外部委託業者の募集

References: IO/MS/24/WPP/GRD

"Welding Preparation in Pit (WPP) contract"

（ピット内溶接準備作業（WPP）契約）

IO 締め切り 2025 年 1 月 15 日(水)

〇前文

この技術仕様書は、サービスおよび供給の一般管理仕様書（GM3S）[R1] と併せて参照されるものであり、[R1]は技術要件の一部を構成します。
万が一矛盾が生じた場合、技術仕様書の内容が[R1]の内容に優先します。

〇目的

ITER 機構（IO）は、溶接準備作業（WPP）のための制限付き入札手続きを実施する予定です。本書で提供される情報および技術的詳細は、予備的なものであり、この作業範囲に関心と能力のある候補者を評価することを目的としています。

〇背景

ITER 機構（IO）は、国際共同の研究開発プロジェクトであり、現在初期の建設作業が進行中です。IO の 7 つの構成メンバーは、欧州連合（Fusion For Energy（F4E）によって代表される）、日本、中華人民共和国、インド、大韓民国、ロシア連邦、アメリカ合衆国です。

このプロジェクトは、平和的な目的での核融合発電の科学的および技術的な実現可能性を示すことを目的としており、初の電力を生産する核融合発電所の設計、建設、運転に必要なデータを得ることを目指しています。また、加熱、制御、計測、遠隔保守など、フルスケールの核融合発電所に必要な主要技術のテストも行います。

ITER の建設サイトはフランスのブーシュ＝デュ＝ローヌ県にあります。ここには IO の本部と建設現場が含まれており、施設の建設は進行中です。さらに詳しい情報は IO のウェブサイト（http://www.iter.org）を参照ください。

ITER プラットフォームは、トカマク機器を収めたトカマク建屋（B11）のピット内にある約 40 の建物で構成されています。作業場所は下図に示されています。

図 1：作業場所

（詳細は英文技術仕様書を参照ください）

ITER プラットフォームには、以下の設備が整った機械加工ワークショップもあります。契約者は、外部の機械加工能力に加え、納期の最適化のために IO の機械加工ワークショップを使用し、操作することを提案される場合があります。

IO 機械加工ワークショップの設備リスト：

- ザイヤー（Zayer）フライス盤 Arion 4000 五軸（異なるサイズ）
- 移動範囲：4000x3100x1100 mm
- DMG フライス盤 X3600mm Y1100mm Z900mm、B 軸スイベル永久回転 +/- 90°
- 許容荷重：5000kg
- NC：SIEMENS 840DSL（Celos 付き）
- ハース（Haas）3 軸 CNC 機械 VF-3 モデル
  主なパラメータ：
  - テーブル上の最大部品重量：1.5 t
  - 最大部品寸法：1.2 x 0.45 m
  - 空気および水冷却
- カズヌーブ（Cazeneuve）並行旋盤
- チャック直径：250mm、ベンチ上を通過する直径：583mm、X 軸：255mm、Z 軸：950mm　NC：SIEMENS（学習機能付き）
- カズヌーブ FV340 従来型フライス盤
  X 軸：850mm、Y 軸：340mm、Z 軸：500mm、テーブル寸法：1300mm x 320mm、最大荷重：320kg
- ドリル機械：H1000mm、ドリル直径：50mm
- 計測ラボ：ミツトヨ製座標測定機（モデル：Crysta Apex）、解像度：0.1μm

追加設備が加わる予定です。
（以下詳細については英文技術仕様書を参照ください。）

〇トカマク組立シーケンス

トカマクは、9 つのセクターモジュールから構成されています。各モジュールは 40°のトロイダル角度を持ち、40°の真空容器セクター（VV）、2 つのトロイダルフィールドコイル（TFC）、40°の真空容器熱遮蔽セクター（VVTS）、およびそれに関連する接続部品と支持構造を含みます。これらのコンポーネントは個別に現場に納入され、その後、目的に応じた治具や fixture を使用して、セクターモジュールに組み立てられます。この作業は、セクターモジュールサブセクター組立（SMSA）契約の一部として、組立ビルで行われます。セクターモジュールはその後、順次トカマクピットに移送されます。
（以下詳細は英文技術仕様書を参照ください）

〇供給の範囲

1 VV着床作業範囲

グループ1は、セクター溶接の開始前に真空容器（VV）で行う必要がある作業に焦点を当てており、冷却器

内／容器外組立の開始に先立って前工程を優先的に完了させることを目的としています（具体的にはラジアルビームの取り外しに関連します)。

グループ1の主要なコンポーネントと作業内容は、図4-1に示されています：

1. 真空容器（VV）の整列および安定性確認
2. ラジアルビームおよびVV整列ユニット
3. 上部安定性ロッドおよび外板補強ツール
4. VVカウンターウェイトおよび中間面補強ツール
5. VVGSおよび下部ストラット設置
6. 内部補強アームおよびインターヴィブストップ（VV間ストップ）

（以下詳細は英文技術仕様書を参照ください）

2 VVTS接続作業範囲

ITER熱遮蔽（Thermal Shield）は、超伝導磁石に適切な熱的バリアを提供することを目的とした重要なシステムであり、磁石と周囲の温暖な表面との間で熱放射による熱交換を避けます。VVTS（真空容器熱遮蔽）は、真空容器と冷却磁石構造の間に配置されます。

WPPグループ2の作業範囲は、VVTS（真空容器熱遮蔽）のピット内組立作業に焦点を当てており、これはVVセクター溶接の前工程または並行作業にあたります。これには以下の作業が含まれます：

1. VVTSピット内接合部の設置（容器内アクセスを含む）
2. VVTS赤道ポートシュラウドの設置
3. VVTS恒久的支持の設置および仮設支持の取り外し
4. STS（側面熱遮蔽）とVVTSの接続
5. フックカバーの設置

（以下詳細は英文技術仕様書を参照ください）

3. 工具作業範囲

WPP 契約者は、特定の組立工具の詳細設計および供給に責任を持ちます。
契約者が設計および製造する必要がある工具のリストは以下の通りです：

1. VV 安定性クランプ
2. VVTS フィールドジョイント整列ツール
3. VVTS スプライスプレート設置ツール
4. VVGS 組立ツール（挿入、整列、シム組立、ボルト設置、リフティングなど）

（以下詳細は英文技術仕様書を参照ください）

〇予想される契約および主要な作業の期間

この契約は、VVセクターを重力支持部に配置し整列させるために必要なすべての作業（エンジニアリング作業パッケージ（EWP）/ 設置作業パッケージ（IWP）グループ1）およびVVTS相互接続作業（EWP/IWPグループ2）をカバーします。作業範囲には、VVセクターを溶接中に整列した位置に保持するために使用される工具および安定性クランプの設計、製造、および供給が含まれます。また、VVTS作業範囲の設置も完了する必要があります（§4.3で記載）。

契約は3つのロットで構成されます：

- ロット1：IWPドキュメントの作成およびEWPドキュメントの更新サポート
- ロット2：工具の設計、製造、および設置
- ロット3：現場での実行作業

すべてのロットは契約署名時に授与されます。
現場での実行作業（ロット3）は2026年第3四半期に開始される予定です（つまり、ロット3）。そのため、ロット1およびロット2は契約署名後に並行して開始される予定です（予想される開始時期：2025年第2四半期）。

ロット1の一環として、契約者はIOと共同で、効率的な作業の順序と現場実行を確保するためのプロセス、手順、リソース配分を開発することが求められます。この作業は、スケジュール要件を遵守するだけでなく、工具とプロセスを最適化して作業実行期間を短縮することを目指しています。

§4で説明されている作業範囲は、契約署名日からおおよそ4年以内に実行される予定です。主要な中間マイルストーンとしては、契約署名から3年以内にすべての9つのVVセクターが整列および安定化され、溶接が開始できる状態になることが挙げられます。以下は、主要な作業の予想される期間を示した表5-1です：

注：以下は主要作業範囲の予想期間です。これらの作業は並行して実行される可能性があり、総予想期間が必ずしもクリティカルパスに従うわけではありません。詳細な作業スケジュールは、提案依頼書で提供されます。

表5-1

作業	繰り返し回数	予想期間
1つのVVの最終整列および着床	9	2ヶ月
VVTSの相互接続	9	4ヶ月
VVTSシュラウドおよび残りの作業範囲	9	1ヶ月
VVTSシュラウドおよび残りの作業範囲	9	1ヶ月

〇経験

候補者の経験には、精密な許容差内での大型機械組立の全サイクルを実施するためのリソース能力が含まれている必要があります。これには、現場実行準備および必要な工具に関連するエンジニアリングおよび設計作業に加え、作業を実行するために必要な適切に資格を持ち、経験豊富な人員が含まれます。

契約署名前に、候補者には、契約に必要な能力の実証を求められる場合があります。たとえば、必要な許容差内でのシムの機械加工などがその一例です。

以下詳細は英文技術仕様書を参照ください

【※　詳しくは添付の英語版技術仕様書「**Technical Specification for Welding Preparation in Pit (WPP) Works**」をご参照ください。**】**
ITER 公式ウェブ　http://www.iter.org/org/team/adm/proc/overview からもアクセスが可能です。

「核融合エネルギー研究開発部門」の HP：　http://www.fusion.qst.go.jp/ITER/index.html
では ITER 機構からの各募集（IO 職員募集、IO 外部委託、IO エキスパート募集）を逐次更新しています。ぜひご確認ください。

イーター国際核融合エネルギー機構からの外部委託
に関心ある企業及び研究機関の募集について

＜ITER 機構から参加極へのレター＞

以下に、外部委託の概要と要求事項が示されています。参加極には、提案された業務に要求される能力を有し、入札すべきと考える企業及び研究機関の連絡先の情報を ITER 機構へ伝えることが求められています。このため、本研究・業務に関心を持たれる企業及び研究機関におかれましては、応募書類の提出要領にしたがって連絡先情報をご提出下さい。

Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

Date: 29 November 2024

Reference: IO/MS/24/WPP/GRD
Subject: **Market Survey for the Welding Preparation in Pit (WPP) Works**

Dear Madam/Sir,

The ITER Organization (IO) launches a Market Survey and requests information from companies having the interest, knowledge and capacity related to: **Welding Preparation in Pit (WPP) Works.**

The main purpose of this Market Survey is to evaluate the market situation and to identify candidate suppliers having the potential capabilities to respond to the IO solicitation.

Please note that this is not a Call for Nomination.

You will find enclosed to this Market Survey (**Annex I**) the Technical Summary for Welding Preparation in Pit Works (ITER_D_CCKJRE_V1.3). To facilitate the understanding of the Technical Summary, a 3D model is available in 3DXML format only. This 3D model represents a single Sector Module in the Tokamak Pit, with all the relevant components and environment for the WPP Works. This 3D model can be found at HERE and is protected by password that you are invited to request by email to Guillaume.Retaillaud@iter.org.

With this letter, we invite all potential companies, institutions or entities from ITER Member States to participate to this Market Survey through the questionnaire **(Annex II).**

We kindly invite the Domestic Agencies to publish this Market Survey on their websites or through other advertising methods, which will help to retrieve the requested information from a maximum of potential candidates.

