INOXCVA

HISTORICALLY FUTURISTIC

A GLOBAL MANUFACTURER OF

STANDARD AND ENGINEERED CRYOGENIC EQUIPMENT

PRESENTER – VIJAY GEHANI

30 YEARS OF EXCELLENCE

INOXXX

WWW.INOXCVA.COM

INTRODUCTION

INOXCVA
HISTORICALLY FUTURISTIC

INOXCVA is among the largest global manufacturers of Cryogenic insulation technology equipment and systems. The company is a part of INOX Group, India's leading business conglomerate with ~US$ 3 billion market cap, 10000+ employees, 150+ business units across India, and a wide international distribution network.

Achieved excellence in Design, Modelling, Analysis, Sourcing, Procurement and Manufacturing of storage, distribution & transport equipment for Cryogens ranging from 2 to 200K (-271 to -73C) Helium, Hydrogen, Nitrogen, Oxygen, Argon, LCO2, LN2O, LNG & Ethylene.

INOXCVA standard & engineered cryogenic equipment serve the Industrial Gas & LNG value chain, our forte being complex turnkey packaged systems.

Meeting present and future clean energy needs through innovative small-scale LNG end-to-end solutions. Development initiatives for Clean Energy, Ultra-low Temperature applications, Advanced Technologies and Turnkey Solutions for Cryogenics in Scientific & Industrial Research

Global Codes, Approvals & Certification: ISO, US DoT, WMI, NHTSA, NBIC, ASME (U), ADM, HP0, PED, TPED, CE, AS1210, CGA, KGSC, DOSH, GOST-RTN, CRN, LR (Marine), ESPN and OHSAS.

INOXCVA have their Offices & Operations in India, Brazil and Europe.

INOXCVA BUSINESS VERTICALS

GLOBAL OPERATIONS & GLOBAL CUSTOMER BASE

Manufacturing Unit (EOU)
Kandla SEZ, Gujarat.
INDIA

Manufacturing Unit (EOU)
Silvassa, Gujarat.
INDIA

Stock & Sale of
Standard product
to Europe Market
Alblasserdam, The Netherlands.
EUROPE

Manufacturing Unit
Kalol, Gujarat.
INDIA

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

Head Office
Vadodara, Gujarat.
INDIA

- Sales and Service Support
- INOXCVA Offices
- INOXCVA Customers

- 3 countries with INOXCVA operations
- 100 countries accommodating INOXCVA clients
- 30 locations providing service support

30 YEARS OF EXCELLENCE
INOXCVA

MANUFACTURING FACILITIES & PLANT EQUIPMENT: KALOL, GUJARAT, INDIA

INOXCVA
HISTORICALLY FUTURISTIC

- CUTTING EQUIPMENT
- PLATE ROLLS
- WELDING EQUIPMENT
- MATERIAL HANDLING EQUIPMENT
- UTILITY EQUIPMENT
- PROCESS EQUIPMENT
- OTHER MACHINERIES

MANUFACTURING INFRASTRUCTURE

FABRICATION SHOP

Size (Cleanroom)	10 x 25 x 6 Mts. Height
Required Temperature and Humidity Conditions for handling, Storage and Wrapping of MLI	PLC Controlled environment of specifications : 25 +/1 Deg. C, 55% RI + (max.)
Operated on	24 x 7 basis
Class	100,000 Class

CLEAN ROOM

MANUFACTURING FACILITIES & PLANT EQUIPMENT: KANDLA, GUJARAT, INDIA

INOXCVA
HISTORICALLY FUTURISTIC

- PLATE ROLLS
- WELDING EQUIPMENT
- TESTING EQUIPMENT
- CUTTING EQUIPMENT
- OTHER EQUIPMENT
- MATERIAL HANDLING EQUIPMENT

PRODUCT RANGE: INDUSTRIAL GAS

In the Industrial Gas business unit, we focus on designing, manufacturing, supply and installation/commissioning of vacuum insulated cryogenic tanks and systems for storage, distribution, and transportation of Industrial Gases like LIN, LOX, LAR, LCO2, LN2O, LNG and ETHYLENE service.
Standard products and Turnkey Packaged System skids customized for vaporization, pumping, boil-off, auto change-over, regulation & control of Pressure, Temperature & Flow.


Storage Tanks


Transport Tanks


Micro-bulk Units


OIL AND GAS

Wide Mouth Container


Vaporisers


Control & Regulating Skids


Engineering storage & Vaporization Package system


LIN Containers


Disposable Cylinder


KEGS

HEALTH, SAFETY & ENVIRONMENT

Our HSE policy covers cryogenic product manufactures in all of its activities by meeting needs & expectations of its clients, sub contractors, public & employees appropriate to nature & OHSE risks.

ISO 9001:2015, ISO 14001:2015 & BS OHSAS 18001:2007

HEALTH

- Safe Work Area
- Personal Hygiene
- First Aid facilities
- Annual Health Checks

SAFETY

- Cultural Change
- Interdependent
- Process Safety
- Incident Reduction

ENVIRONMENT

- Waste Management
- Emission
- Water Consumption
- Employment

Bureau Veritas Certification

INOX INDIA LIMITED

INOXCVA
HISTORICALLY FUTURISTIC

HEAD OFFICE: 09TH FLOOR, KP PLATINA BUILDING, OPP. PIZZA HUT, NEAR RACE COURSE CIRCLE, VADODARA – 390 007, GUJARAT, INDIA.

This is a multi-site certificate, additional site(s) are listed on the next page(s)

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the Management System Standards detailed below.

Standards

ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018

Scope of certification

DESIGN, MANUFACTURE, MARKETING, DISPATCH, INSTALLATION, COMMISSIONING AND SERVICING OF VACUUM INSULATED CRYOGENIC TANKS & PIPES, SUPER INSULATED CRYOGENIC CONTAINERS, VAPORIZERS, DISPOSABLE CYLINDERS AND BEVERAGE KEG, VACUUM CHAMBERS AND RELATED EQUIPMENTS

Original cycle start date for ISO 9001 & ISO 14001: **18 March 2019**
Original cycle start date for ISO 45001: **02 March 2021**
Recertification cycle start date: **06 January 2022**
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **17 March 2025**
Certificate No. **IND.21.2222/IM/U** Version: **2** Issue date: **02 September 2022**

Signed on behalf of BVCH SAS UK Branch
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.

Local office: Bureau Veritas (India) Private Limited (Certification Business), 72 Business Park, Marol Industrial Area, MIDC Cross Road "C", Andheri (East), Mumbai – 400 093, India.

Pg 1 of 2

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call + 91 22 6274 2000.

