



*Monaco iter* **INTERNATIONAL FUSION ENERGY DAYS** *December 2-4 2013*

# **ITER VACUUM VESSEL EU SECTORS FROM DESIGN TO PROCUREMENT: AMW EXPERIENCE**

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The activity described in the presentation are developed by AMW in the frame of the contract with F4E



The sentences reported in the presentation not represent necessarily the opinion of ITER

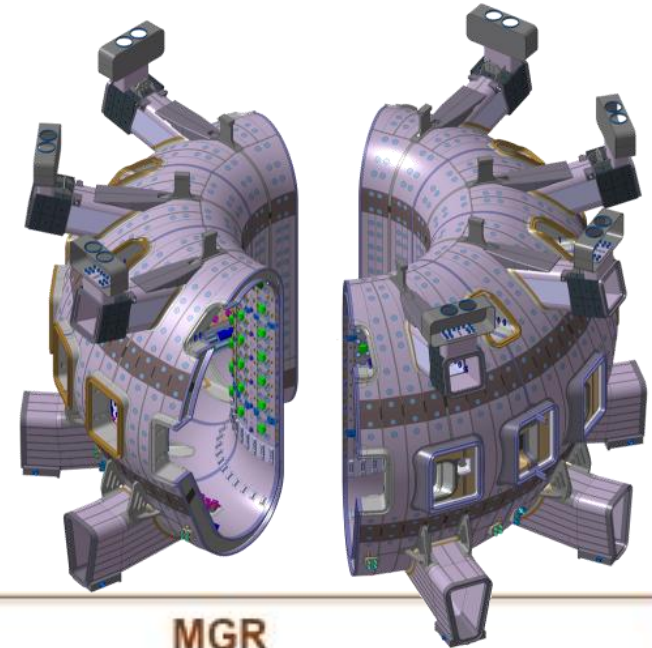
## CONSORTIUM MEMBERS AND WORK SHARING









### Ansaldo Nucleare

Leader of the Consortium is in charge of project management, engineering coordination, Quality Assurance surveillance and Quality Control programs

### Walter Tosto, Mangiarotti

Are the manufacturers of the Consortium, both in charge of the execution of detail engineering, special processes development and manufacturing and test of the sectors



