

AUBERT&DUVAL



HIGH PERFORMANCE MATERIALS FOR NUCLEAR INDUSTRY



www.aubertduval.com

AUBERT & DUVAL

Your partner to energize your success



Main materials

HPS High performance steels

A range of alloyed steels with tightly controlled characteristics offering optimum value for customers.

NiSA Nickel-based superalloys

Materials keeping high surface integrity while withstanding severe mechanical stress in a high temperature and corrosive environment.

Ti Titanium alloys

Pure or alloyed titanium, combining mechanical properties and corrosion resistance with light weight.

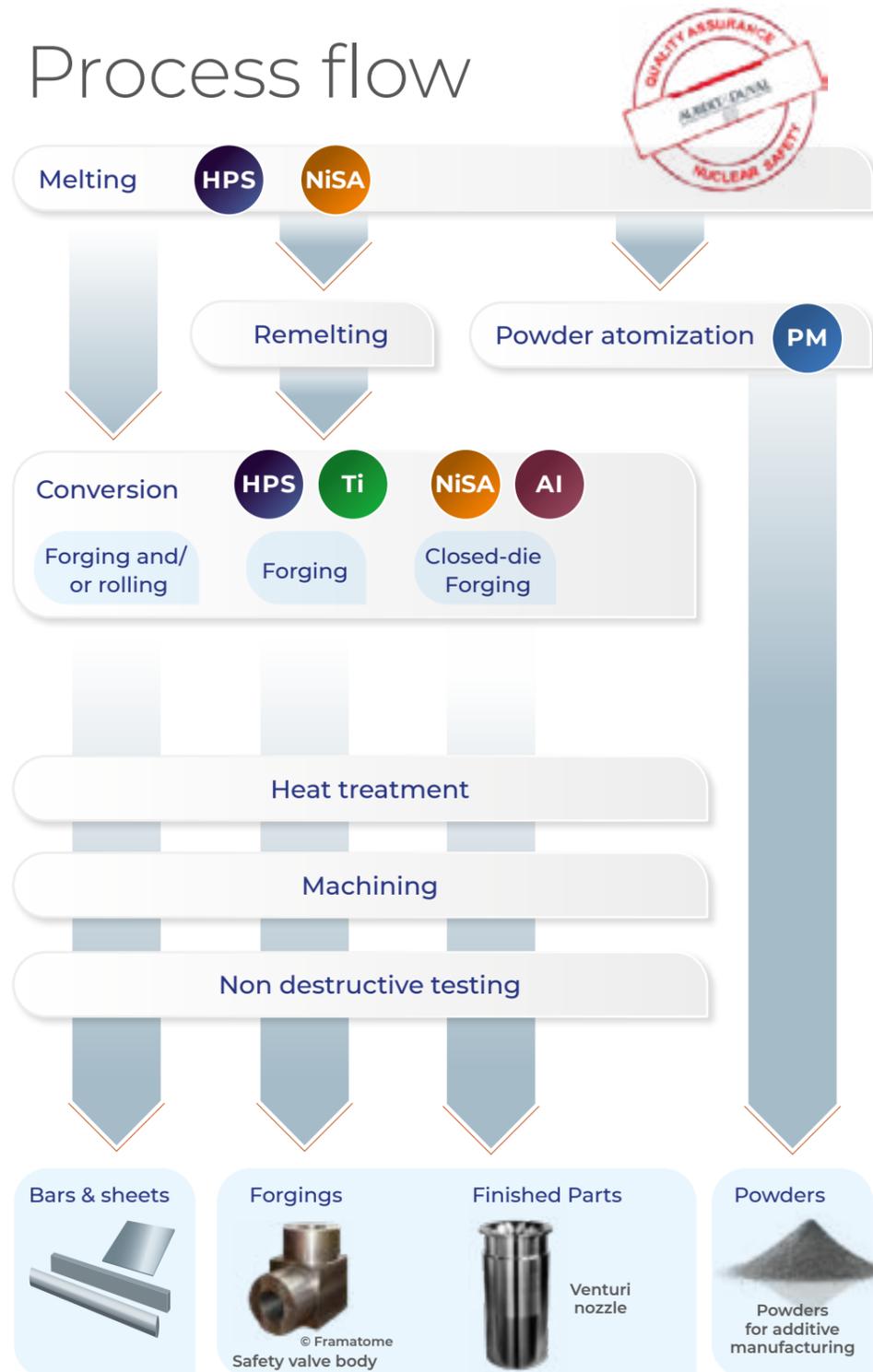
Al Aluminum alloys

For specific applications combining resistance with light weight.

PM Metal powders

Metal Powders (steels, superalloys, titanium) for additive manufacturing.

Process flow



For almost 60 years Aubert & Duval has been a key partner for the development of forged and rolled products, especially those customized for the nuclear market. With full vertical integration from melting, to remelting, hot converting and machining (rough machining through to near-net-shape parts), Aubert & Duval offers wide-ranging cutting edge capabilities for nuclear applications.



Equipment

- MELTING**