COMPETENCY – APPROVALS & ACCREDITATION

INOXCVA
HISTORICALLY FUTURISTIC

MAIN DESIGN CODES

- ASME Sec. VIII Div1 with (App 44) & without Cold Stretch
- EN 13458 with & without Cold Stretch- for Static tanks
- EN 13530 with & without Cold Stretch- for Transport tanks
- AS 1210 with & without Cold Stretch - for Static tanks
- EN 1251 - for Cryogenic containers less than 1000 liters
- API 620 - Field erected flat bottom tanks
- EN 13480 for Cryogenic piping

SUPPLEMENTARY CODES, REGULATIONS / DIRECTIVES

- CGA S1.1 , S1.2, S1.3, 341
- EN 13648
- ASME B31.3
- UBC 1997
- ASCE
- IBC 2006
- API 2000
- ADR
- IMDG
- EN 12079
- PED
- NFPA 59A
- SMPV, 2016, GCR
- Indian standards
- ESPN

SHIP FUEL/CARGO-TANK: DESIGN CODES/RULES

- BV Rules
- DNV Rules
- LR Rules
- ABS Rules
- USCG
- IGC
- IGF (Draft) -IMSBC

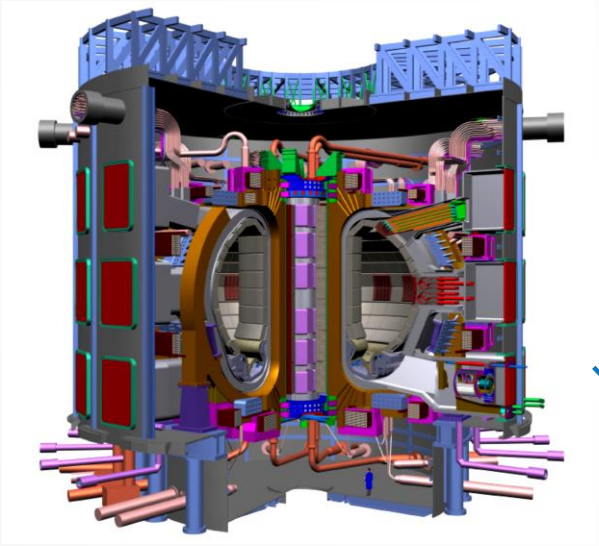
TECHNOLOGY/ENGG DESIGN TOOLS

- AUTOCAD
- INVENTOR/ SOLIDWORKS/ CATIA
- COMPRESS FOR PRESSURE VESSELS
- ANSYS -FINITE ELEMENT ANALYSIS
- AUTO PIPE NOZZLE
- CAESAR

PRODUCT RANGE: CRYO SCIENTIFIC

INOXCVA's Cryo Scientific manage R&D initiatives, applications, and turnkey solutions for scientific and industrial research. The capabilities include designing, modelling, analysis, detailing, manufacturing and sourcing to meet project requirements and deadlines.

