THEMATIC WORKSHOP

Plant systems program

Cooling, Cryogenics & Tritium Breeding Blankets: status & future business opportunities

Alfonso MARQUEZ

ITER Deputy Plant Systems Project Manager

With over 15 years of experience in engineering, Alfonso Marques has extensive expertise in static and rotating equipment, pressure vessels, piping systems and stress analysis. Alfonso Marques holds degrees in Industrial Engineering with a focus on Nuclear Energy and Mechanical Engineering. His career spans multiple roles in project management, engineering, and site supervision across various industries.

Chairperson:

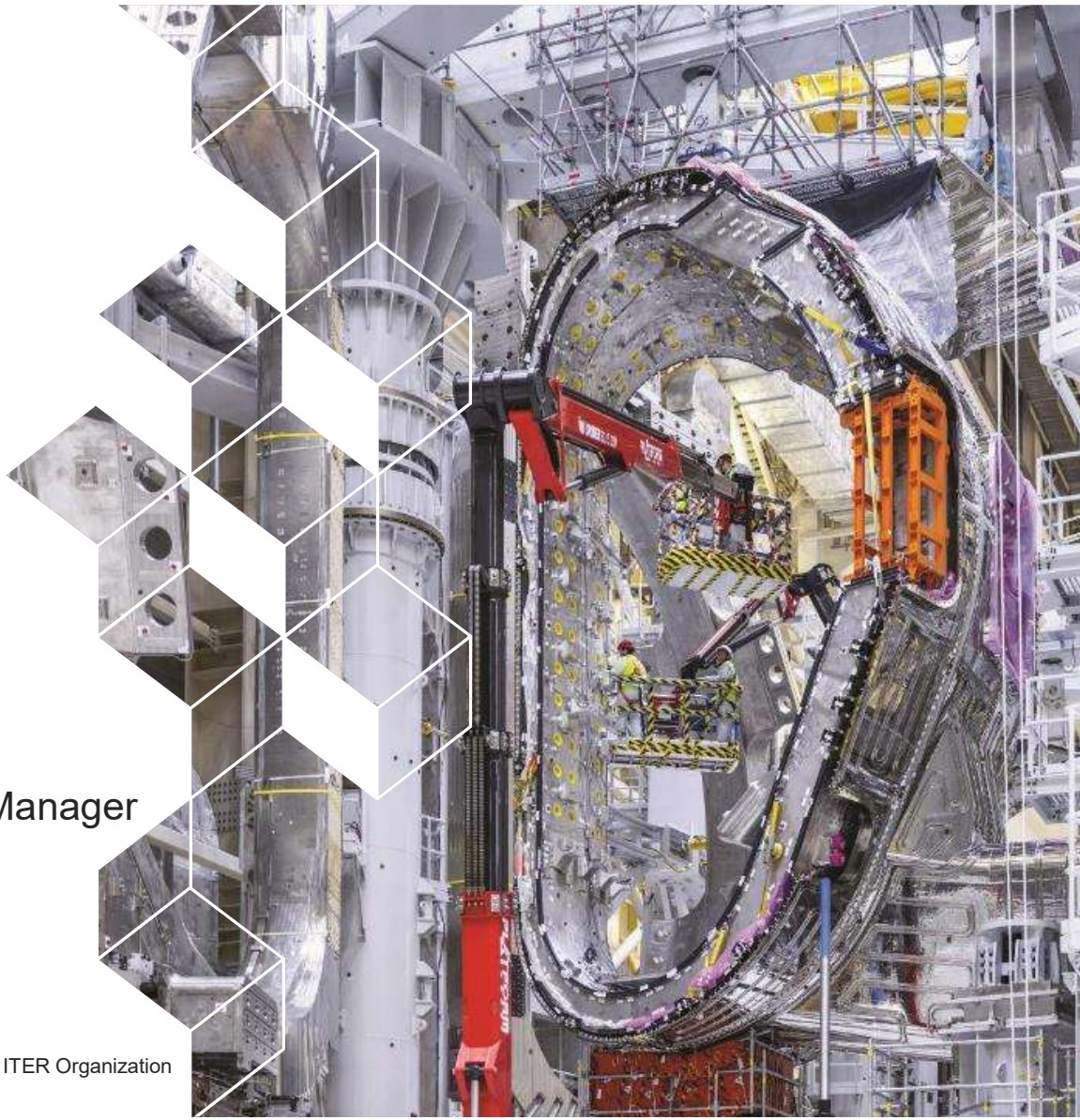
Yutaka Kamada
ITER Deputy Director-General, Science & Technology

IBF/25
INTERNATIONAL ITER BUSINESS FORUM

Plant Systems: Cooling & Tritium Breeding Systems

Alfonso Márquez Sánchez

ITER, Plant Systems Deputy Program Manager



Friday APRIL 25th

Overview of the session

1. **Cooling Water System**
2. **Vacuum Vessel Pressure Supression System**
3. **Cryogenic System**
4. **Magnet Cold Test Facility**
5. **Tritium Breeding Blanket Systems**
6. **Working with ITER, by Bhumika Joshi, Inox India Limited.**
7. **Bussiness Opportunities, by Jingju Gao, ITER organization**

1. Cooling Water System

Overview, achievements and next activities

The Tokamak Cooling Water System

Main function: heat removal during plasma operation
Other functions: Baking.

Clients: VV, Divertor, IV coils, NBI,

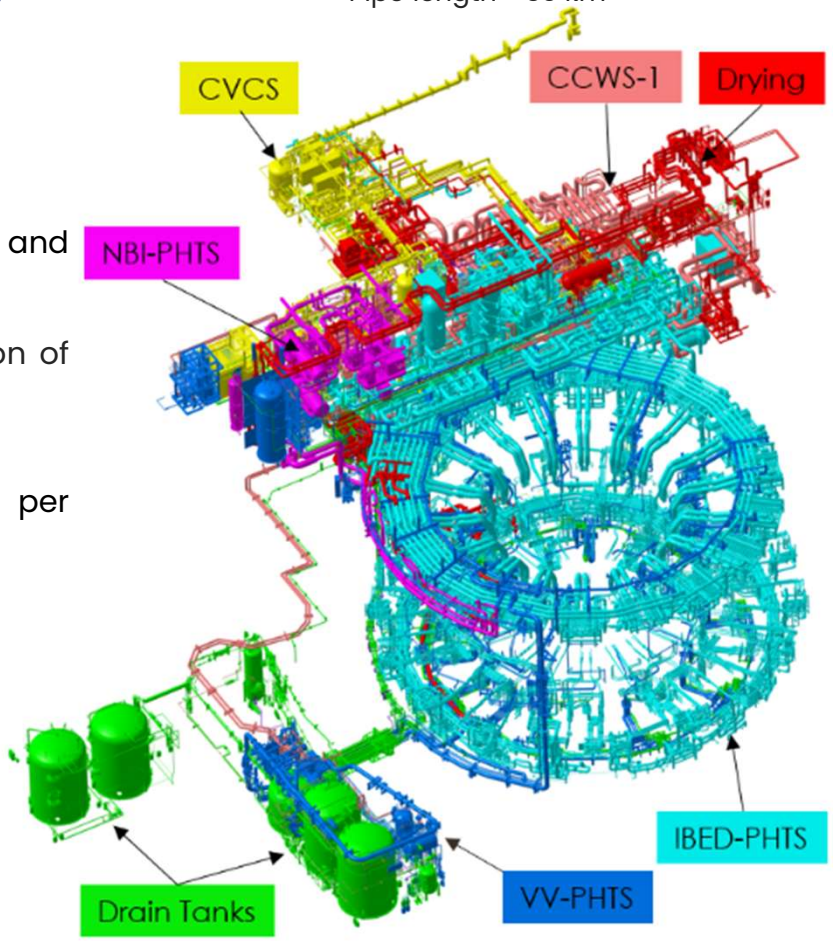
Other supporting subsystems: Drying, Draining and Volume and chemical control systems.

Final Design approved (2017 and 2019), delivery and installation of systems ongoing.

Design of TCWS is under the responsibility of the US-DA as per Procurement Arrangement (PA) for TCWS.

Procurement Tenders are and will be launched by IO following different arrangements signed between the USDA and IO.

Power ~ 880 to 1040 MW
Flowrate ~ 5800 to 6850 kg/s
Pipe length ~ 50 km



VV: Vacuum Vessel
CVCS: Chemical and Volume Control System
PHTS: primary Heat transfer System
NBI: Neutral Beam Injector
IBED: Integrated Blankets, ELM coils and Divertor

The Secondary Cooling Water System and HRS

Main Function: To transfer heat from systems and clients to Heat Rejection System (HRS).

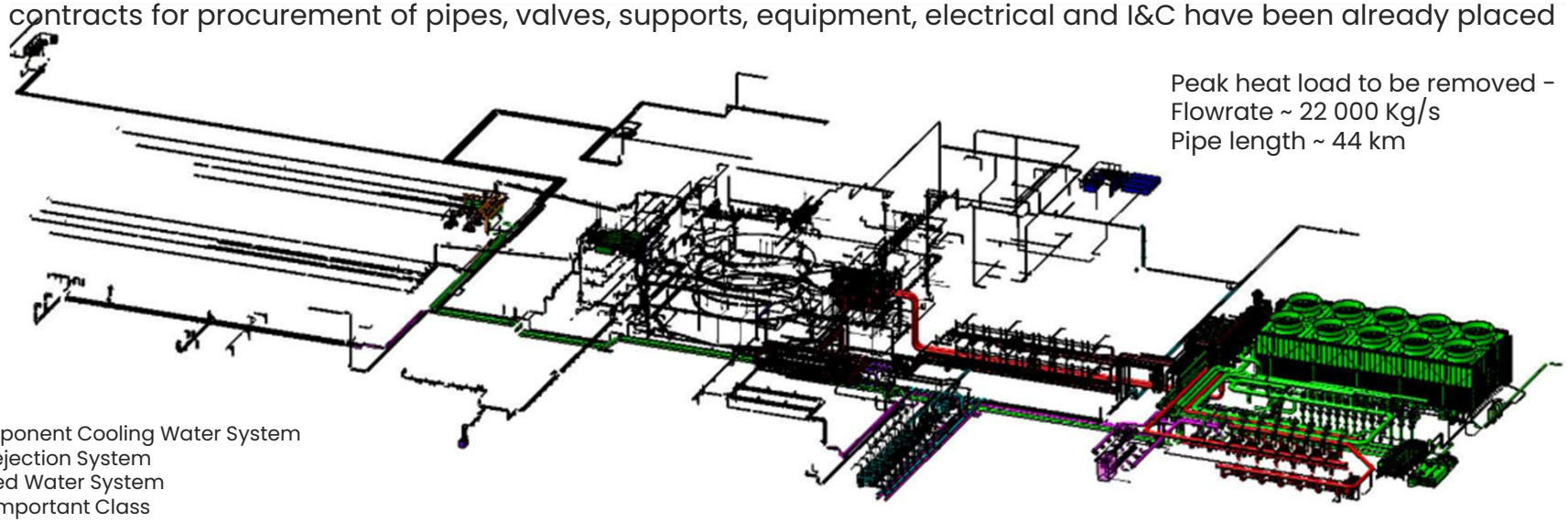
The CCWS clients are nuclear class (CCWS-1 and CCWS-1A) whereas non-nuclear clients are covered by (CCWS-2).

