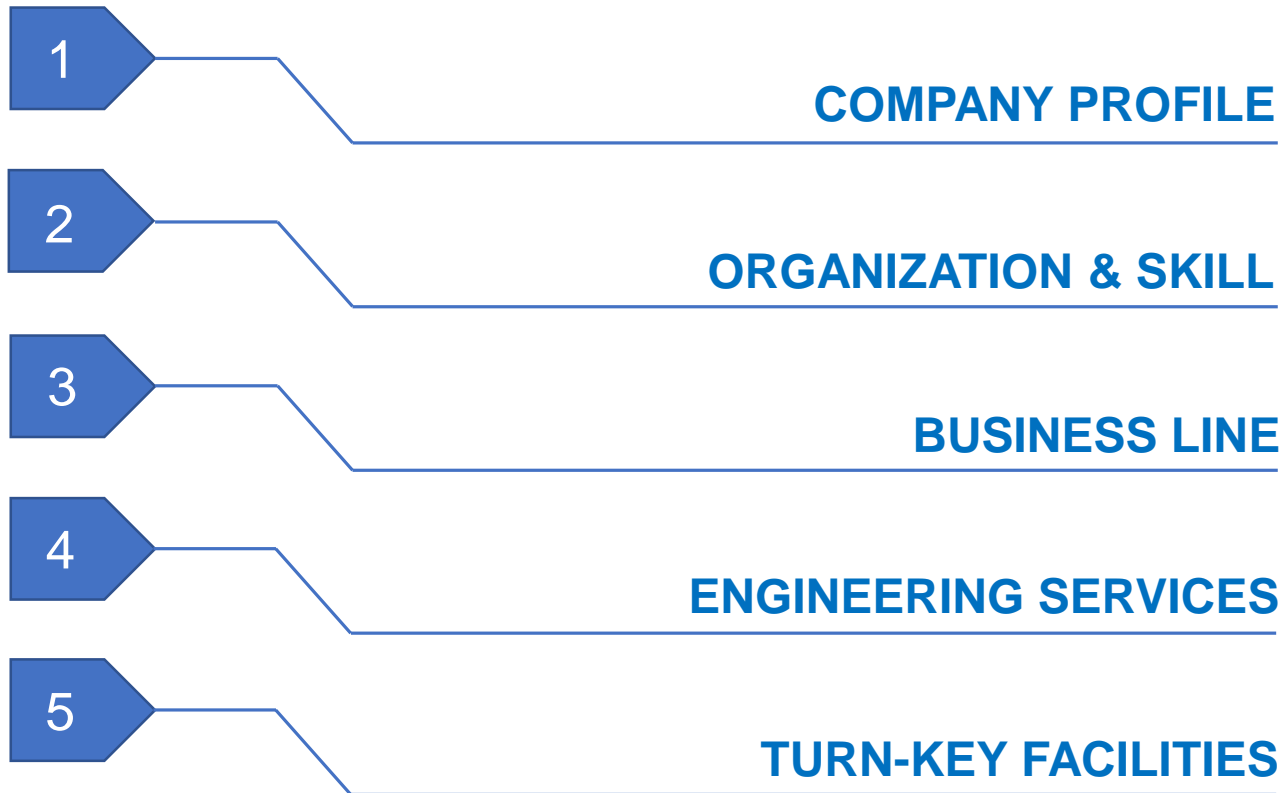


S.R.S. Servizi di Ricerche e Sviluppo S.r.l.

# SRS PRESENTATION

ANTONIO NAVIGLIO  
12.04.2019

# SUMMARY



1

## COMPANY PROFILE



# 1. COMPANY PROFILE

## S.R.S. Servizi di Ricerche e Sviluppo S.r.l.:

- is a SME with a 40-year experience in the field of design and engineering of processes, plants and machineries in several technological sectors mainly in the Nuclear sector.
- offers multidisciplinary engineering services in the design of equipment, systems and civil structures and provides services related to decommissioning activities of nuclear installations and Waste Management.
- supplies, “as turn-key”, components and systems for nuclear application, including complete complex experimental facilities useful to test innovative components, as well as demonstration of component/plant behavior in any operational and accidental conditions.
- belongs to SRS GROUP, which is a cluster of Companies whose characterizing feature is the capability in tackling new and complex engineering problems, always finding a solution, looking at cost effectiveness and at time scheduling.



# 1. COMPANY PROFILE

## S.R.S. GROUP COMPANIES

### **S.R.S. GROUP S.r.l.**

*ROME, ITALY – Vicolo delle Palle, 25-25/B*

### **S.R.S. SERVIZI DI RICERCHE E SVILUPPO S.r.l.**

*ROME, ITALY – Vicolo delle Palle, 25-25/B*

### **SRS USA LLC**

*DELAWARE, WILMINGTON - Corporation Trust Center, 1209 Orange Street*

### **S.R.S. ENGINEERING DESIGN S.r.l.**

*ROME, ITALY – Vicolo delle Palle, 25-25/B*

*TURIN, ITALY - Corso Unione Sovietica, 612/15 A*

*MARANELLO (MO), ITALY - Via Tazio Nuvolari, 55*

*NAPLES, ITALY - Centro Direzionale – Edificio F12*

### **S.R.S. VIRTUAL PROTOTYPING S.r.l.**

*ROME, ITALY – Vicolo delle Palle, 25-25/B*

### **Q PROGETTI S.r.l.**

*ROME, ITALY – Vicolo delle Palle, 25-25/B*

### **CAE TECHNOLOGY S.r.l.**

*TURIN, ITALY - Corso Unione Sovietica, 612/15 A*



# 1. COMPANY PROFILE

## S.R.S. Servizi di Ricerche e Sviluppo

	2016	2015	2014	2013	2012
<b>Personnel</b>	40	30	23	19	16
<b>Yearly Turnover [kEu]</b>	4.440	2.600	2.400	1.960	2.600

