

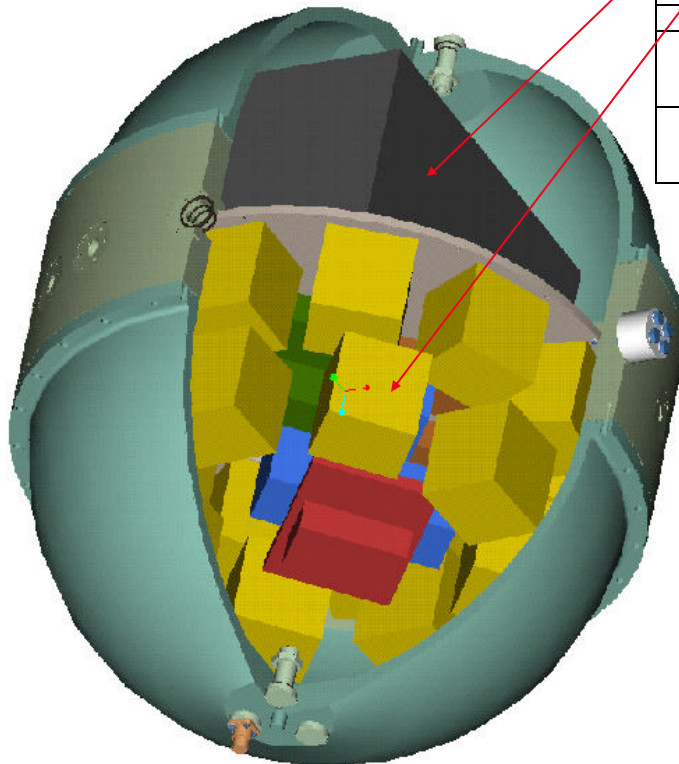
JUNCTION BOX & FRAME: STATUS & PLANNING

CERN, June 7th 2000

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I.N.F.N. Genova

Vessel inside layout



ITEM [-]	DESIGNATION [-]	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	N° [-]
1	main transformer	330	350	600	1
2	Clock module	320	200	20	1
3	ROR electronic-optic	110	170	50	1
4	Output breaker/switch	130	140	150	16
5	low voltage supply	370	115	100	1
6	Timed relay	210	121	56	2
7	short mode relay	140	90	56	1
8	JB control module	300	115	100	1
9	EOC-copper 5 kV terminal	110	170	150	1
10	Electrode terminal	110	170	50	1
11	1000 V terminal	110	170	50	1

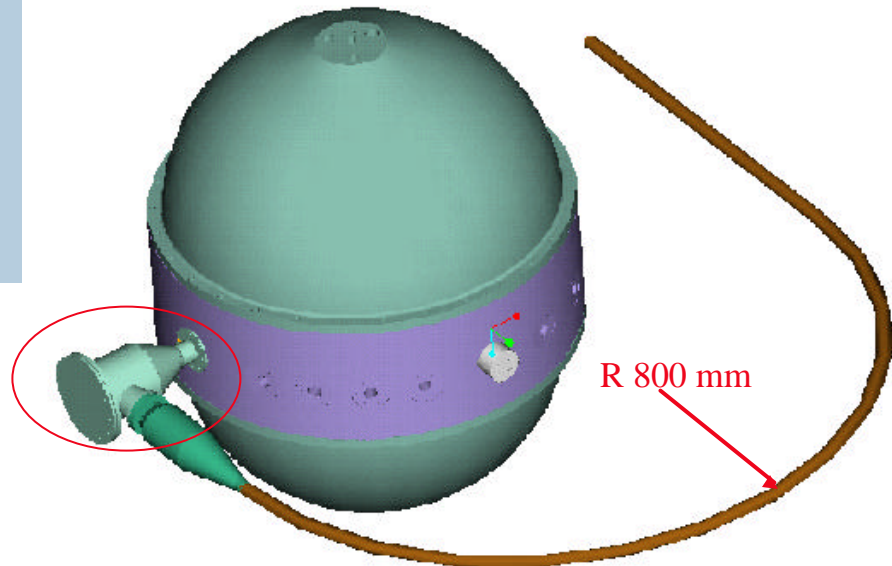
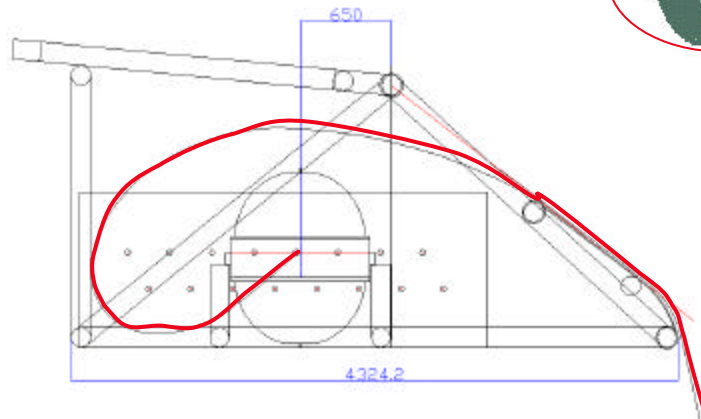
REMARKS:

- the 300 mm high spacer allows the housing of the electronic components, as listed in the table (courtesy A. Calzas - CPPM)
- the transformer has been placed in the upper chamber, for better thermal insulation of the other chamber, where the electronics components are
- a physical model has been built: it validated the CAD model and confirmed the compliance of the design

Vessel outside layout - main cable entry

REMARKS:

- an additional box is required to house the terminal board foreseen to make the final connections while on board
- the 90° side entry allows to reduce the frame overall dimensions and complies with the cable minimum bending radius (800 mm)



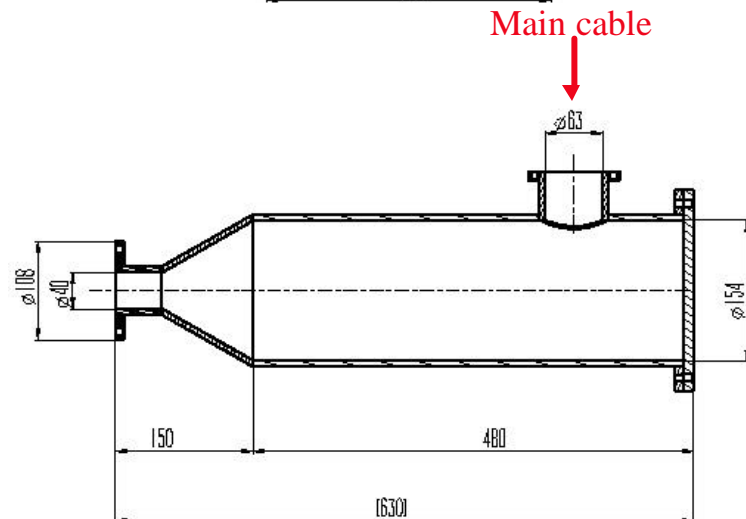
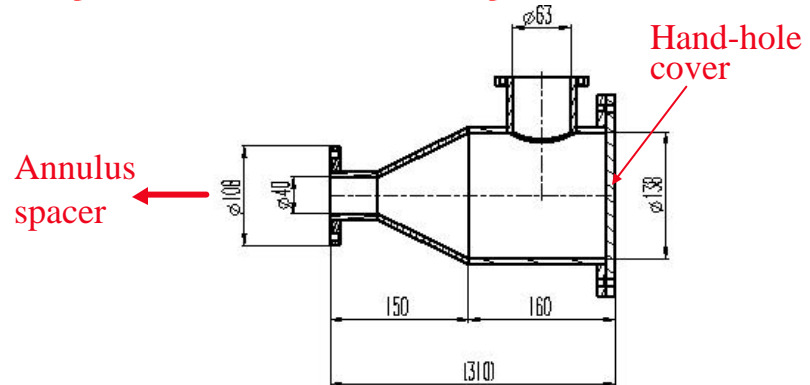
Vessel outside layout - auxiliary JB

NOTES:

- the first option optimises both frame layout and stresses on the main JB
- the second option allows an entire LCM module to be housed in, but implies a quite larger bending moment on the flange and complicates the frame layout
- are we going to foresee any safety barrier between the main and the auxiliary JBs?