CHWS is divided into CHWS-H1, train A and B for SIC, and CHWS-H2 for non-SIC components.

HRS releases all the heat from the ITER components to the environment.

Design of SCWS is completed except for CCWS-2F, CHWS-H4 (responsibility of IN-DA) and the safety loops CHWS-1A and 1B under the responsibility of IO.

Some contracts for procurement of pipes, valves, supports, equipment, electrical and I&C have been already placed

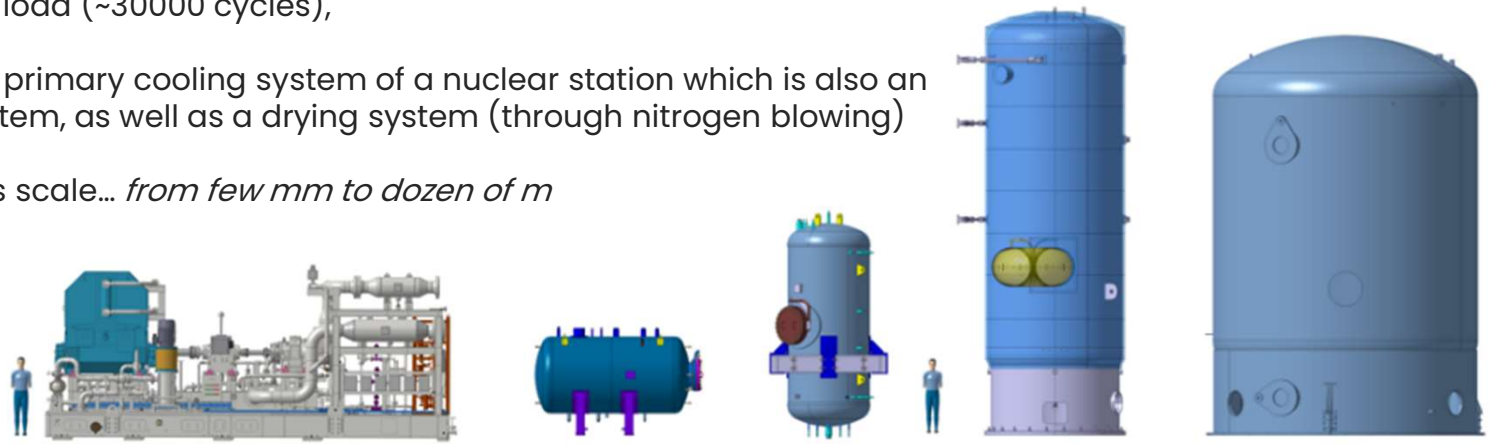


Peak heat load to be removed - 1150 MW
Flowrate ~ 22 000 Kg/s
Pipe length ~ 44 km

CCWS: Component Cooling Water System
HRS: Heat Rejection System
CHWS: Chilled Water System
SIC: Safety Important Class

Some data about the cooling water system

- Equipment weight = TCWS 3900 T (~ 7 times the weight of A380),
  SCWS 1700 T
- Piping + supports weight = TCWS 2600 T (~ 4.5 times the weight of A380),
  SCWS 13 400 T
- Piping length ~ TCWS 50 km = more than a marathon run, SCWS 44 km.
- TCWS will be the first primary cooling loop of a nuclear station employing double wall piping (confinement function),
- TCWS will be the first primary cooling loop of a nuclear station conceived to operate with a pulsed/cyclic heat load (~30000 cycles),
- TCWS will be the first primary cooling system of a nuclear station which is also an heating (baking) system, as well as a drying system (through nitrogen blowing)
- Equipment at various scale… *from few mm to dozen of m*



TCWS Procurement Status – Valves & piping

Piping and Fittings	80 % Delivered
Valves	50 % Delivered more than 800
Primary and Secondary Supports	50 % Delivered
Flanges	16 tons of flanges Delivered

Check, Ball and Butterfly valves

Steel Plates

Forged Pieces

Primary Supports

Flanges

TCWS Procurement Status – Equipment

USDA scope

DRS Drain Tanks	Delivered Installed
DYS Nitrogen Storage Tank	Delivered
VV-PHTS Main Pump, Canned Motor Pumps, Chemical Injection Skid, Heater	
DYS Compressors, Economizer, Aftercooler, Heater, VFD Booster Pumps	
DRS Refilling Transfer Pumps, Transfer Pumps, WCT Vacuum Pump…	

Procurement contracts are placed all over the world like The Netherdlands, Denmark, Florida-US, Italy, Spain, France.

TCWS Procurement Status – Equipment

IO scope

VV-PHTS Volume Control Tank, Pressure Relief Tank	Delivered	Installed
DRS Waste Collection Tank, Auxiliary Drain Tank	Delivered	Installed
VV-PHTS Pressurizer, Heat Exchangers, DYS Filters	Delivered	
VV-PHTS Filters, DYS Condenser, Cyclone Separator, Demister, …		

Procurement contracts are placed all over the world like in India, China, Italy, France, South Korea, …

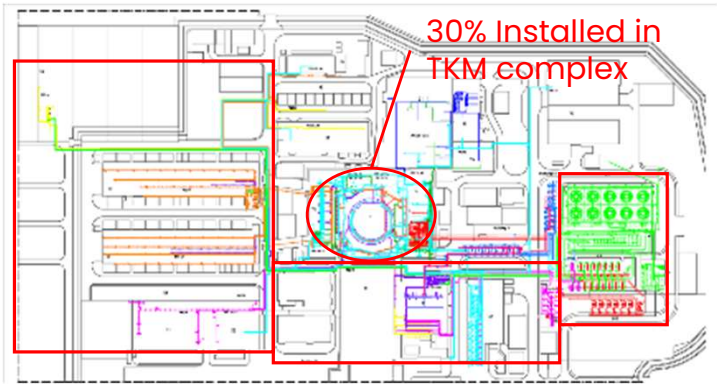
TCWS Procurement Status – E I&C

SIC & NON SIC Electrical switchboards	80 % Delivered	10% Installed
SIC & NON SIC I&C Cubicles	100% Delivered	
Solenoid Valve mounting box assemblies	100% Delivered	
Humidity Sensors, Oxygen Sensors	100 % Delivered	

Humidity sensors

SCWS Procurement Status

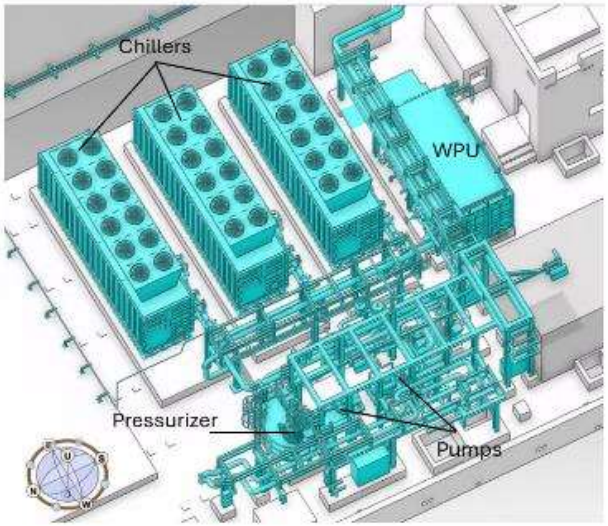
Equipment	60 % Delivered	60% Installed
Piping Distribution + Supports	80% Delivered	50% Installed
E and I&C (conventional)	80 % Delivered	40% Installed
Valves	60 % Delivered	40% Installed



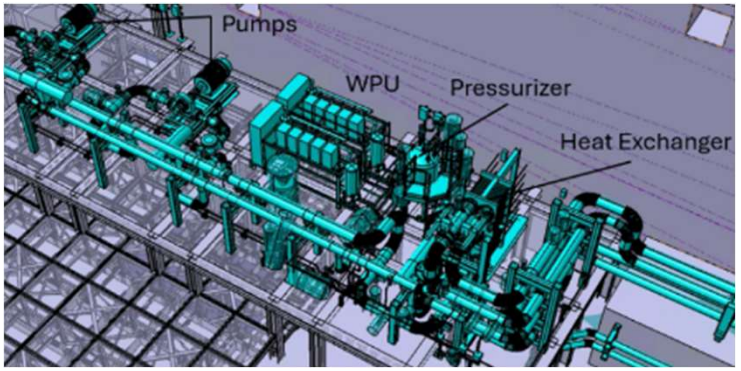
Heat Rejection System & Cooling Water Plant

Next activities – Equipment SCWS

- CHWS-1A and 1B equipment
  - 6 Chillers
  - 4 pumps
  - 2 pressurizers
  - 2 Water Polishing Units
- CCWS-1A equipment
  - 1 Heat Exchanger
  - 2 pumps
  - 1 pressurizer
  - 1 Water Polishing Unit



Number of main equipment to be procured (SCWS)	**19**

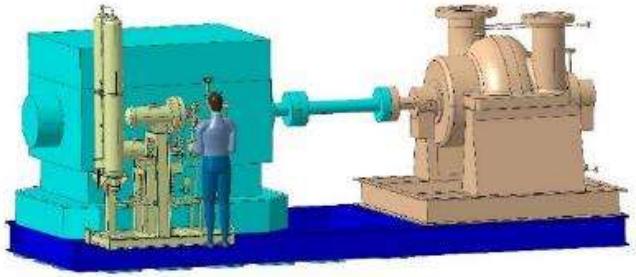


Next Activities – Equipment TCWS

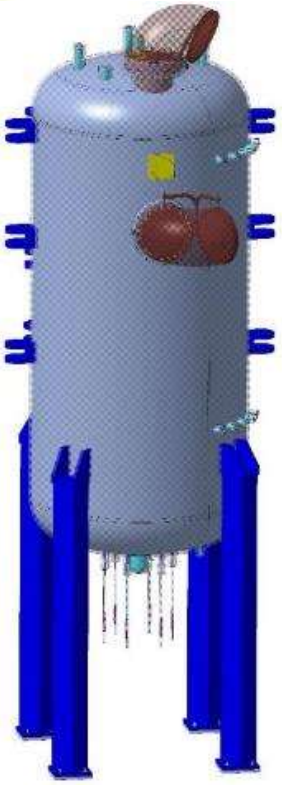
- Mid 2024:
  - 8 Centrifugal Main Pumps (2.9 MW, 500 m head), Ongoing
  - 8 Shell and Tube Heat Exchangers (30 t, 110 Mw/unit) Ongoing
- Mid 2025
  - IBED Pressuriser (100t, 2.8 MW), and Pressure Relief Tank (25t, 60 m^3),
  - 2 Demineralizers and 1 Mobile resin transfer cask shielded (30t)
  - 10 filters,
  - 1 Electrical Heater (4 MW)
- 2026/2027
  - 4 Heat Exchangers and 1 Letdown cooler
  - 2 Vacuum pump skid,
  - 2 Degasifier Skid,
  - 2 Chemical Additive Skid,
  - 3 Tanks

Number of main equipment to be procured (TCWS)	**54**

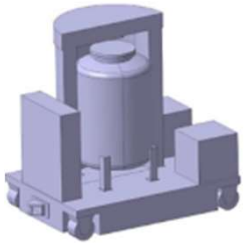
IBED Main Heat Exchanger



IBED Main Pump



IBED Pressurizer



Mobile Resin Cask

Filters

Next Activities – Valves and I&C

- 714 Valves (415 for SRO and 299 for DT-1):
  - Butterfly Valves,
  - Swing Check Valve, Axial Check Valve, Lift Check Valves, Damped Check Valves,
  - Globe Valves,
  - Ball Valves

- Pressure Relief Valves+ Rupture Disc (83 units)

- Sensors
  - Pressure Sensors, Differential Pressure Sensors, (115 units)
  - Temperature Sensors, level switches.
  - Sensor Mounting Boxes and Associated Mechanical Components
  - Signal Conditioning Cubicles, SIC (20 units) and non SIC (37Uts)
  - Compressed Air Tubing (20 km) and associated fittings,
  - PLC and HMI Software (16 units representing 4685 input/output)

- Service contract will be also launched for the SRO mechanical analyses to perform: pipe stress analysis, support design, support drawing, …

- Qualification of valves and instruments is required in certain cases

French / European regulations on Pressure Equipment

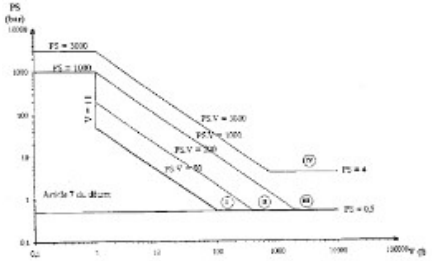
- ITER is identified as a Basic Nuclear Installation (INB). A “basic nuclear installation” is subject to the French nuclear safety regulations and controlled by the nuclear safety authority (ASN).