 - Melting furnaces (EAF, AOD, LF) up to 60 tons
 - Vacuum Induction Melting (VIM) up to 20 tons
 - Remelting furnaces (ESR, VAR) up to 30 tons
 - Powder atomization (VIM, Gas) up to 1 ton
- FORGING**
 - Open-die forging presses from 1,500 to 5,000 tons
 - Closed-die forging presses from 4,500 to 65,000 tons
- ROLLING MILL**
 - 20-200 mm diameter bars
- HEAT TREATMENT**
 - Solution and ageing furnaces
 - Horizontal and vertical quenching equipment
- TESTING**
 - Immersion UT up to 13 tons
 - Automated contact UT up to 20 tons

Aubert & Duval has also put in place over many decades dedicated skills to co-design re-engineered metallurgical solutions with its clients.

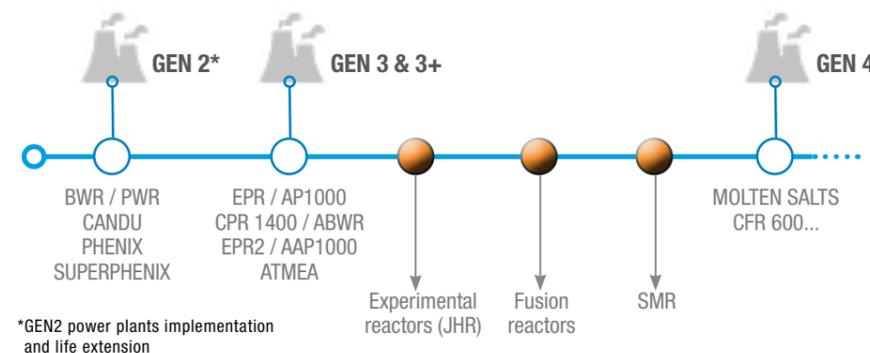
Sales of alloys and superalloys have progressively expanded across a broad spectrum of primary circuit contractors and their subcontractors. We are proud to accompany first class companies such as FRAMATOME, TECHNICATOME, NAVAL GROUP, CEA and many other international major players.

Aubert & Duval processes nickel-base alloys, high-performance steels, aluminum and titanium alloys.

Aubert & Duval melting capacities allow extra low cobalt achievement:

- nickel-base alloys (<150ppm)
- high performance steels (<300ppm)