DEFENSE RESEARCH



ATOMIC PLASMA RESEARCH

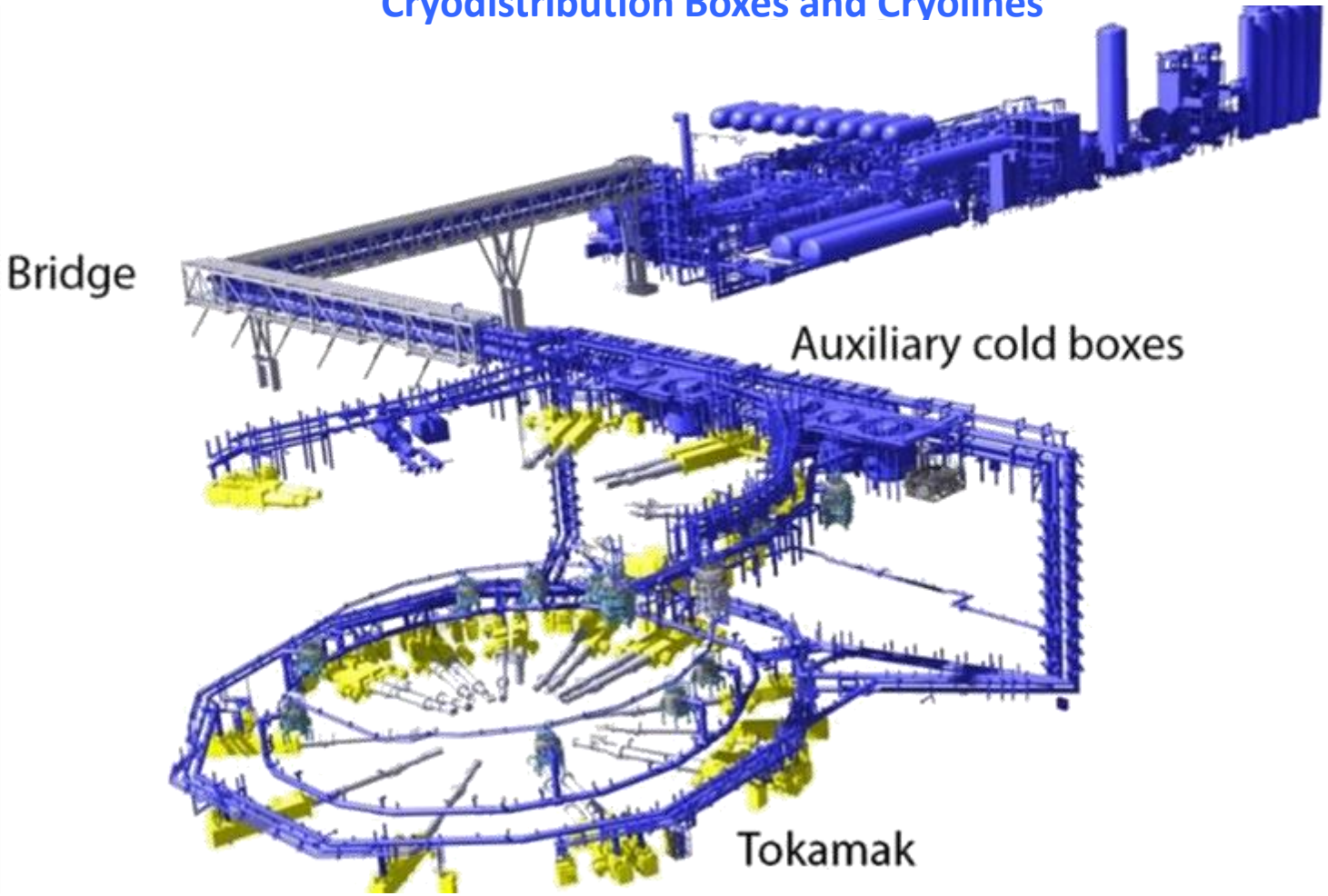
SCIENTIFIC & INDUSTRIAL RESEARCH

SPACE SIMULATION & SATELLITE LAUNCH FACILITIES

ITER CRYOGENIC SYSTEM

- ITER Cryogenics system in Tokamak B11 , Plant bridge & Cryoplant building

Cryodistribution Boxes and Cryolines

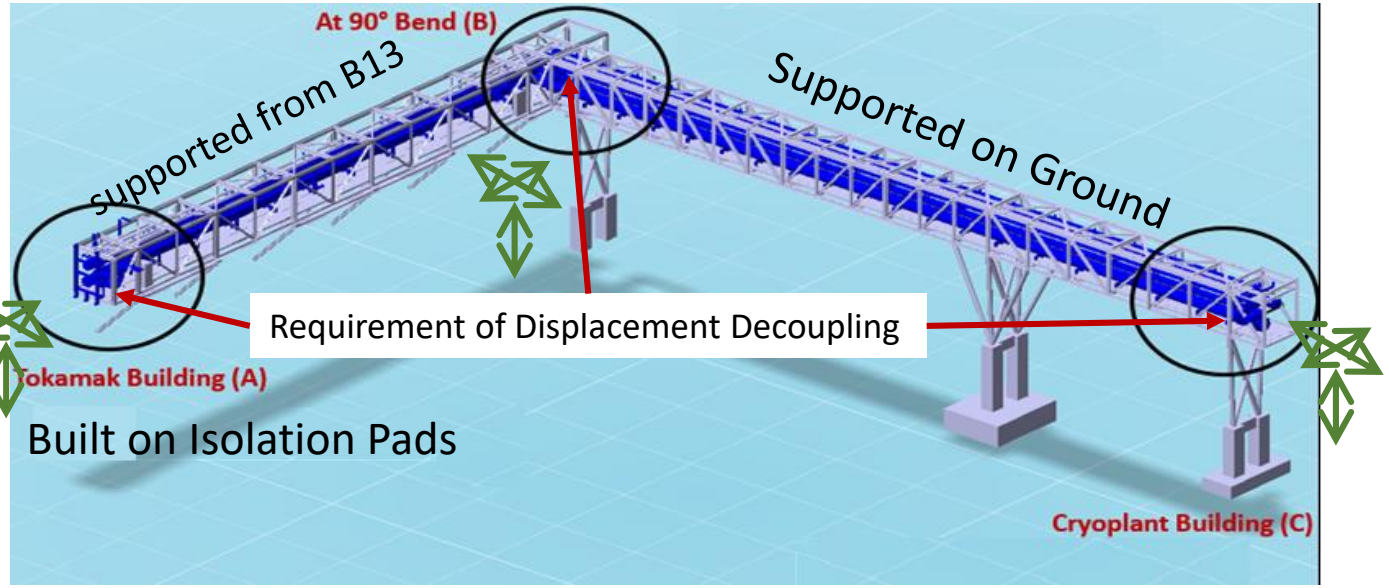


- **Participation of INOX INDIA started in ITER Project from 2010 with Design of Prototype Cryoline Project**

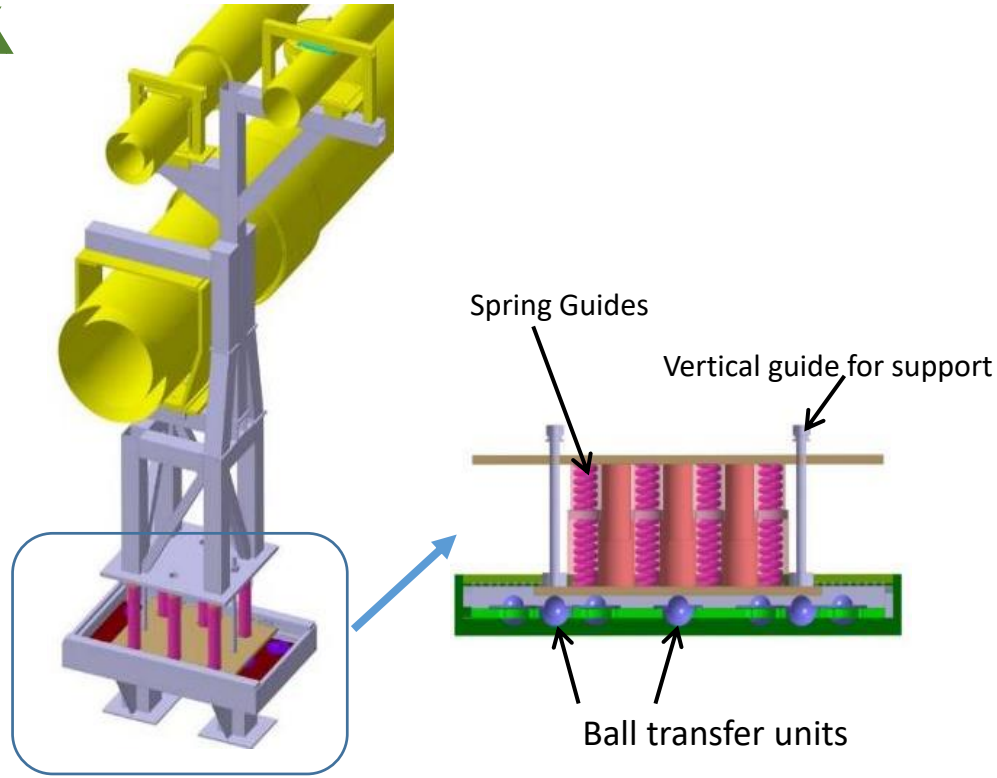
- **In 2014, INOX was awarded Design, Manufacturing, Installation and Testing of Group Y Cryolines & Manufacturing, Installation and Testing of the Prototype Cryoline**

- **In 2015, INOX was awarded Design, Manufacturing, Installation and Testing of Group W Warm lines**

