

# BU PCM

## Strategic products & solutions

September 2021

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# SUMMARY

**01 .** BU PCM Presentation

**02 .** BU PCM Business Diversification

# ID Card of the BU Projects & Components



## OUR DNA

**Design and manufacture heavy and mobile components for nuclear power plants**

- Security | Quality | Safety
- Pilot equipment projects
- Execute/lead our projects
- Provide value to our customers
- Support customers on their sites
- Develop expertise

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## PRODUCTS & SERVICES



### Forgings and castings

- Forged parts for the primary loop nuclear components made in steel, carbon or stainless steel
- Large dimensions molded parts (primary pump casing)
- Forged parts for containers or other markets (defense)
- R&D, process engineering teams
- Le Creusot – 331 employees



### Heavy components

- Manufacturing of vessels, steam generators and pressurizers for nuclear power plants
- Primary loop pipes manufacturing
- Saint-Marcel - 783 employees



### Mobile Components

- R&D Design and manufacturing of reactor coolant pump and control rod drive mechanism (new builds and spare parts)
- In-house test lab
- Jeumont- 475 employees



### Large projects

- Management and execution of new building projects of nuclear reactors for the scope N4S and major projects of components replacement
- EPC skills for all the nuclear scope
- Projects communities– 279 employees

## KEY FIGURES



**Workforce**

**1884 ETP**



**R&D | INNOVATION**

**Budget : 10 M€**  
**24 main R&D projects**

# LE CREUSOT MANUFACTURING

Reference No: A1632

**Heavy forged parts for PWR and BWR components**

Reference No: A1723

**Component parts for casks for fuel assemblies and nuclear products transportation: design, manufacturing, qualification**

Reference No: A1724

**Technical centers Le Creusot: forging activities characterization, carbon segregation analyses, training – Accredited COFRAC**



# The widest range of forgings and castings for the nuclear market

## Stainless steel forgings and castings



Core Barrel



Core/Plate



Pump Casing



Elbows



Cold Legs



Hot Legs

## Carbon steel forgings



Pressurizer  
bottom Head



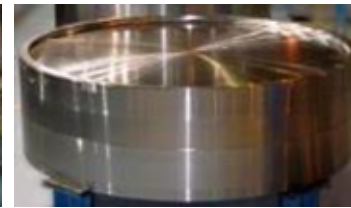
Monoblock reactor  
vessel closure Head



Reactor vessel  
shells



Lower shell



Tubes sheet



Steam generator  
primary Head



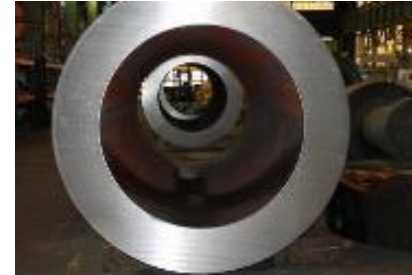
# Forgings for storage and transport of used fuel



Forging



Container



Container after sawing of  
testing washers



Non destructive testings

# Saint-Marcel Manufacturing

Reference No: A1009

**Major NSSS components manufacturing: forging, casting and machining of heavy components for new builds**

Reference No: A1729

**St Marcel milling and hot spinning capacities: components manufacturing**

Reference No: A1727

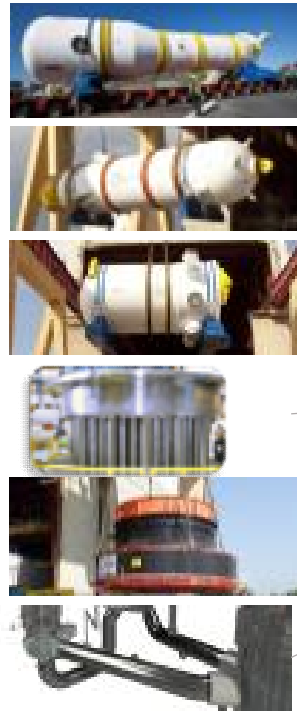
**Technical centers St Marcel mechanical calculation codes for all NSSS types and components: design, modelization and conception**

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# 680 heavy components manufactured for 106 reactors in 11 countries



	Manufactured	In progress
Steam Generator-GV	362	49
Pressurizer	75	2
Reactor vessels with closure head	82	2
Internal vessel	82	2
Replacement closure head	79	2
Primary loop pipes		2
	<b>680</b>	<b>59</b>