Supplying for all generations of nuclear power



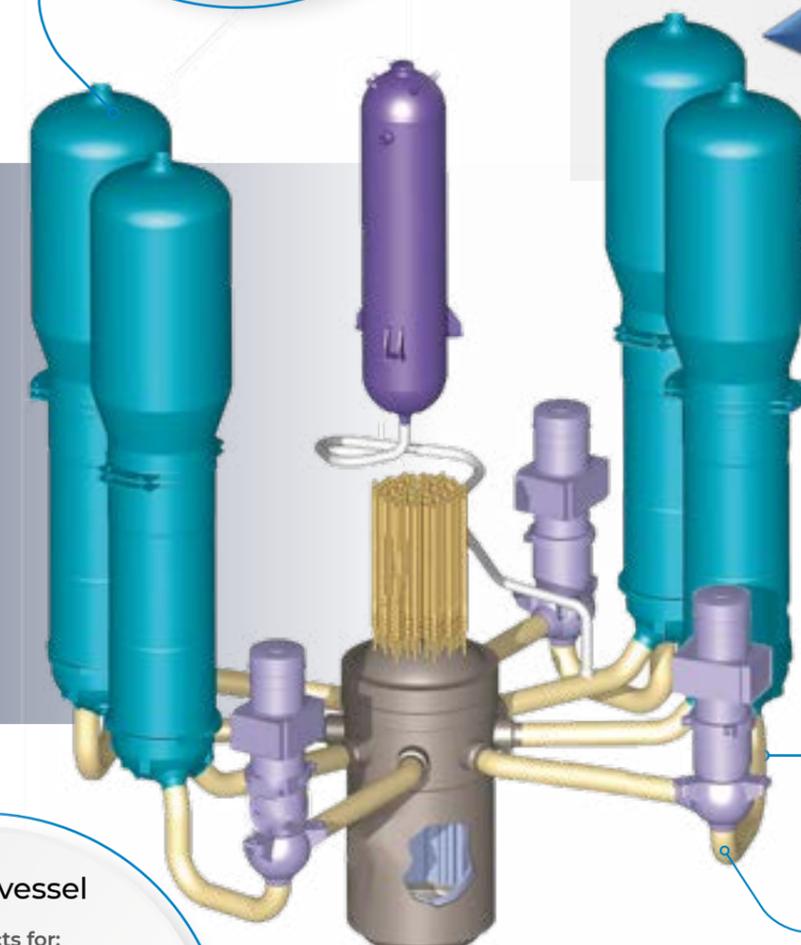
HIGH PERFORMANCE ALLOYS FOR CRITICAL NUCLEAR APPLICATIONS

Combining metallurgical expertise, outstanding industrial capabilities and high manufacturing skill, Aubert & Duval is involved at each stage of primary circuit, i.e. nuclear reactor, steam generator, pressurizer, primary pump and connecting pipes. Whether working on homogenous structure of open-die forged massive parts (up to 25 tons), or wrought advanced materials with an ultra-low cobalt content, Aubert & Duval has the ambition of being a recognized manufacturer and supplier of safe, competitive nuclear solutions to help its customers meet global energy challenges.



Steam generator

- Flow limiter
- Bars for tubes
- Divider plate
- Anti-vibration bars
- Nozzles and manways
- Safe end nozzles
- Safe valve bodies
- Support blocks

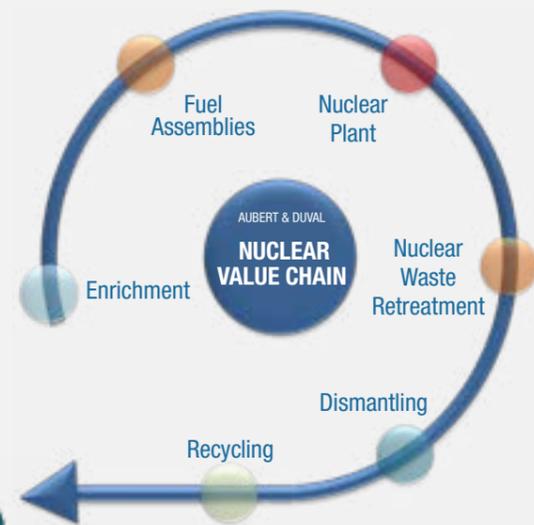


Reactor vessel

Long products for:

- Adaptator flanges
- Raw material for adaptator sleeves
- Safe end nozzles
- Latch housing for CRDM
- Bars for bolts, nuts and washers
- Support blocks
- Nuclear fuel assemblies