## S.R.S. GROUP COMPANY

	2016	2015	2014	2013	2012
<b>Personnel</b>	94	76	70	63	65
<b>Yearly Turnover [kEu]</b>	6.900	8.300	6.600	6.200	4.800



# 1. COMPANY PROFILE



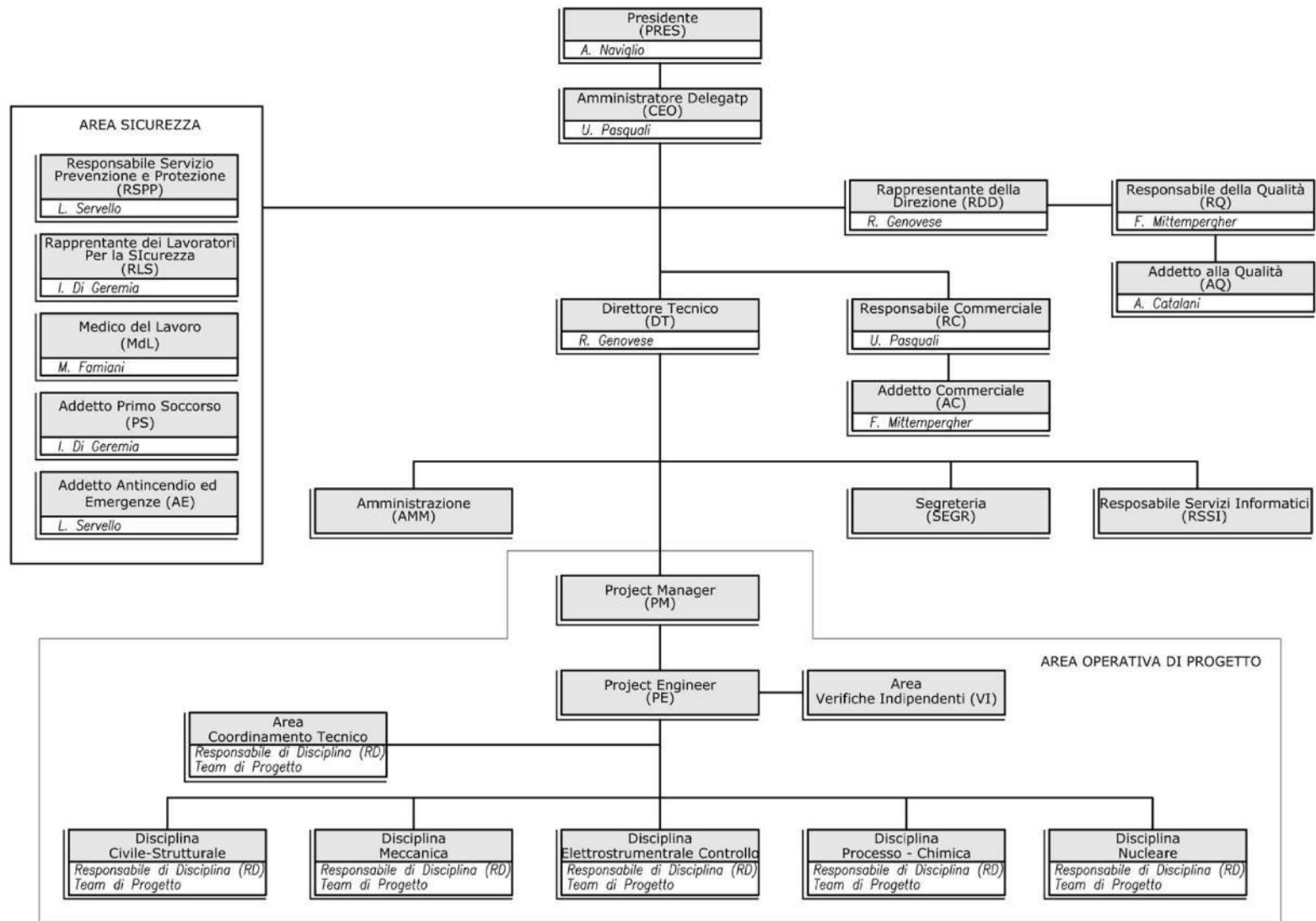
2

## ORGANIZATION & SKILL





## 2. ORGANIZATION & SKILL



## 2. ORGANIZZATION & SKILL

The production capacity of the company has over **70,000 hours/year**, achieved mainly by internal resources.

S.R.S. has the availability of external staff thanks to a proven network of cooperation with the other companies of SRS GROUP and with specialized companies, supported by specific cooperation agreement.

The whole staff (including externals staff) is of the order of some 100 units (more than **175,000 hours/year**).

The technical structure includes **five technical areas or division**. Each area has a technical responsible with a managing role coordinating design activities.

The technical areas are:

- Nuclear;
- Mechanical;
- Civil;
- Electrical;
- Automation.



## 2. ORGANIZZATION & SKILL

### NUCLEAR DIVISION

S.R.S. capabilities deal with all aspects of nuclear safety and radiological protection for nuclear installations, in particular:

- Nuclear installation safety analyses, including:
  - ✓ Identification and selection of initiating events;
  - ✓ Probabilistic, deterministic and hybrid safety assessments;
  - ✓ Calculation of doses and radiological impact on workers and population.
- Criticality and burn-up calculations; fuel loading strategies;
- Reliability analysis of reactivity control systems, power distribution calculation in sub-critical and critical systems, reactivity coefficients calculation;
- Radiation shielding design;
- Evaluation of radiation doses to exposed individuals and population;
- Evaluation of integral radiation dose to materials;
- Fluid-dynamic and thermal-hydraulic calculations, in transient and steady state conditions, in support to core and system design, in operational and accident scenarios.