# JEUMONT MANUFACTURING

Reference No: A1003

**Control Rod Drive Mechanisms for new  
NPP**

Reference No: A0148

**Reactor coolant pumps (RCP) supply new  
builds projects**

Reference No: A1722

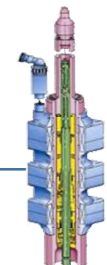
**Technical centers Jeumont: mechanical  
characterization, tensile testing, training -  
Accredited COFRAC**

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# Very high level of technology for the Nuclear and Defense markets



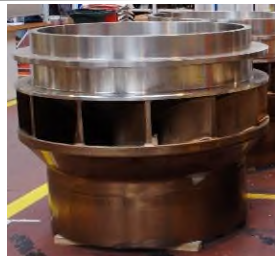
## Reactor coolant pump : machining, welding, assembly, control



Motor



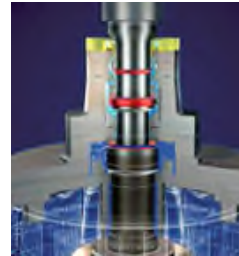
Shaft



Diffuser



Bearing shoes



Mechanical seal

## Applications for the defense market



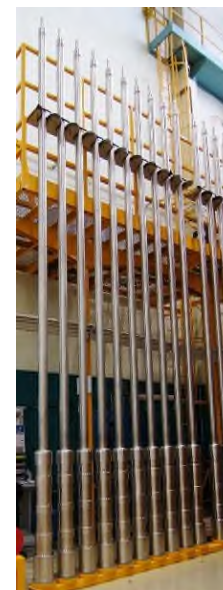
Navy pumps



Control rod guide tube: pans and 1/2 sleeves



## Control rod drive mechanism



Full mechanism installation



Pawl



Coil

# BU PCM

**Business diversification**

# COMPONENTS DIVERSIFICATION

In line with business development strategy, BU PCM is looking for diversifying workshops business.

The targeted markets are:

- VVER
- CANDU
- LARGE DIAMETER PIPES
- DIFFERENT PURPOSE OF METAL WORKING



# VVER Components

PCM ready to help VVER operators

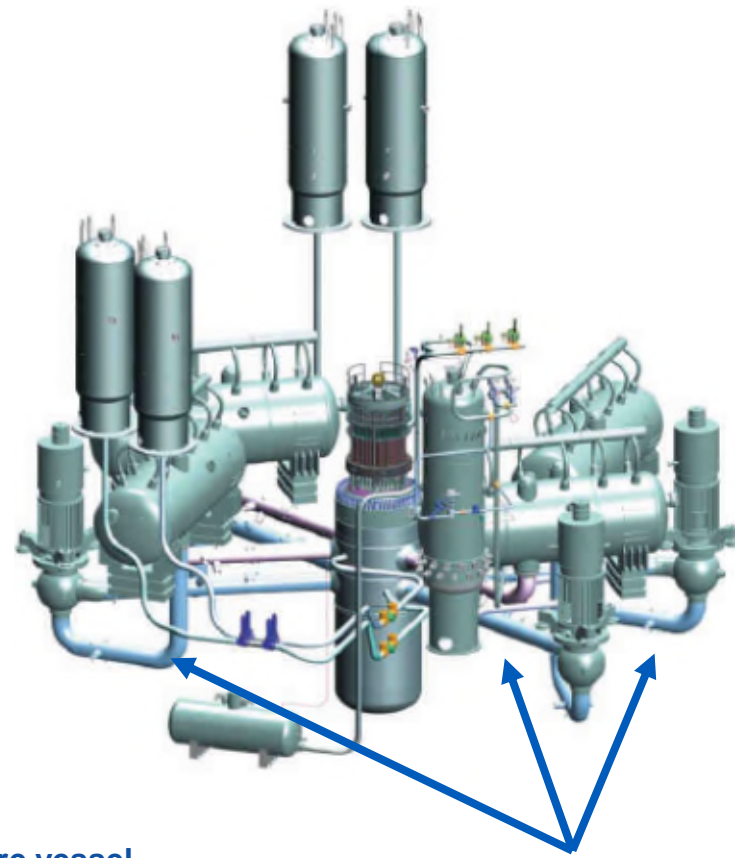


Pumps adapted to VVER



Forgings

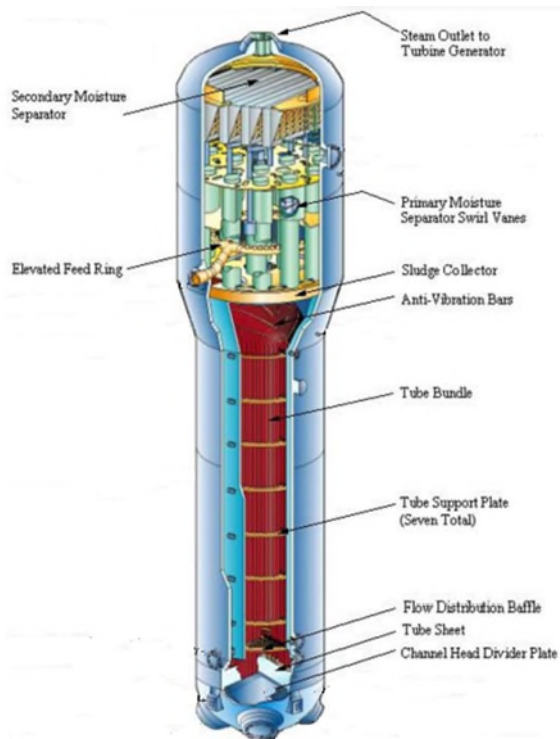
Reactor pressure vessel



Primary loops

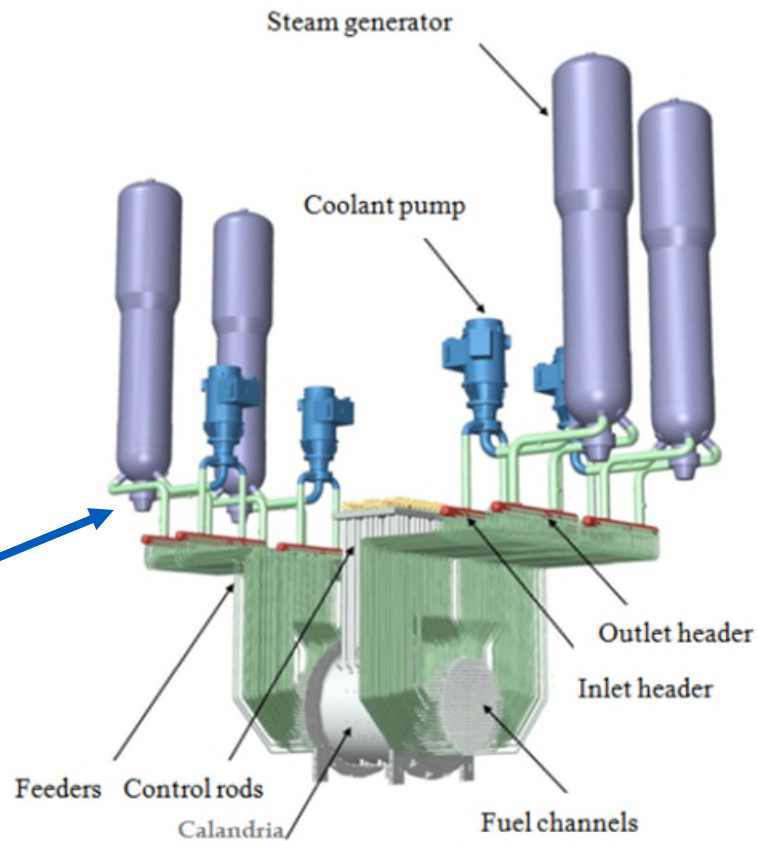
# Candu Components

PCM ready to help Candu operators



Steam generators

Primary loops



# Large diameter pipes

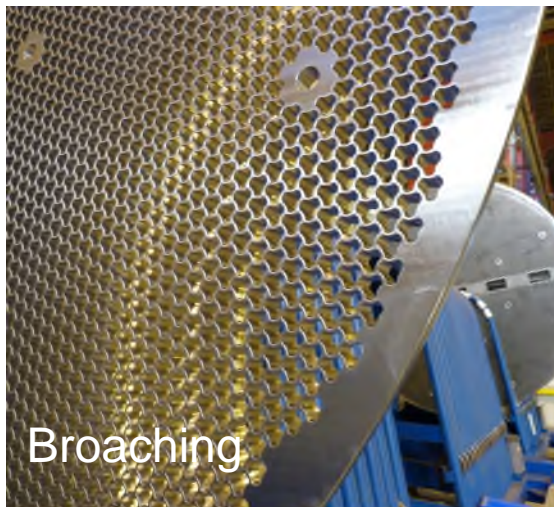
- Made out of forged tubes with or without integrated nozzles
- Dimensions range:
  - Diameter from 800mm to 1100mm
  - Thickness from 50mm to 150mm
  - Length from 1000mm to 10000mm