- Propagation of safety requirements to the last level of sub-contracting chain is of paramount importance.

- Some Tokamak Cooling Water System equipment are subject to the **Nuclear Pressure Equipment Order (ESPN)** and Pressure Equipment Directive (PED 2014/68/EU).

- Having knowledge and experience in applying regulations during design, including considerations for in-service inspection aspects and manufacturing activities, is essential. Preferred configuration for the ESPN is that suppliers are the legal Manufacturers (like module G or others)

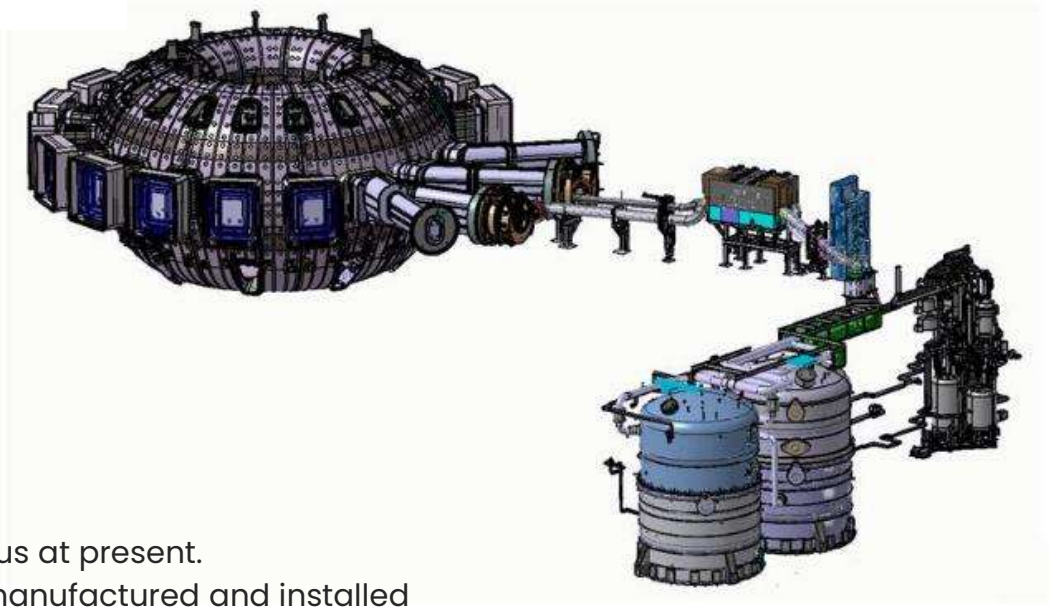
- Equipment needs to be designed respecting requirements European Directive like Machinery, including lifting *accessories* (2006/42/EC)



2. Vacuum Vessel Pressure Suppression System

Overview, achievements and next activities

VVPSS – Description and Status

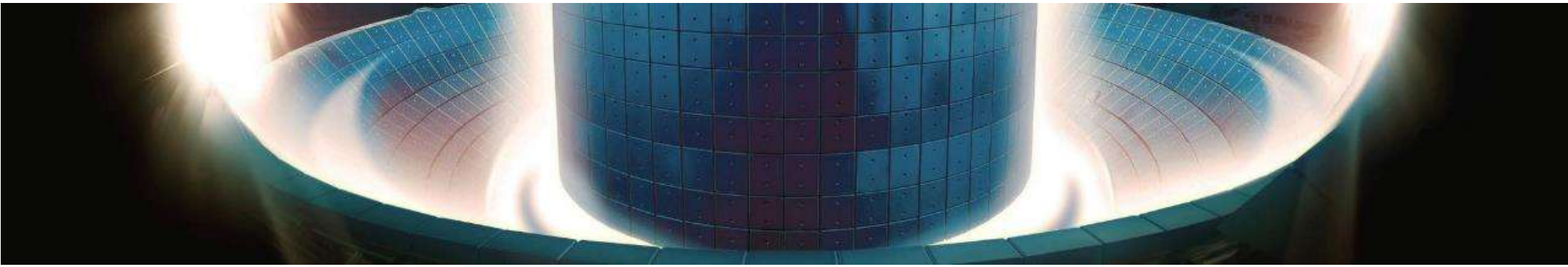


Description:

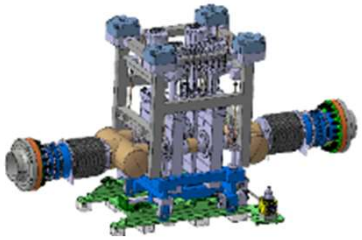
- protects the vacuum vessel from overpressure
- A gas-processing system made of pressure vessels, reactors, scrubbers and filters together with large and small-bore pipes
- Delivered by the ITER Organization.

Current Status and achievements

- Final Design Review planned in Q1 2026
- Qualification of all equipment is required and is the major focus at present.
- A limited quantity of (captive) equipment has already been manufactured and installed
- Equipment specifications are in production and tenders launched for valves and temperature instruments
- Ongoing full-scale tests for steam condensation system qualification
- Ongoing full-scale prototyping and qualification of oxidation catalyst and reactor & scrubber tank
- Ongoing full scale, remote handled UHV rupture disc prototyping and qualification

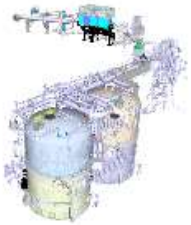


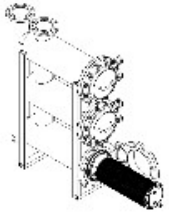
VVPSS Next activities

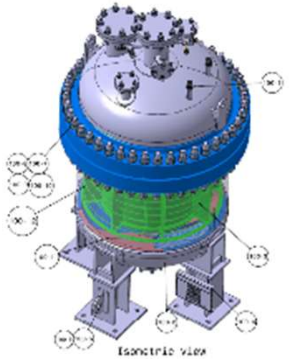


Tenders for the following equipment will be launched over the next 12 months for delivery in 2027/2028:

- Remote handled, ultra-high vacuum valve assembly
- Hydrogen oxidation reactor final equipment (ESPN)
- Gas HEPA filter assembly (500Nm3/h)
- In-line gas heaters (ESPN)
- Neutron & magnetic qualified pressure instruments (≈ 100) and associated ancillaries and impulse lines
- DN500 to DN20 seamless, cobalt controlled, stainless-steel piping (≈ 20 tonnes) & piping supports
- Magnetic shielded solenoid / piezo valves (≈ 200)
- Passive Fire Protection supply & installation







3. Cryogenic system

Overview, achievements and next activities

The Cryogenic System – Main Functions and clients

4 K Cooling

Superconducting magnet system:

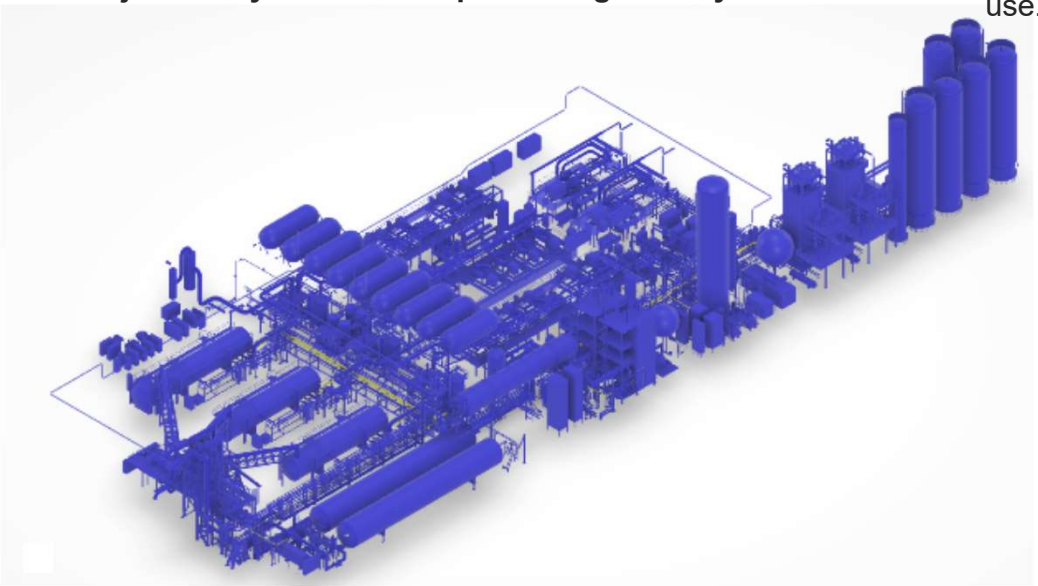
Central Solenoid (CS) Toroidal Field (TF)

Magnet Structure (ST) Poloidal Field (PF)

Correction Coils (CC)

Cryopump system: Machine Torus, Cryostat & Neutral Beam

Pallet Injection System & Disruption Mitigation System



80 K Cooling

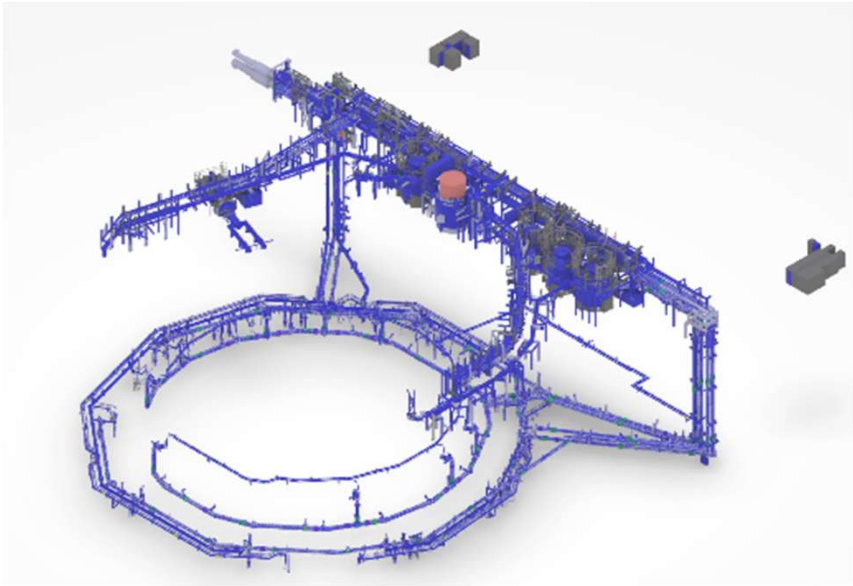
Thermal shields (magnets, cryolines, cold boxes..)