Please return a completed questionnaire, **no later than 15 January 2025**, to the following email address guillaume.retaillaud@iter.org, copy to antoine.calmes@iter.org

Yours sincerely,

Antoine Calmes
Group Leader
Procurement for Plant & Machine Assembly
Procurement Division

IDM UID
CCKJRE

VERSION CREATED ON / VERSION / STATUS
28 Nov 2024 / 1.3 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical summary for Welding Preparation in Pit works (WPP)

Preliminary technical description of the scope of the WPP contract issued to the market to check the interest and capabilities of potential tenderers.

Technical Summary for Welding Preparation in Pit (WPP) contract

1 Purpose

The ITER Organization (IO) intends to issue a Restricted Tender procedure for the Welding Preparation in Pit works (WPP).

The information and technical details provided in the present document are preliminary with the purpose to assess the interest and capabilities of potential candidates for this scope of works.

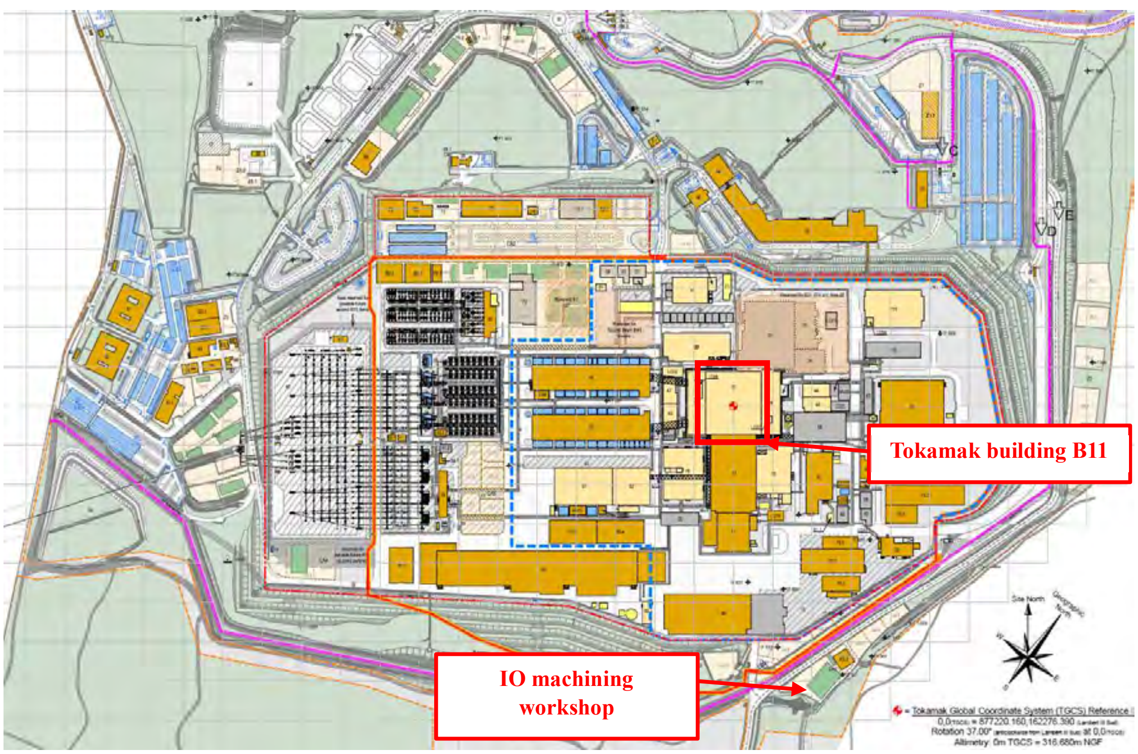
2 Background

The ITER Organization (IO) is a joint international research and development project for which the initial construction activities are underway. The seven members of the IO are: the European Union (represented by Fusion For Energy (F4E)), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA.

The project aims to demonstrate the scientific and technological feasibility of fusion power for peaceful purposes and to gain necessary data for the design, construction and operation of the first electricity-producing fusion plant. It will also test a number of key technologies, including the heating, control, diagnostic and remote maintenance that will be needed for a full-scale fusion power station.

The ITER site is in the Bouches du Rhône district of France. It includes the Headquarters of the IO and a construction worksite. The construction of the facility is on-going. Further information is available on the IO website: http://www.iter.org.

The ITER platform is made of about 40 buildings serving the Tokamak machine located in the pit of the Tokamak building (B11). The location of works is shown in the figure below.



The ITER platform also houses a machining workshop composed of several equipment described in the list below. The Contractor may be proposed to use and operate the IO machining workshop in addition to the Contractor's external machining capacity to optimize the schedule of delivery.

List of equipment in IO machining workshop:

- Zayer milling machine Arion 4000 Five-Axis of different sizes. Travel: 4000x3100x1100 mm
- DMG milling machine X3600mm Y1100mm Z900mm, axe B swivel permanent +/- 90°. Permissible load 5000Kg. NC SIEMENS 840DSL with Celos
- Haas 3-axis CNC machine VF-3 model with few key parameters:
  - Max. weight of component on table: 1.5 t
  - Max component dimensions: 1.2 x 0.45 m
  - Air and water cooling
- Cazeneuve parallel lathe: chuck diameter 250mm, diameter passing over the bench 583mm, X255mm, Z 950mm. NC SIEMENS by learning
- Cazeneuve FV340 Conventional Milling Machine: X850mm, Y340mm, Z500mm, table dimension 1300mm x 320mm, max load 320Kg
- Drilling Machine: H1000mm drilling diameter 50mm
- Metrology lab with coordinate measuring machine from Mitutoyo (Model Crysta Apex) with a resolution of 0.1µm

Additional equipment will be added.

3 Tokamak assembly sequences

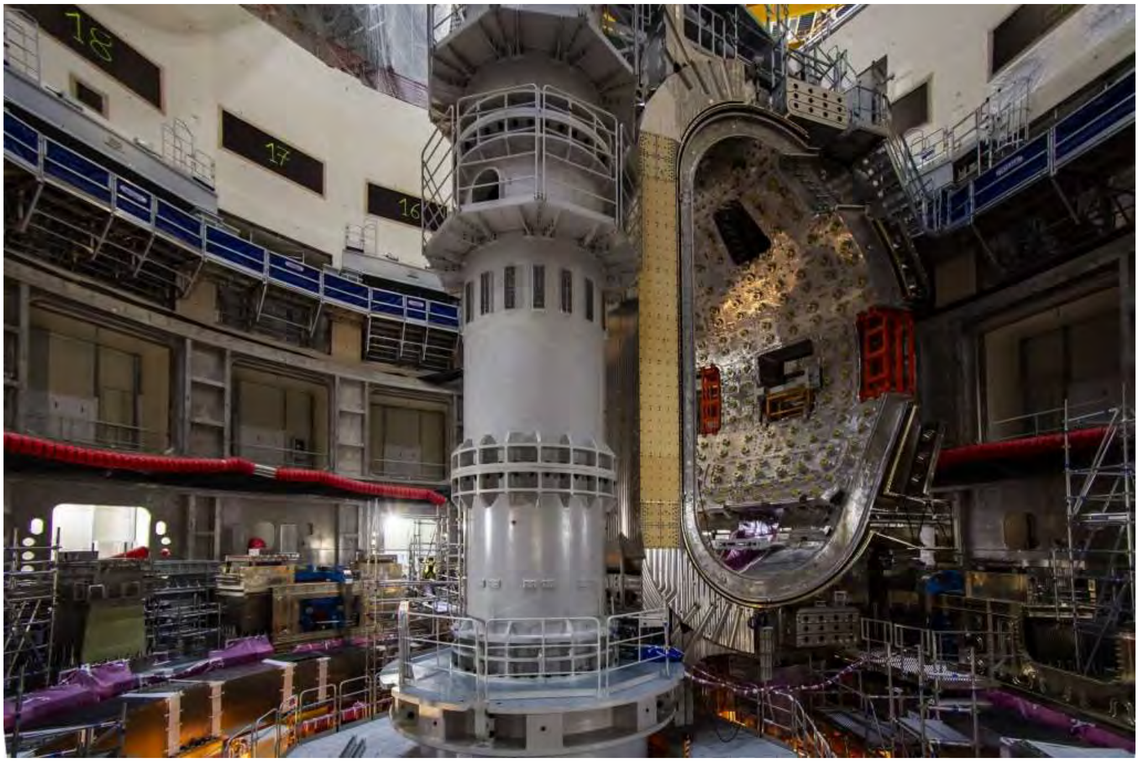
The Tokamak is assembled from nine Sector Modules, each encompassing a toroidal angle of 40°, and comprising a 40° Vacuum Vessel sector (VV), two Toroidal Field Coils (TFC), a 40° Vacuum Vessel Thermal Shield sector (VVTS), and the associated interconnections and supports. The components are delivered to the site individually, and sub assembled into Sector Modules using purpose-built jigs and fixtures in the Assembly Building as part of the Sector Module Sub-Sector Assembly (SMSA) contract. The Sector Modules are then transferred to the Tokamak Pit sequentially.

Once in the Tokamak Pit, the TFCs are precisely aligned and attached to their permanent supports as part of the Sector Module in-Pit Assembly (SMPA) Contract. In addition, this contract performs the interconnections between the TFCs when the 2nd and subsequent Sector Module's TFCs are lifted, aligned and secured to their gravity supports.
After the completion of the 9 sectors landing and the completion of all intercoil connections in the pit, the next main activity is embedded in the so-called A4 scope whose main objectives are:

- The load transfer of all TFC on their gravity support (SMPA scope).
- The installation and the tightening of all the Pre-compression rings upper and lower (SMPA scope).
- The load transfer of the VV on their gravity support (WPP scope)
- The removal of all associated tools (SMPA and WPP scopes).

The TFC load transfer can be performed in parallel with the WPP contract scope.
There is a potential to have some indirect co-activities with the VV ports assembly and welding contract in case some work anticipation is possible with ports and bellows positioning and welding.

The same applies to the VV welding contract and Diagnostic assembly contract which could be performed sequentially before and/or in between VVTS assembly and VV landing activities.



As part of the Welding Preparation in Pit (WPP) Contract, three main activities are considered:

- The VVTS sectors are connected sequentially to each other between two Sector Modules in the Tokamak Pit. Technically, this scope of work can be performed as soon as 2 sectors are in the pit.
- The handling, positioning, and bolting of the VVGS between the cryostat and the VV sector.
- The alignment and the landing of the VV sectors on the Vacuum Vessel Gravity Support (VVGS), this operation is possible only once the interconnections on each of its neighbor TFCs are completed (three Sector Modules in the Tokamak Pit is the minimum pre-requisite to start this activity), the center VV sector is then aligned to its target position and secured to the VVGS.