REMARKS:

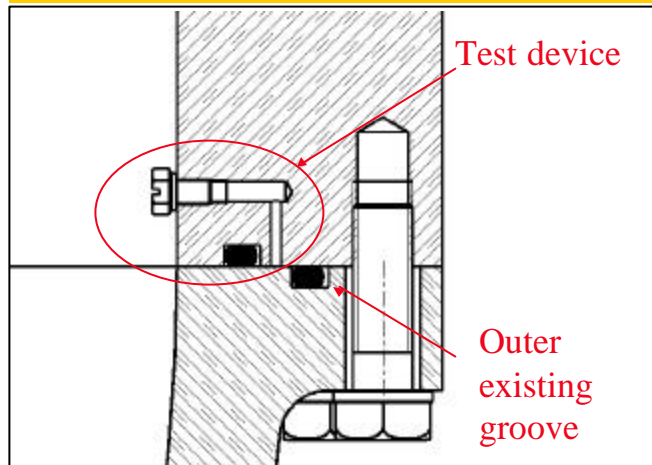
- a preliminary design of that box already exists; details (inside dimensions, sealing philosophy), **MUST BE AGREED THIS WEEK**
- the final geometry of the main cable termination **HASN'T BEEN DEFINED YET**
- a detailed study of the components inside the auxiliary JB **DOESN'T EXIST YET**



Vessel accessories - main O-rings

MAIN FEATURES:

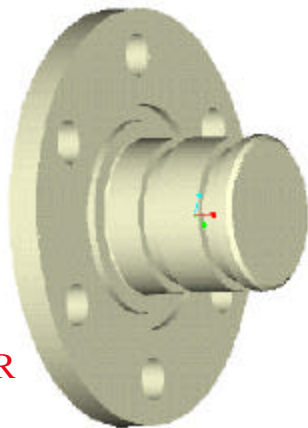
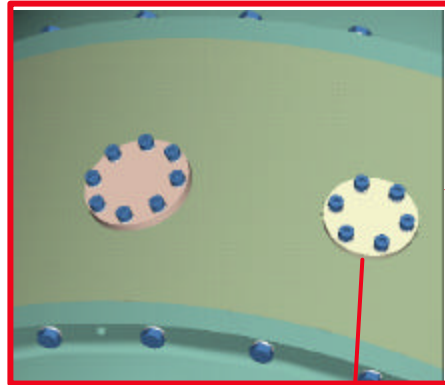
- one piece rings (no junctions)
- double O-ring (inner + outer), for higher reliability
- material: VITON, to withstand the chemical attack of both sea water and transformer dielectric oil (expected lifetime: 20 years)
- inner O-ring: manufacturer's standard, the relevant groove will be machined after O-ring manufacturer instructions
- outer O-ring: custom designed (to use the groove existing on one of the caps), requires a purpose-made mould
- test device foreseen to check the functionality of the seal



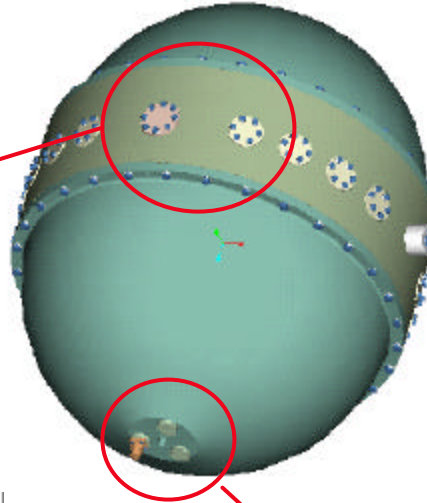
REMARKS:

- specification has been written
- a market survey has been done
- possible suppliers have been identified
- a tender has been launched
- the order has been placed
- delivery: end of July