Thermal anchors of SC magnets gravity supports

Chevron baffles of the cryopumps.

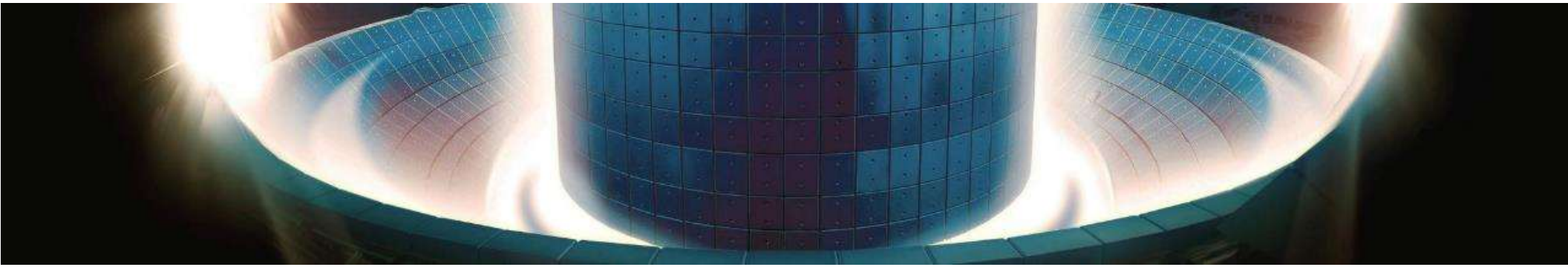
50 K Cooling: High Temperature Superconducting (HTS) current leads of the magnet system.

300 K Helium: Conditioning, flushing, or any other maintenance/operation use.



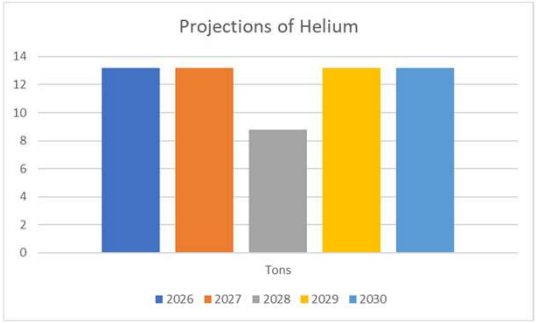
The Cryogenic System – Status and Achievements

System / component	Present status
Cryogenic systems in Cryoplant Buildling • Three Liquid Helium Plant • Two Liquid Nitrogen Plant • Two 80 K Loop • Storage and Auxiliary Systems • Cryolines and Warmlines • CTCB	▪ 100% Installation completed ▪ Under commissioning and testing
Cryolines and warm lines in Tokamak Building	▪ 95% Installation completed except the interfaces with clients ▪ Warm acceptance test of the installed lines
Cryodistribution boxes in Tokamak Building	▪ All five Auxiliary Cold Boxes are in their final position ▪ Thermal Shield Cold Valve Box is under factory acceptance test ▪ Manifold Box is under final design
Cryolines and warm lines in C1 cryobridge	▪ Installation is complete and warm acceptance test is in progress



Cryogenic System Next activities

- Procurement of Liquid Nitrogen: ~7500 kg in next 18 months
- Procurement of Liquid Helium:



- Operation of the plant for Magnet Cold Test Facility
- Completion of Cryolines
- Commisioning completion

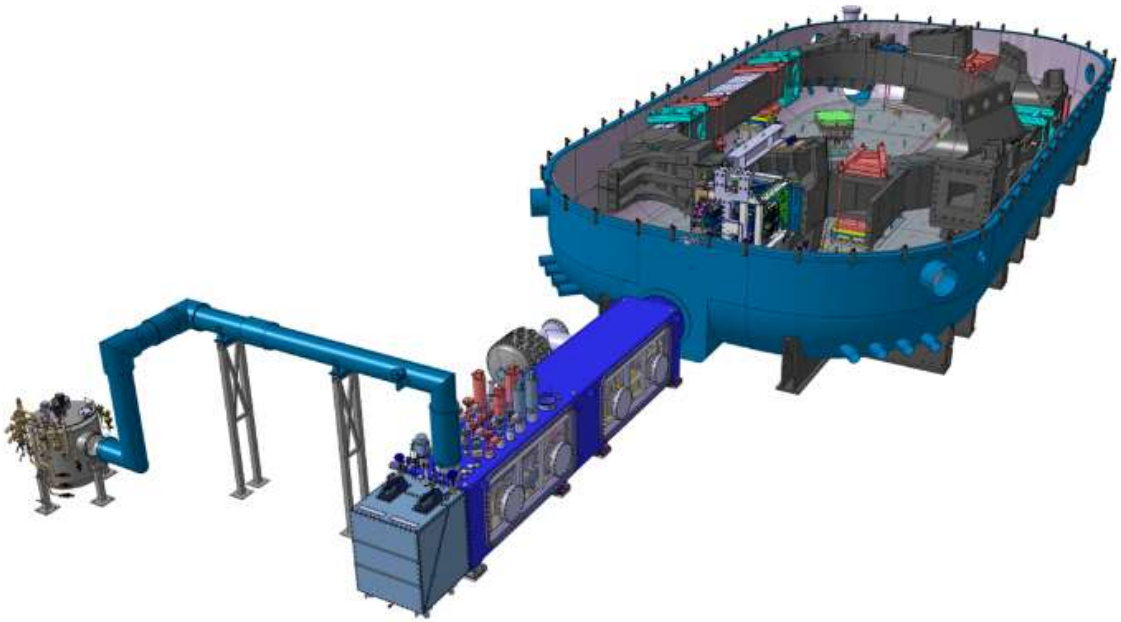
4. Magnet cold test facility

Overview, achievements and next activities

MCTF – Functions and overview

Function: To test at 4K and energized the TF coils, and PF1, benefiting from existing infrastructure and equipment:

Building 55 infrastructure
Coil Terminal Box: CTB TF18-1 with its instrumentation
Cryogenic system: Cold Box 3, Warm compression station



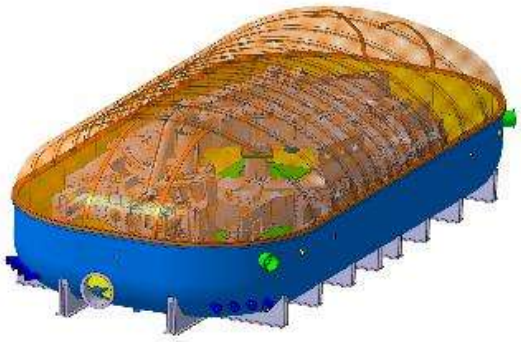
PF1: *D=9 m, 160 tons*

TF: HxL=17 x 10 m, 300 tons

MCTF – Status of procurement and construction

Cryostat and Vacuum Pumping:

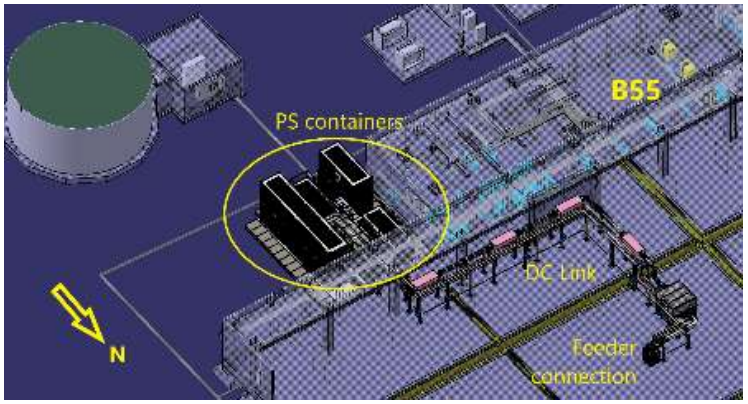
- Dimensions: 21.5 m x 10.5 m x 6 m
- Thickness 30 mm/40 mm (sup/inf)
- Weight: 300 tons
- 2 primary pumps and 4 diffusion pumps

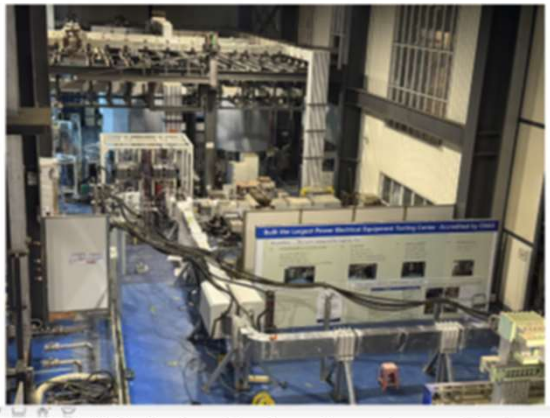


MCTF – Status of procurement and construction

Power Supply System:

- Current: 5 kA to 70 kA
- Normal/discharge ramp : ±10 A/s
- Max ramp in discharge : – 40 A/s
- 3 Dump resistance configurations





DC link during Factory Acceptance Test

Power Converter (CV)

Manufacturing by RXHK/RHR/ASIPP

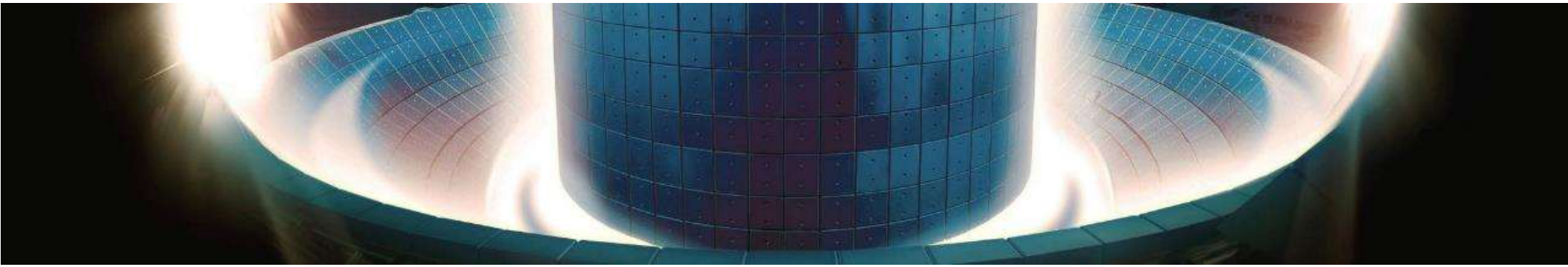
MCTF – Status of procurement and construction

Adaptation of the Cryogenic system and feeder:

- 150 m of cryogenic lines
- Interconnection Valve Box
- Specific ICF (In-Cryostat Feeder) for supply of electrical power and cryogenic fluids