VV Sectors overall dimension (m)	7.9 (Length) x 6.6 (Width) x 13.8 (Height)
Material	SS 316 L(N)-IG
Unit Mass	440 tons

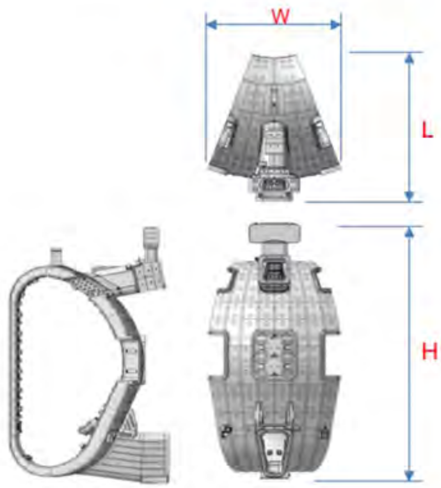


Figure 3-1: VV Basic Weight and Dimensions

Once all nine Sector Modules have completed their VVTS field joint connections and the VV has been secured to the VVGS, the Sector Welding (SW) contract will join the VV sectors welding the field joints according to a plan which aims to minimize deformations.
In parallel, SMPA will start the A4 scope which includes the load transfer of the TFC torus, removal of the Central Column tooling (no longer required to support the Radial Beams) and assembly of the upper and lower Pre-Compression Rings to the TFCs.

This market survey is for the WPP contract. There will be coactivity with several other contracts:

- SMSA contract at the start (for the landing of the sector in the pit),
- SMPA contract for the sector interconnection and the A4 scope,
- In-vessel Diagnostic, Fueling and Instrumentation (IDFI) contract,
- Port Positioning Assembly and Welding (PPAW) contract (for Cryostat/Building Bellows assembly and welding scope)
- SW contract at the end,
- Transverse contracts including radiographic test, scaffolding, crane operation ...

Cleanliness & FME:

The ITER Tokamak machine is composed mainly of VQC (Vacuum Quality Class) components assembled and operated under clean conditions in order to comply with vacuum and with the machine operation requirements (i.e. comply with thermal shield emissivity requirement).

These clean conditions apply in worksite 1 (Tokamak pit and crane hall, B13 and B17) and a cleanliness protocol shall be applied. It defines rules necessary to maintain the requested level of cleanliness and establishes requirements regarding workers and material access, clean clothes, works (including dirty works) and housekeeping.

In addition, works by WPP Contractor in the worksite 1 (in particular in the pit), are subject to the Foreign Material Exclusion (FME) process which aims at preventing any risk of loss object in the machine. Any foreign material would be detrimental for the operation.

4 Scope of work

4.1 VV landing scope

The Group 1 is focused on the necessary activities to perform on the VV prior to the start of sector welding and prioritization of the release of predecessors to the start of in-cryostat/ex-vessel assembly (related to removal of the radial beams).

The main components and activities in Group 1 are shown in Figure 4-1:

1. Vacuum Vessel Alignment and Stability
2. Radial Beam and VV alignment unit
3. Upper Stability Rods and Outboard Bracing Tools
4. VV Counterweights and Mid Plane Bracing Tool
5. VVGS and Lower Strut Installation
6. Inboard Bracing Arms and Inter-VV Stops

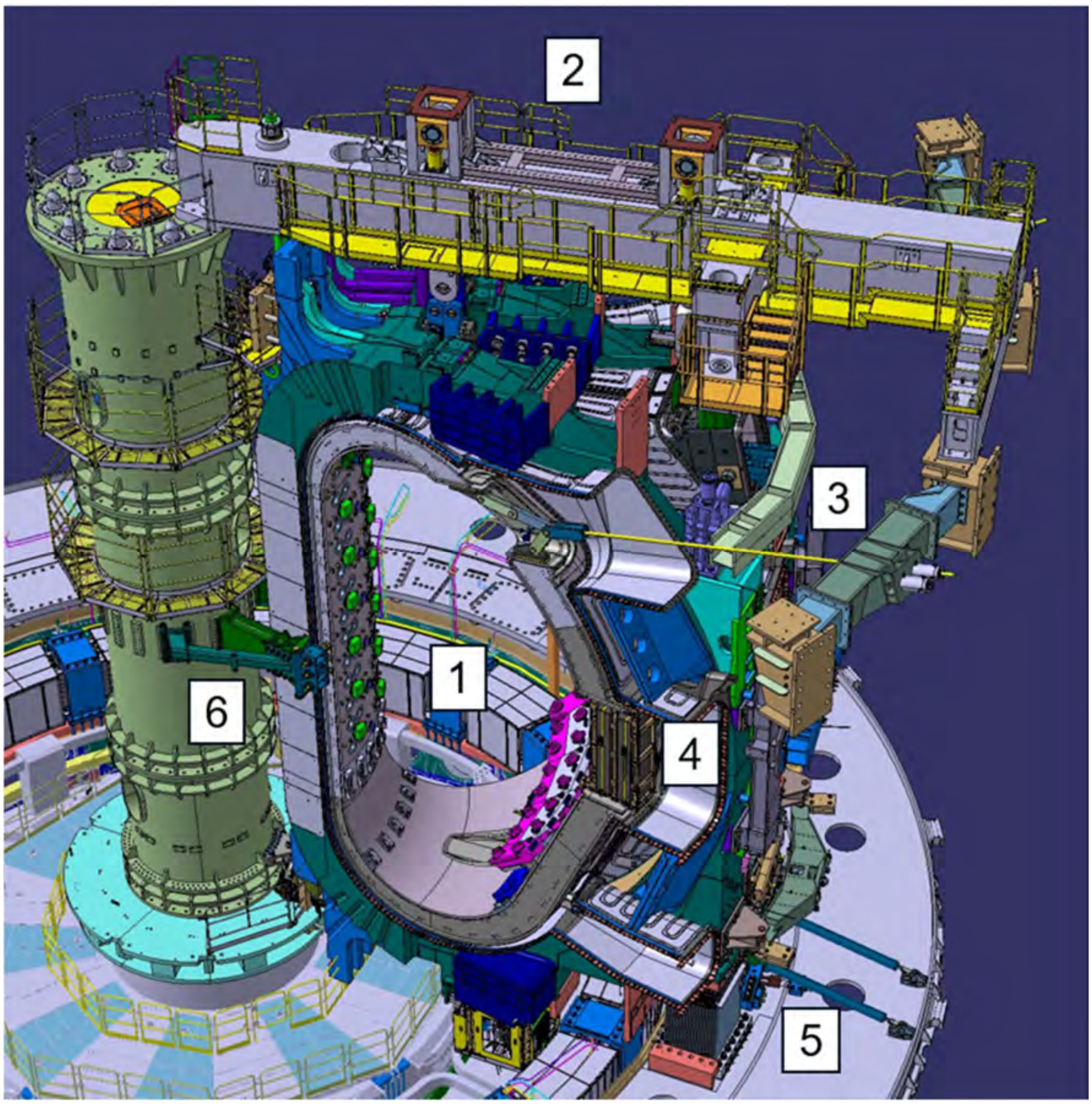


Figure 4-1: Single Sector Overview

In order to land the VV onto the VVGS sector by sector, the VV must be stabilized from tilting radially inboard by use of stability clamps as shown in Figure 4-2. The WPP Contractor will install the upper stability rods and lower strut. The upper stability rods are secured to the VV upper port by temporary welded pads, and to the concrete building by the radial beam support anchor frames.

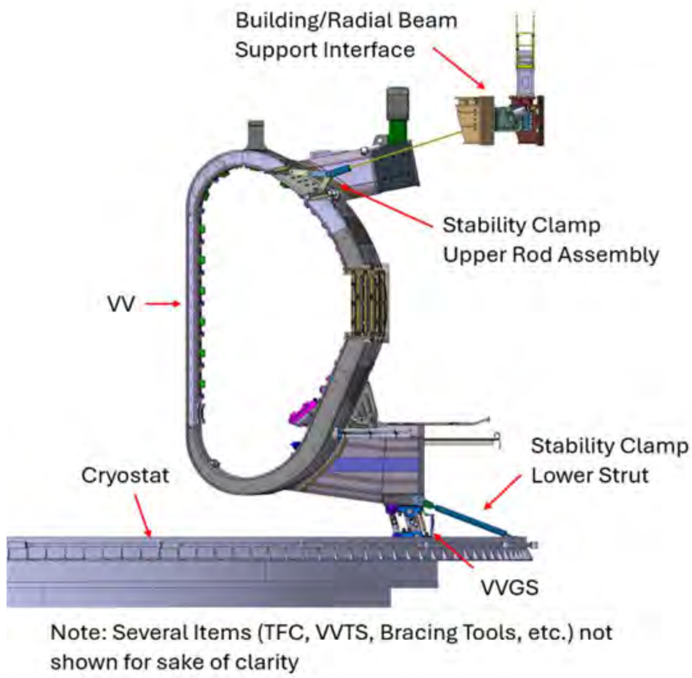


Figure 4-2: Landed VV Side View

The main activities related to the alignment of the VV will start when three side by side sectors are lifted to the Pit (SMSA scope) and the adjoining inter-coil connections are completed between the TFCs (SMPA scope). The main predecessor for the stability clamp installation is the installation of the IOIS (Intermediate Outer Inter-coil Structure) by the SMPA contractor.

The WPP Contractor will develop and implement the methodology for aligning the VV to its target position and tolerance. The target position and tolerance (expected to be in the range of +/- 3mm) will be provided by the IO. During the alignment, the VV will be continuously measured using the fiducial network in-vessel. Radial, vertical and toroidal adjustment can be performed using the jacks on the radial beam VV alignment unit shown in Figure 4-3. Radial and toroidal tilting of the VV can be adjusted by removing or adding weights to the counterweight frames in the equatorial port shown in Figure 4-4, or by engaging the stability clamp upper rods or lower strut.

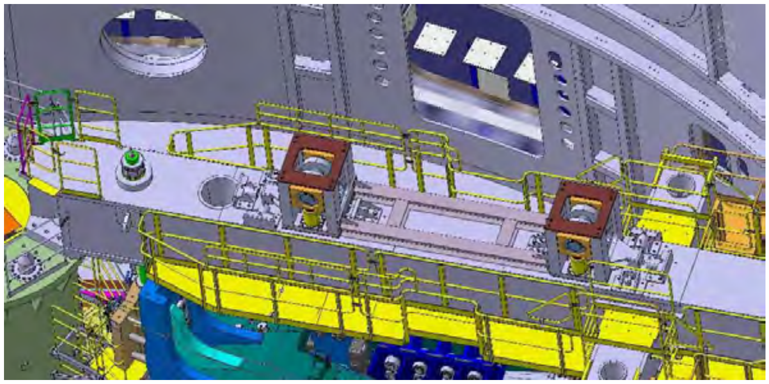


Figure 4-3: VV Alignment Unit

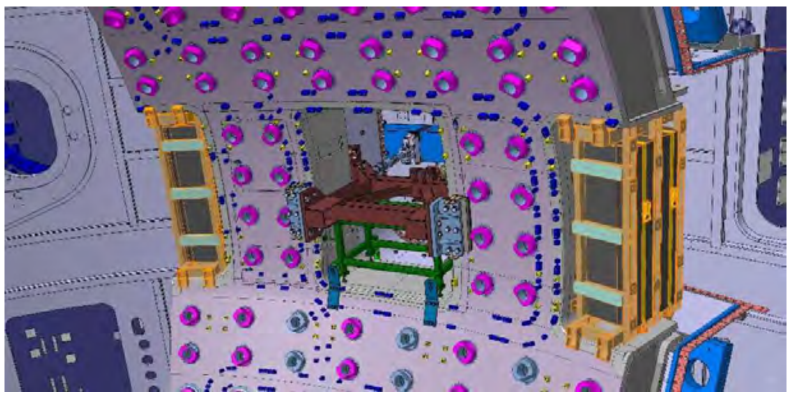


Figure 4-4: VV Counterweights

The WPP Contractor will develop and implement the methodology for aligning the VVGS (~11 tons) to the target position and securing it to the VV and Cryostat Base with the use of M72 super bolts shown in Figure 4-6. The sequence for the VVGS positioning and alignment includes the installation of 2D machined electrical insulation shims and 3D machined alignment shims. The 3D machined alignment shims are based on reverse engineering the as-built surveys of the VV and VVGS. The custom machining of all shims is the responsibility of WPP Contractor.

