General Overview of JADA procurement activities

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IBF/17
29th March, 2017
Palais des Papes, Avignon
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• Summary
ITER is the core machine in 3rd phase of the fusion R&D plan, and it is an “experimental reactor of Japan” being constructed in France under international collaboration.
In-Kind Procurement by Japan

Toroidal Field (TF) Coil
- TF Conductors: 25%
- TF winding, assembly: 47%
- TF Structures: 100%

Center Solenoid (CS) Coil
- CS conductors: 100%

Diagnostics (under design)
- Micro Fission Chamber
- Poloidal Polarimeter
- Edge Thomson Scattering
- Divertor Impurity Monitor
- IR Thermography
- Thermocouples
- Upper Port Integration
- Lower Port Integration

Neutral Beam H&CD
- HV Bushing: 100%
- 1 MV Power Supply HV part: 100%
- 1 MeV Accelerator: 33%

Blanket Remote Handling System (under design)
- Blanket module
- Vacuum Vessel
- Vehicle with Manipulator

Divertor
- Outer Target: 100%

Detritiation System (ADS, under design)

Electron Cyclotron H&CD
- Equatorial Launcher
- Gyrotron
JADA has signed 12 PAs, corresponding to about 90% in credit value out of total Japanese contribution to the ITER in-kind procurement.
JA has successfully completed procurement of all TF conductors. 84% CS conductors has completed, and 69% already shipped to US.
TF Coil Winding (MHI)

- **Winding**
  - 20 DPs completed,

- **Transfer**
  - 11 DPs completed,

- **Heat Treatment**
  - 18 DPs completed,

- **Turn Insulation**
  - 10 DPs completed,
TF Coil Winding (MHI)

CP Welding

9 DPs completed,

DP Insulation

7 DPs completed,

DP Impregnation

7 DPs completed,

DP Stacking

First 7 DPs stacked for TF#1 in Dec. 2016.
Insulation wrapping of first 7 DPs stacked for TF#1 was completed in Jan. 2017, which is accomplishment of one of IC milestones in time.
2\textsuperscript{nd} manufacturing line in Toshiba has fully commissioned for series production of TF coils.
First TF coil structure is to be completed soon by MHI and HHI.

Outboard Sub-assembly (HHI) (consisting of 4 Basic Segments) Waiting for final weld connection.

Inboard Sub-assembly (MHI) (consisting of 3 Basic Segments)

16m
ITER Japan has contributed in construction of ITER NB Test facility at Padua, Italy, to fulfill the requirement of ITER NB system. The HV PS components has been almost completed by HITACHI.
Almost all components have been already installed at NBTF site at Padua Italy.
✓ Major requirement of ITER Gyrotron already achieved (1 MW for 1,000 s, efficiency > 50%, 5 kHz modulations, etc.).

✓ First Gyrotron for ITER has been delivered to QST Naka in December 2016 (on schedule). The gyrotron is to be shipped to ITER site after high power test at Naka.
JADA expects 3 PAs to be signed in the next several years, followed by contract awards for manufacturing of various components.
## Delivery and On-site activities

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JADA on-site activities from receipt on-site till completion of Integration tests etc. since mid. 2018 to 2032, requires support of European companies.
Most of the on-site assembly, installation works are to be carried out by IO. The on-site integration test etc. shall be carried out under initiative of IO. JADA supports the IO activities sending scientists and engineers for supervisory.

For this activities JADA expects following support from EU companies:

- **Interpreter**, with good understanding of related technology,
- **Engineer with experience of crane handling of heavy weight components** (for TF coil, NB HVPS),
- **Electric/mechanical engineer** capable of assembly of HV components (for NB HVPS),
- **Mechanical engineer for precision instruments** (for ECH gyrotron, launcher, Blanket RH, Diagnostics),
- **Plant engineer** (for ADS).
Contribution of Foreign Company

Current contribution of Foreign Company to the JADA in-kind components for ITER are as follows:

- **Tungsten mono blocks for Divertor Outer Target** *1

- **Fabrication of TF Coil structure**
  - TF Coil structure Materials:
    - KIND (Germany)*2, Industeel (France)*2, FAV (Italy) *3
    - TF Coil structure (Phase III): HHI (Korea) *4

- **CS strand and cable for CS1U Module and CS2U Module**
  - (6 x 933m + 628m): Kiswire Advanced Technology (Korea) *4

- **Blanket Remote Handling System**
  - Review and design of part of BRHS: PAR system (USA) *4

**Note**

*1: contract with JADA through Japanese company, Marubeni Utility Service.
*3: contract with JADA through Japanese company, e-Energy /HHI.
Summary

