

Overview of the Machine Assembly Contract Strategy Implementation

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Disclaimer: The views and opinions expressed herein do not necessarily reflect those of the ITER Organization

7 & 8 April 2021

Remote ITER Business Meeting

- 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

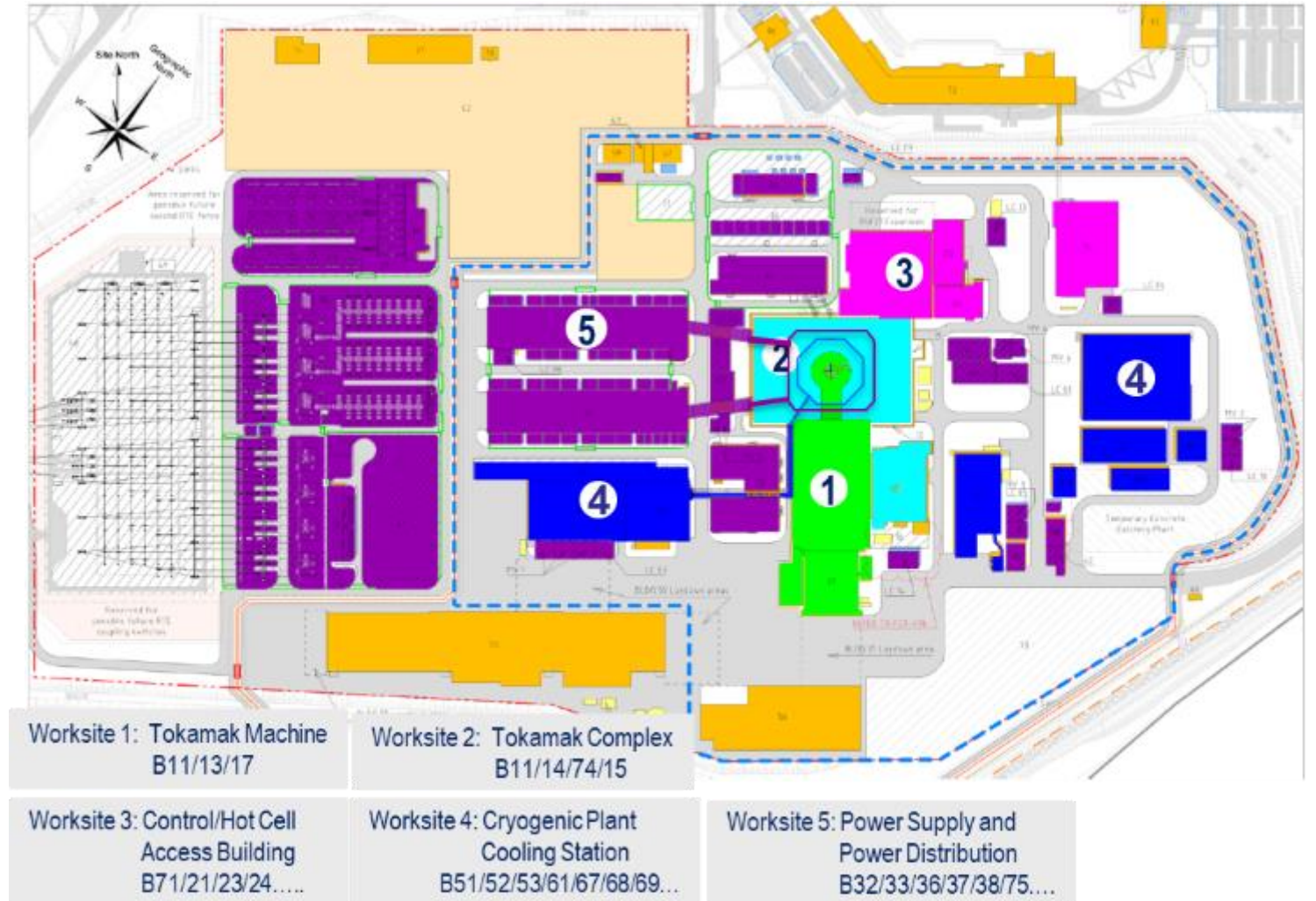
Worksite Areas

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