UNIQUE ARRANGEMENT FOR DISPLACEMENT DECOUPLING



Patent approved in India, USA & Europe

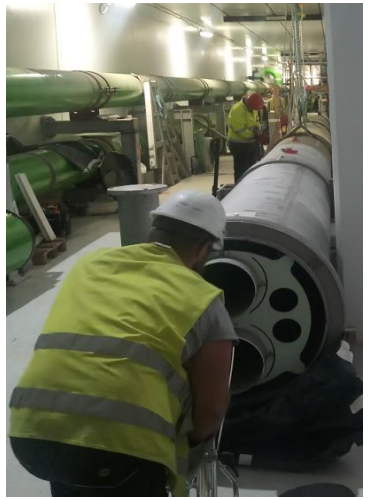


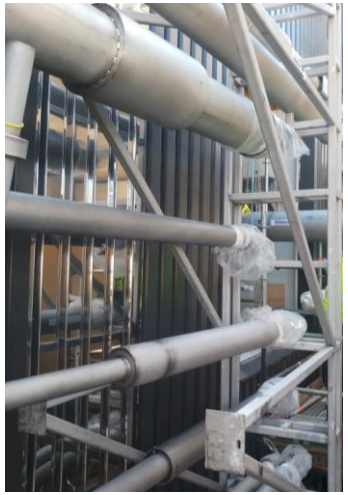
DESIGN, MANUFACTURING, INSTALLATION & ACCEPTANCE TESTS OF ITER

ITER-GROUP Y CRYOLINES PROJECT

ITER - W GROUP OF WARMLINES

MANUFACTURED & SUPPLIED TO ITER SITE





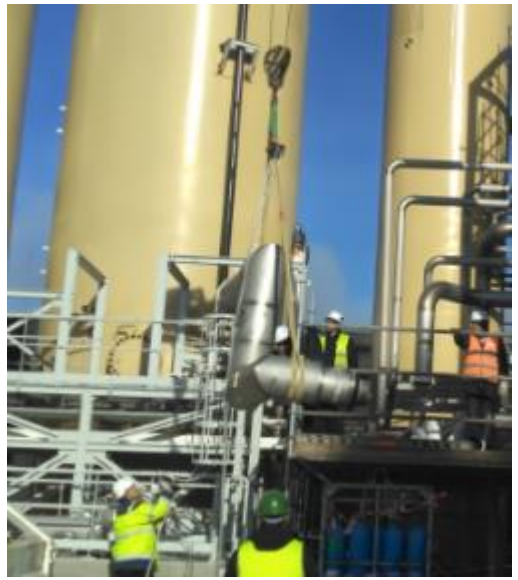
SITE INSTALLATION & TESTING

CURRENT STATUS

- SUPPLY SCOPE 100% COMPLETED
- INSTALLATION ~70% COMPLETED

DESIGN, MANUFACTURING, INSTALLATION & ACCEPTANCE TESTS OF ITER

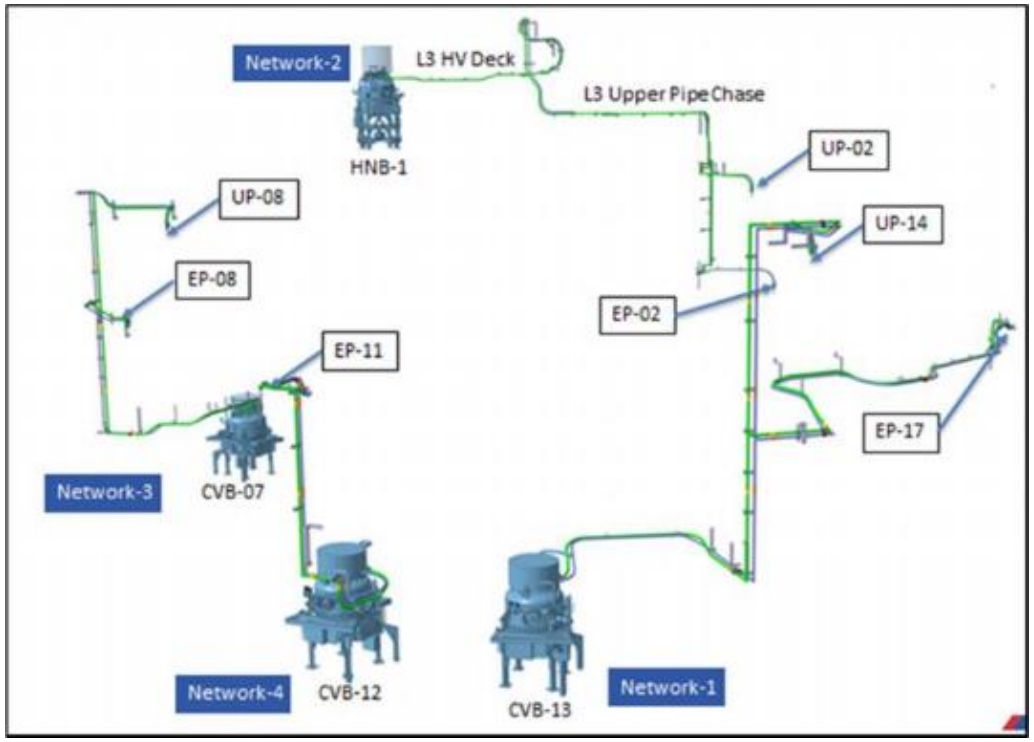
INOXCVA
HISTORICALLY FUTURISTIC



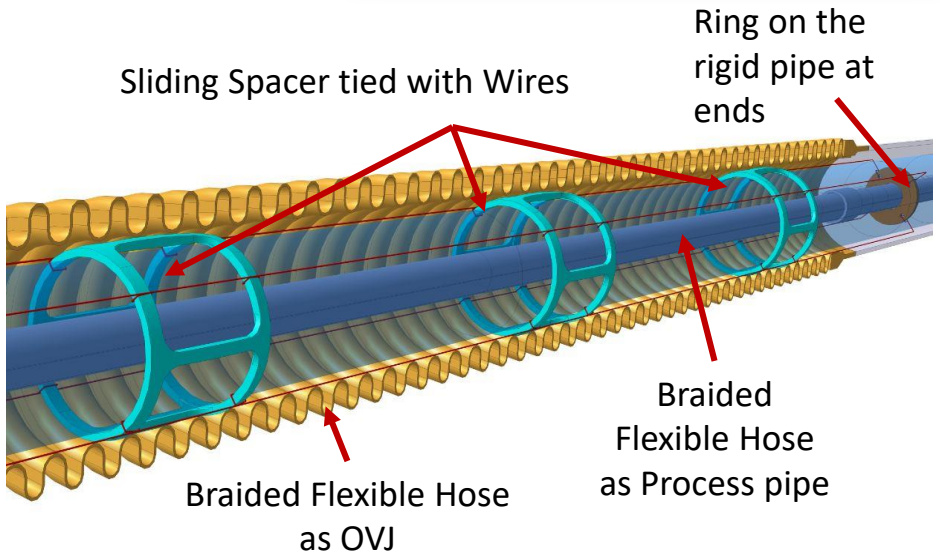
DMS CRYOLINES – FIRST DIRECT CONTRACT FROM IO

INOXCVA
HISTORICALLY FUTURISTIC

Design, Manufacturing, Testing and Supply of Disruption Mitigation System Cryolines - Part 1 Executed, Part-2 Under Execution



Unique design of Sliding Spacer due to stringent heat load constraints developed for which patent filed by INOX India



The ITER DMS Cryogenic transfer lines connecting different Cold-Valve Boxes up to the Shattered Pellet Injectors [SPIs] , supplies supercritical Helium at 5K to the Shattered Pellets Injectors brings back Helium at 100K.