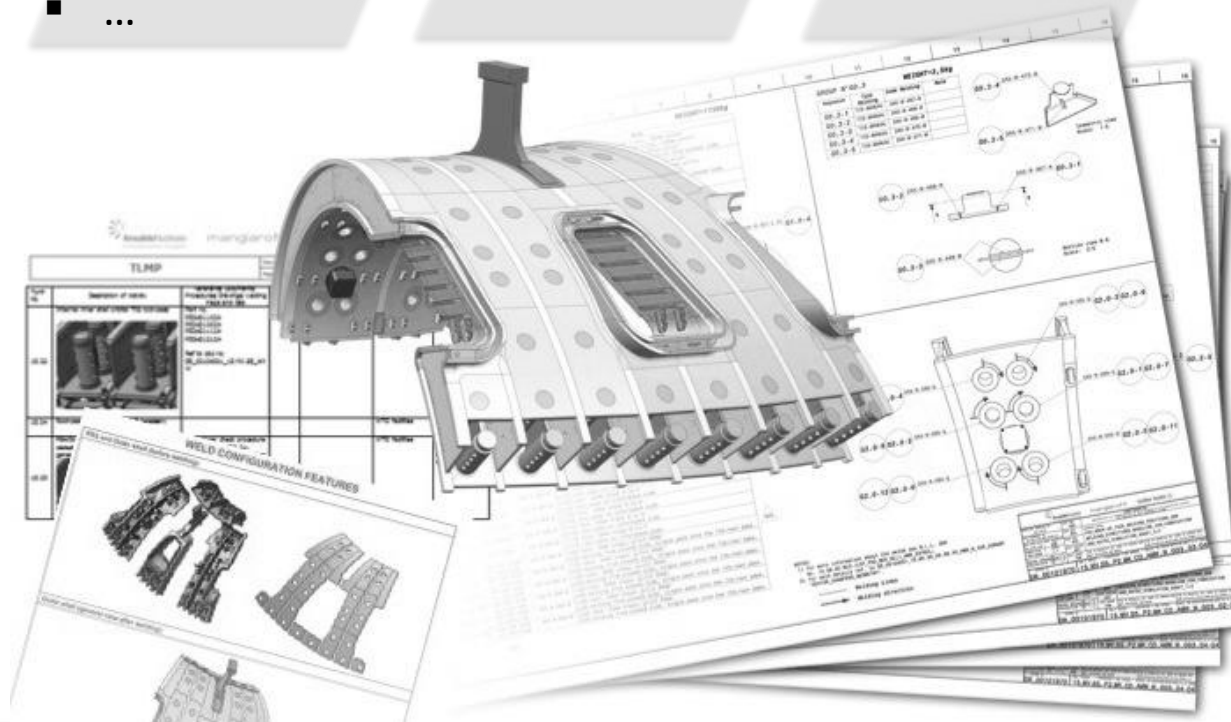
ANN	Shared	WTO		MGR			
							
<b>Stage 1</b>	<b>Stages M</b>	<b>Stages D</b>				<b>Stages F</b>	

## ENGINEERING DEVELOPMENT

- CONCEPTUAL AND DETAILED MANUFACTURING DESIGN
- WELDING BOOK, ATLAS, SEQUENCES
- CONTROL PLAN, INSPECTION PLAN
- TOP LEVEL MANUFACTURING PLAN
- MANUFACTURING AND TEST PROCEDURES
- ...

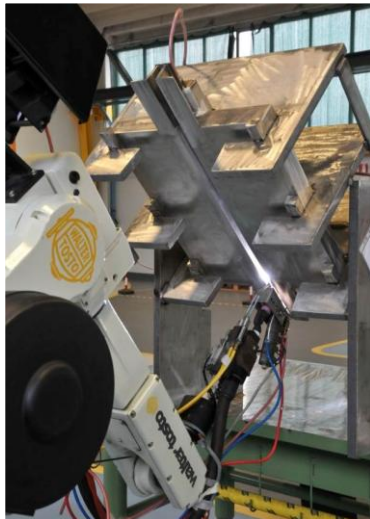
## DEMANDING REQUIREMENTS TO BE COMBINED WITH COMPLEX DESIGN

- MANUFACTURING OF VERY COMPLEX STRUCTURE
- NUCLEAR CODE AND REGULATION STD.
- TIGHT TOLERANCES TO BE ACHIEVED
- VACUUM QUALITY CLASS 2 COMPONENT
- INSPECTION FEASIBILITY OF CLOSED BOX STRUCTURE
- HANDLING OF HEAVY AND UNBALANCED PARTS
- ...