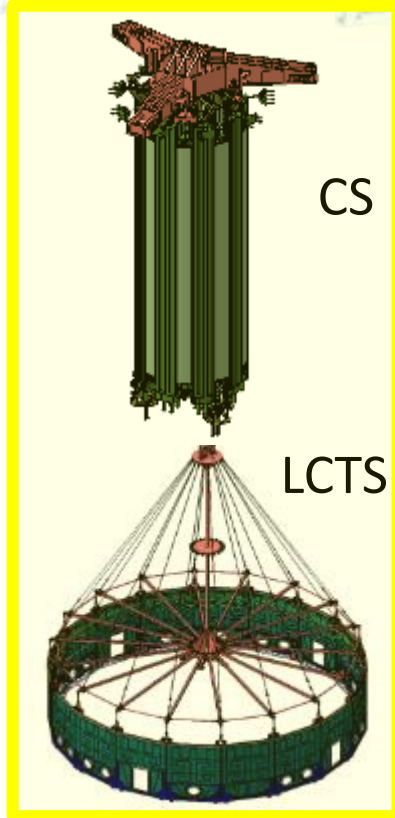
Worksite 2 – Major Contracts

- 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

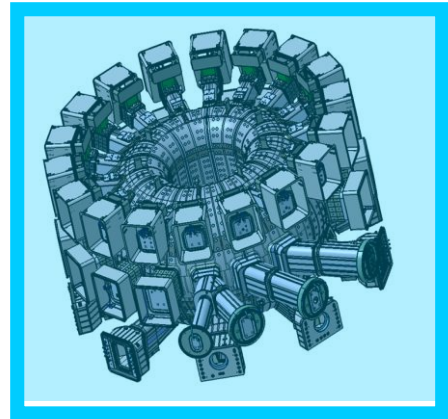


Worksite 1 Contracts

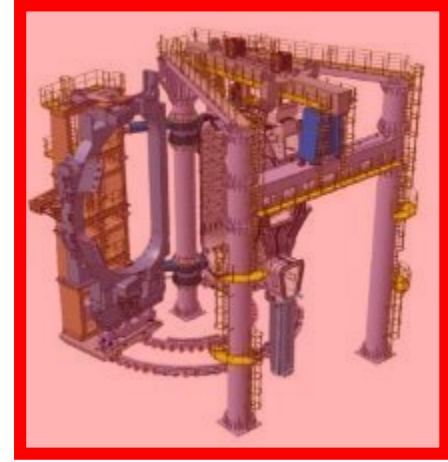
A7: Pre-Assembly



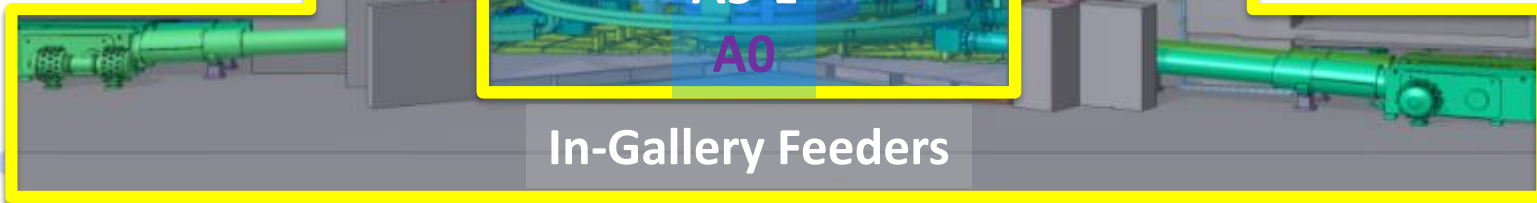
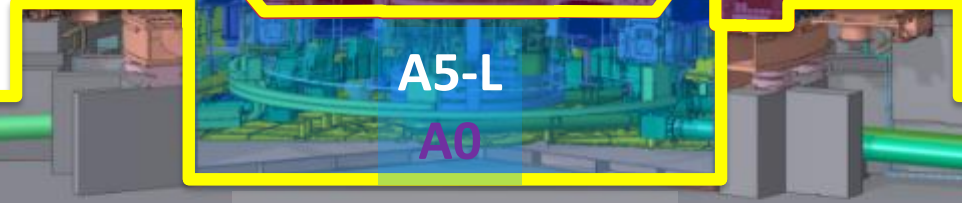
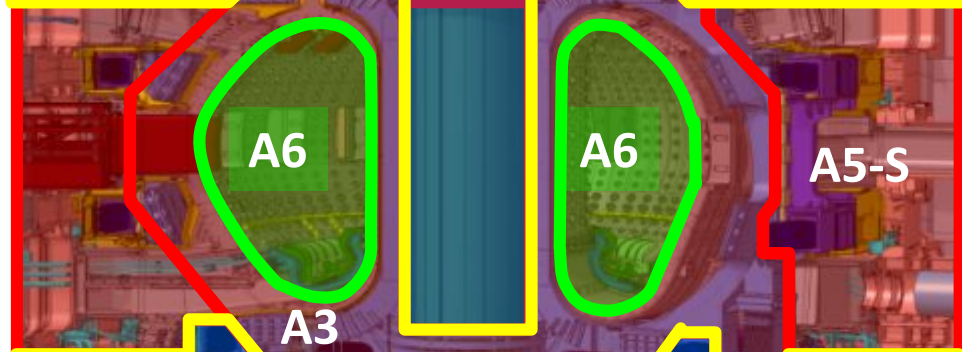
A4: Metrology Activity