AUBERT & DUVAL: supplier for conventional and emerging technologies



Primary Pumps

- Seal housing
- Pump shaft
- Thermal barrier
- Disc for flywheel
- Motor shaft
- Main flange
- Diffuser flange

Connectors

- Safety valve bodies
- Surge line tubes
- Severe accident valve bodies

Main materials

HPS High performance steels

A&D grade	Common name	Normes/Références
16/18MND5	16/18MnNiMo5	SA 508 Gr 3/RCCM-M2119
P355	P355	1.0571/NF EN 10222-4
MOC2	42CrMo4	1.7225/RCC-M5110
MOCV2	42CrMoV4-6	1.7711/RCC-M 5110
25NCD8-05	25NiCrMo8-05	RCC-M2132
20NCD14	20NiCrMo14-07	SA 508 Gr 4N Class 1 /
NC40M1	40NiCrMo7.03	AISI 4340 / RCC-M2312
NC40M4	40NiCrMoV7.03	AISI 4340/RCC-M2311-RCC-M2312
SC2109	X2CrNi 18-10	AISI 304L
SC2118	X2CrNiMoNb 17-13-2	AISI 316L
X18PA	X5CrNiTi 18-10	AISI 321
X18NBZ	X6CrNiNb18-11	AISI 347
X13MA	X12Cr13	AISI 410
X13BC	X6Cr13	AISI 405
X17U4	X5CrNiCuNb 17.4	1.4542
APX®4	X5CrNiCu16.5.1	1.4418
SC2287	X10CrNiMoTi 15-15	15-15 Ti
XN26TW	X6NiCrTiMoVB25-15-2	A286

NiSA Nickel-based superalloys

Aubert & Duval grade	Common name
NY690	ALLOY 690
NY600	ALLOY 600
NY800	ALLOY 800
PER20N	ALLOY X750
SC8006W	ALLOY 718 (Low Co)

Ti Titanium alloys

Aubert & Duval grade	Common name
TiCp	Ti ASTM Grade 2
TA6V	Ti ASTM Grade 5

PM Metal powders

- 316L
 - Ni625
 - Ni718
 - TA6V
- Other grades on demand.