Cryolines supplied by Inox India

IVB supplied by Inox India



MCTF - Achievements and next activities:

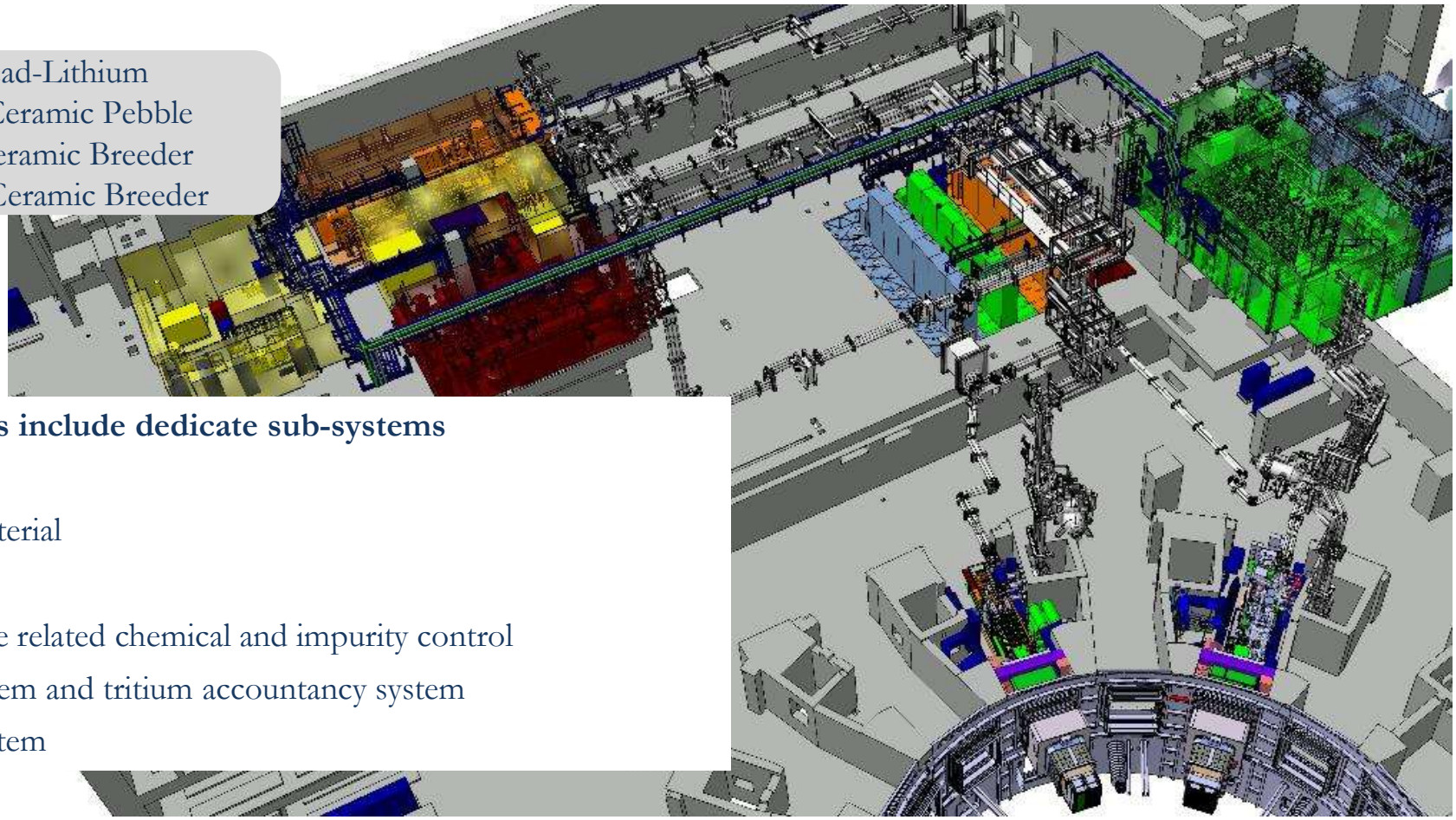
- Project was launched in June 2023
- Final design review completed in July/Nov 2024
- Construction and on-site installation works August 2024 – September 2025
- System commissioning May 2025 – September 2025
- Integrated Commissioning tests
  - With a superconducting jumper July 2025 – August 2025
  - With Cryostat and vacuum system – November 2025
- First TF coil to be prepared/tested December 2025 – May 2026

5. Tritium breeding Blanket System

Technologies, roadmap and next challenges

TBM technologies for testing during the DT-1 operation

WCLL: Water Cooled Lead-Lithium
HCCP: Helium Cooled Ceramic Pebble
WCCB: Water Cooled Ceramic Breeder
HCCB: Helium Cooled Ceramic Breeder

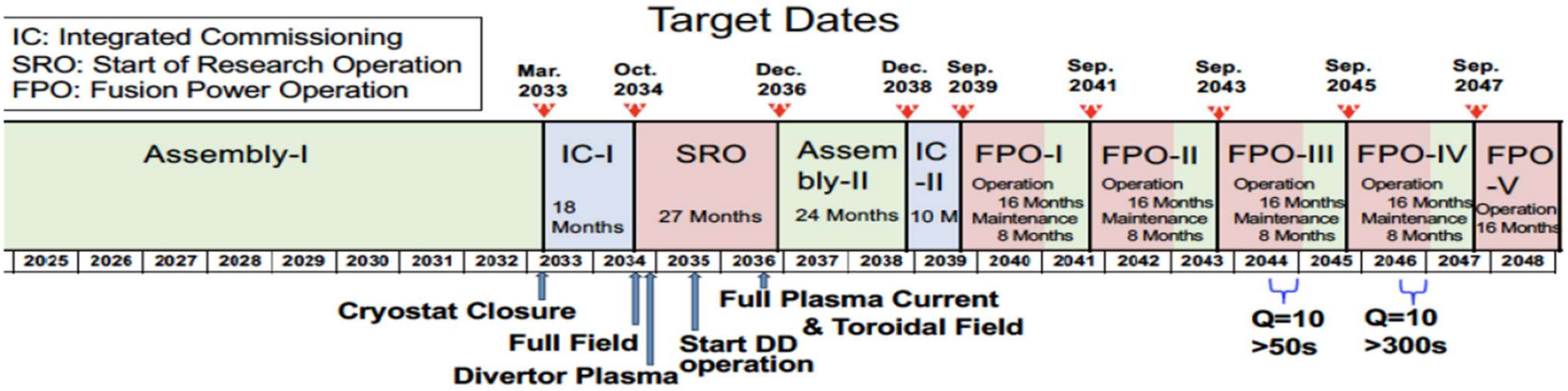


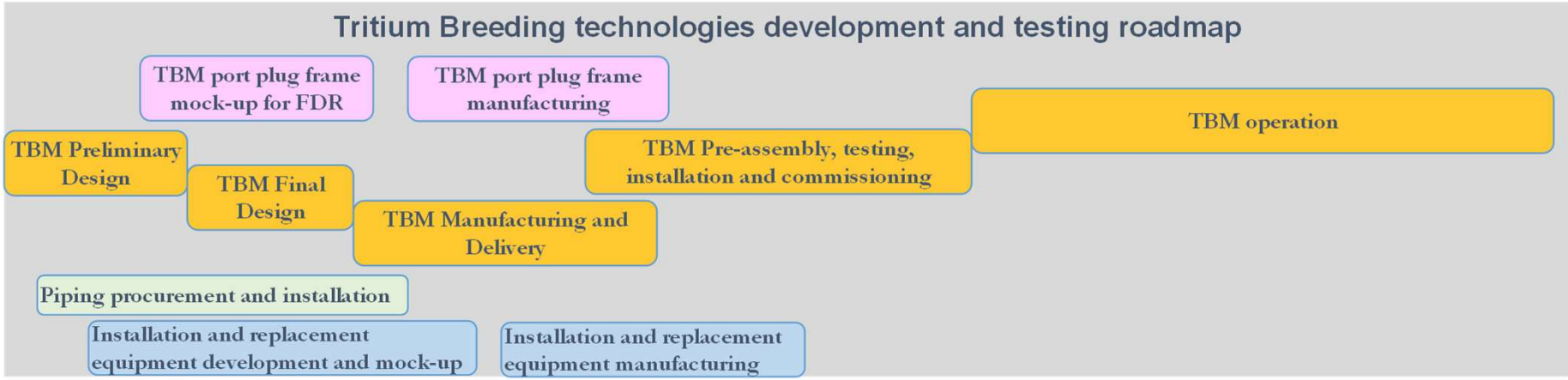
WCCB | WCLL
HCCB | HCCP

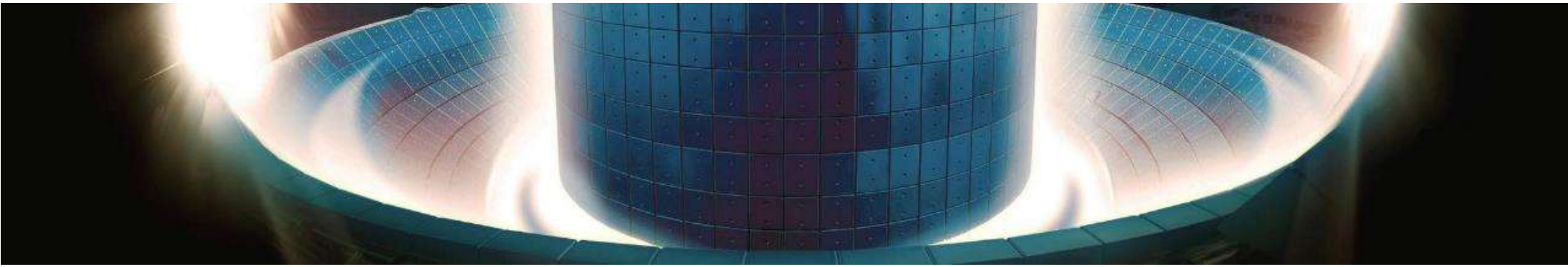
Each TBM technologies include dedicate sub-systems

- Breeding material
- Neutron multiplier material
- Shielding layer(s)
- Cooling system and the related chemical and impurity control
- Tritium extraction system and tritium accountancy system
- Neutron activation system

TBM development and testing roadmap in the ITER baseline 2024







Next activities

TBM Port Plug frame and dummy

- Engineering activities for the final design finalization — by 2028
- Mock-up manufacturing and testing to support the final design solution — by 2028
- Manufacturing of the final components, testing and delivery — from 2029 to 2033

Installation and replacement equipment

- Mock-up manufacturing and testing — from 2027 to 2030
- Manufacturing of the final components, testing and delivery — from 2031 to 2034

6. Bussiness Opportunities

by Jingju Gao, ITER organization

Bussiness opportunities

Cooling Water System – Static equipment & valves

Description	Solicitation Type	Expected Publication Period	Expected Date of Signature	Cost Range Indicator	Cost Range
Procurement of IBED PHTS Pressurizer and Pressure Relief Tank	CFT: Call for Tender	Q2-2025	Q4-2025	C	between 4,000,000 to 12,000,000
PHNB Main Heat Exchangers	CFT: Call for Tender	Q2-2026	Q2-2027	C	between 4,000,000 to 12,000,000
PHNB Pressurizer	CFT: Call for Tender	Q2-2026	Q2-2027	A	between 300,000 to 2,000,000
CCWS-1A, CHWS-1A and 1B Pressurizers (Qty 3)	CFT: Call for Tender	Q3-2027	Q3-2028	A	between 300,000 to 2,000,000
CCWS-1A Heat Exchanger	CFT: Call for Tender	Q3-2027	Q3-2028	A	between 300,000 to 2,000,000
Valves for TCWS and SCWS	CFT: Call For Tender	Q3-2025	Q1-2026	C	between 4,000,000 to 12,000,000