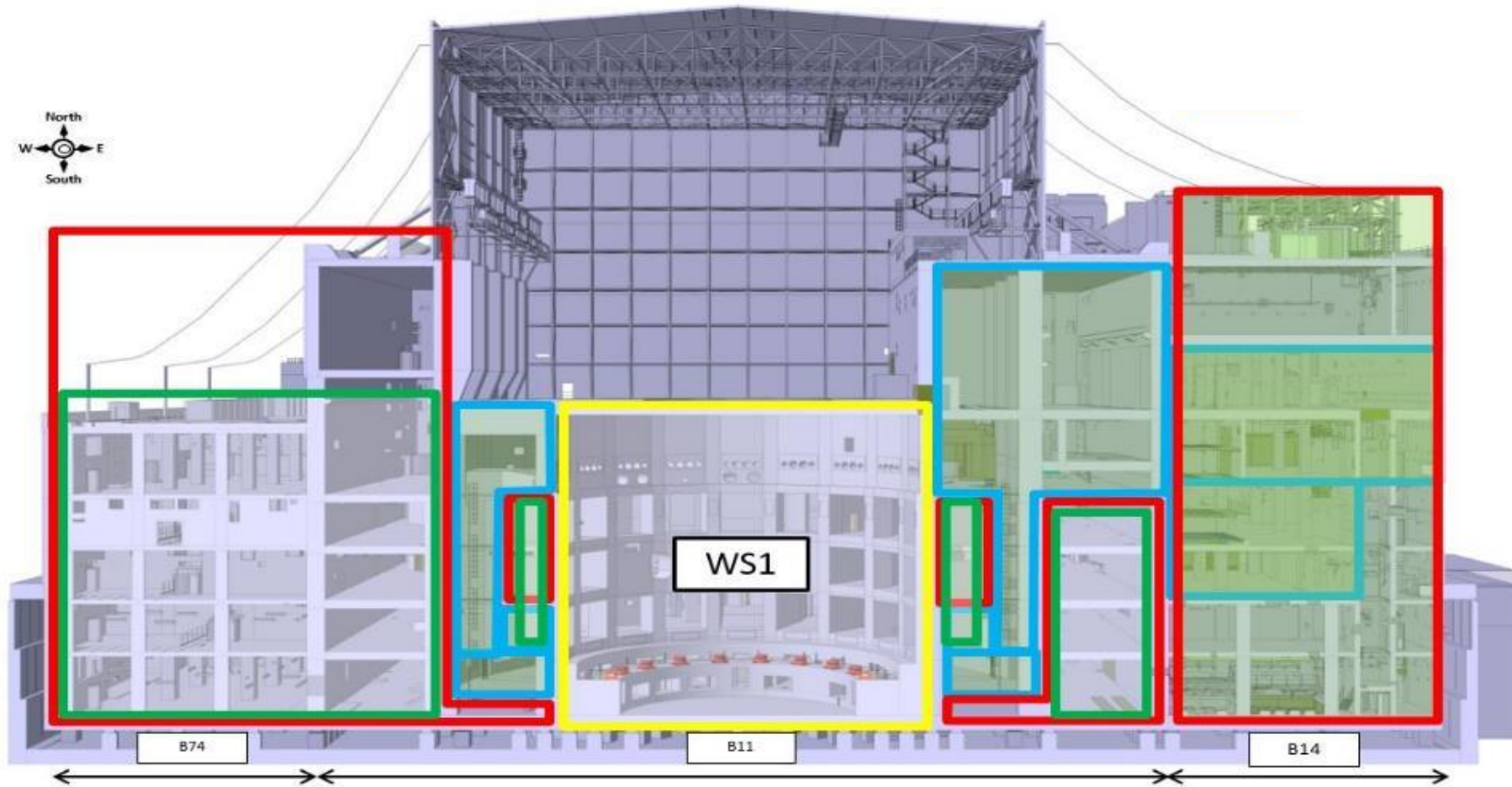
A2: Sector-Sub Assembly






- A0
- TAC-1
- TAC-2
- VVW2P
- A6-I



Worksite 2 Contracts



-  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