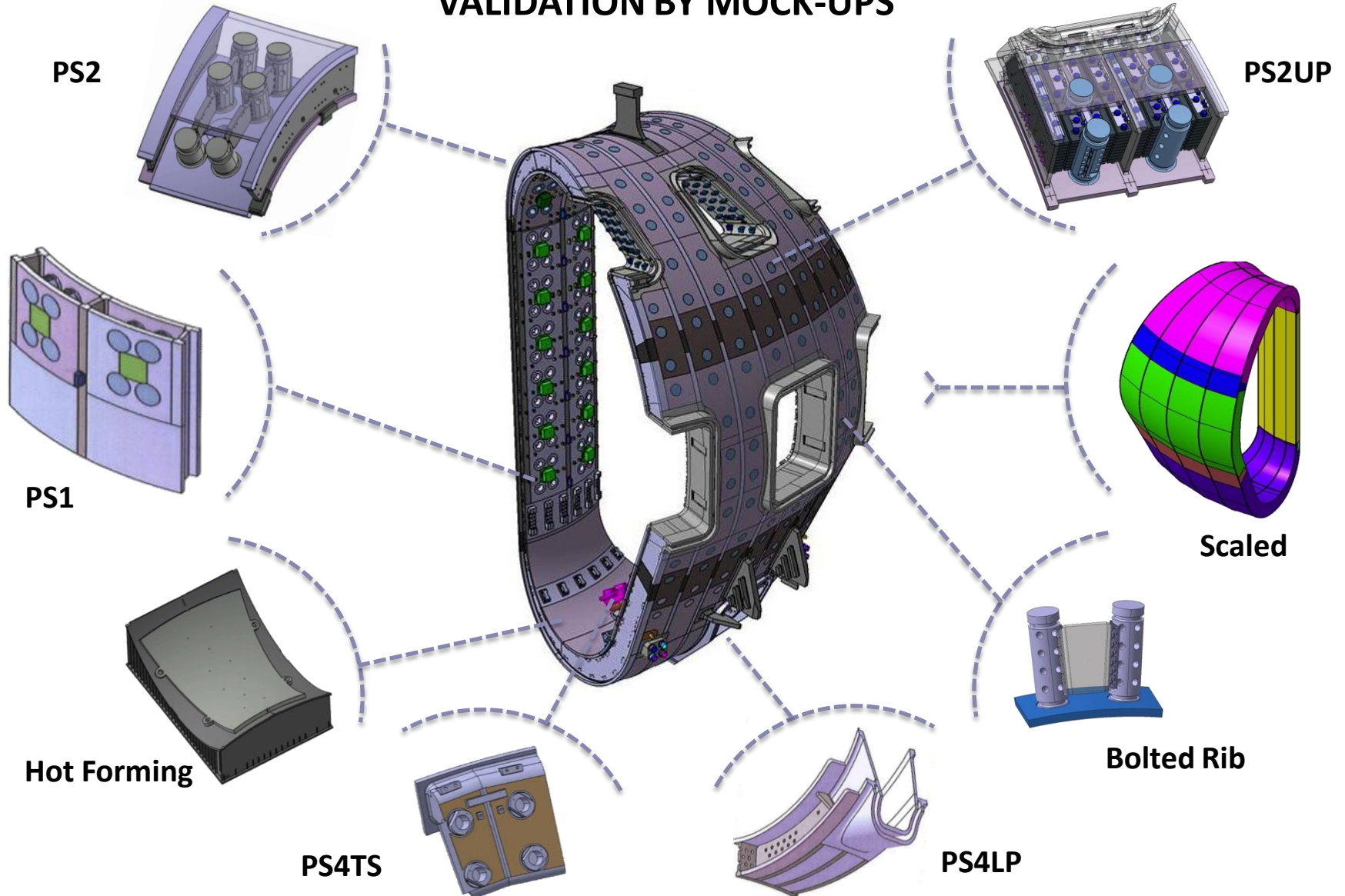


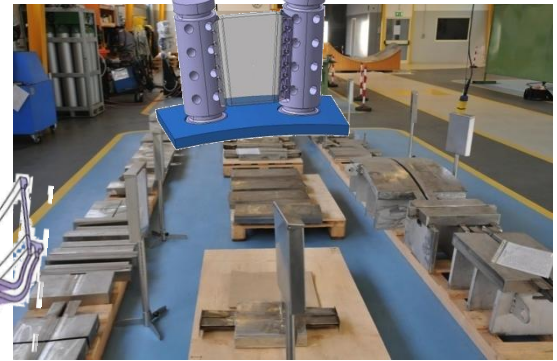
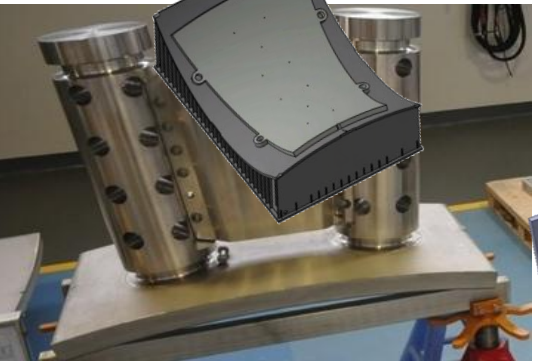
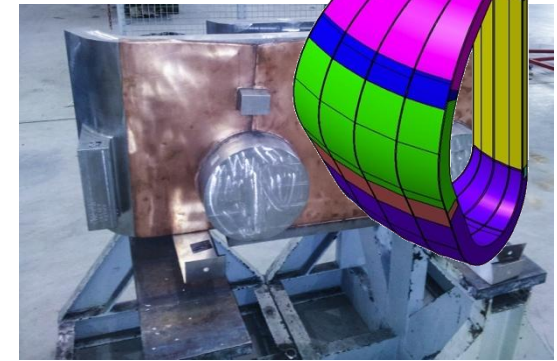
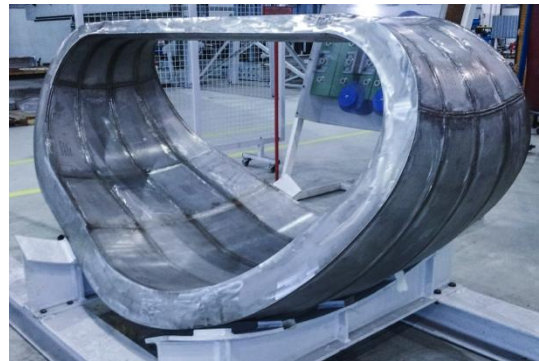
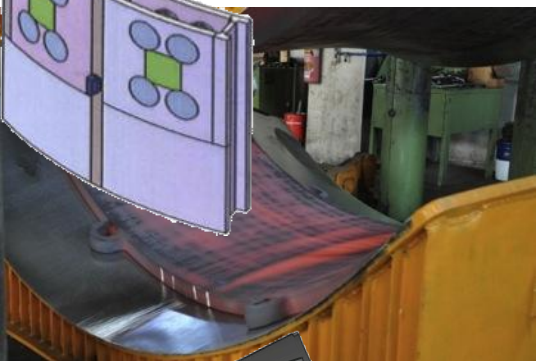
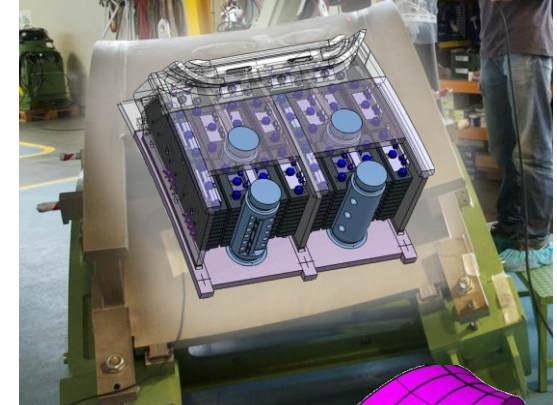
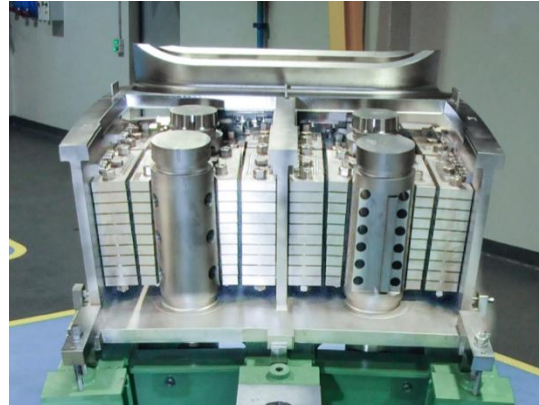
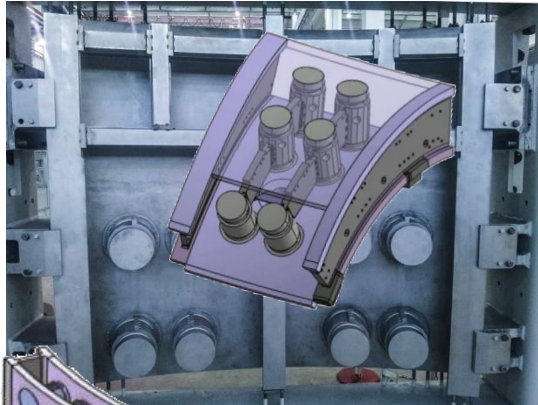
## THE SIX PILLARS OF THE AMW'S MANUFACTURING STRATEGY

1. LEARNING BY PREVIOUS RESEARCH EXPERIENCES
2. PILGRIM STEP
3. USING PIECES IN STABLE CONDITION – 3D HOT FORMING AND SOLUTION ANNEALING
4. MAXIMIZING ELECTRON BEAM WELDING AND LOW HEAT INPUT TECHNIQUES
5. MACHINING JUST BEFORE WELDING
6. NOT CONSTRAINED PIECES