The analyses are carried out according to international and national standards and rules, namely ANS, ANSI, ASME, IEEE, DOE, NUREG, SMACNA, ISO, IAEA, ICRP, CEI IERC, UNI and UNI EN.



## 2. ORGANIZZATION & SKILL

### MECHANICAL DIVISION

S.R.S. capabilities include:

- process definition, concept analysis and feasibility studies;
- design of complex mechanical systems, as nuclear systems (primary circuit components, reactor auxiliary systems, nuclear and non nuclear), heating, ventilation and air conditioning systems, liquid/solid/gaseous waste treatment facilities, fire-control systems, and mechanical systems in general as per international industrial standards and nuclear safety rules (ASME, ANSI, APIE, IEEE, IAEA, EUR, DIN, UNI EN, ASME AG-1, ISO, NUREG, ANS, etc.);
- structural analyses as per Italian regulation (UNI, PED);
- structural analyses as per US and international nuclear standards (ASME III, ANSI, ASME AG-1, NUREG, ANS);
- non-linear structural analyses;
- preparation of technical specifications, engineering analyses reports, project development time schedules and cost estimates.

Of particular interest are the research and development capabilities (with the realization and testing of prototypes) for the development of innovative components and systems in the areas of robotics, heat transfer and fluid dynamics (innovative HX, valves, etc.).



## 2. ORGANIZZATION & SKILL

### CIVIL DIVISION

S.R.S. capabilities include:

- architectural design;
- reinforced concrete structural design;
- steel structure design;
- structural analyses as per Italian rules and regulations;
- structural analyses as per US regulation (ACI) and nuclear standards;
- non linear structural analyses, static and dynamic (time histories);
- preparation of technical specifications, engineering calculation reports, project development time schedules and cost estimates.



## 2. ORGANIZATION & SKILL

Software	Civil/Structural Discipline		Mechanical Discipline			Nuclear Discipline			Electro-Instrumental Discipline				
	FEM Static Dynamic	2D/3D Modeling	Mechanical / Thermo fluid dynamic verifications	2D/3D Modeling	Space Management	Dose and shielding calculations	Environmental assessment analyses	Criticality	2D/3D Design/ Calculations/ Drawings	Risk of lightning	Calculation lightning Engineering	2D/3D Drawings	Calculation of performance level and security features (PL e)
ABAQUS	X		X										
ANSYS - MECCANICO	X		X										
NASTRAN	X		X										
SAP2000	X		X										
STRAUS7	X		X										
TNO-DIANA	X		X										
ANSYS – CFD (CFX E FLUENT)			X										
CSC			X										
GT STRUDL			X										
HYPERWORKS ALTAIRE HYPERMESH	X		X										
HYPERWORKS ALTAIRE OPTISTRUCT	X		X										
HYPERWORKS ALTAIRE LS DYNA	X		X										
HYPERWORKS ALTAIRE RADIOS	X		X										
CMP Analisi strutturale	X												
PARATIE Plus	X												
PV ELITE			X										
LABVIEW (NATIONAL INSTRUMENT)									X				
SOLID WORKS				X	X								
REVIT		X		X	X								
3D S.MAX		X											
RECAP		X											
AUTOCAD FULL		X		X								X	
AUTOCAD ARCHITECTURE		X											
AUTOCAD MEP				X									
ALLPLAN Ingegneria		X			X								
CATIA		X		X									
TEKLA STRUCTURES		X											



## 2. ORGANIZZATION & SKILL

Software	Civil/Structural Discipline		Mechanical Discipline			Nuclear Discipline			Electro-Instrumental Discipline				
	FEM Statica Dynamic	2D/3D Modeling	Mechanical / Thermo fluid dynamic verifications	2D/3D Modeling	Space Management	Dose and shielding calculations	Environmental assessment analyses	Criticality	2D/3D Design/ Calculations/ Drawings	Risk of lightning	Calculation lightning Engineering	2D/3D Drawings	Calculation of performance level and security features (PL e
AVEVA EVERYTHING3D		X		X	X								
AVEVA PDMS		X		X	X								
AVEVA P&ID												X	
SOLID EDGE SIEMENS				X	X								
CREO (PRO E.)				X	X								
PIPESTRESS			X										
MCNP*						X		X					
SCALE						X		X					
FRAMES							X						
MICROSHIELD						X							
MICROSKY SHINE						X							
AMPERE Professional									X				
Progetto Integra-EXEL									X				
FLASH										X			
DIALUX											X		
Abb DOC										X			
SISTEMA (IFA)													X
NAVISWORK FREEDOM					X								
NAVISWORK SIMULATE					X								
SHOWCASE					X								
ASHRAE Duct Fitting Database			X										
TFM (WATTS-CAZZANIGA)			X										
EDILCLIMA RETI GAS			X										
EDILCLIMA ANTINCENDIO			X										
PRIMUS			X										

\* Inclusi pre e post processori: VISED, SABRINA



3

## BUSINESS LINE





# 3. BUSINESS LINE



## ENGINEERING SERVICES

Turnover: > 9 MEu in the last 5 years



## OWNER ENGINEER

Turnover: 1 MEu in the last 5 years



## TURN-KEY FACILITIES

Turnover: > 5 MEu in the last 5 years



### 3. BUSINESS LINE

In the last years, the specialist ENGINEERING services of S.R.S. GROUP have focused on the following areas:

- DECOMMISSIONING of nuclear power plants and of fuel cycle research facilities;
- NUCLEAR WASTE MANAGEMENT;
- INTERIM NUCLEAR WASTE DISPOSAL and FINAL NUCLEAR WASTE DISPOSAL;
- Design, development and construction of GENERATION III and GENERATION III+ nuclear power plants;
- Development activities (design and R&TD) of FUSION REACTORS, GENERATION IV nuclear power plants (with reference to SFRs, LFRs and GFRs) and FUEL CYCLE systems.