TAC-2 Machining Workshop on CA3



TAC-1 Workshop on CA6

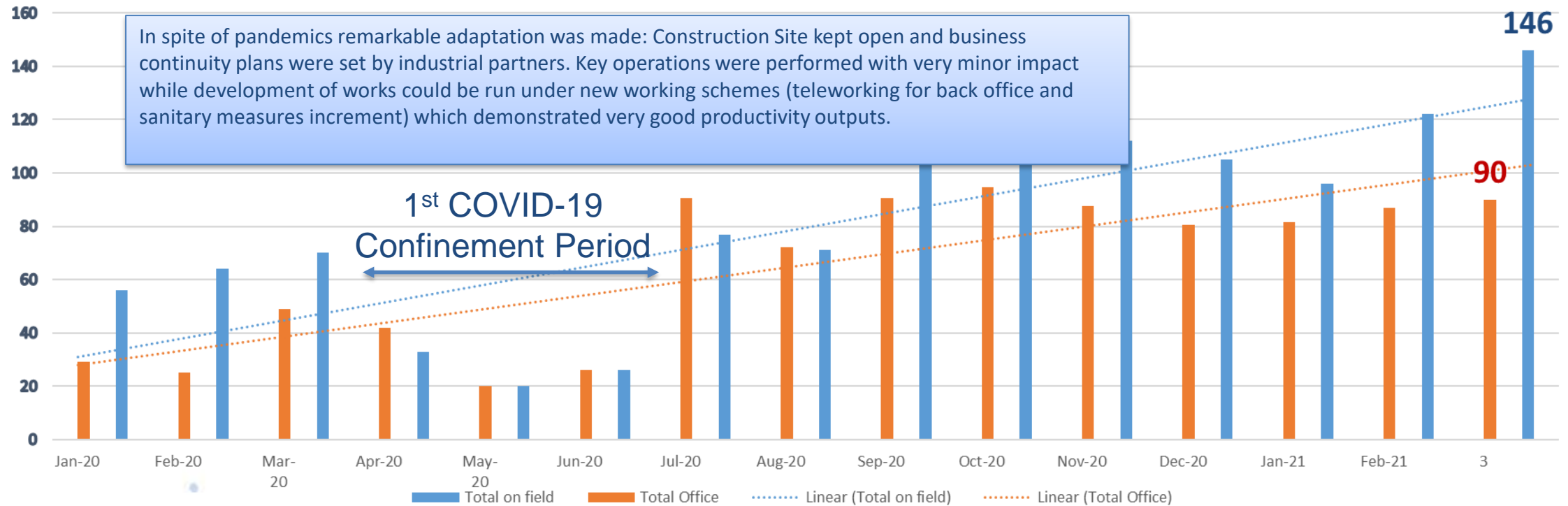
Contract Implementation

- 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.