Vessel accessories - plugs & penetrators

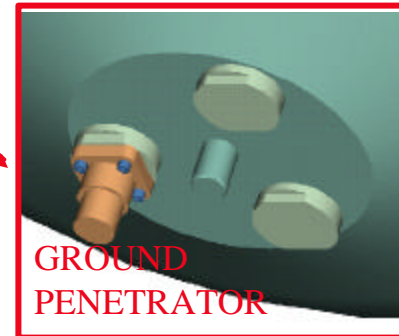


PENETRATOR
HOLE PLUG



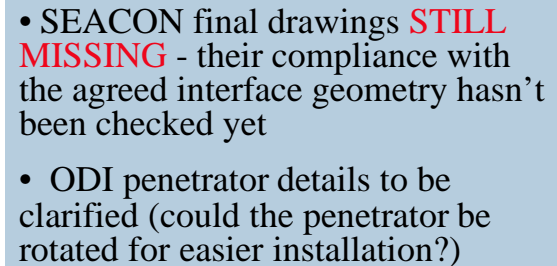
REMARKS:

- ground anode penetrator (from A. Calzas - CPPM)
- installed on an existing plug (no extra-hole)
- on the electronic components side cap
- plugs will allow the pressure test even if the penetrators are not available
- the plugs reply the design of the penetrator (same sealing philosophy and interface geometry)



GROUND
PENETRATOR

- 2 possible suppliers (ODI and SEACON)
- interchangeability (ODI and SEACON must have the same interface with the JB)



Vessel pressure test

MAIN FEATURES:

- both static and dynamic test required
- test of the JB stand alone (without penetrators and auxiliary JB): **DOES IFREMER AGREE?**
- acceptance criteria: no leakage nor permanent deformation (after comparison of the CMM dimensional check before and after the test)



REMARKS:

- a specification has been written (after IFREMER specifications), with a detailed test procedure
- some supplier has been identified
- a tender has been launched, and we've got offers
- preference given to Italian suppliers, for easier transport and follow up
- we're ready to place the order, as soon as the delivery date of the JB will be confirmed

Vessel manufacturing

MAIN FEATURES:

- executive drawings have been prepared
- a specification have been written, where only forging and cutting have been allowed during the manufacturing; **NO WELDING WAS ALLOWED**
- destructive and non-destructive tests required, as well as all the relevant certifications
- after a market survey, a tender has been launched, and we got 4 offers

REMARKS:

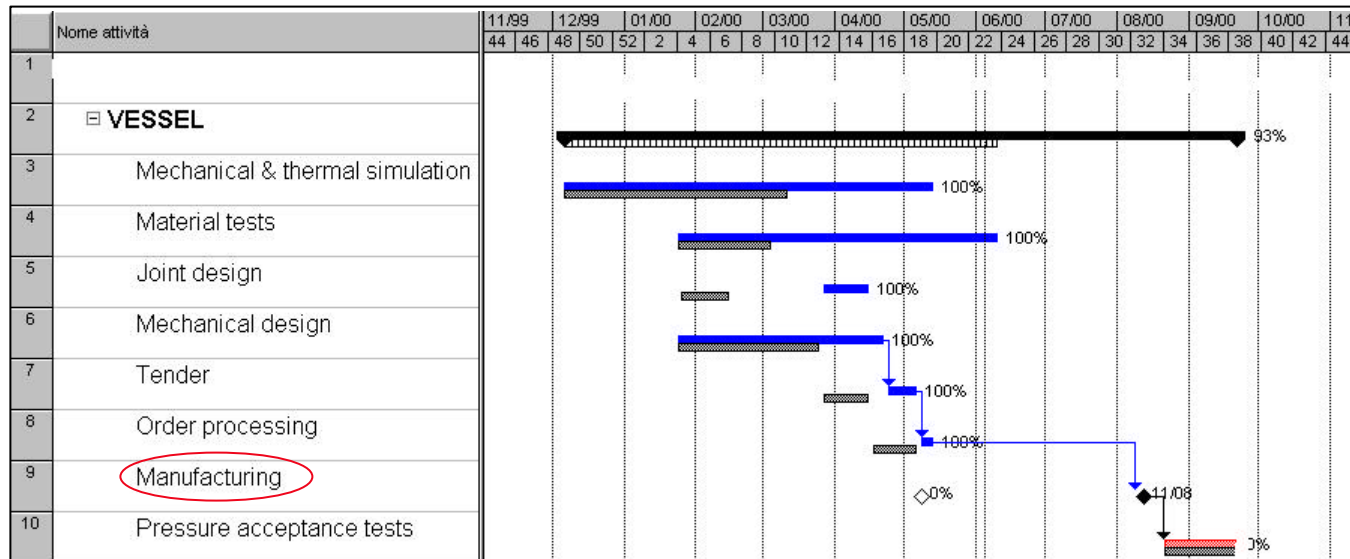
- order has been placed to TIMET LOTERIOS, an Italic-American company specialised in titanium construction;
- their price was aligned with the other competitors
- the base alloy is produced by a TIMET company: easier procurement
- they use to deal with pressure vessels and aeronautic constructions, that means with high quality standards
- the company is favourably located (near Milano) for manufacturing follow-up
- good reference list in titanium constructions