The Owner Engineer Services are developed in the same fields.



4

## ENGINEERING SERVICES



# 4. ENGINEERING SERVICES

**Project**      **Design and erection of a facility for the treatment of solid contaminated materials arising from dismantling activities**

**Country:**      Italy

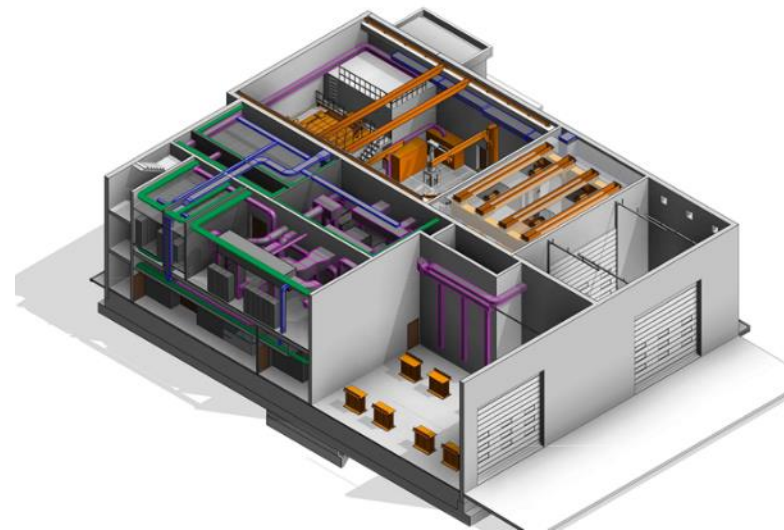
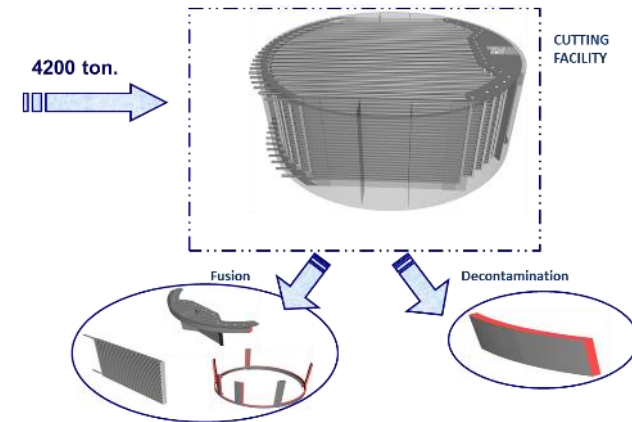
**Client :**        So.G.I.N.

**Partner:**      An Italian Consortium

**Contract value:** 12.0 MEU

**SRS C.V.:**      550 kEU

**Scope:**        Design



# 4. ENGINEERING SERVICES

Project: **Design, Equipment supply, Installation, and commissioning of SICOMOR Plant**

Country: Italy

Client : So.G.I.N.

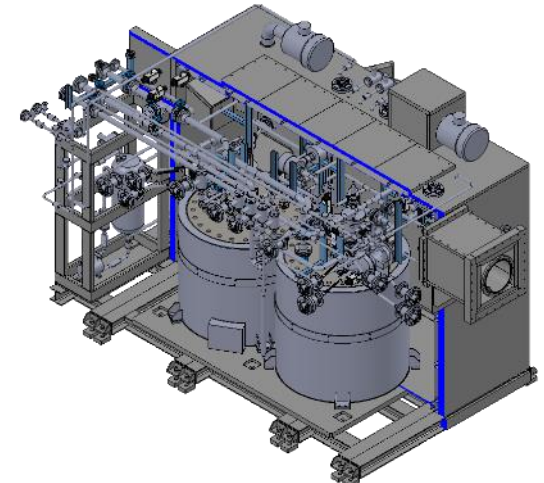
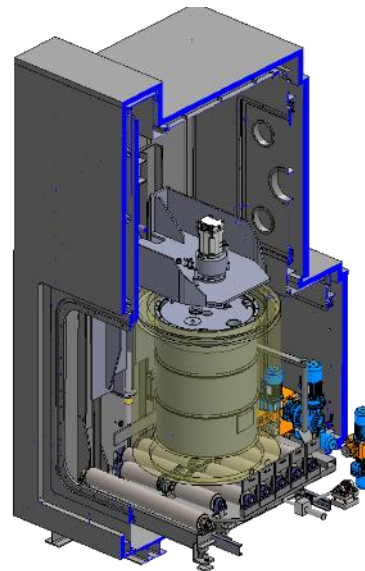
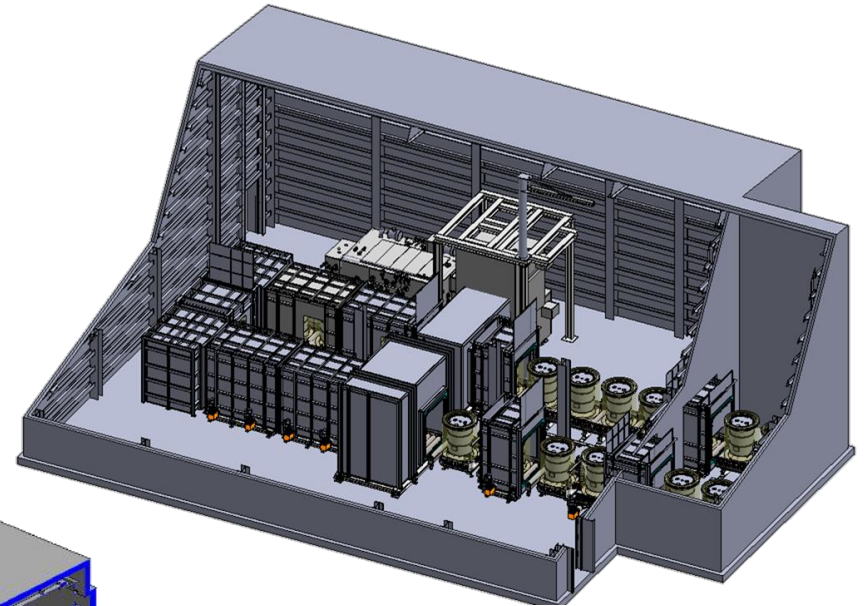
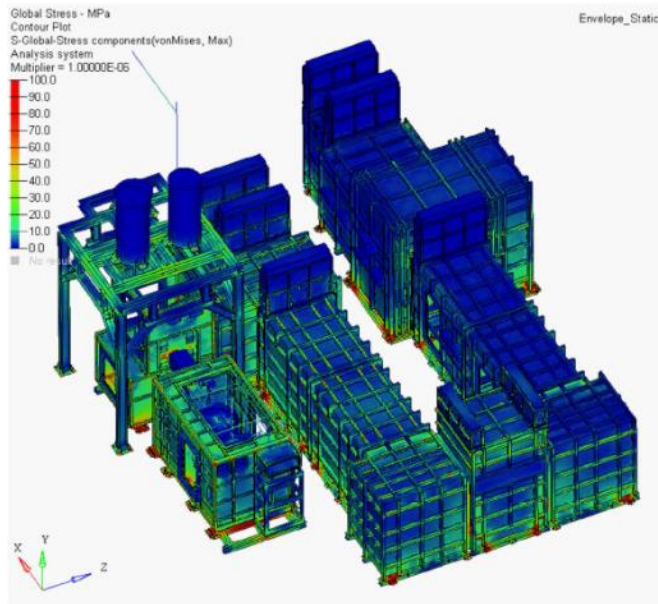
Partner: Consorzio RESEARCH