Contract Implementation

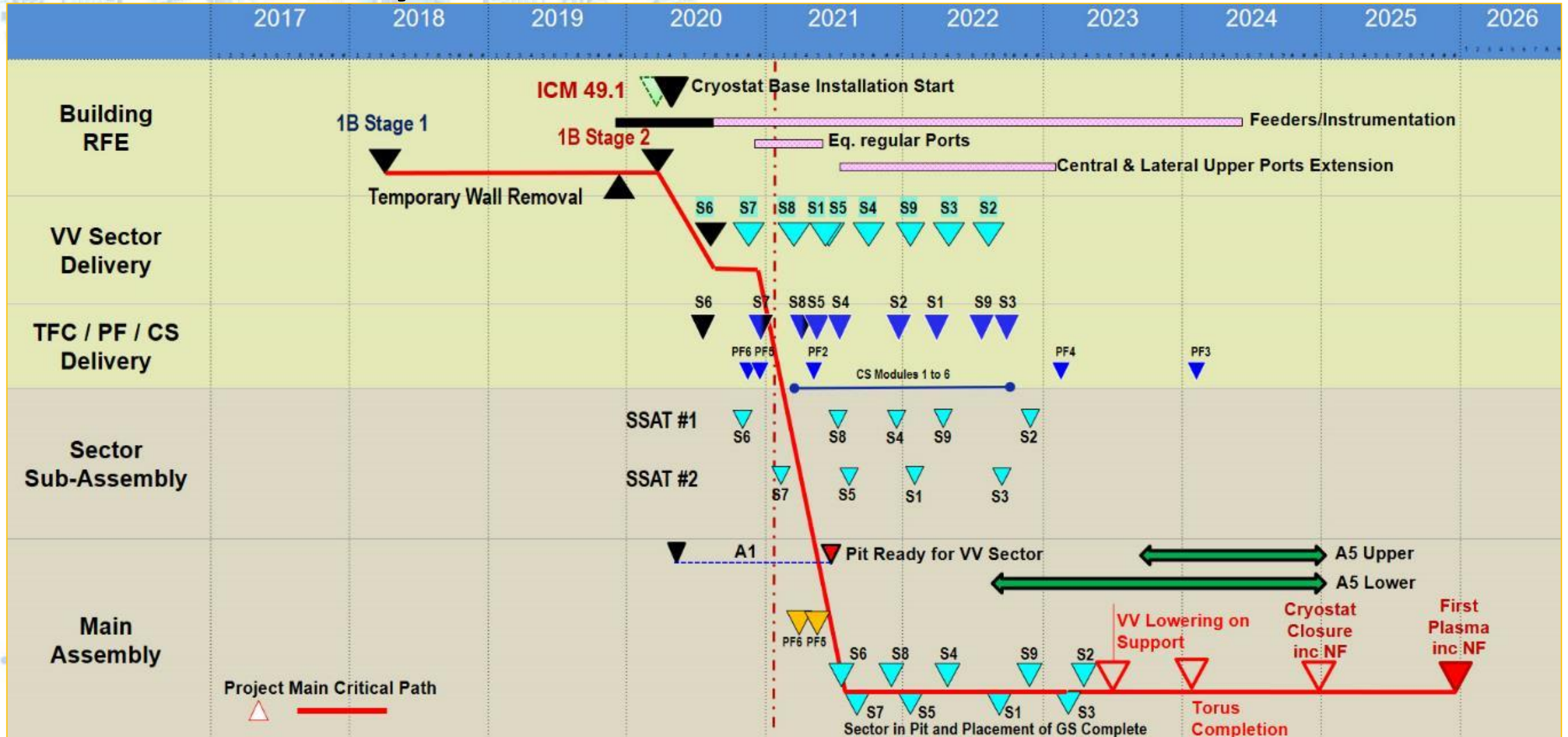
- Ramping-up Site Mobilization (2020-2021):

On-site TAC & TCC Contractor Mobilization (FTE)