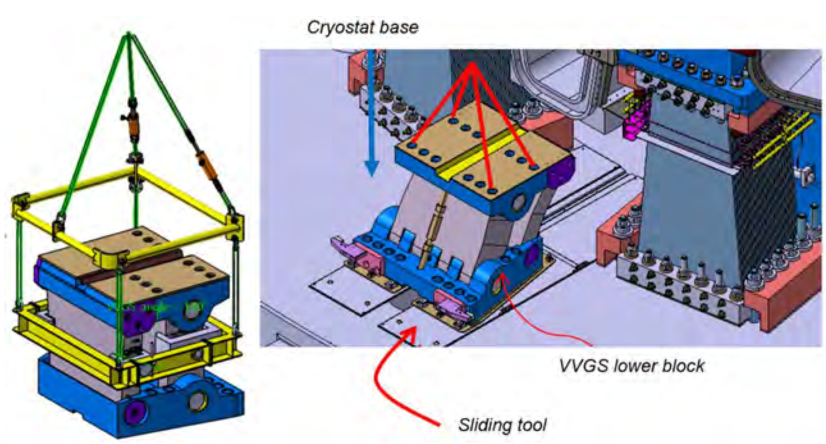


Figure 4-5: VVGS Lifting and Positioning

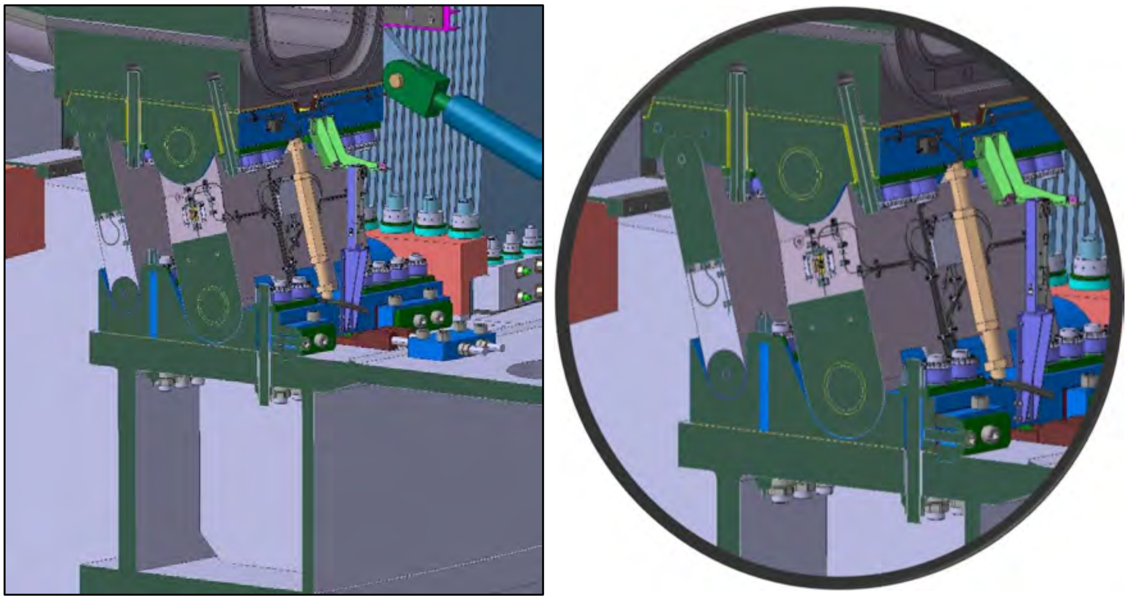


Figure 4-6: VVGS Section Cut with M72 Super Bolts

The VV must be unconstrained during the alignment to the target position. Therefore, the bracing tools must be disengaged by the WPP Contractor before the start of the alignment or load transfer. The Mid-Plane Bracing tool (MPB) and Divertor Level Stabilizer (DLS) will be dismantled and removed by the WPP Contractor since they are no longer required for seismic restraint when the VVGS is connected to the VV.

The Inboard Bracing Arms shown in Figure 4-7 are disengaged only by retracting the yellow bolts. The Outboard Frames, also shown in Figure 4-7, are disengaged by retracting the orange pads.

The MPB, shown in Figure 4-8, is installed in the center of the Sector Module in the equatorial port. The DLS, shown in Figure 4-9, is installed in the VV Lower Port Stub Extension. The MPB weighs in total ~10 tons while the DLS weighs in total ~6 tons. Both the DLS and MPB are removed by dismantling sub-assemblies (~1 to 5 tons) and lifting them out of the pit. The IO will provide the dismantling bespoke tooling to the WPP Contractor.