Contract value: 12,0 MEU

SRS C.V.: 1 MEU

Scope: Design

ANALISI STATICA (1.3 PERMANENTE +/-1.5 TERMICA)





# 4. ENGINEERING SERVICES

Project: Numerical analysis for design validation of TN24ER Cask for transportation and storage conditions

Country: Italy

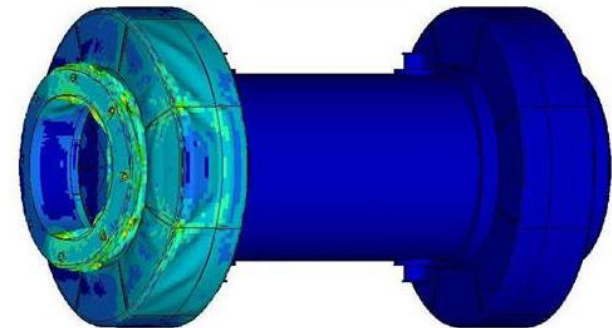
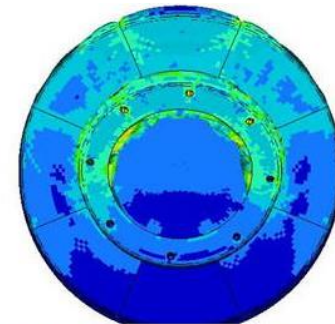
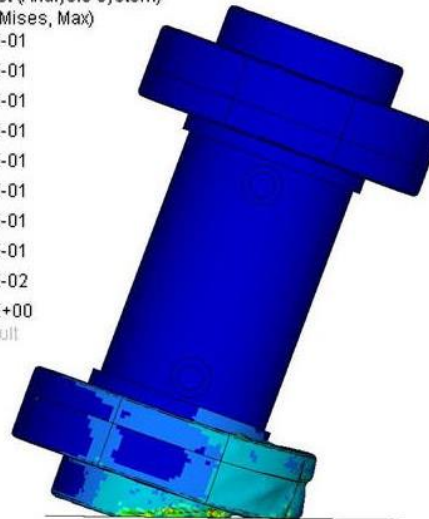
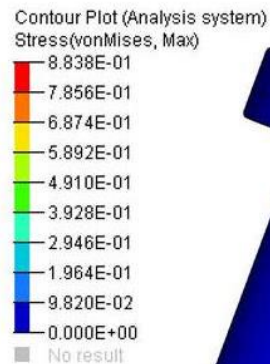
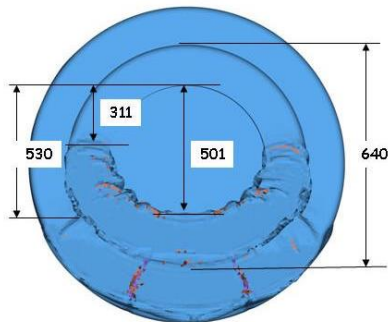
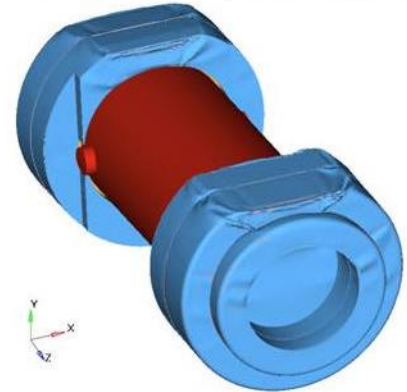
Client : So.G.I.N.