- Cumulated Direct Field 360 kmhrs since 2018

Phase I Assembly Schedule



Major Achievements



Cryostat Base Lifting

Weight/Size: 1250 Tons / Diam 29 meters

Date: 20 May 2020

Contract: TAC1 – CNPE Consortium

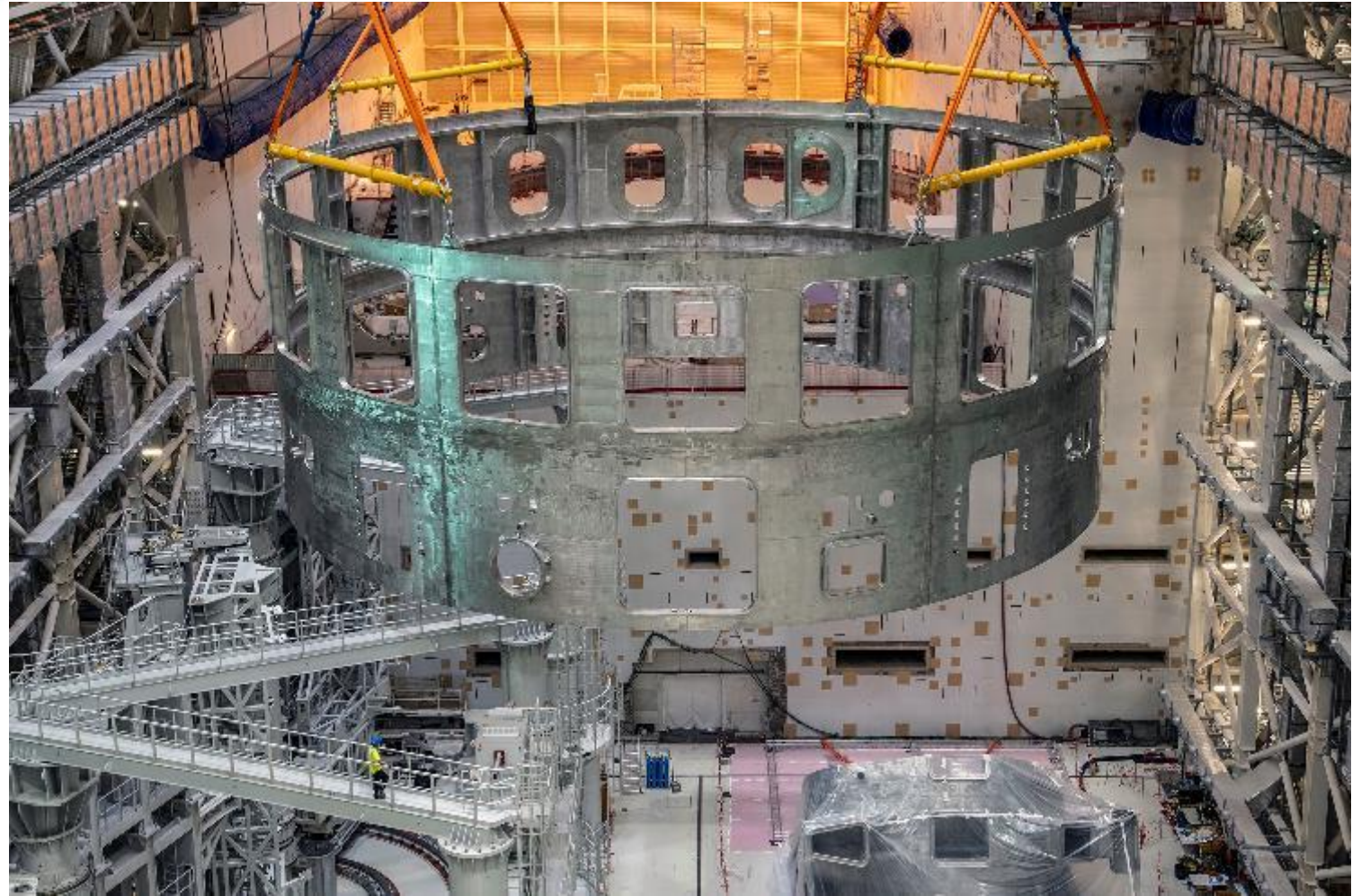


Cryostat Lower Cylinder Lifting

Weight/Size: 660 Tons / Diam 29 meters

Date: 02 September 2020

Contract: TAC1 – CNPE Consortium



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