30 YEARS OF EXCELLENCE
INOXXXX

FLEXIBLE CRYOLINES FOR THE TRANSFER OF CRYOGENIC FLUID

Flexible Cryolines have diameter ranging from DN10 to DN80 and lengths ranging from 20m to 75m, and are designed for various load combinations including accidental conditions of fire and external pressurization.

HMS VESSELS - IO

INOXCVA
HISTORICALLY FUTURISTIC

Design , Manufacturing, Testing and Supply of Hydrogen Mitigation System Vessels - Supplied

Challenges

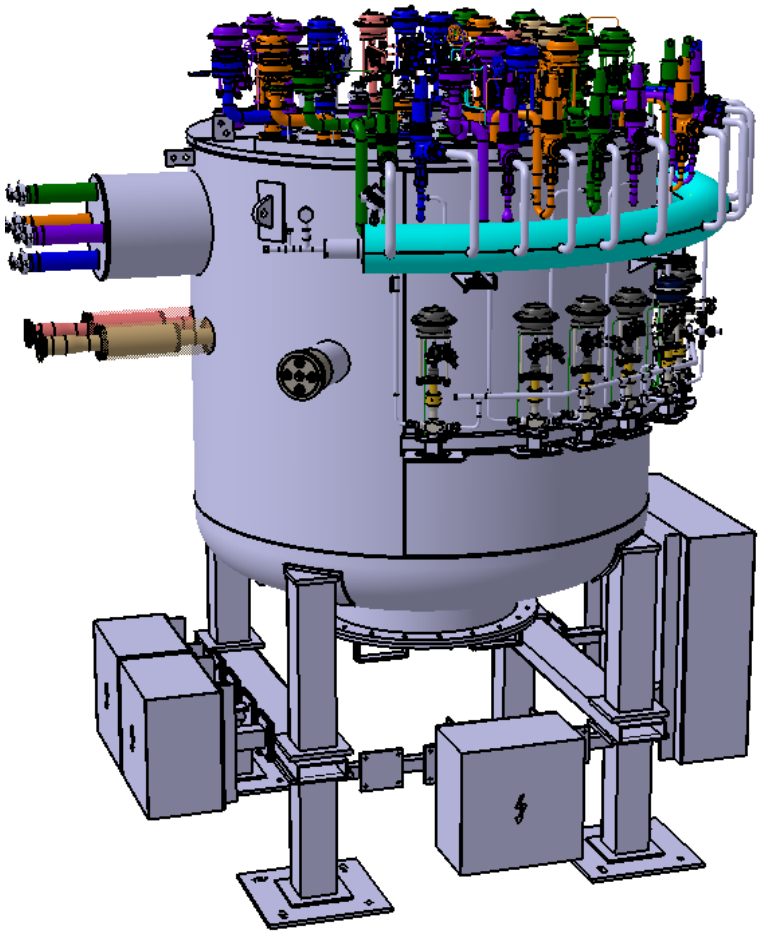
Special Chemistry material with Co-0.2%

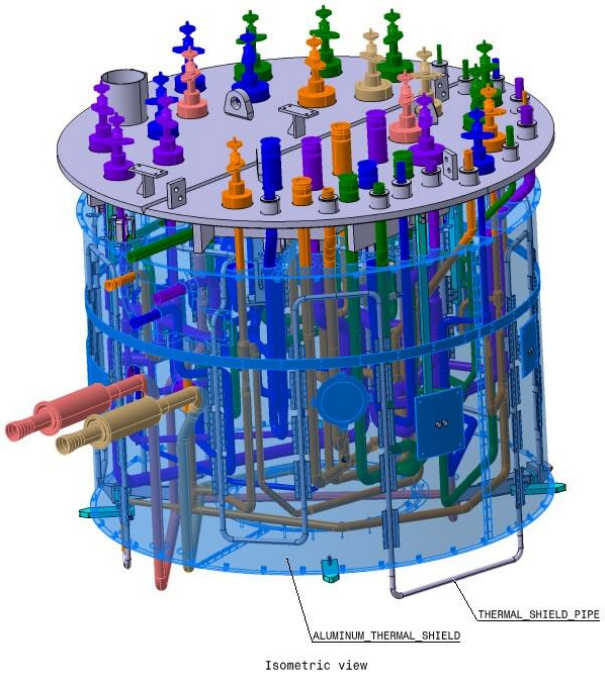
13m long coil around PST vessel is one piece without any welding

ESPN certified tanks supplied for first time by India, required special nuclear training