Bussiness opportunities

Cooling Water System – Rotating Equipment

Description	Solicitation Type	Expected Publication Period	Expected Date of Signature	Cost Range Indicator	Cost Range
CVBD Charging pumps	CFT: Call for Tender	Q4-2025	Q3-2026	B	between 1,500,000 to 5,000,000
CVNB Charging Pump #1 and #2	CFT: Call for Tender	Q4-2025	Q3-2026	A	between 300,000 to 2,000,000
PHNB Main Pumps	CFT: Call for Tender	Q4-2025	Q3-2026	C	between 4,000,000 to 12,000,000
PHNB Low Flow Pump	CFT: Call for Tender	Q4-2025	Q3-2026	A	between 300,000 to 2,000,000
PHBD Baking Pump	CFT: Call for Tender	Q2-2026	Q2-2027	A	between 300,000 to 2,000,000
CCWS-1A, CHWS-1A and 1B Pumps (Qty 6)	CFT: Call for Tender	Q3-2027	Q3-2028	B	between 1,500,000 to 5,000,000

Bussiness opportunities

Cooling Water System –Other process Equipment

Description	Solicitation Type	Expected Publication Period	Expected Date of Signature	Cost Range Indicator	Cost Range
CVBD Demineralizer and resin transfer cask	CFT: Call for Tender	Q2-2025	Q4-2025	B	between 1,500,000 to 5,000,000
Procurement of TCWS IBED heater HT-1000	CFT: Call for Tender	Q2-2025	Q4-2025	A	between 300,000 to 2,000,000
CVCS Chemical additive skids	CFT: Call for Tender	Q4-2025	Q3-2026	A	between 300,000 to 2,000,000
CCWS-1A, CHWS-1A and 1B Water Polishing Units (Qty 3)	CFT: Call for Tender	Q3-2027	Q3-2028	A	between 300,000 to 2,000,000
CHWS-1A and 1B Chillers (Qty 6)	CFT: Call for Tender	Q3-2027	Q3-2028	C	between 4,000,000 to 12,000,000

Bussiness opportunities

Cryogenic System– Helium and Nitrogen supply

Description	Solicitation Type	Expected Publication Period	Expected Date of Signature	Cost Range Indicator	Cost Range
Contract for Gas Supply	CFT: Call for Tender	Q1-2026	Q3-2026	A	between 300,000 to 2,000,000
Contract for Helium Supply	CFT: Call for Tender	Q1-2026	Q3-2026	C	between 4,000,000 to 12,000,000

Bussiness opportunities

VV Pressure Suppression System

Description	Solicitation Type	Expected Publication Period	Expected Date of Signature	Cost Range Indicator	Cost Range
Bleed Valve Design and Build	OT: Open Tender	Q2-2025	Q4-2025	A	between 300,000 to 2,000,000
I&C Instrumentation	OT: Open Tender	Q2-2025	Q4-2025	A	between 300,000 to 2,000,000
Gas HEPA filter assembly (500Nm3/h)	OT: Open Tender	Q2-2026	Q3-2026	A	between 300,000 to 2,000,000
In-line gas heaters (ESPN	OT: Open Tender	Q3-2025	Q4-2025	A	between 300,000 to 2,000,000
Magnetic shielded solenoid / piezo valves (≈ 200)	OT: Open Tender	Q2-2026	Q3-2026	A	between 300,000 to 2,000,000

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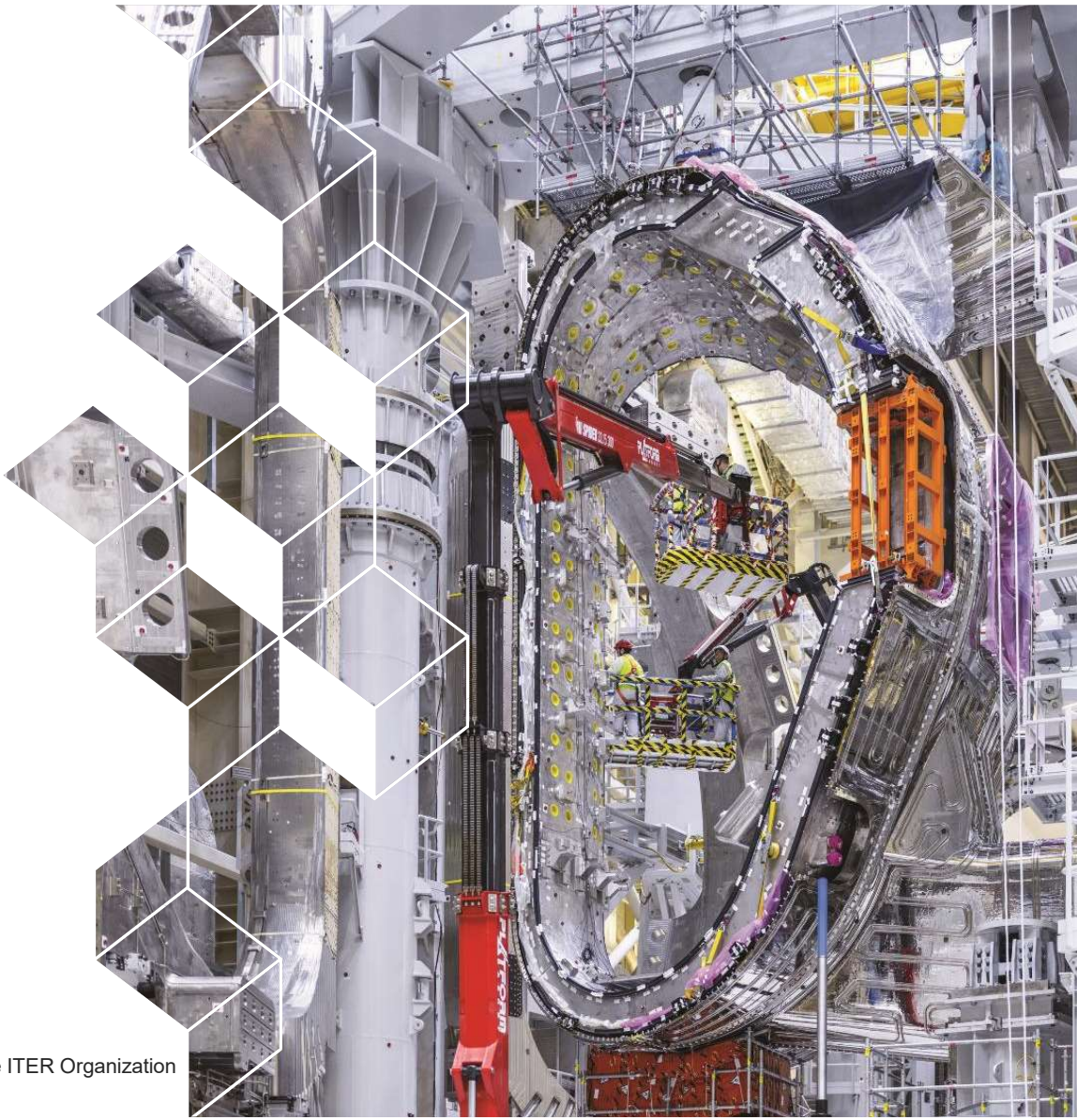
INOXCVA experience in ITER project



Bhumika Joshi

INOX India Limited

FRIDAY, APRIL 25TH

Presentation Topics

1. **Company Overview**
2. **INOX Journey at ITER**
3. **Achievements & Success Stories**
4. **Conclusion**

1. Company Overview

INOXCVA: An Overview

INOXCVA
HISTORICALLY FUTURISTIC

» Established in 1992

REVENUE

₹11.37 Bn | US$137 Mn

CUSTOMERS

5,000+

UNITS

20,000

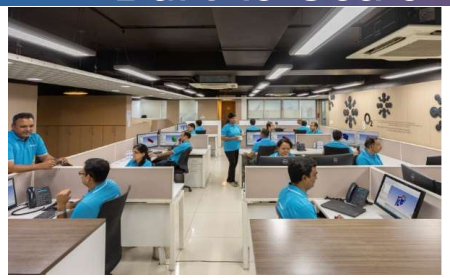
EXPORTS

60%

Built To Scale. Built To Thrive.

RATINGS

CRISIL : A+ | D&B : 5A1



EMPLOYEES

~ 2000

MATERIAL HANDLED

>13,500 Ton/Year

4 LOCATIONS WITH TOTAL AREA

125,391 m^2

INOXCVA: A True-BLUE Indian Multinational

INOXCVA
HISTORICALLY FUTURISTIC

Designed, Engineered and Made In India

Making For The World

5000+ customers across 100+ countries

Europe

Stock & Sale of Standard product to Europe Market
Alblasserdam, The Netherlands (2014)

Brazil

Sale of standard products, Integration of Semi-Trailers, and facility for Repair & Rehab of Cryogenic Tanks
Indaiatuba, Sao Paulo (2012)

India

Head Office
Vadodara, Gujarat

Manufacturing Unit
Kalol, Gujarat (1992)

Manufacturing Unit
Savli, Gujarat (2023)

Manufacturing Unit
Silvassa, Gujarat (2004)

Manufacturing Unit (EOU)
Kandla SEZ, Gujarat (2007)

3
countries with INOXCVA operations

30
locations providing service support

100
countries accommodating INOXCVA clients

● Sales & Service Support ★INOXCVA Offices◆ INOXCVA Customers

2. INOX Journey at ITER

To Begin the Role of INOX in ITER…

2006-2010

INOX started working towards its successful association with ITER from the time India decided to associate with ITER Project as a member Country

Participation Started in ITER Project

In 2010 INOX India was awarded the Design of Prototype Cryoline

The Journey commenced 2006

INOX Role in ITER Cryogenics – First Steps..

The Layout of Prototype Cryoline was considering one of the most critical layout in Tokamak Building with six process pipes in one Vacuum Jacket.

With successful execution of PTCL Design .....
INOX was qualified to bid for the Larger project of ITER Cryolines.

INOX journey with ITER – a breakthrough step..