FORGING



Vessel design and production planning




NOTES:

- actual values (blue)
- previsions (grey)
- ongoing activity: MANUFACTURING

REMARKS:

- design and tender phases completed
- orders have been placed
- vessel schedule **ON TIME**

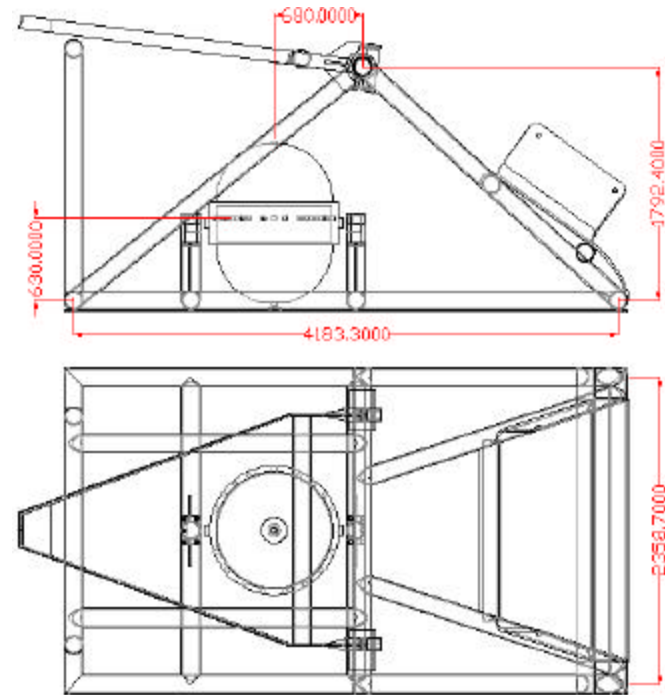
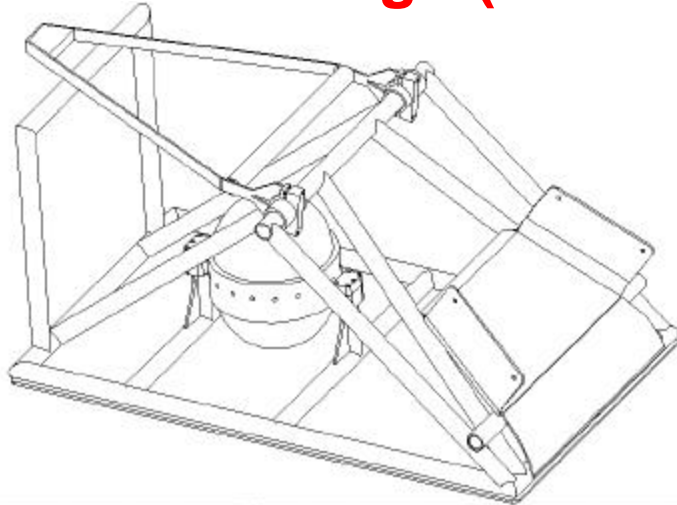
Vessel Quality Control Plan