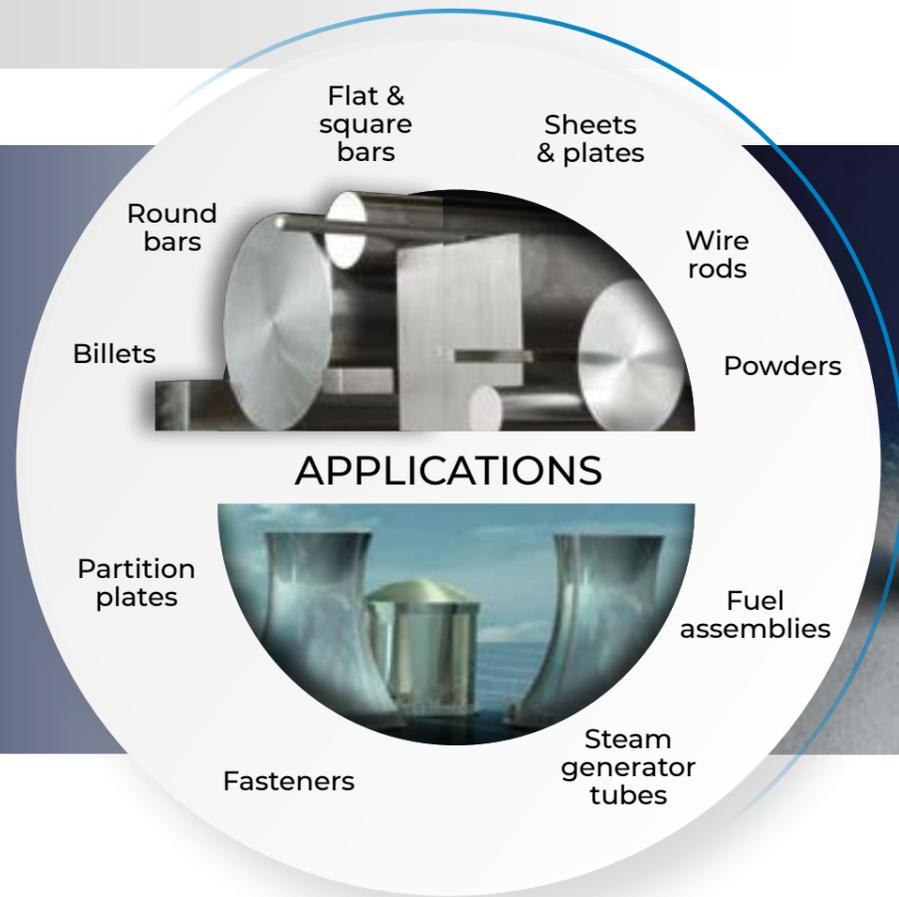
Al Aluminum alloys

- AL6061

A complete offer of bars, plates, sheets and powders for Nuclear Power generation applications

Aubert & Duval follows the most stringent requirements in terms of grade composition, material integrity, dimension tolerances, quality documentation and quality control.

Aubert & Duval operates to RCC-M, RCC-MR, RCC-MRx, as well as to ASME code and many customer certifications.



Bars, Sheets & Plates

Main sizes

	mm	inches
Round Bars	Ø 20-450	Ø 0.79-18
Flat & Square Bars	T ≤ 450	T ≤ 18
Sheets	length ≤ 2000	≤ 79
	width ≤ 1000	≤ 39
	thickness 20 ≤ T ≤ 10	0.79 ≤ T ≤ 0.39
Plates	length ≤ 6000	≤ 236
	width ≤ 4000	≤ 157
	thickness ≤ 150	≤ 5.9

Surface conditions

- Black
- Ground
- Peeled
- Others

Heat-treated conditions

- Annealed

Main Processes



Melting / Remelting



Rolling



Forging

Powders for Additive Manufacturing

Particle size distribution

- Laser Beam Melting: • 10-53 or 15-63 µm
- Electron beam Melting: • 45-106 µm
- Direct Energy Deposition: • 45-90 µm or 45-106 µm



Atomizing



CERTIFICATIONS AND SPECIFICATIONS

In addition to general certifications (ISO 9001, ISO 14001, ISO 18001), our plant laboratories are ISO 17025 accredited by third parties.

Quality Assurance for Nuclear Safety

CUSTOMER INSPECTION

NUCLEAR SAFETY AUTHORITIES

THIRD PARTY INSPECTION

QUALITY DOCUMENTATION

Aubert & Duval issues quality documentation according to the specifications and the applicable code Customer's to begin the production

Holding point release, involving if required, a third party

QUALITY INSPECTION

Aubert & Duval Quality Department and the customer inspect process and quality documentation

to continue production through witness points and holding points by customer and third parties if required

QUALITY COMMITMENTS

Review of Contract
Aubert & Duval Quality Dpt. gives

for Purchase Order acknowledgement

Offer according to customer's specifications, any deviation validated by Aubert & Duval Quality Dpt. and acknowledged by Customer Quality.

QUALITY REQUIREMENTS ANALYSIS

in the Request for Quotation package

RELEASE FOR SHIPMENT

Holding point release

Certificate of conformity to deliver the product





AUBERT & DUVAL



All are trademarks owned by Aubert & Duval
Photo credit : Naval Group, Framatome
Design by  irweego www.irweego.com - Aubert & Duval - 11-2023

The information and the data presented herein are typical or average values and are not a guarantee of maximum or minimum values. Applications specifically suggested for material described herein are made solely for the purpose of illustration to enable the reader to make his own evaluation and are not intended as warranties, either express or implied, of fitness for these or other purposes. Aubert & Duval's liability shall not extend, under any circumstances, to the choice of the Product and its consequences.

www.aubertduval.com