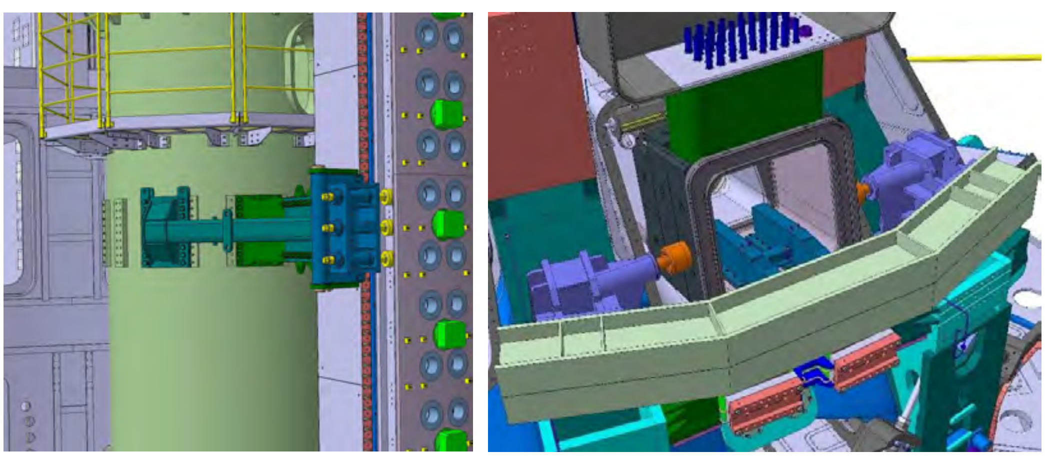


Figure 4-7: Inboard Bracing Arms and Outboard Frames

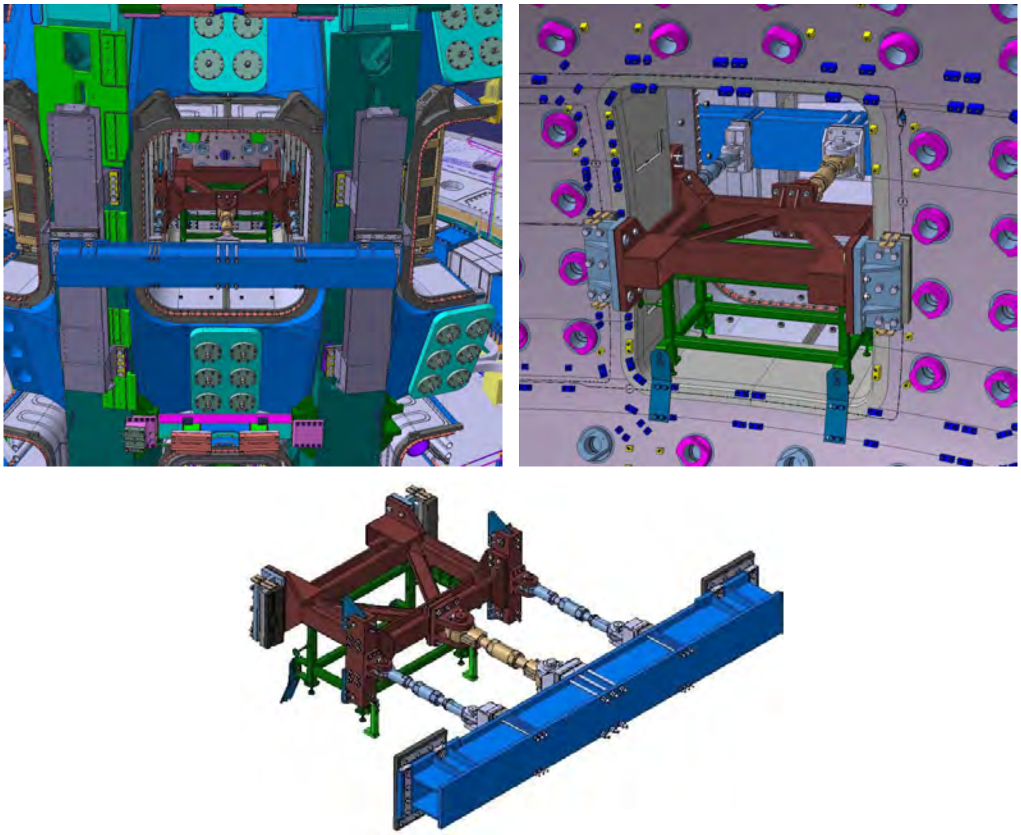


Figure 4-8: Mid Plane Bracing Tool

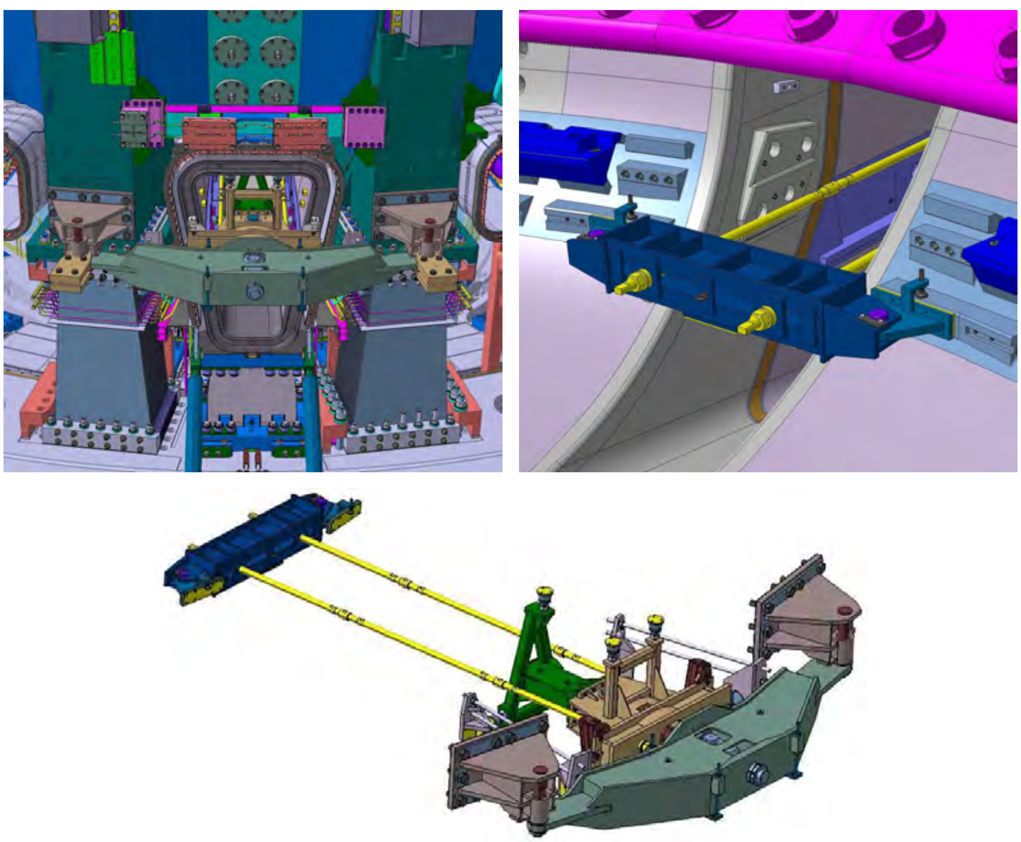


Figure 4-9: Divertor Level Bracing Tool Removal

4.2 VVTS connection scope

ITER Thermal Shield is a critical system that aims to provide an appropriate thermal barrier to the superconducting magnets, avoiding heat exchange by thermal radiation between magnets and the surrounding warm surfaces. The VVTS is interposed between the vacuum vessel and the cryogenic magnet structure.

The WPP Group 2 scope is focused on the VVTS (Vacuum Vessel Thermal Shield) pit assembly activities that are a predecessor or parallel activities to the VV sector welding. This includes:

1. VVTS In-Pit Joint Installation, including in-vessel access
2. VVTS Equatorial Port Shroud Installation
3. VVTS Permanent Support Installation and Temporary Support Removal
4. STS (Side Thermal Shield) to VVTS connection
5. Installation of Hook Covers

The In-Pit Joint installation is the connection of two adjacent VVTS sectors from the inside of the vacuum vessel through 124 splice plates of different shapes, see Figure 4-10. The installation of the splice plates is a predecessor to VV welding since the VVTS sits between the VV and the TFC (when the VV welding is complete, there is no longer access to the VVTS), see Figure 4-11.

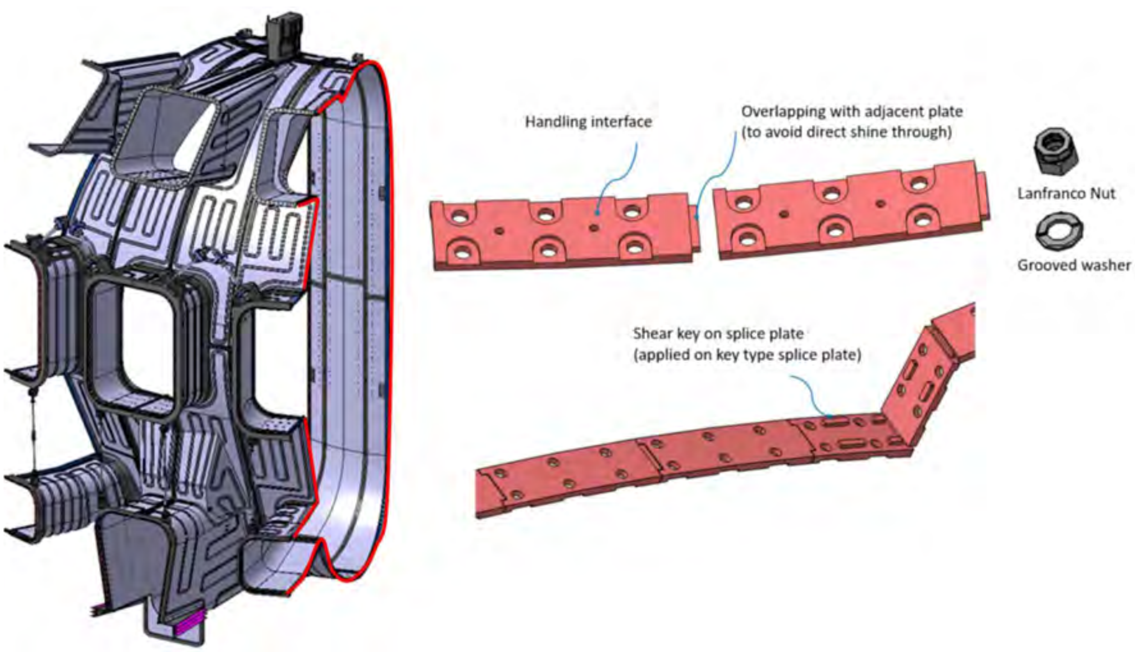


Figure 4-10: VVTS Field Joint Splice Plates

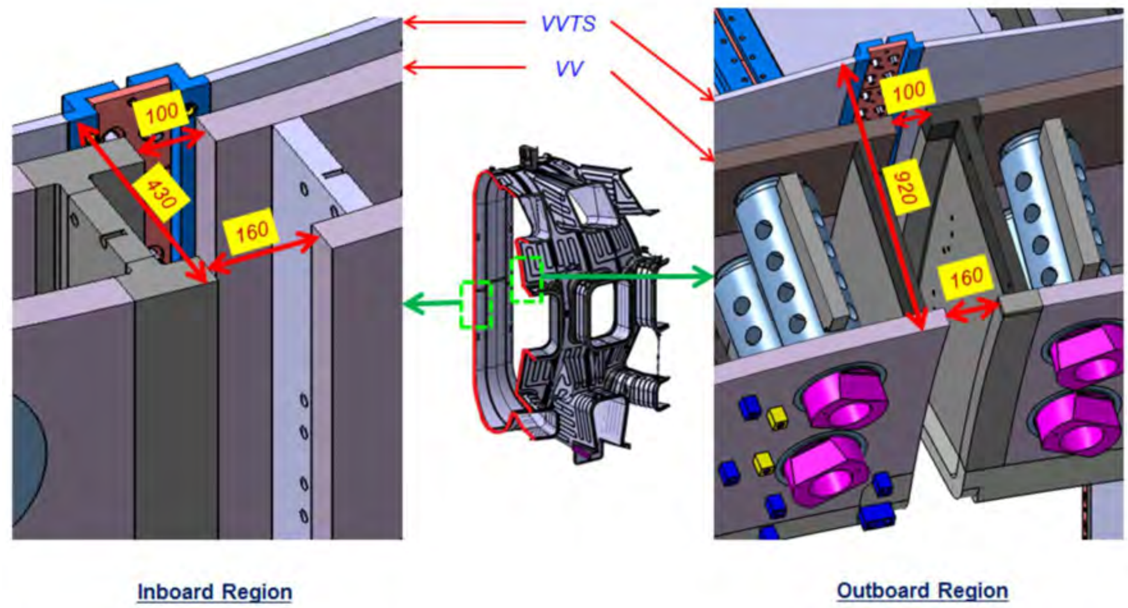


Figure 4-11: VVTS Proximity to VV

IO will supply the blocks of 304 grade stainless steel and the nominal CAD models to the WPP Contractor for machining the splice plates. If custom machining is required, the as-built data of existing sectors and customized CAD models of the associated splice plates will be provided by the IO Metrology and Reverse Engineering team for the WPP contractor to prepare for the machining.

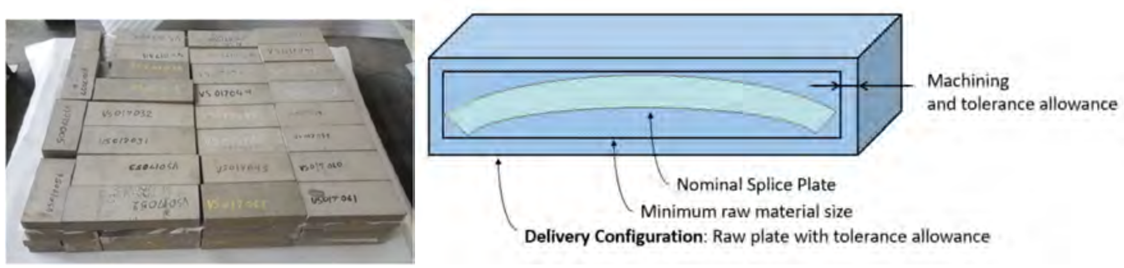


Figure 4-12: VVTS Machining Blocks

Using specialized tooling, the WPP Contractor will align the two adjacent VVTS sectors, then perform the installation of each splice plate. Noting that, as shown in Figure 4-14, the working environment and access for the installation of the VVTS splice plates is extremely challenging. Special care will be needed to ensure suitable access, the weld preparation of the VV is not damaged and that there is no risk to drop or lose small items such as fasteners.