 LOTARIOS <small>A TIMET COMPANY</small>		PIANO DI CONTROLLO - Quality Control Plan						QCP -		H0100		
STANDARD DI FABBRICAZIONE - Fabrication Standard				TITANIUM GR. 5		COLLAUDO - Inspection						
POS	DESCRIZIONE Description	%	DOCUM. APPLICABILI Applic. Documents		CRITERI DI ACCETTAZ. Acceptance Criteria		LUOGO ISP. Inspect. Place	ENTI ISPETTIVI - Inspection Agency				NOTE - Notes
			CODICE - Code	LOT PROC.	CODICE - Code	LOT PROC.		<input checked="" type="checkbox"/> LOTARIOS QC	<input type="checkbox"/> CLIENTE Customer	<input type="checkbox"/> AG. INDIP. T.P.I.		
1	IDENTIFICAZIONE MATERIALI Material Identification	100		PRT-007		PRT-007	LOT	H/C			R	
2	VERIFICA CERTIFICATI D'ORIGINE MII Test Certificates Review	100	SPC. MAT. Material Spec.		SPC. MAT. Material Spec.		LOT	H/C			R	UNI EN 10204 - 3.1B
3	TRASFERIMENTO MARCATURE Transfer of Markings	100		PRT-008		PRT-008	LOT	H		W	H	
4	FORGIATURA Forging	100		PRT-001		PRT-001	FORNITORE	H		W	W	
5	T. TERMICO DI RICOTTURA Annealing Heat Treatment	100		PRT-005		PRT-005	FORNITORE	C		W	W/R	
6	PRELIEVO PROVE MECCANICHE Mechanical Test Sampling	100		PRT-009		PRT-009	FORNITORE	H		W	H	(STACCARE DUE PROVINI, 1 PER IL CLIENTE)
7	PROVE MECCANICHE Mechanical Test	100	ASTM B361-97A	PRT-009	ASTM B361-97A	PRT-009	FORNITORE	C		R	R	
8	ESAME MICROGRAFICO Micrographic Test	100	ASTM E 112				FORNITORE	C		R	R	
9	CONTROLLO CON ULTRASUONI (UT) Ultrasonic Test (UT)	100	ASME SA 388	PRT-020	ASME SA 388	PRT-020	FORNITORE	C		R	H	
10	CONTROLLO FORMATURA (VD) Forming Check (VD)	100		PRT-013		PRT-013	LOT	H				
11	PROVA IDRAULICA TENUTA OR (HT) Hydrostatic Test (HT)	100		PRT-019		PRT-019	LOT	C		H		310 BAR - DURATA 90 MINUTI O-RING FORNITI DAL CLIENTE
12	CONTR. VISIVO E DIMENS. FINALE (VD) Final Visual and Dimensional Check (VD)	100	DWG.	PRT-033	DWG.	PRT-033	LOT	C		H		
13	MARCATURA E CERTIFICAZIONE Marking and Certification	100		PRT-002		PRT-002	LOT	C		R		UNI EN 10204 - 3.1B
14	CONTROLLO IMBALLAGGIO Packing Check	100		PRT-026		PRT-026	LOT	H				

REMARKS:

- several tests have been specified, to ensure the compliance with the requirements as well as the absence of faults (cracks, grain growth after forging, geometry...)
- an independent agency has been charged to survey the most critical phases and tests

Frame design (developed by LNS Catania)



REMARKS:

- welded pipe construction, penetrant fluid test foreseen for the weldings
- design compliant with the main cable side entry option
- material: Ti 6 Al 4 V (the same as the vessel, to avoid any electro-chemical corrosion)
- order ready to be placed **AFTER APPROVAL OF THE COLLABORATION**
- delivery time: 3 months after order