# On purpose Metal working

## Complex components

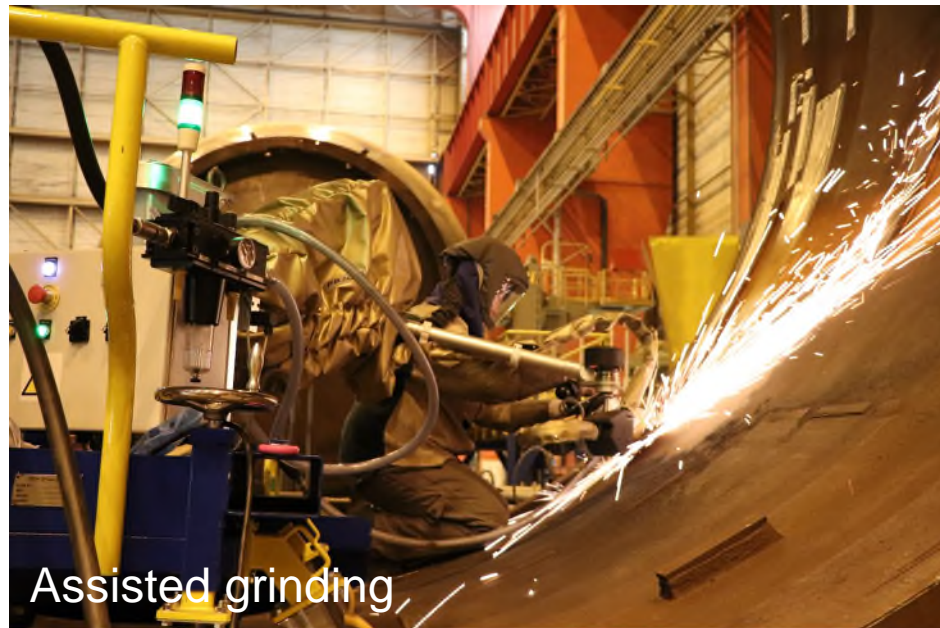


# On purpose Metal working

## Robotized applications



Welding

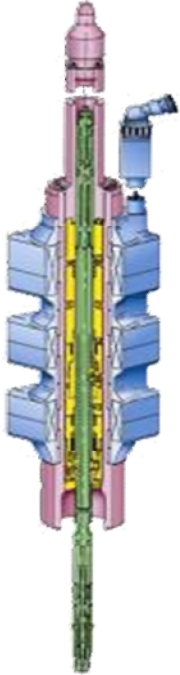


Assisted grinding



# MOBILE EQUIPMENT SPARE PARTS

# DESIGN AND MANUFACTURER OF SPARE PARTS



Jeumont is able to:

- ✓ Study OEM and non-OEM spare parts for mobile components
- ✓ Propose technological and regulatory upgrades
- ✓ Produce and deliver the components

Wheels, diffuser, shafts, stator, rotor, seals, bearings, BT, stops, coupling, as well as all mounting accessories

Supplier of spare parts for the interchangeable CRDM with OEM or non OEM (ESP, EEM, coils, control rod, etc.)

**Any mobile spare parts needs, contact us !**



Control rod drive mechanism (CRDM)

Reactor coolant pump (RCP)

# SMALL MODULAR REACTORS

# Small Modular Reactor

Reference: TechnicAtome (TA), our current customer for RPV SMR solution.

## Our possible contributions

- Anticipated Preliminary Design:
  - Identification of possible optimizations of the design
  - Feasibility study of component design from the manufacturing point of view
- Detailed Design:
  - Analysis of the detailed design and recommendations thanks to calculation studies
  - Optimization of design from manufacturing point of view and development of technical & process solutions
- Component process engineering & manufacturing
- Framatome, thanks to its proprietary workshops, can evaluate industrialization effort of SMR projects

**Whatever the regulation, whatever the project stage,  
Framatome will make the project to bridge the gap with  
industrial reality**

SMR Nuward  
RPV in yellow



Nuscale (USA)



# DIGITAL SOLUTIONS



# DIGITAL SOLUTIONS



Your performance  
is **our** everyday **commitment**

## PCM developing a Digital Business:

- Relying on a growing catalog of Digital Solutions



### PCM

- › Digital solutions
- › Mobile Equipment Services (RCP and CRDM)
- › New Builds / GEN4 & Advanced Reactors
- › Products for Non-Nuclear Industries