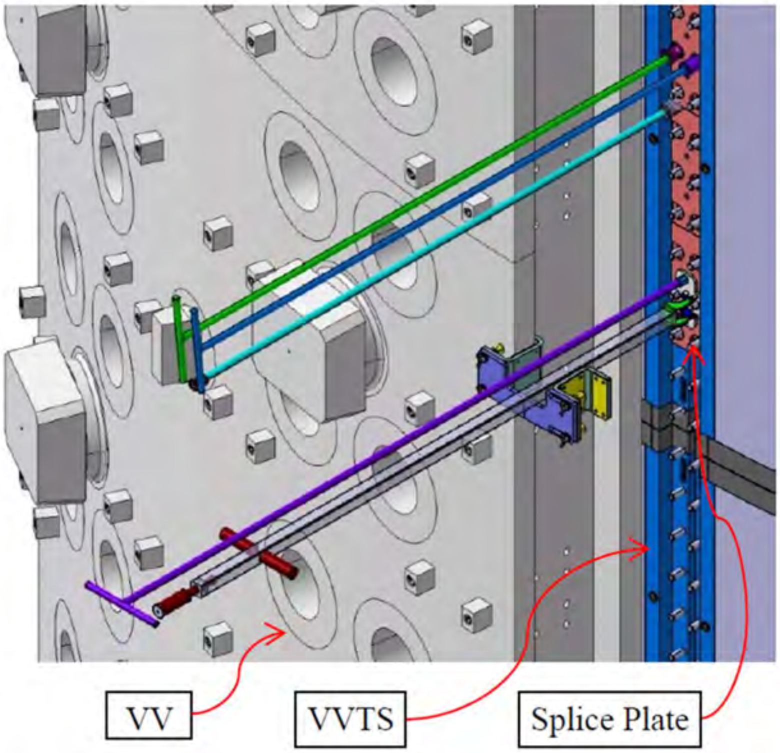


Figure 4-13: VVTS Installation Tool Example

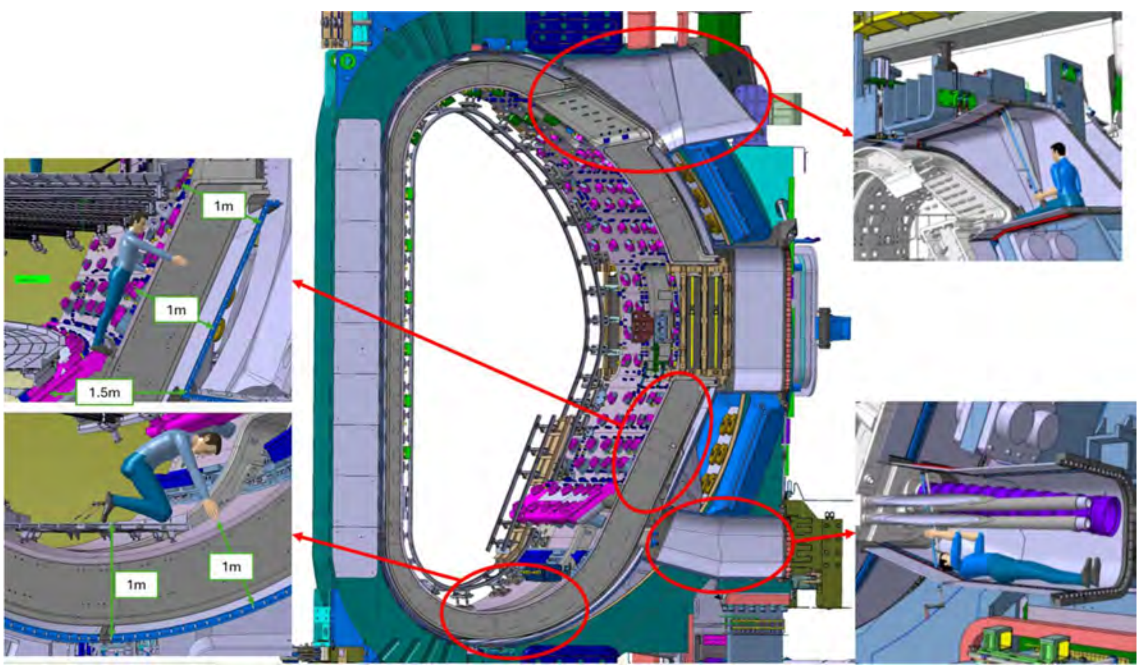


Figure 4-14: VVTS Field Joint Challenging Access

Following the connection of the VVTS sector field joints, the associated Equatorial Shrouds are lifted to the Tokamak Pit and are aligned to the field joint and secured to the VVTS sectors by WPP Contractor, as seen in Figure 4-15. The lateral left and right shrouds, when pre-assembled, have a total weight of ~3.5 tons. The IO will provide the lifting tooling and counterweight (if required) for the installation.

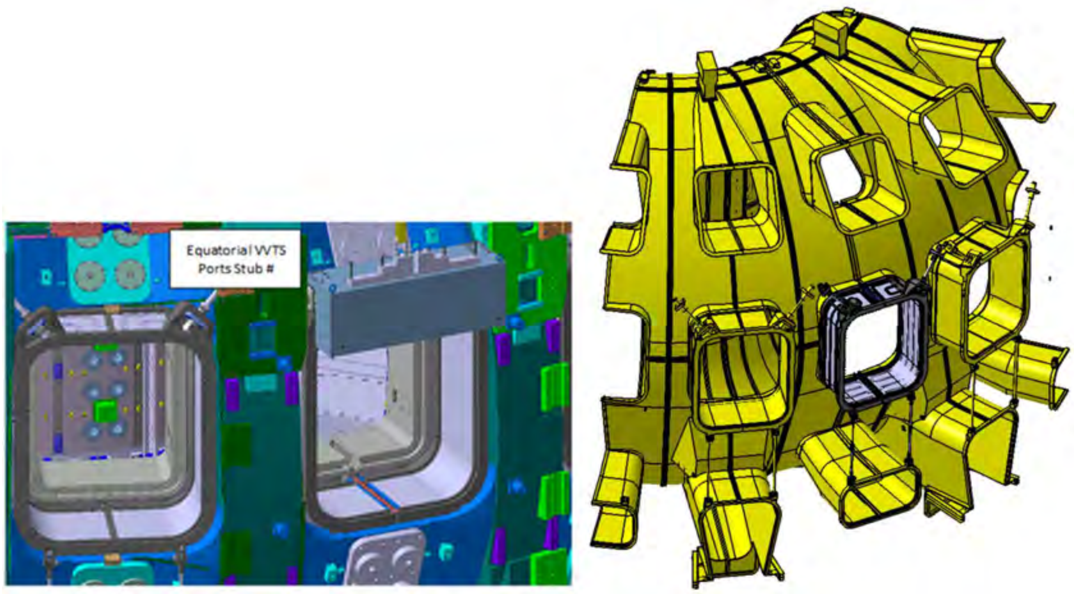


Figure 4-15: Equatorial VVTS Shroud Installation

The VVTS temporary supports hold the VVTS sector connected to the TFCs until the completion of the VVTS full torus (9 sectors). At this point, the permanent supports on the 9 field joint Equatorial Shrouds are connected to the TFC so that WPP Contractor can remove the temporary supports. Some of the temporary supports may be required to be adjusted by WPP Contractor as part of the alignment of the VVTS in pit when attaching the field joint splice plates.

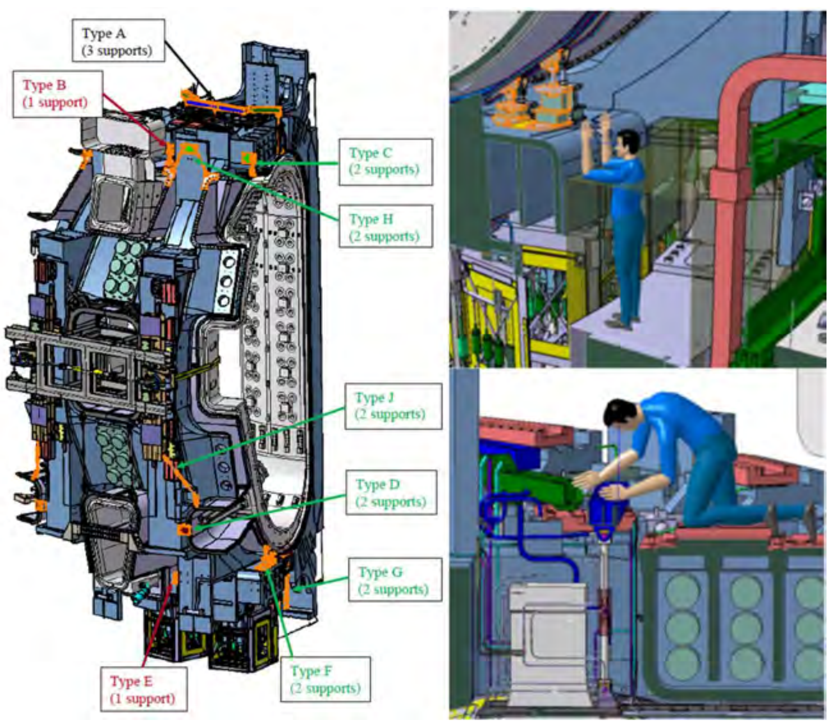


Figure 4-16: VVTS Temporary Supports

Once the Radial Beams are removed from the Sector Modules, it will allow the access to install the nine hook covers of the VVTS by WPP Contractor. After the load transfer, the connection between the Side Thermal Shield (STS) and the VVTS lower port area will be performed on all nine sectors by WPP Contractor.

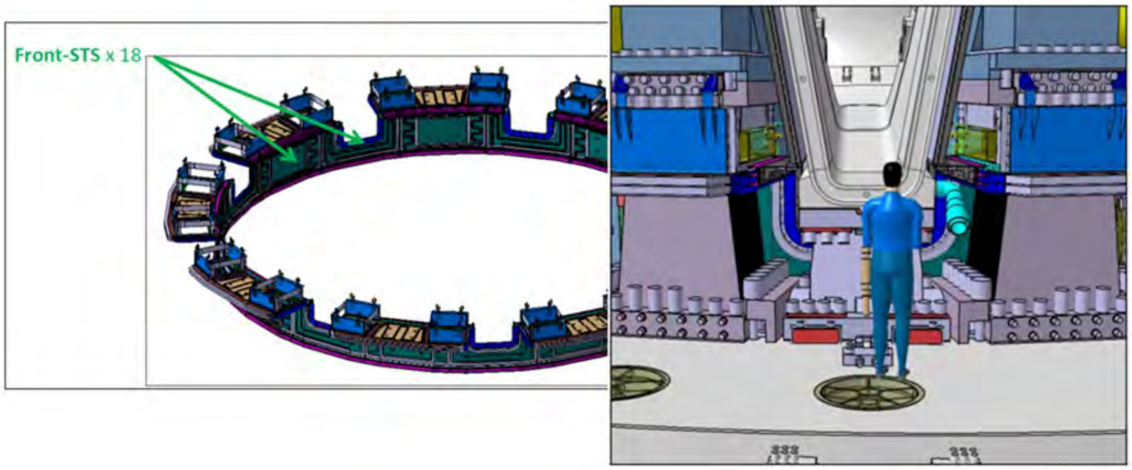


Figure 4-17: VVTS to STS Connection

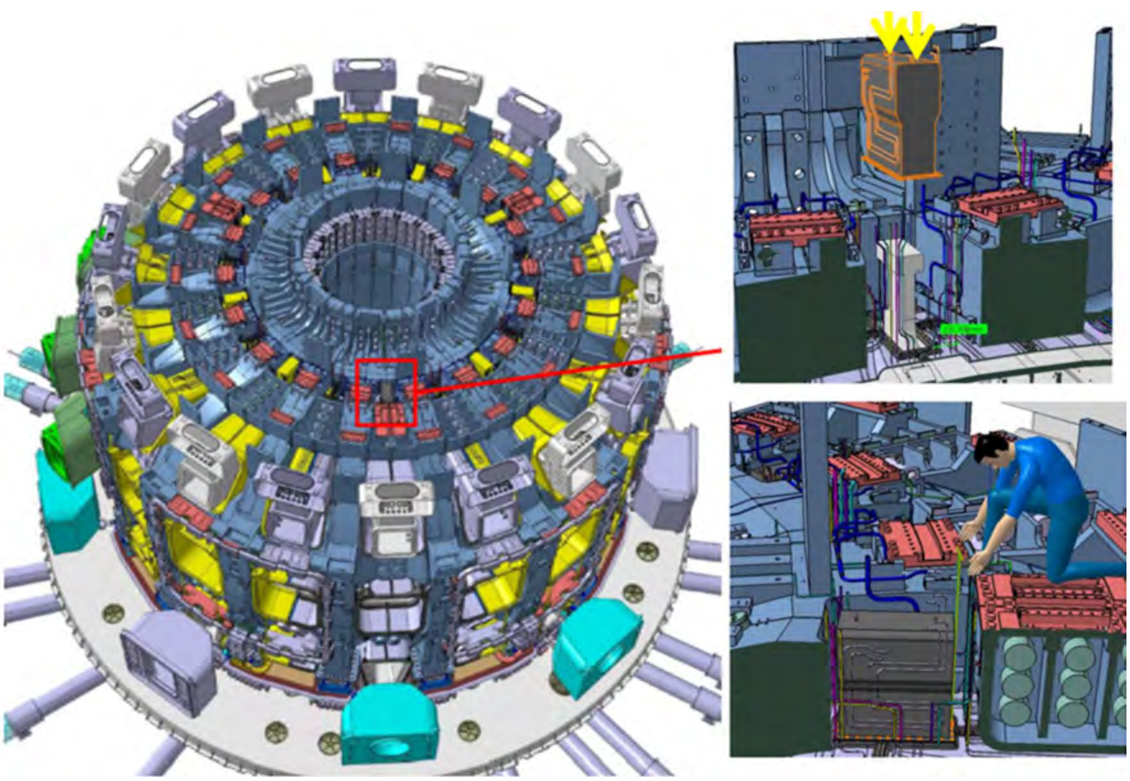


Figure 4-18: VVTS Hook Cover Installation

4.3 Tooling scope

The WPP Contractor will be responsible for the detailed design and supply of specific assembly tooling.