30 YEARS OF EXCELLENCE
INOXXXX

TEST COLD VALVE BOX – ITER ORGANIZATION



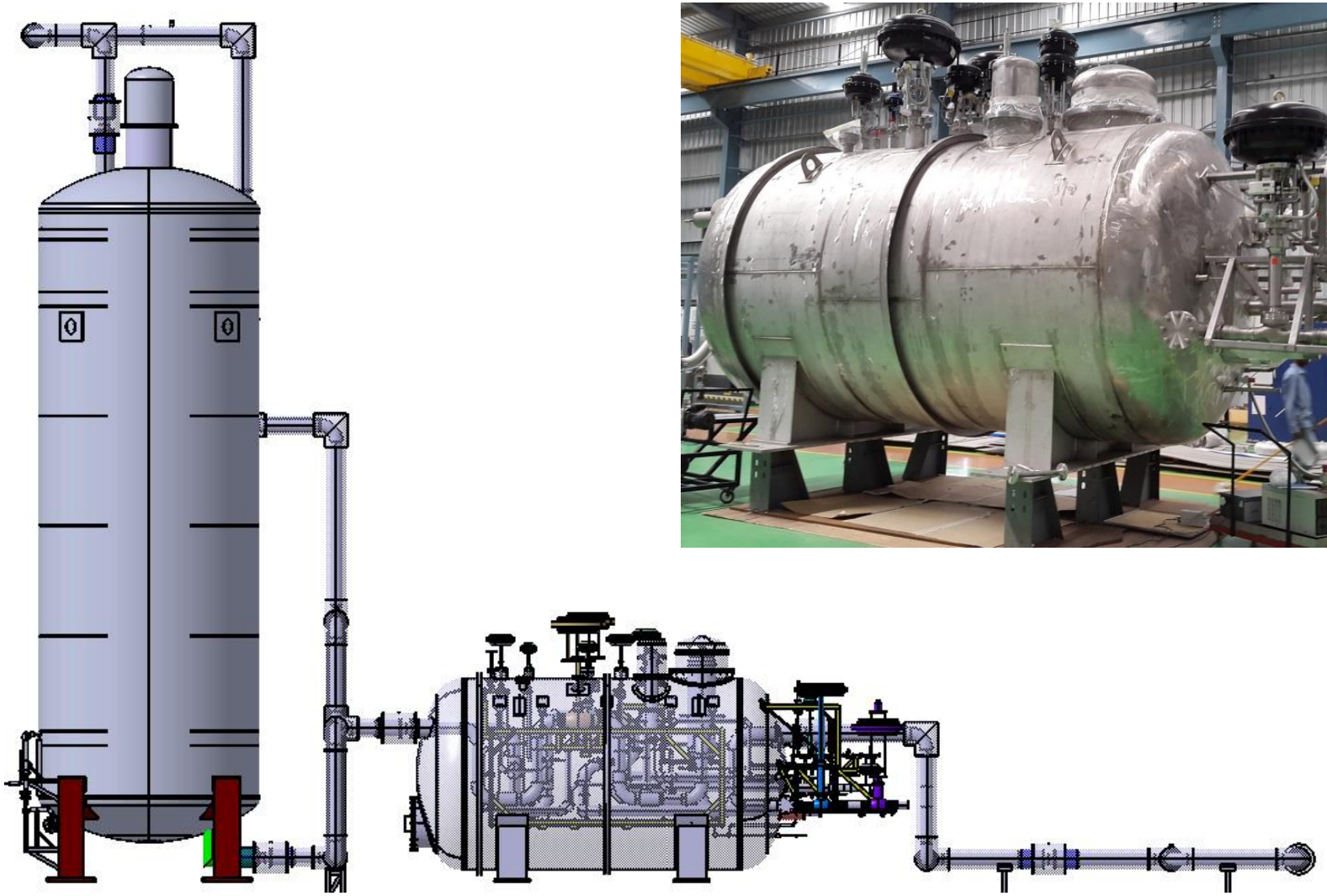


Diameter: 2 meters
Height: 3.5 meters
Service Temperature: 4K to 500K
Pressure: 25 Bar
Extensive Instrumentation including Cryogenics Control valves, Temperature Sensors, Pressure Transducers, mass flow meters etc.

Under Execution

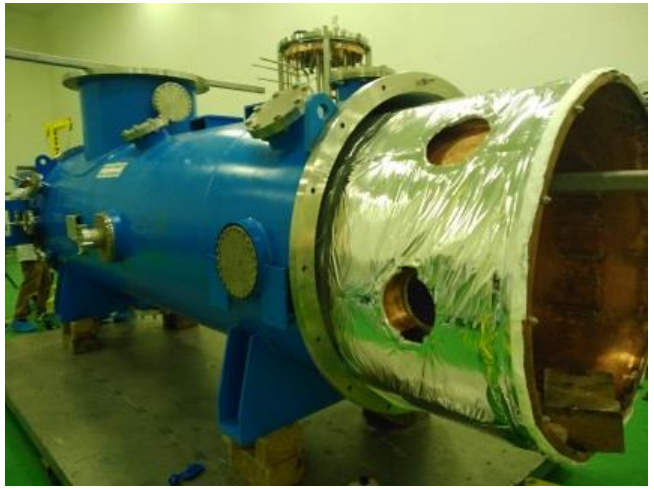
LOX STORAGE TANK WITH VALVE BOX & CONNECTING CRYOLINE

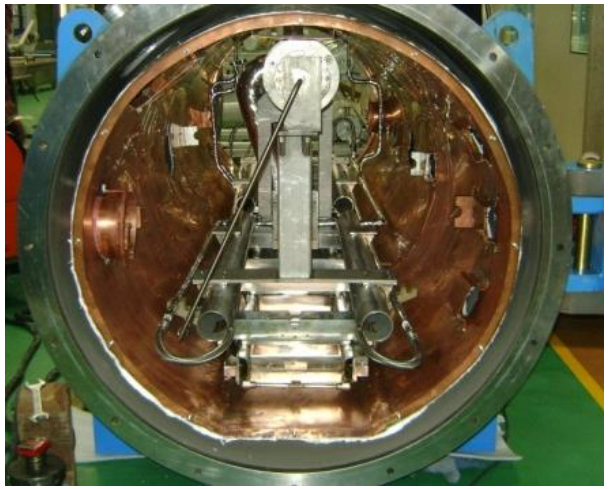
INOXCVA
HISTORICALLY FUTURISTIC



40 KL LOX TANK AND VALVE BOX WITH INTERMEDIATE CRYOLINE

HORIZONTAL TEST STAND (HTS) CRYOSTAT FOR RRCAT, INDORE





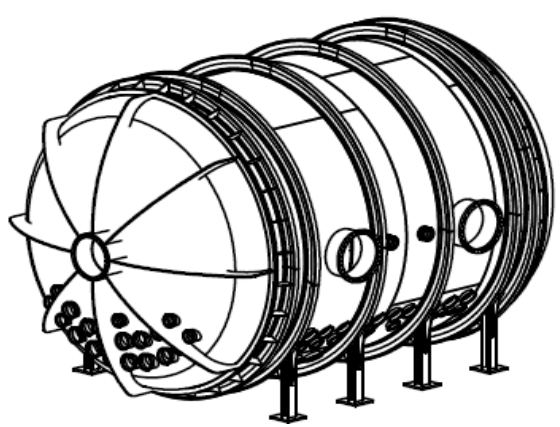
DESIGNED TO TEST TWO 1.3 GHZ SCRF TESLA TYPE CAVITIES

Projects for SAC AHMEDABAD

INOXCVA
HISTORICALLY FUTURISTIC

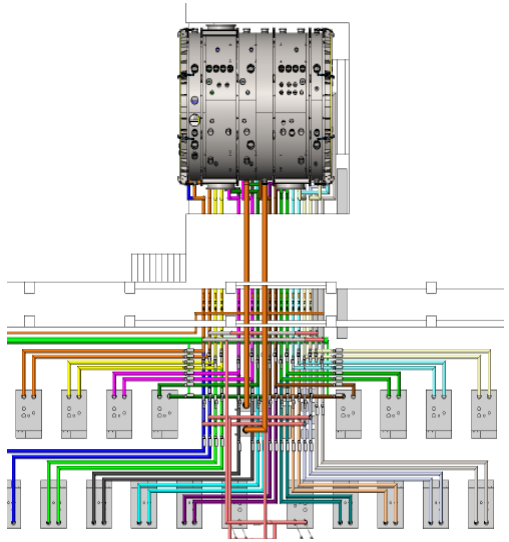
Project : COMNAVAC With LN2 System, Commissioned At Space Application Center Ahmedabad