PRODUCT NAME	BU	MARKET AREA(S)
<b>PUBLIC</b> A3003 : Additive Manufacturing for components design & manufacturing	PCM	Framatome advantage; Advanced reactors; New plant
<b>PUBLIC</b> A3005 : Machining and milling advanced simulation and training centre	PCM	Framatome advantage; New plant
<b>PUBLIC</b> A3002 : Mechanical calculations tool development	PCM	New plant; Framatome advantage; Advanced reactors
<b>PUBLIC</b> A3004 : Process simulation services	PCM	New plant; Framatome advantage; Advanced reactors
<b>PUBLIC</b> A3001 : Remote Inspection Service	PCM	Plant in operation; Plant's long term operation; Framatome advantage

- And, ready to help customers for their needs or digital transformation

# | Machining Simulation Center

## | Illustration



## | Features

- Complete training simulator (e.g. machining) coupling:
  - A fully representative operating panel, paired with a simulation and visualization engine, and
  - An interactive screen, that displays the image and true movements of the machining center

## | For which customers ?

- Every industry working on special processes
- National Education
- Training Centers

## | Our competitive advantages

- Knowledge of special processes
- Develop with and for Framatome production teams
- Fully representative of actual equipment

## | Obstacles to development

- Ability to realistically all manufacturing processes (e. manual welding)

## | Customer Benefits



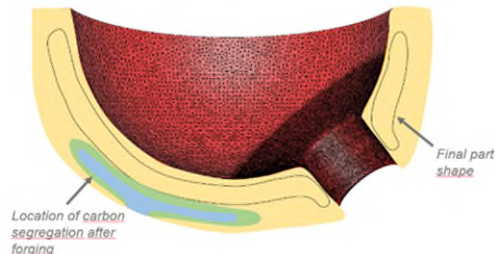
- Access to training facilities at lower costs
- Scalable training tool



- Simplify management of training schedules and validation of skills

# | Process simulation services

## | Illustration



## | Features

- Metallurgical expertise service for forging processes
- Production follow-up service (single part or series):
  - First part follow-up and simulation
  - Instant simulation with real production parameters
  - Serial parts comparison with first one thanks to process simulation
- Manufacturing program optimisation service

## | For which customers ?

- Civil and military nuclear
- Every company designing, buying, producing forged components

## | Our competitive advantages

- Knowledge of steel ingots combined with manufacturing program know-how
- Reactivity of results after the production operation
- Trusted service by nuclear military customers

## | Obstacles to development

- Accessibility to the upstream value chain (Design Authority)
- Scale of development to reach the 'digital twin' (meta-models, digital transfo workshop, qualification)

## | Customer Benefits



- Design: confirmation of components feasibility
- Production: manufacturing program optimisation & validation



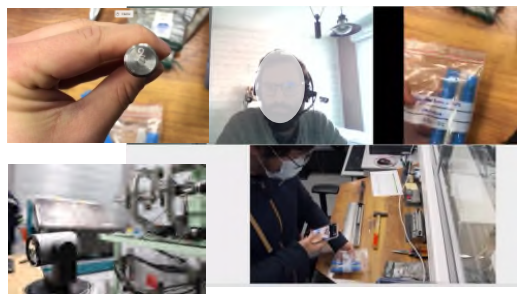
- Add value during qualification process



- Help justify predicted life time thanks to knowledge of components' metallurgy

# | Remote Inspection Service

## | Illustration



## | Features

- Remote monitoring of factory operations
- Audio/video means and access to data
- Information Flow Security (C2)

## | For which customers ?

- Nuclear customers & suppliers
- Nuclear Safety Authorities
- Notified Bodies
- All critical industries

## | Our competitive advantages

- Possible captivity: inspections in our plants and/or on our activities
- Legitimacy of sovereignty and control of information flows (C2 management)
- Internally tested Framatome

## | Obstacles to development

- Many competitive solutions in the market (including our potential customers)

## | Customer Benefits



- Eliminates travel costs and risks
- Increases productivity of inspection tasks
- Adds flexibility to inspector scheduling



- Control manufacturing activities as if you were on site

# Our customer's performance always in mind

## Solutions Portfolio

Our global portfolio of products and services  
Find the right solution to operate & optimize  
your facility

[!\[\]\(bd1a142de767a21e5362c595f844a4ff\_img.jpg\) Learn more](#)



**Your performance**  
is **our** everyday **commitment**