Partner:

Contract value: 250 kEU

SRS C.V.: 250 kEU

Scope: Cask verification by analysis



# 4. ENGINEERING SERVICES

Project: **Numerical analysis for design validation of Container for transportation and storage conditions**

Country: Italy

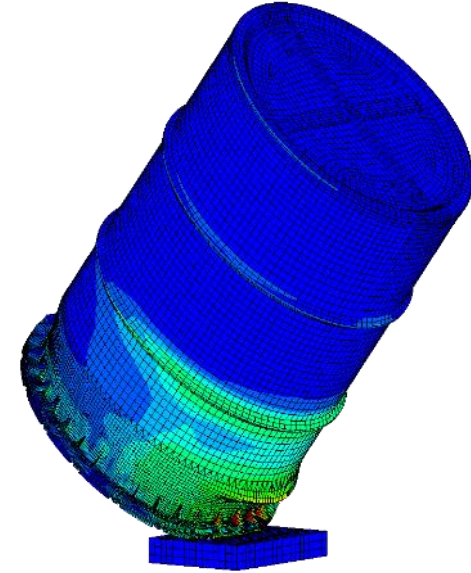
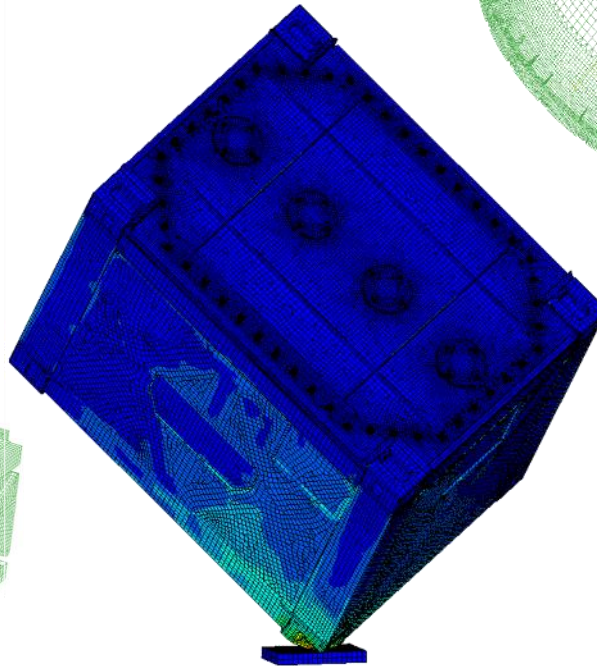
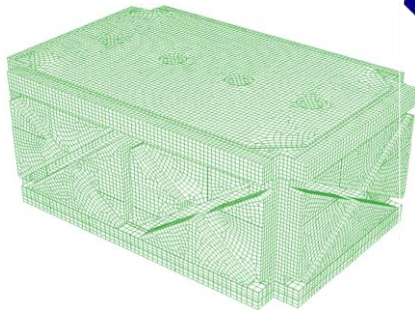
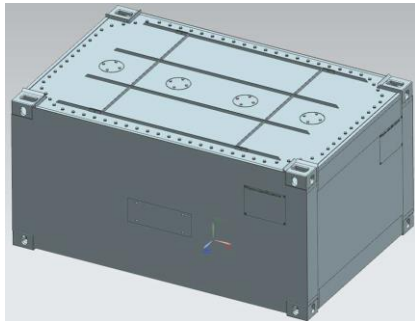
Client : So.G.I.N.

Partner:

Contract value: 200 kEU

SRS C.V.: 200 kEU

Scope: IP-2 Container verification by analysis



## KEY POINTS

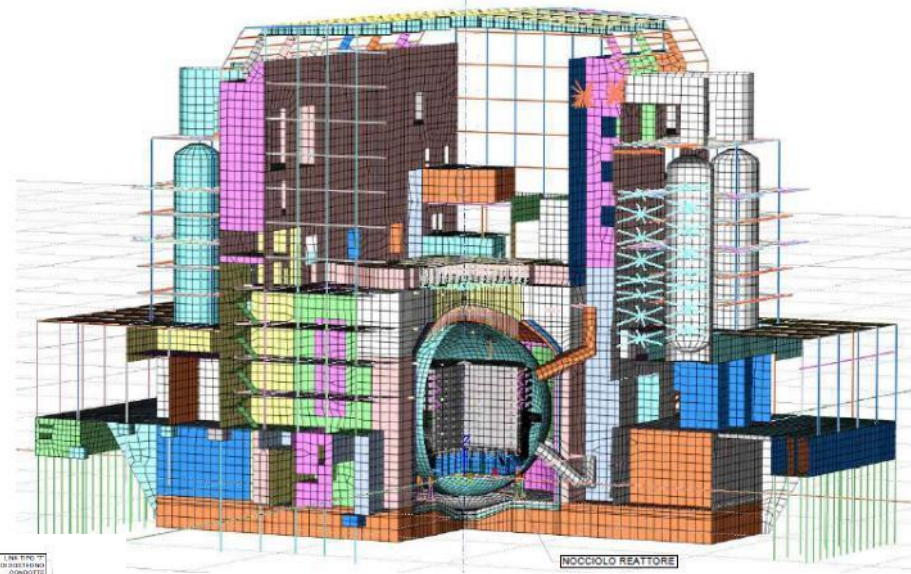
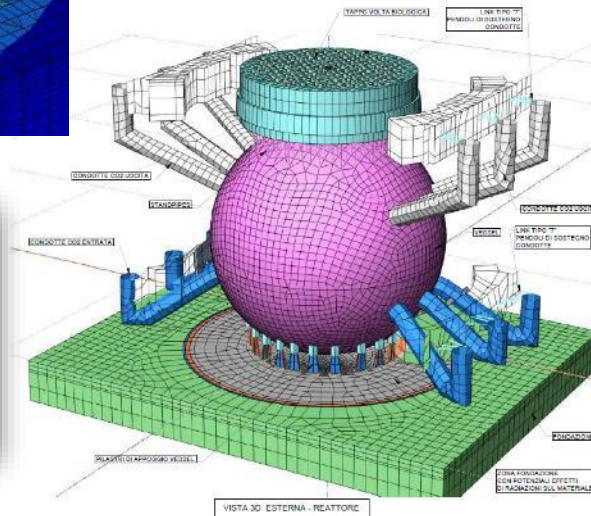
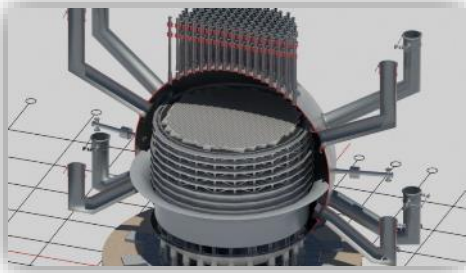
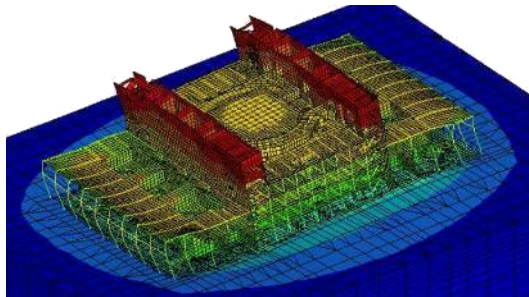
- Non Linear Numerical Analysis for different impact condition
- Software: Abaqus CAE/Esplicito
- FEM Model: 411063 nodes and 337862 elements