VACUUM CHAMBER MANUFACTURING



AUXILIARY SYSTEM MANUFACTURING

S.I. PIPING MANUFACTURING



30 YEARS OF EXCELLENCE
INOXXX

Thermo Vacuum Chamber – 310 M3 SAC ISRO

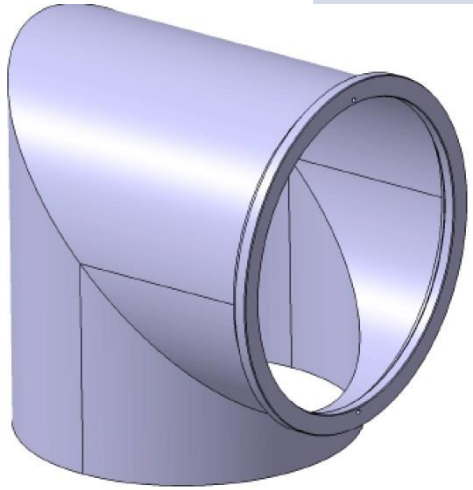
Weight – 70 MT
Thickness – 20 MM
Diameter – 6.5 Mtrs Total
Length: 11.2 Mtrs

1.5T MRI CRYOSTAT – IUAC DELHI

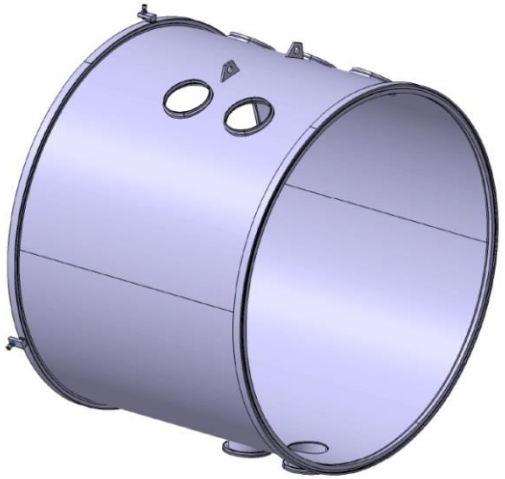
Diameter: Approx. 2.2 m
Length: Approx. 1.8 m