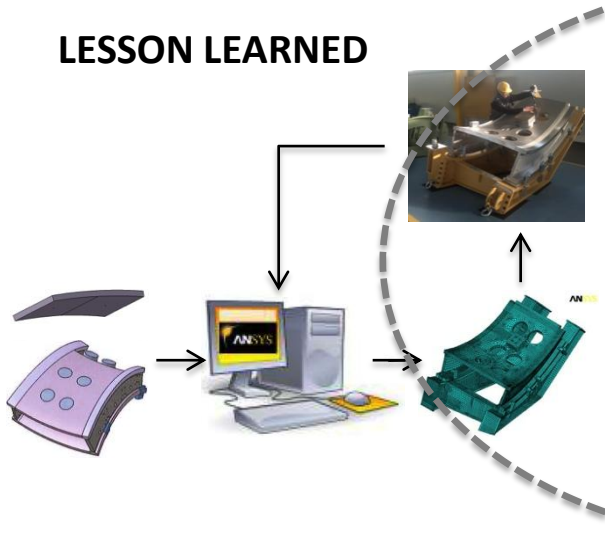
## VALIDATION BY MOCK-UPS





# ROAD MAP TO NEXT STEPS

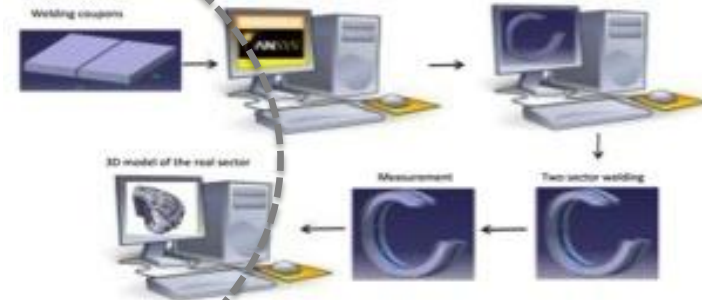
## LESSON LEARNED



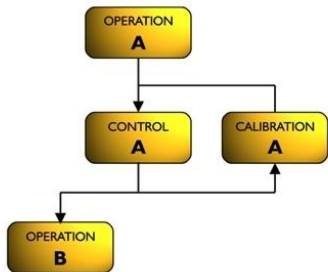
## BACKGROUND



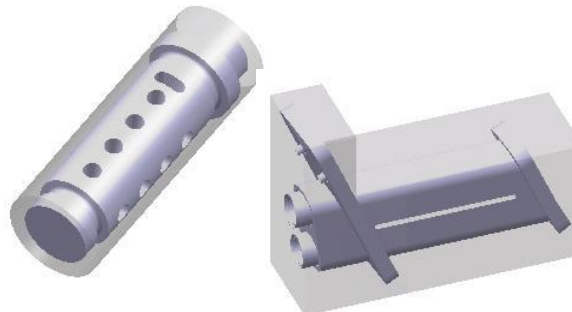
## SIMULATIONS ANALYSIS



## MANUFACTURING ENG



## MATERIAL DWG



## INSPECTION PLAN



Welding of IVC rails	Welding of port stub extensions	Final machining - sector acceptance (4)
20	20 mm	20 mm
10 mm	10 mm	10 mm

## WHERE WE ARE

### ENGINEERING AND QUALIFICATION

- PRE-CONDITION FOR THE START OF MANUFACTURING ACTIVITY ACHIEVED
- ALMOST ALL DOCUMENTS NEEDED FOR THE START OF FABRICATION APPROVED
- MANUFACTURING AND TEST PROCEDURE APPROVED OR CONDITIONALLY APPROVED
- CONCEPT DESIGN S5 APPROVED, DETAIL DESIGN UNDER APPROVAL CYCLE
- MAIN MANUFACTURING PROCESS QUALIFIED
- MANUFACTURING PERSONNEL TRAINED AND READY TO START FABRICATION

### MATERIALS

- ALL MAIN MATERIALS PROCURED FOR S5, S4 AND S3
- PLATES AVAILABLE FOR FIRST ACTIVITIES, SHIPMENT OF REMAINING PLATE UNDER COMPLETION
- FILLER METAL FOR PRODUCTION UNDER FINAL ACCEPTANCE
- HEATS FOR FORGINGS STARTED, DELIVERY OF FORGINGS SCHEDULED FROM JAN '14

### INVESTMENTS

- ALL EQUIPMENT AND WORKSHOP AREA ARE QUALIFIED AND READY FOR OPERATION
- DIES AND JIGS READY FOR THE ACTIVITIES OF THE FIRST TWO YEARS



## A PARTICULAR THANKS FOR THEIR SUPPORT



**FUSION  
FOR  
ENERGY**



pro beam

 **tecnatom**

**NATEC**  
INGENIEROS



## THANK YOU FOR YOUR ATTENTION