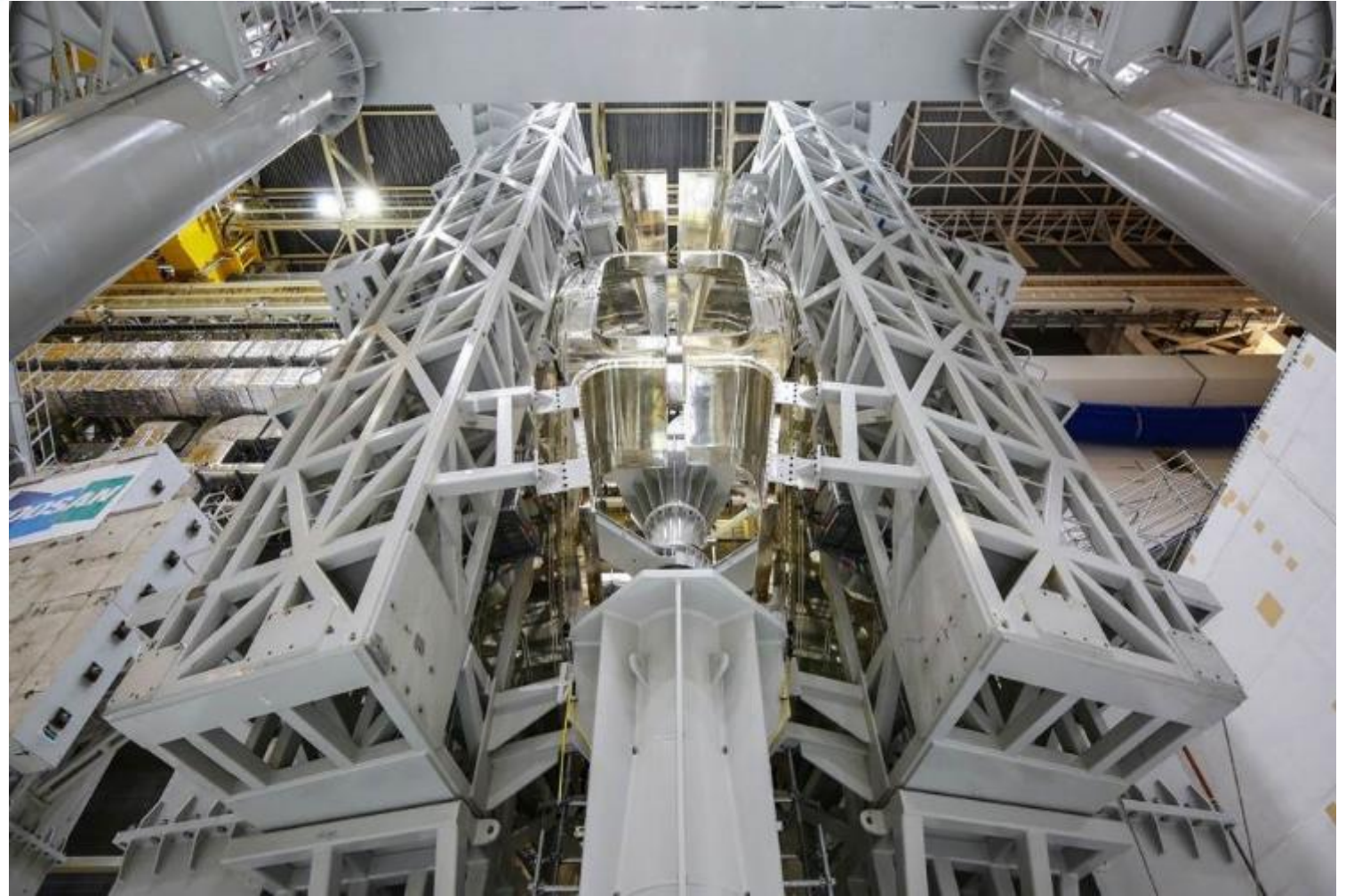


VVTS Sector 6 Outboards in SSAT#2

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

Date: 12 February 2021

Contract: TAC2 – DYN Consortium



TCCO 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
3. Various supplies : Welding gas, Filler material, Consumables, Tools, Logistic, temporary construction equipment, HSE equipment, waste.

➤ 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 ?