufacture
    2. Local Labor resources / services (Workers incl. Mechanical, welding, lifting, painting, etc …, and Engineers)

  ➢ **TAC-2 (DYNAMIC SNC):**
    1. Manpower, with specific focus on Method Technician/CAD Operator, I&C Engineer/Operator, Planner/Project Controller
    2. Construction tools and consumables delivery, such as small tools/parts, lifting items, etc.
    3. Non destructive testing service (UT, PT, radio, etc.)
Other opportunities (4/5) :

- TAC/TCC subcontracting / supplies main needs :

  ➢ **VVW2P (ENSA):**

    1. Workers to cover fields such as: Welding, Machining using CNC milling tools, Maintenance, assemblers...
    2. NDTs, subcontracting services for UT+LT+RT

  ➢ **TCC0 (ENDEL Cons):**

    1. NDT (mainly radios)
    2. Painting
    3. Scaffolding
Other opportunities (5/5):

- TAC/TCC subcontracting / supplies main needs:

  ➢ **TCC-1 (FINCANTIERI Cons.):**
    1. NDT (Non Destructive Tests)
    2. Platforms / metallic structures prefabrication
    3. Piping (spools)

  ➢ **TCC-2 (META SNC):**
    1. Steel structure fabrication
    2. Non Destructive Test (RT) on site
    3. Piping insulation & Painting
    4. Services in the field of Instrumentation and Control, Electrical, Busbar
THANK YOU

ANY QUESTIONS?