The list of tools to be designed and manufactured by the Contractor includes:

1. VV Stability Clamps
2. VVTS Field Joint Alignment Tools
3. VVTS Splice Plate Installation Tools
4. VVGS Assembly Tools (for insertion, alignment, shim assembly, bolt installation, lifting, etc)

4.3.1 VV Stability Clamps

As part of the Group 1 scope of works described in §4.1, the final design and supply of the stability clamps (including all needed tools to install the stability clamp) will be required by the WPP Contractor. The IO has performed a detailed conceptual design, including definition of the load cases to be considered by the clamps. The WPP Contractor shall, as part of the final design, complete the mechanical analysis of the tools, assess the reaction loads on the interfaces, confirm the assembly feasibility and manage all necessary drawings and inspection plans for the manufacturing. Final Design Review (FDR) and Manufacturing Readiness Review (MRR) will need to be conducted by the WPP Contractor.

The stability clamp upper rod assembly, shown in Figure 4-19, weighs ~8.5 tons and is connected to the VV in both lateral upper ports near the field joint via temporary welded pads as shown in Figure 4-20. Temporary welds will be done on the VV which is a Protection Important Component (PIC). Appropriate welding, removal and NDE (Non-Destructive Examination) are required according to the RCC-MR.
The upper rods are then connected to a support structure which is attached to the existing Radial Beam (RB) supports shown in brown in Figure 4-21.
The stability clamp lower strut, shown in Figure 4-22, are required to resist the loads associated with the VV rotation when landed on the VVGS.

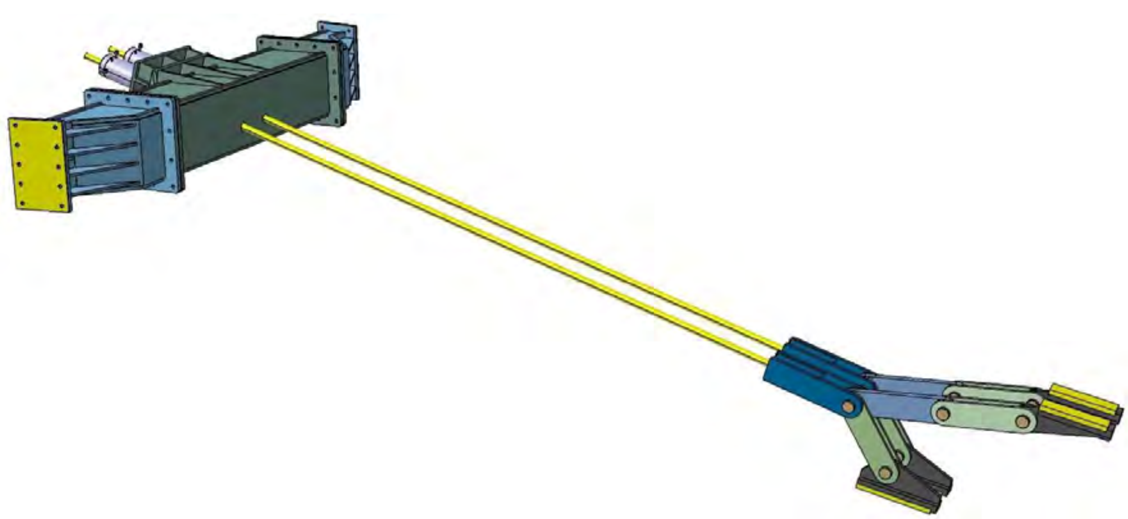


Figure 4-19: Upper Rods Assembly

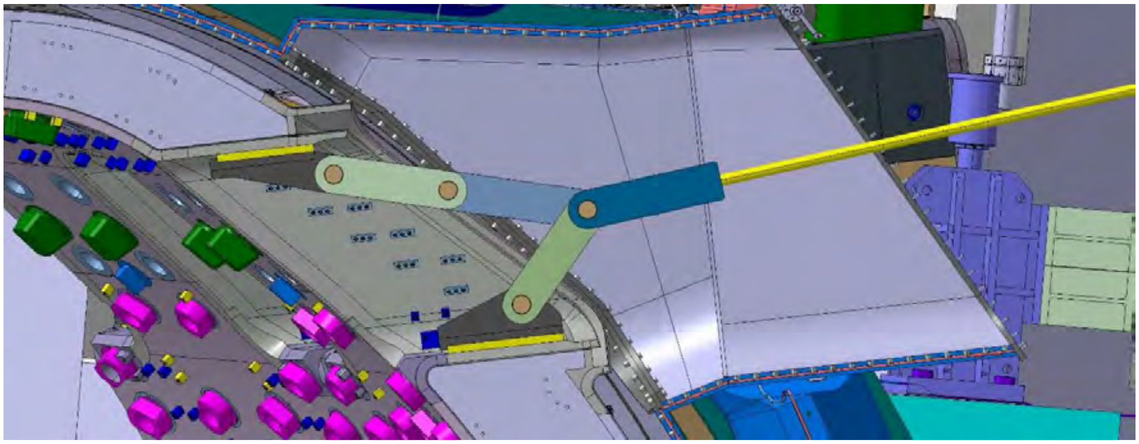


Figure 4-20: Stability Clamp Upper Rod VV connection

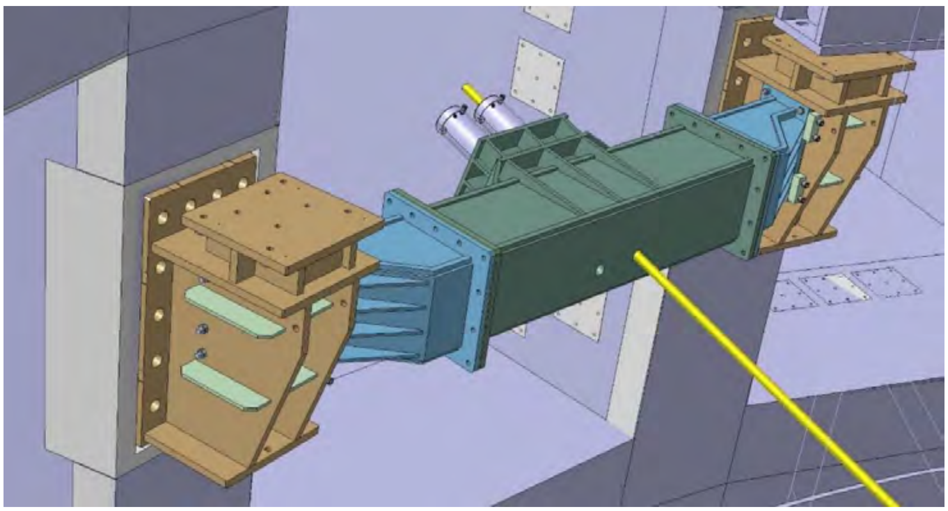


Figure 4-21: Upper Rod connection to the RB support and Building

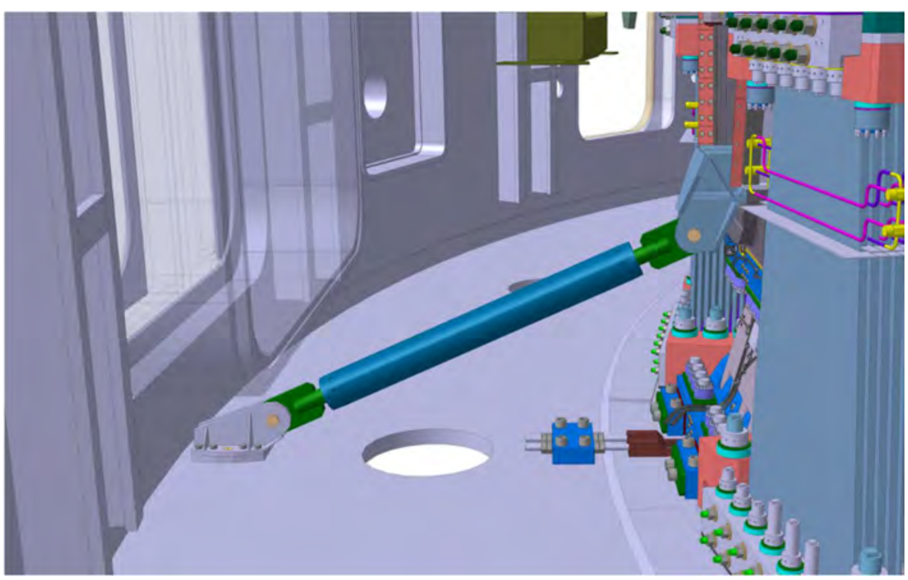


Figure 4-22: Lower Strut Connected to Cryostat Base

4.3.2 VVTS Field Joint Alignment Tools

As part of Group 2 scope of works described in §4.2, the VVTS sectors will be aligned together by pulling the panels in several axis distributed around the VVTS field joint sufficiently to secure key splice plates, thus locking the position of the flanges and avoiding the custom machining of the splice plates.

Shown in Figure 4-23, is an IO concept of a tool that could be imagined for alignment on the location of the shroud flanges. The WPP Contractor will be required to develop a detailed conceptual and final design of the alignment tools, strategy and methodology, considering the constraints imposed by the challenging environment. Upon the IO approving of the final design, the WPP Contractor is then responsible for the manufacturing and supply of the tools.