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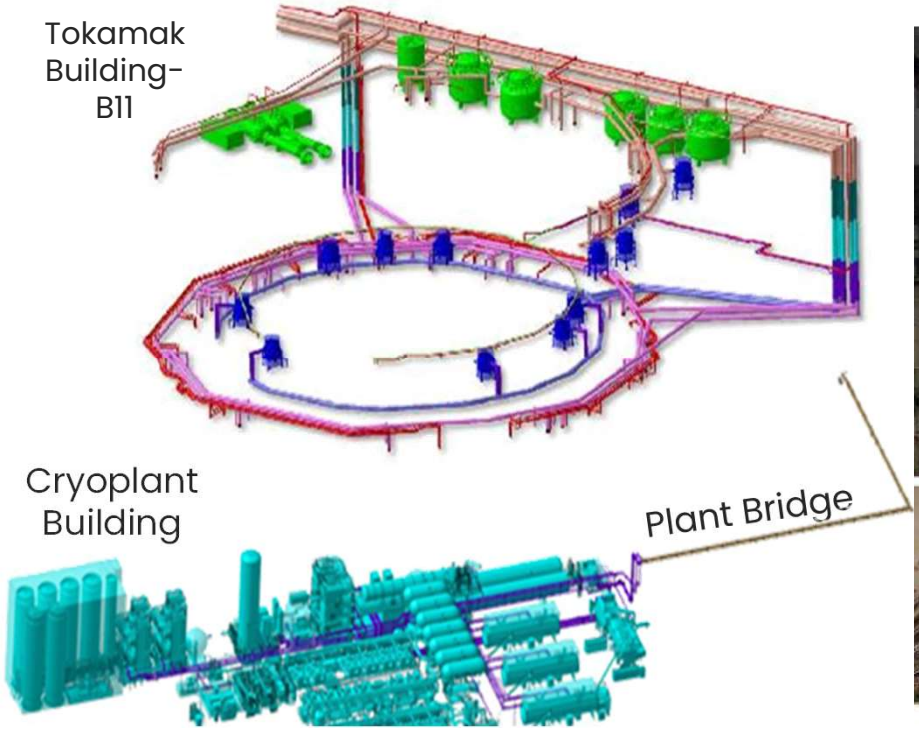
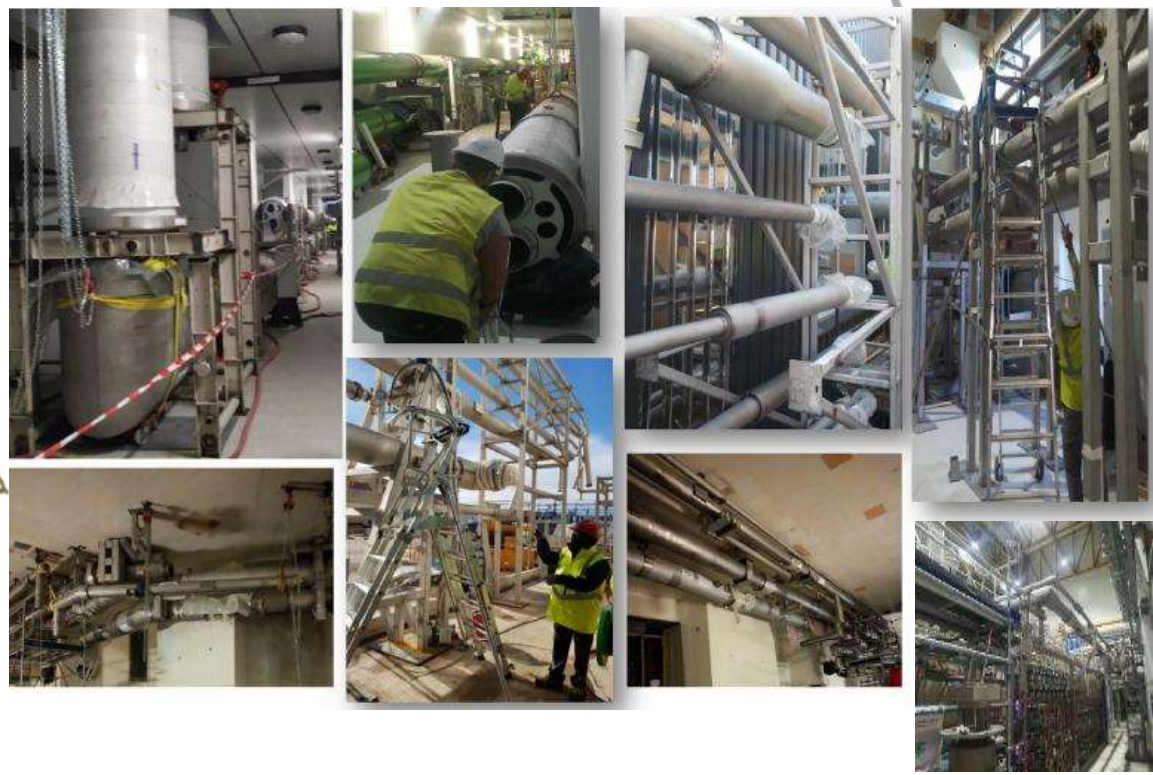
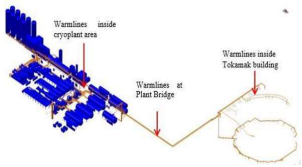
Design, Manufacturing, Installation and Testing of Group Y Cryolines ~ 4.2 km



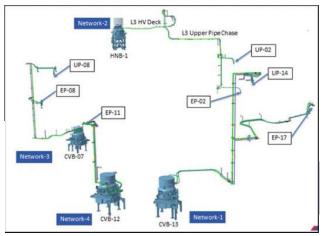


Journey with ITER..



~6km of Warm lines – Design, Manufacturing, Installation & Testing

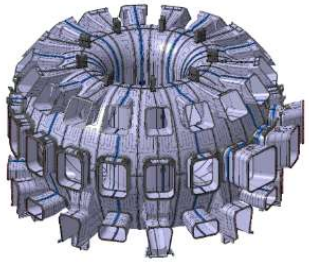
Warm line Contract - 2015



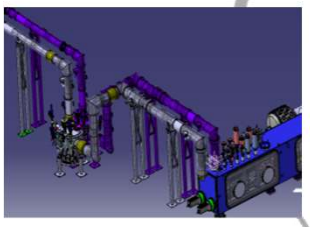
DMS Cryolines – 2019 & 2020

HMS vessels- ESPN-2021

Test Cold Valve box & its Cryolines – 2022



VV Thermal shield work- 2023

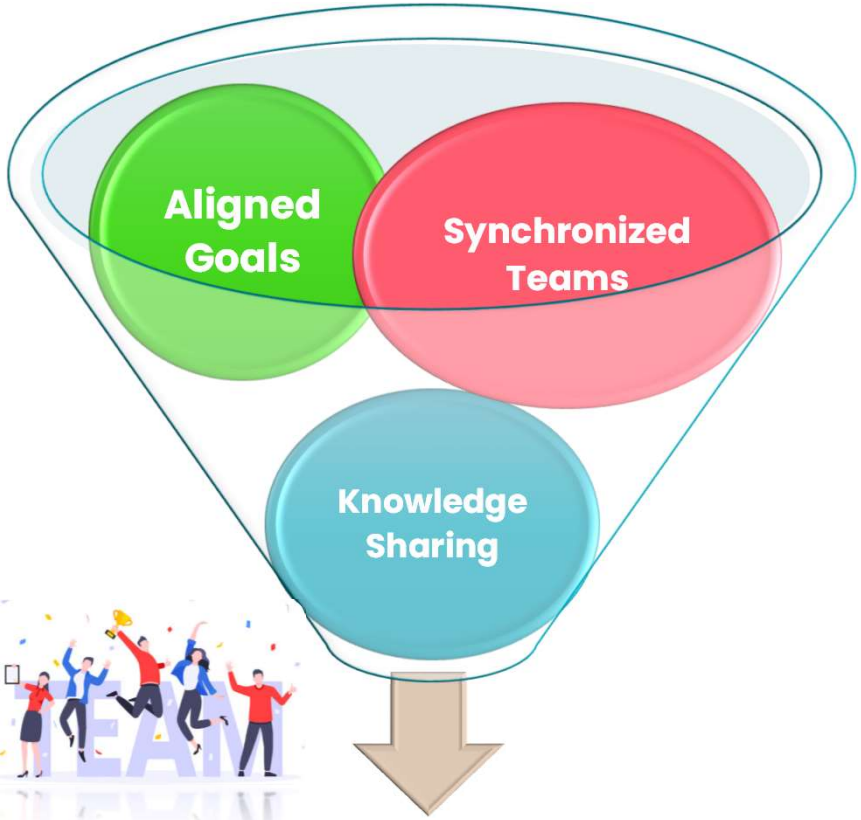


Cryolines & Valve box for Magnet Test Facility -2024

3. Achievements & Success Stories

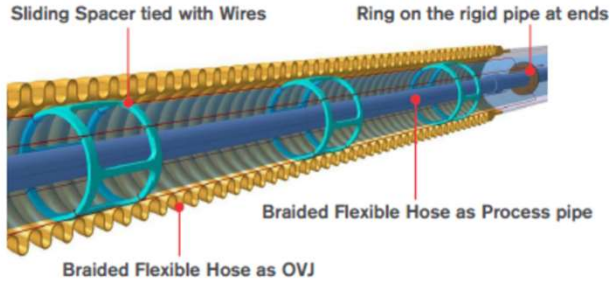
Achievements…

INOXCVA
HISTORICALLY FUTURISTIC



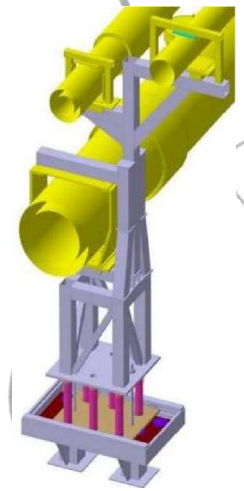
Innovations & Success Stories

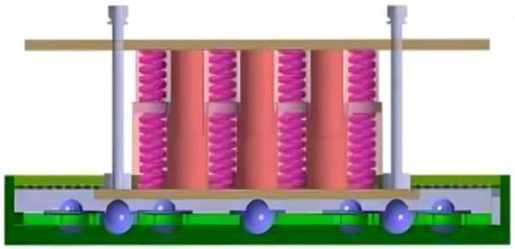
Unique design of Sliding Spacer to adhere to stringent heat load constraints



Sliding Spacer

Displacement Decoupling





Appreciation & Success stories…

INOXCVA
HISTORICALLY FUTURISTIC

Not just any pipes

Robert Arnoux

In order to produce and sustain plasmas ten times hotter than the core of the Sun, some essential elements of the ITER machine need to be cooled to temperatures only encountered in the void of outer space. Superconducting magnets and cryopumps will operate at a few degrees above absolute zero—~ 4 K, or *minus* 269 °C—and the thermal shield will be only slightly warmer (80 K, or *minus* 193 °C). These temperatures are obtained by circulating a steady flux of cryogenic fluid through a complex network of high-technology piping—the ITER cryolines.

Manufacturing of the ITER cryolines began in 2017 at the Cryo Scientific division of INOXCVA, an Indian company with a half-century's worth of experience in cryogenics. The dedicated workshop is located in the outskirts of Vadodara, an industrial city with a population of more than two million in the western state of Gujarat.

CRYOLINES

India's INOXCVA completes full scope

6 SEP 2021 Print Read the latest published articles

All angles, bends and turns, a complex system of cryolines produced in India will distribute the cooling power generated by the ITER cryoplant to clients throughout the installation. Four years after manufacturing was initiated, the last batch left INOXCVA's Vadodara facility in July 2021.