## 4. ENGINEERING SERVICES

Project:	Latina NPP - Reactor building (RB) seismic vulnerability evaluation
Country:	Italy
Client :	So.G.I.N.
Partner:	
Contract value:	600 kEU
SRS C.V.:	600 kEU
Scope:	IP-2 Container verification by analysis



## GENERAL DATA OF THE FE MODEL:

Ntot. Elem	=	235350
Ntot. Joint	=	233307
N. Solid Elem	=	84824
N. Shell Elem	=	131115
N. Rigid Elem	=	54
N. 1D Elem	=	12948
N. Masses	=	5341
N. Link	=	1068
<b>TOT</b>	<b>=</b>	<b>235350</b>

## SOFTWARE:

## PRE PROCESSING:

- HYPERMESH 10.0 (Altair)
- Fx+ FOR DIANA

### POST PROCESSING:

- TNO DIANA (Main Software)
- ABAQUS STANDARD  
( Independent check )





# 4. ENGINEERING SERVICES

Project: **ITER - Numerical Analysis on First Wall Panel and First Wall Modules**

Country: France

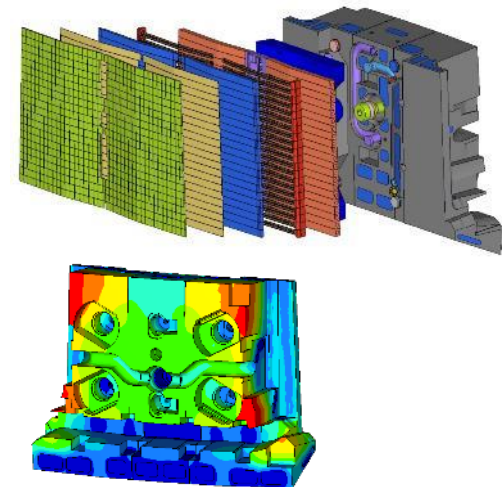
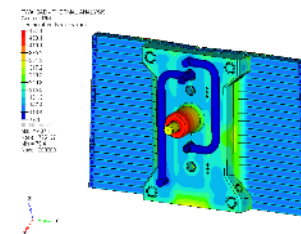
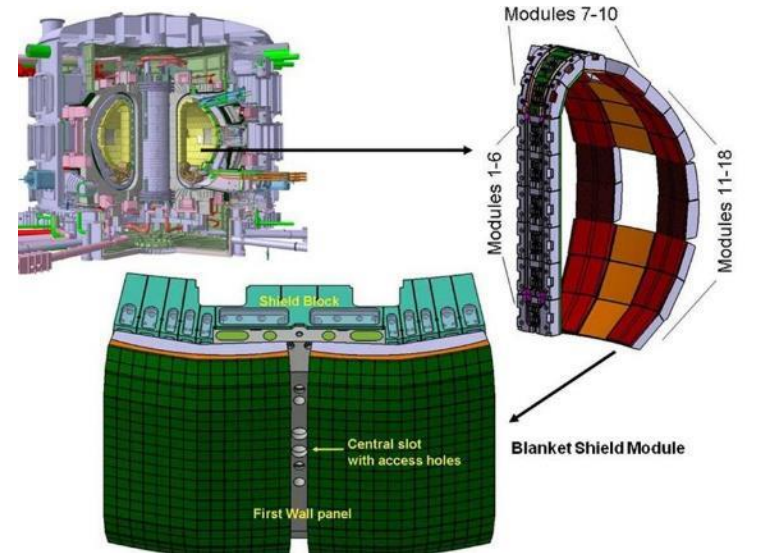
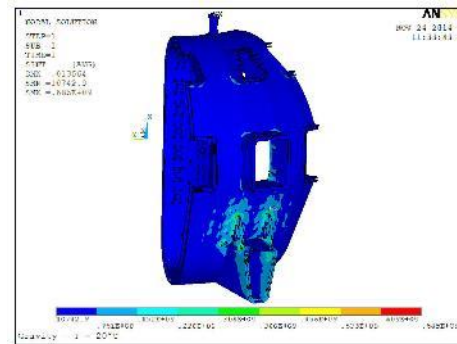
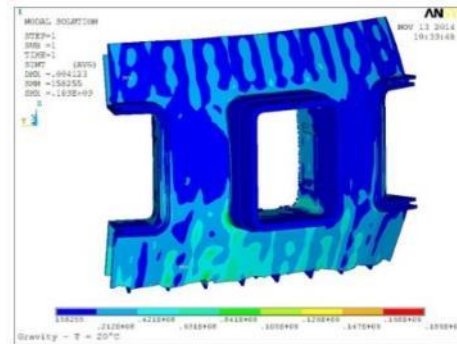
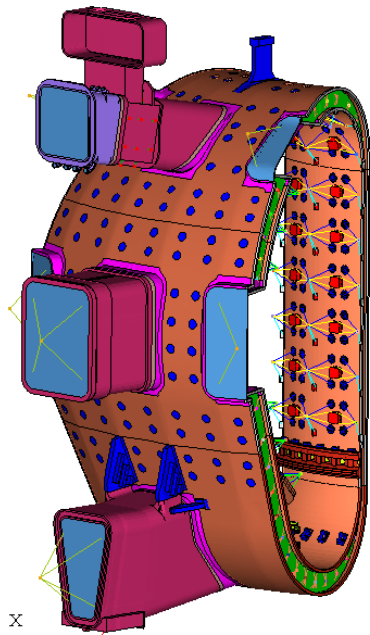
Client : F4Energy