- The procurement of TF Coil conductor was completed.
- The TF Coil conductor winding has been completed for first 7 DPs of TF coil No.1.
- 1 MV HV power supply components and HV bushing were manufactured and 80% of them have been installed at NBTF site at Padua, Italy.
- 170 GHz, 1 MW gyrotrons #1 and #2 have been manufactured.
- Fabrications are in progress for TF Coil, TF Coil structures, CS conductor.
- Design and Qualification are on-going for Blanket remote handling system, Launcher of EC system, Diagnostics and ADS.
- JADA is looking for good European companies which can support our on site activities.
Procurement of in-kind components of ITER is being processed according to the procurement procedure and regulations of JAEA.

Contract process of JAEA is general competitive bidding for ensuring the transparency of contract. *1, *2

Solicitation of comments on reference specifications (draft) is performed to finalize reference specification.

Before the Call for Tender, information for bidding is published on Official Gazette based on Governmental Procurement.

After tendering, technical review will be done for the selection of supplier.

Note
*1: Suppliers who join the bidding of JAEA contract need the registration process to Contract Dept. of JAEA before bidding.
*2: The bidding specifications shall be written in Japanese language.
Selection of Supplier

➢ Technical evaluation will be done for the selection of supplier by review of the documents.

➢ The following required items and criteria for evaluation will be specified in the reference specifications.

• Record of supply for the applicable product to JAEA or other organizations;
• Record of supplying similar products to JAEA or other organizations;
• the tender evaluation criteria specified in the PA;
• the required features of the Supplier’s QA system; and
• characteristics of the required manufacturing facilities.

➢ The criteria for selection will be determined according to the PA or agreement with IO. Criteria will be included in the reference specification.
JADA has implemented the following project management tools/methods for smooth execution of Procurement of ITER components:

1. **Schedule monitoring**
   - Primavera (DWS, between IO and JADA) and
   - Microsoft Project (monitoring of detailed resource loaded activity between JADA and Supplier)

2. **Requirement management**
   - Compliance matrix

3. **PA follow-up meeting**
   - Every 2 weeks, for each PA, held with procurement Gr. (PBS) and Support Gr. (Project Management)
   - Status of design/manufacturing and schedule
   - Achievement of Milestones on DWS (AWP/SMP/CDWS)
   - Resource availability/adequacy of each activity
   - Risk management table with prevention/mitigation actions

4. **Domestic Design review**
   - Dry-run held before CDR/PDR/FDR in IO
   - Review all technical/managerial materials, and confirm the design maturity

This Project management is successful, achieving 93% of AWP SMP (100% taking into account “obsolete”) and 100% of AWP CDWS in 2014.
TF Coil Structures

Outboard Sub-assembly
(consisting of 4 Basic Segments before welding B1+B2 and B3+B4)

Inboard Sub-assembly
(consisting of 3 Basic Segments)

The sub-assemblies have been welded within required tolerance.
(1) Completion of manufacturing of full tungsten OVT prototype PFUs (Mar. 2015)

(2) Successful completion of high heat flux test (Dec. 2015)

Manufacturing of full tungsten OVT prototype PFUs has been completed.
High heat flux test of the prototype PFUs has been completed, and JADA has successfully been qualified in December 2015. See Shimizu, IVC session on Day 3
Blanket RH System

- PAs signed in Dec. 2011.
- Final Design Review for Package 1 (Vehicle and Manipulator) was closed in Jan. 2015.
- Final Design for other components in progress for FDRs to be held in 2017 and 2018.
- Manufacturing contract for Procurement Package 1 was awarded in Feb. 2015. Manufacturing design is on-going.
- Call for tender is on-going for manufacturing contract for Procurement Package 2 (rail deployment system).

Design on-going including structural analysis.

- Design seismic load: 5G in peak (SL-1)

Test for design justification is also on-going such as irradiation test.
AC Servo motors confirmed to work after 8MGy irradiation (ITER requirement: 1MGy)

Non-halogen cable

AC servo motor

Co-60 source
Diagnostics: MFC and Popola

R&D for Vacuum Feed-through (SIC) of Micro Fission Chamber in progress.

Radiography Test by inserting film detected welding defects.

New building for development of ITER diagnostic systems was constructed in March 2015.

Preliminary Design Review of Poloidal Polarimeter was held in Nov. 2015

Front UPP mirror module
Rear UPP mirror module
EPP mirror module
RR assembly on FW
RR assembly on divertor
In-Vessel Mirror Design

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MFC and Popola

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