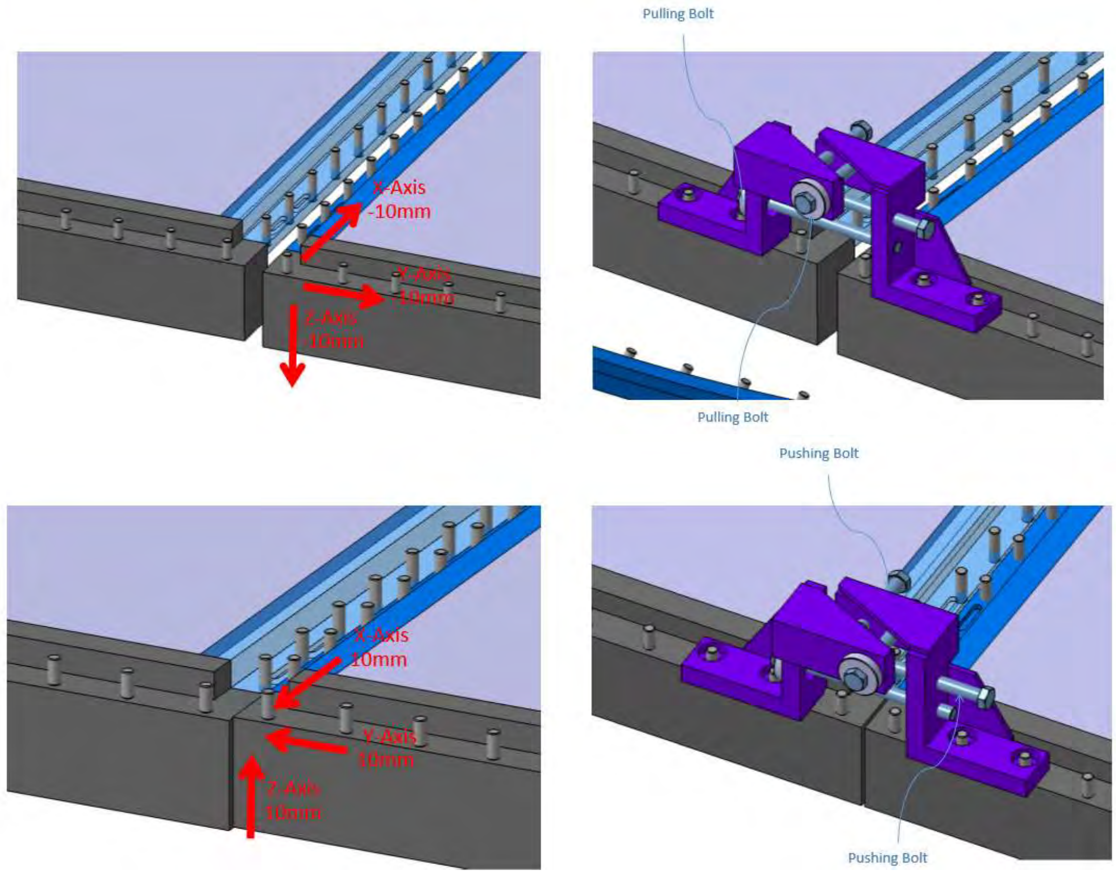


Figure 4-23: VVTS field joint alignment tools

4.3.3 VVTS Splice Plate Installation Tools

As part of Group 2 scope of works described in §4.2, the VVTS splice plates must be carefully and efficiently installed in the pit from inside the VV. The IO has one prototype installation tool shown in Figure 4-13 which will be provided to the WPP Contractor. However, the WPP Contractor will be responsible for developing an optimized solution for the splice plate installation. The optimized solution must comply with all material requirements, protection of the VV weld preparation, foreign material exclusion/dropped item protection and other working environment constraints. The WPP Contractor must demonstrate value engineering in the solution, showing a clear benefit to the assembly efficiency with the optimized tool.

Upon the IO approving of the final design, the WPP Contractor is then responsible for the manufacturing and supply of the tools.

4.3.4 VVGS Assembly Tools

As part of the Group 1 scope of works described in §4.1, the VVGS Assembly will require specific tooling to lift, align, translate, bolt, shim, etc..., considering the challenging environment. The WPP Contractor will be required to develop a detailed conceptual and final design of the VVGS assembly tools, strategy and methodology. Upon IO approving of the final design, the WPP Contractor is then responsible for the manufacturing and supply of the tools. The WPP Contractor must demonstrate value engineering in the solution, showing a clear benefit to the assembly efficiency with the optimized tool.

5 Expected contract and main activities durations

This Contract covers all activities needed to place and align the VV sectors on their gravity supports (Engineering Work Packages (EWP)/Installation Work Packages (IWP) Group 1) and to perform the VVTS inter-connection (EWP/IWP Group 2). The scope includes the design, manufacturing and supply of tools and stability clamps used to hold the VV sectors in their aligned position during welding and to complete the installation of the VVTS scope as describe in §4.3.

The Contract will consist of 3 lots:

- Lot 1: production of IWP documentation and support to EWP documentation updates;
- Lot 2: design, manufacturing and installation of tools; and
- Lot 3: execution works on-site.

All 3 lots will be awarded at Contract signature.

Due to the start of site execution in the 3rd quarter of 2026 (i.e. Lot 3), Lot 1 and Lot 2 will be launched in parallel after Contract signature (expected Q2 2025).

As part of Lot 1, the Contractor will be expected to work collaboratively with the IO to develop processes, procedures and resource allocation to ensure efficient sequence and site execution to not only comply with the schedule requirements but to optimize the tools and processes to reduce the works execution durations.

The scope of works as described in §4 is expected to be executed within an estimated duration of 4 years from the date of Contract signature, with a key intermediate milestone to get all 9 VV sectors aligned and stabilized to release their welding at 3 years from Contract signature, and according to the following preliminary durations of the main activities in Table 5-1:

Note: below are the estimated durations for the main scope of works. These activities could be performed in parallel and the total estimated duration will not necessarily be on the critical path. A detailed schedule of works will be provided in the Request for Proposal.

Activity	Repetition	Estimated duration
Final alignment and landing of 1 VV	9	2 months
Interconnection of VVTS	9	4 months
VVTS shrouds and remaining scope	9	1 month
Removal of the stability clamps	9	1 month

Table 5-1: Main on-site activity durations

6 Experience

The Candidate experience shall include the resource capability to perform the full cycle of large mechanical assembly within precise tolerances. This includes engineering and design activities related to preparation of site execution and necessary tooling as well as suitably qualified and experienced personnel required to execute the works.

Prior to Contract signature, the Candidates may be requested to perform demonstration of capabilities keys to the Contract such as machining of shims within required tolerances.

7 Eligibility

Participation is open to all legal persons participating either individually or in a grouping (consortium) which is established in an ITER Member State:

- European Union,
- Republic of India,
- Japan,
- People's Republic of China,
- Republic of Korea,
- Russian Federation,
- United States of America.

The ITER Organization may decide to broaden the eligibility to other countries as deemed appropriate.

A legal person cannot participate individually or as a consortium partner in more than one application or tender. A consortium may be a permanent, legally established grouping or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization. The consortium cannot be modified later without the approval of the ITER Organization.

Legal entities belonging to the same legal grouping are allowed to participate separately if they are able to demonstrate independent technical and financial capacities. Bidders' (individual or consortium) must comply with the selection criteria. IO reserves the right to disregard duplicated references and may exclude such legal entities from the tender procedure.

Annex II – Questionnaire

Ref. IO/MS/24/WPP/GRD

Welding Preparation in Pit (WPP) Works at ITER Site

Firms interested in participating to this market survey shall return a completed questionnaire to the following email address guillaume.retaillaud@iter.org with copy to antoine.calmes@iter.org, no later than 15 January 2025.

Please note that this is not a Call for Nomination request. At this moment the ITER Organization (IO) is preparing a contract and procurement strategy for this project.

For all questions in the document, please refer to the Annex I - Technical Summary for WPP ref. ITER_D_CCKJRE V1.3.

1. *General information about the Company / Institute compiling the questionnaire*

Company Name: ……………………..

Persons to be contacted:

Contact person	*Name + Title*	*Email address*	*Telephone*
Commercial Matters:			+
Technical Matters:			+

Main activities

Main activities	*Description*
1.	
2.	
3.	
……………………..	

Turnover

Contact person	*Turnover 2021*	*Turnover 2022*	*Turnover 2023*	*Number of employees*
All activities				
In the field of *Assembly of large mechanical equipment for Nuclear Plants or classified installations*				

Your Contact: Guillaume RETAILLAUD - Procurement Responsible Officer PRD/PPMA - Phone: +33 4 42 17 37 16
Email: guillaume.retaillaud@iter.org copy to antoine.calmes@iter.org

2. Technical Competence and Experience

2.1 Do you have experience in the machining of customized high precision steel shims, i.e. with tolerance of ISO 2768 fH for 0.5m² and thickness < 30-40mm?

YES ☐ **NO** ☐

If YES, please provide examples and explain what the challenges were and how you had achieved such requirements: methods, process of manufacturing and controls:

………

………

………

2.2 Do you have experience in the assembly (including handling and precise alignment) of large nuclear components (greater than 100 tons, 20m high) in a congested environment with coactivity and difficult access?

YES ☐ **NO** ☐

If YES, please provide examples and explain what the challenges were and how you had achieved such activities:

………

………

………

2.3 Do you have experience in accurate metrology (several tenth of mm), reverse engineering and live monitoring (such as during the critical load transfer of the VV)?

YES ☐ **NO** ☐

If YES, please provide examples relevant on-site precision metrology and reverse engineering as well as your preliminary approach to controlling the load transfer of the VV:

………

………

………

2.4 Do you have enough capacities to machine ***up to 20 (twenty) VVTS splice plates per week****, as described in technical summary,* ***to cope with the*** *future execution plan?*

YES ☐ **NO** ☐

If YES, please provide a description of the capacities (including subcontractors), the time schedule and the industrial plan:

....

....

....

2.5 Do you have experience in working in high cleanliness-controlled environment and works in confined space?

YES ☐ **NO** ☐

If YES, please provide examples and any complementary information:

....

....

....

2.6 Do you have experience in design of tooling as described in the technical summary in chapter 4.3 Tooling scope?

YES ☐ **NO** ☐

If YES, please provide examples and any complementary information:

....

....

....

3. Scope of Works

3.1 Would your Company / Institute be interested in and capable to execute the entire scope of works as described in the Technical Summary at ITER site (France)?

YES ☐ **NO** ☐

If YES or NO, please explain and justify:

....

....

....

3.2 Would your Company / Institute cover the full scope of supply as a single contractor?

YES ☐ **NO** ☐

If NO, please specify and justify which part of the contract would be taken over by another company, and in which role: as a partner in a consortium or as a subcontractor? Please indicate the name and address of the potential company/companies if known at this time.

Please provide the information requested in the below table:

Services to be performed by another company (and % of the work)	***Partner in a consortium or Subcontractor + Name and Address (optional)***	***Comments***
....		
....		
....		

4. *Company's capacity*

Will your company be capable of mobilizing resources according to the 3 Lots of this Contract within the time frame specified (consider working in 3 shifts for Lot 3)?

YES ☐ **NO** ☐

If yes, please provide a proposed staffing plan (non-binding) considering the information provided and demonstration of capabilities to meet it:

....

....

....

5. *Nuclear / first-of-a-kind experience*

Are you familiar with ITER alike projects?

YES ☐ **NO** ☐

Please provide overview and any complementary information:

....

....

....

6. *Quality Assurance*

Are you certified ISO 9001 or equivalent in the field of this project?

YES ☐ **NO** ☐

Please specify your certifications.

QA Certifications	*Comments*	*Validity Period*

7. General Comments

Please indicate any other information that may be relevant for this Market Survey.

....
....
....
....
....
....
....

Signature:

COMPANY STAMP

Name: ....

Position: ....

Tel: ....

Date: ....