Partner: SRS Engineering Design

Contract value: Framework Contract

SRS C.V.: Framework Contract

Scope:



5

## TURN-KEY FACILITIES



# 5. TURN-KEY FACILITIES

**Project:** China Lead-Bismuth Experimental Facility (2,5MW)  
**Country:** CHINA  
**Client :** INEST  
**Partner:** ENEA  
**Contract value:** 5,260 MEU  
**SRS C.V.:** 3,475MEU  
**Scope:** Design, Fabrication, Equipment Supply, and Installation on site



## KEY POINTS



Biggest LBE facility design, construction and installation

220 ton LBE inventory in the Main Vessel

2,5 MW Core Simulator electric power

Equipment validation

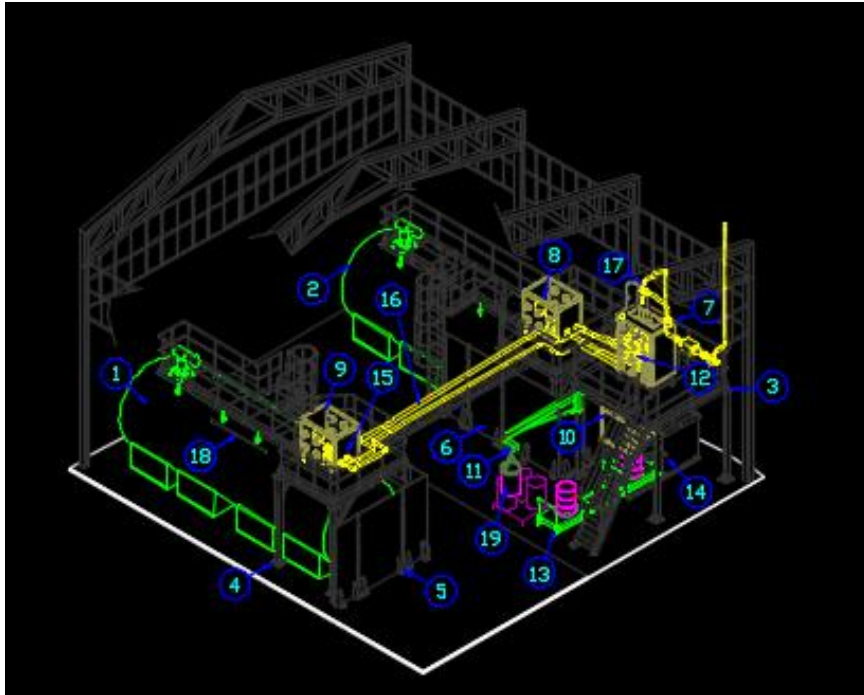
Safety Assessment for first Chinese LFR





# 5. TURN-KEY SUPPLIES

Project: **Process Circuit for radioactive liquids**  
Country: ITALY  
Client : ISPRA JRC  
Partner: DEMONT Spa  
Contract value: 550 kEU  
SRS C.V.: : 197 kEU  
Scope: Design, Fabrication, Equipment Supply,  
and Installation on site



## KEY POINTS

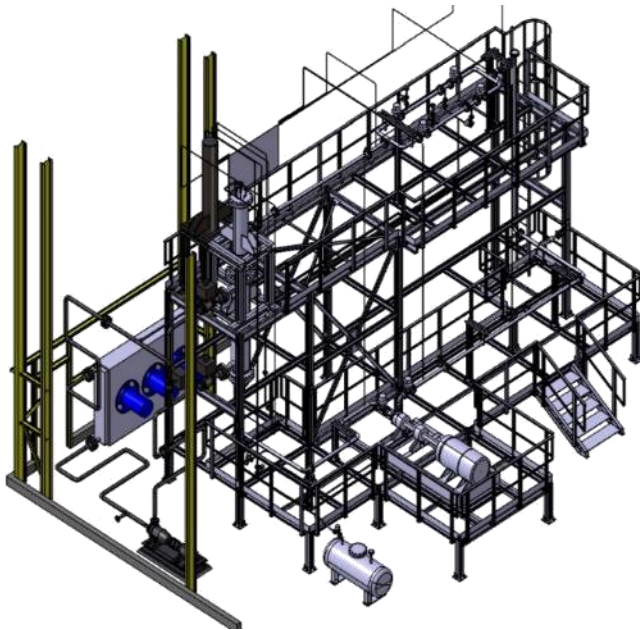


Reception and storage of liquid waste up to 60 m<sup>3</sup>  
Mixing and sampling of the liquid waste  
Static and dynamic confinement of the loop



# 5. TURN-KEY FACILITIES

Project: **Heavy Liquid Metal Experimental Loop for Advanced Nuclear Applications (HELENA)**  
Country: ITALY  
Client : ENEA  
Partner:  
Contract value: 476 kEU  
SRS C.V.: : 476 kEU  
Scope: Design, Fabrication, Equipment Supply, and Installation on site



## KEY POINTS



LBE facility design, construction and installation  
Multipurpose Facility  
250 kW electric power  
Equipment&Code validation  
Material corrosion test