Photo courtesy: ITER Bulletin

Appreciation & Success stories…

INOXCVA
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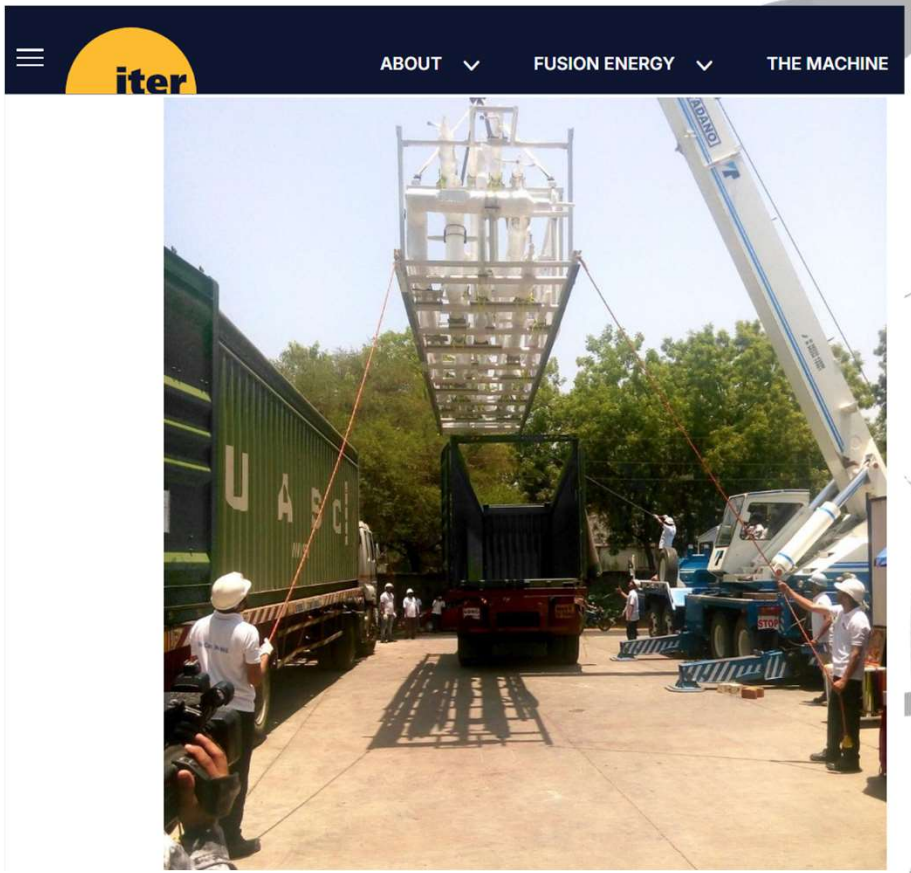
INOXCVA Completes Manufacturing of Group-Y Cryolines & Group-W Warmlines for ITER Project

Indian multinational, INOXCVA, announced the completion of the manufacturing of Group-Y Cryolines & Group-W Warmlines for the Prestigious ITER Project, one of the most ambitious energy projects in the world today to provide cheaper energy to the whole world.

July 31, 2021. By News Bureau



Flag-off Ceremony of the first containers to ITER-France

Appreciation & Success stories…

INOX INDIA has achieved one of the major Milestone of ITER project "**successfully completion of all pressure tests in Cryoplant building**". Total **16 circuits of cryolines and 48 circuits of warmlines have been pressure tested in Cryoplant building.**

Appreciation & Success stories…

IMAGE OF THE WEEK

Repaired thermal shield elements leave Indian facility

5 FEB 2024 Print Read the latest published article

Three panels from the vacuum vessel thermal shield sets that were sent to India for repair are now heading back to ITER to be reassembled.

iter ABOUT FUSION ENERGY

Thermal shield repair will be performed by INOX India. The contract was signed on 29 June for the repair of two sets of vacuum vessel thermal shield, and the optional repair of five others. The panels for these two sets will be disassembled at ITER, shipped to INOX premises for repair, tested for leaks in the factory, then shipped back to the ITER site for reassembly and testing by the contractor. A team from INOX is already mobilized on the ITER site for disassembly. Qualification activities on a mockup are also underway at the INOX India workshop under ITER Organization supervision.

"One team, one goal, one incredible outcome."

Appreciation & Success stories…

INOXCVA
HISTORICALLY FUTURISTIC

CRYOPUMP TEST FACILITY

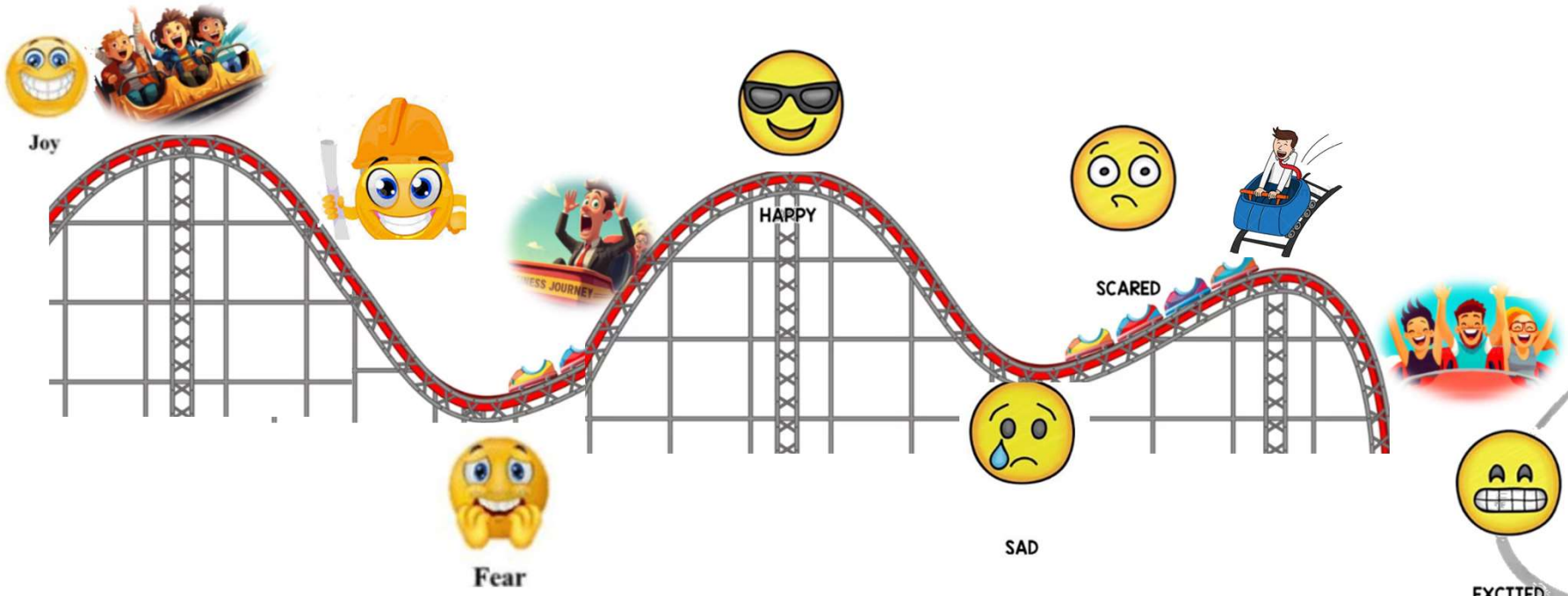
Ready to enter commissioning

20 JAN 2025

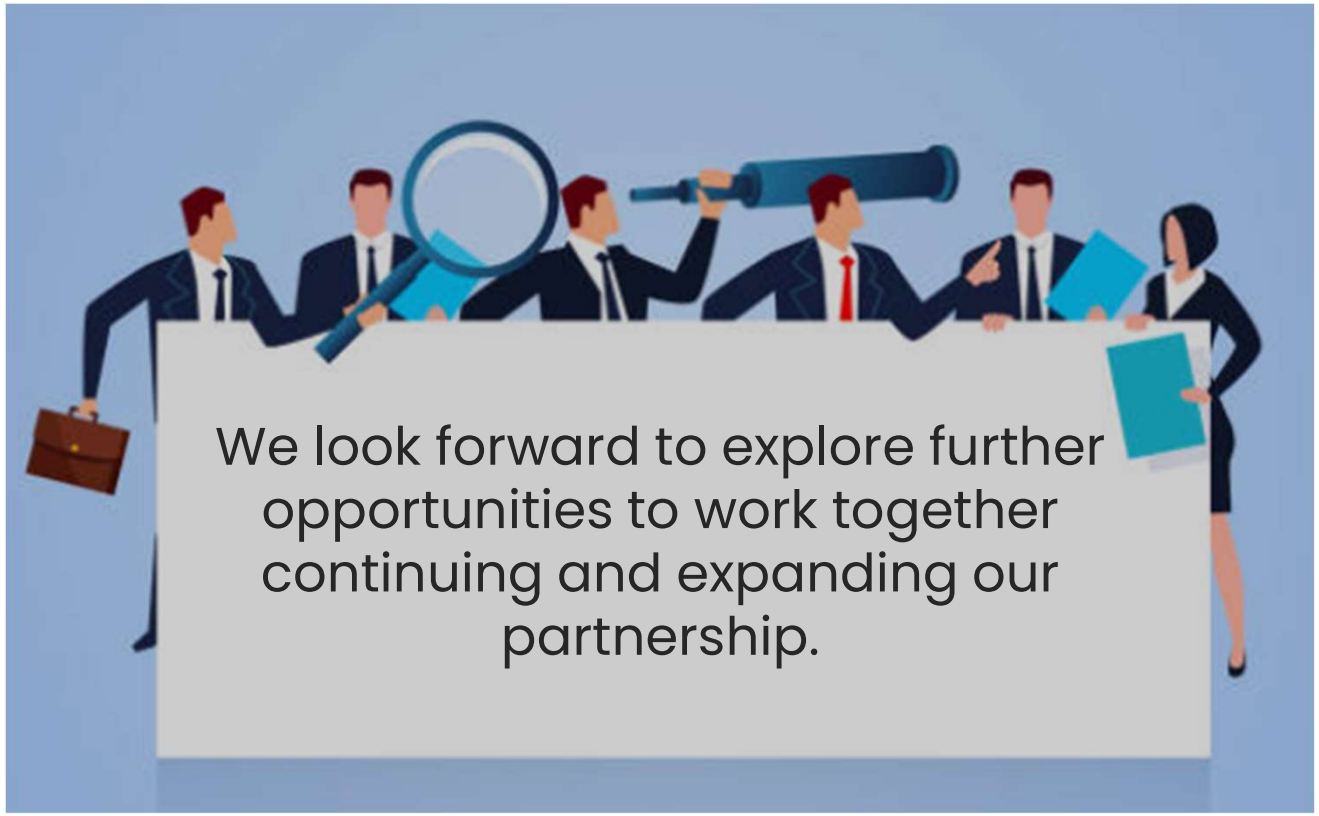
ITER Director-General Pietro Barabaschi (third from left) praised the quality and efficiency of the collaboration between the cryoplant team, the vacuum team and INOX-CVA—the ITER India contractor that built the cold valve box and some of the connecting cryolines and that participated in the equipment's installation.

4. Conclusion

Journey with ITER.. Filled with different emotions



- Through every high and low, we found our strength.
- We didn't just deliver results—we gained deep learnings along the way.
- The rich experience gained from ITER Projects has expanded our skills and perspectives.


We look forward to explore further opportunities to work together continuing and expanding our partnership.

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THANKS

TO BE PART OF THE WORLDWIDE **FUSION** NETWORK

cea aif

iter china eu india japan korea russia usa

assystem Capgemini

ITER CHINA FUSION FOR ENERGY ITER-India ITER JAPAN iter KOREA INSTITUTION PROJECT CENTER ITER ROSATOM iter US

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