SUPPLY OF SERVICE MODULE VV – CERN

Total quantity: 127

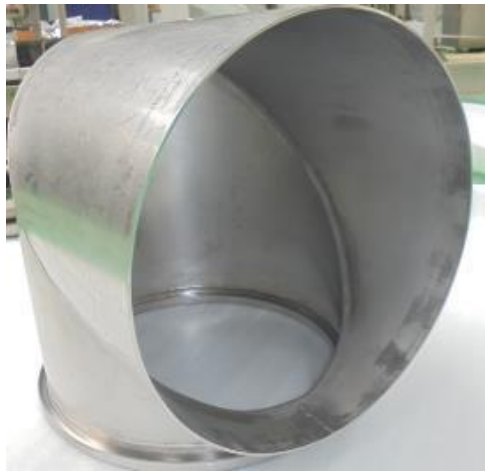


Diameter: Approx. 1 meter



SERVICE MODULE VACUUM VESSEL

JUMPER VACUUM VESSEL



SUPPLY OF SERVICE MODULE VV – CERN

INOXCVA
HISTORICALLY FUTURISTIC

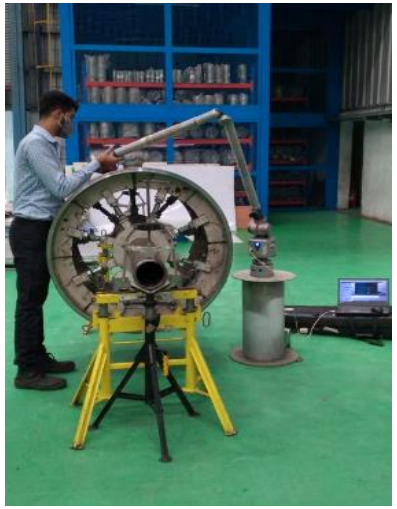
Manufacturing stages

Flange with fixture for pre machining

Rolled shells

Fixture for Flange fit up

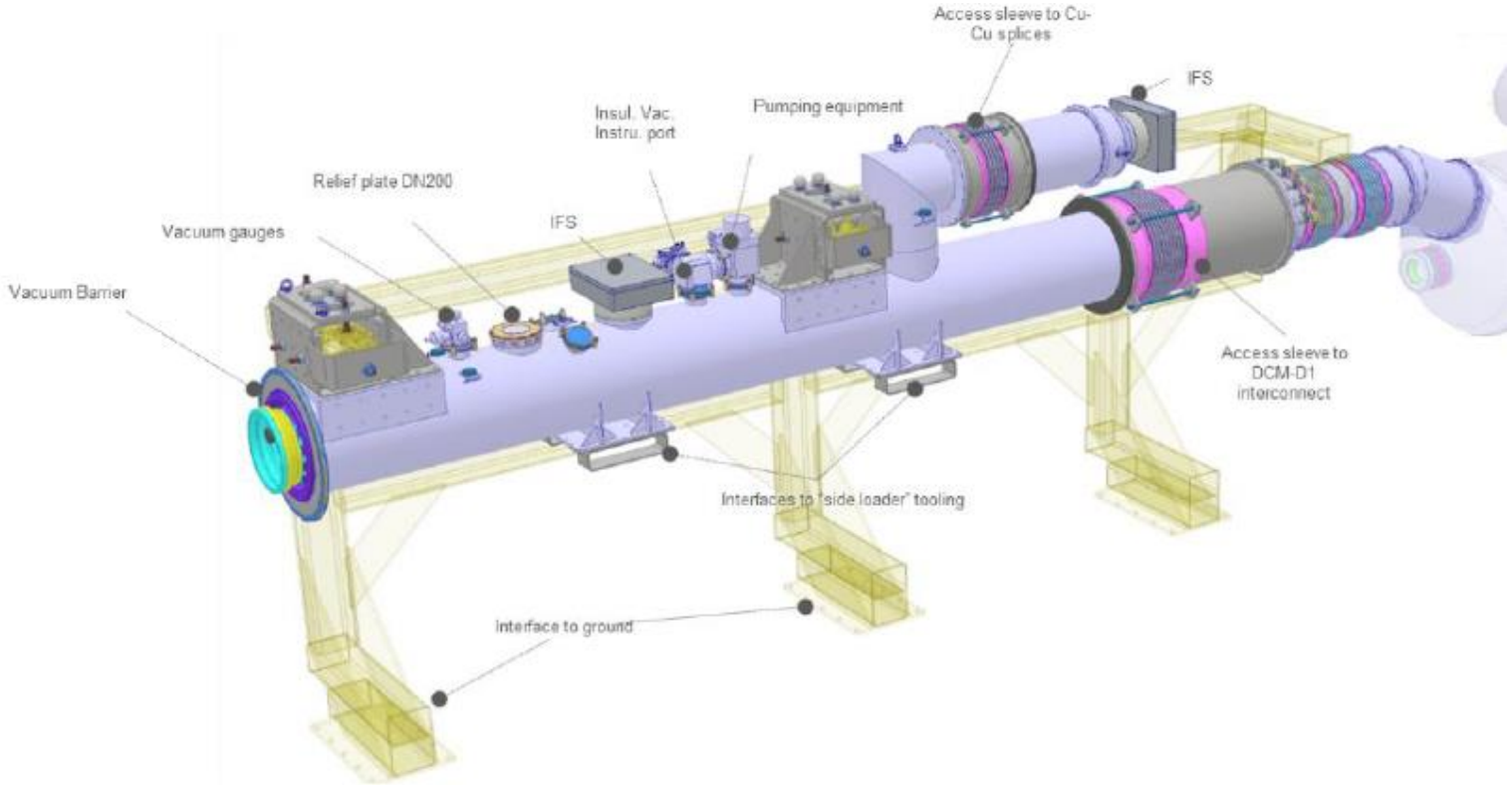
Faro inspection for vessel



Jumper vessel machining

30 YEARS OF EXCELLENCE
INOXCVA

SUPPLY OF FOUR SETS OF SUB-ASSEMBLIES OF VACUUM VESSELS



Status - Ongoing

The DCM device performs the electrical continuity of superconducting busbars between magnets and the cold powering system of the HL-LHC project. The conductors are located in a vessel filled with superfluid helium in nominal operation.

The DCM vacuum vessel assemblies consist of a 6.5 m long, Ø 500 mm main horizontal body and a removable 1.3 m long, Ø 400 mm diode envelope. The vacuum vessel assembly is composed of six sub-assemblies as shown in next slide.

SUPPLY OF FOUR SETS OF SUB-ASSEMBLIES OF VACUUM VESSELS

INOXCVA
HISTORICALLY FUTURISTIC

Status - Ongoing

Table 2: vacuum vessel sub-assemblies.

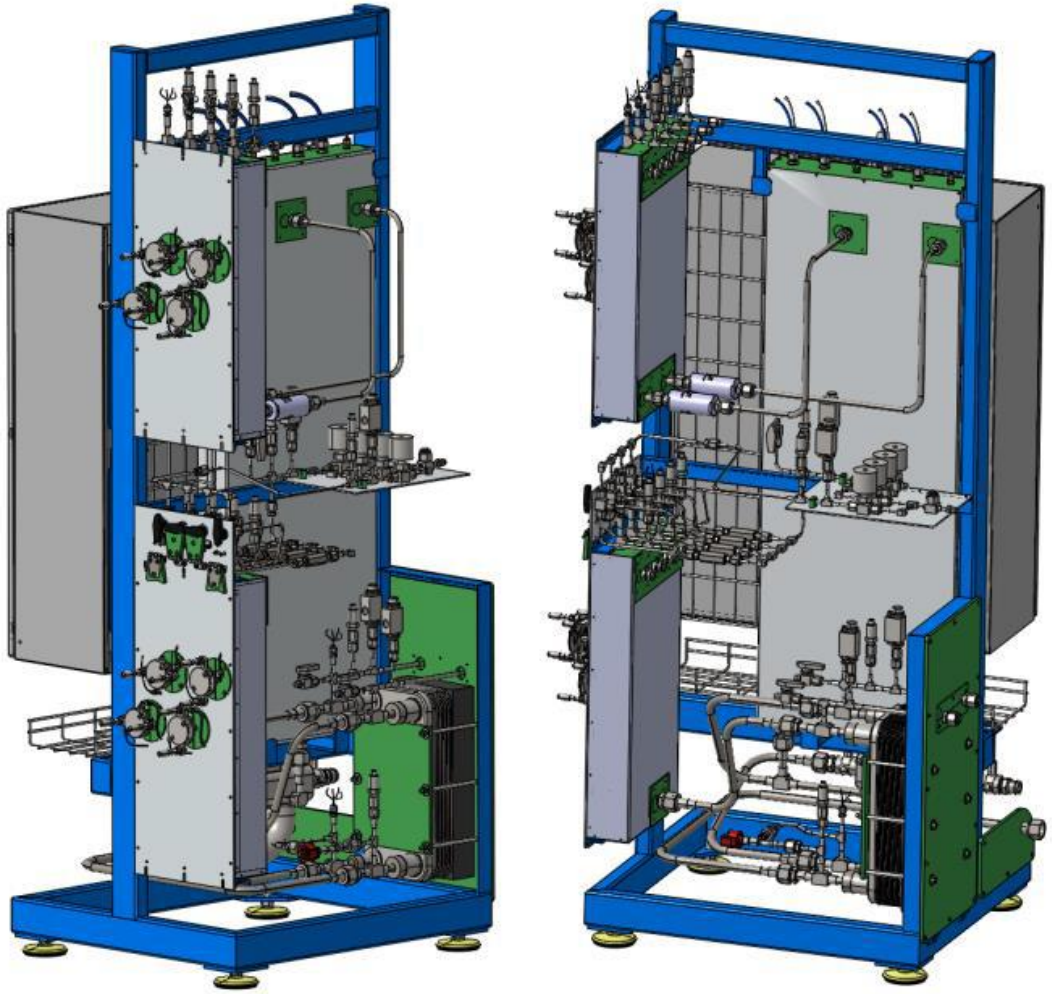
#	Sub-assembly	Qty	Drawing number	Version	Illustration
1	Main vacuum vessel assembly	4	LHCLDQD_0051	AD	
2	Vacuum vessel extension assembly	4	LHCLDQD_0060	AE	
3	Vacuum vessel swan neck link assembly (Supplied: Bellows & LHCLDQD_0102)	4	LHCLDQD_0104	AA	
4	Vacuum vessel swan neck assembly	4	LHCLDQD_0064	AC	
5	Vacuum vessel periscope assembly	4	LHCLDQD_0071	AB	
6	Diode vacuum vessel assembly	4	LHCLDQD_0078	AD	

30 YEARS OF EXCELLENCE
INOXXXX

ASSEMBLY/WELDING OF CO2 DISTRIBUTION RACKS

Quantity: 6 nos.

Status - Ongoing



A pumped CO_2 cooling must be provided to allow for the detector tests. For this reason, distribution racks for cooling CO_2 must be installed on multiple locations inside the clean room of the SR1 building where different tests and commissioning activities will take place.

THANK YOU

INOXCVA®
HISTORICALLY FUTURISTIC

30 YEARS OF EXCELLENCE
INOXXXX

SILVER JUBILEE CELEBRATION WE OWE OUR SUCCESS TO YOU

INOXCVA AN INOX GROUP COMPANY