AUBERT&DUVAL

High-Strength Steels and Alloys for the Defense Industry

Enhancing your performance

Our pledge:

Your satisfaction

Committed to support the Defense Industry

A long history

Aubert & Duval has the capability to design, melt, manufacture and market metallurgical products with high mechanical properties in steels, superalloys, aluminum and titanium alloys.

As a leading provider of forgings for gun barrels, Aubert & Duval has over 65 years of experience within this business segment and **is proudly serving the gunner community both for new equipment and upgrades**.

Qualified Products and Processes

Aubert & Duval is fulfilling the most stringent requirements for artillery applications.

Its sister company, Erasteel, a leading manufacturer of high speed steels, can supply **tungsten alloyed high speed steel for ammunition application**.
(AISI.T1 / HS 18.0.1 / AFNOR Z80WCV 18.4.1)

Development

Constantly seeking to meet customer's demands, Aubert & Duval:

- Has developed **High Strength Steel Grades** for light gun turret and light artillery systems.
- Has recently announced its decision to further invest in **titanium forgings**, together with UKTMP, a leading supplier in titanium raw material.

Aubert & Duval is also involved in supplying forgings for Navy, Submarine and Torpedo applications.
Please ask for a dedicated brochure.

AQAP-2110

ISO 9001
EN/AS/JISQ 9100

A Dedicated and Complete Line of Products

Your best source for custom forgings

Equipment to meet your specific needs

A well preserved know-how passed on over the years

Our range of equipment is one of the widest, most flexible and most modern in the world.

- 40 to 70-ton arc furnaces
- Ladle refining
- Vacuum degassing equipment
- Vacuum induction furnaces (VIM), up to 12 tons
- Electro-slag remelting furnaces (ESR), up to 25 tons
- Vacuum-arc remelting furnaces (VAR), up to 30 tons
- Atomizing towers for powder production.

Closed-die forgings Open-die forgings

Forging presses
from 1,200 to 4,500 tons

Die forging presses
from 4,600 to 65,000 tons

Hammers
from 3,500 to 60,000 kg/m

Continuous forging machine
from Ø 70 to Ø 450 mm

Rolling mills
bars from Ø 7 to Ø 200 mm

Heat treatment furnaces

- Horizontal up to 21 meters
- Vertical up to 9.5 meters

Products for missiles

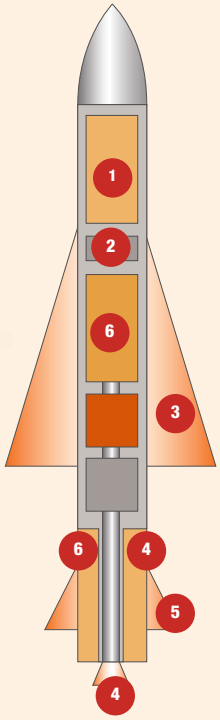
For every stressed component of a missile, Aubert & Duval offers:

- Tubes
- Forged and closed-die forged parts
- Rolled sheets
- Bars

Made of Maraging, stainless steel grades, aluminum or titanium alloys to meet the most stringent requirements for critical parts of a missile.

> Corrosion, extra-low or high-temperature resistance, **ductility at negative temperature** and weldability, mechanical resistance.

Aubert & Duval is also able to provide steels suitable for flow-forming, leading to specific mechanical properties.



Form	Fabrication process
Thin tubes	Extruded
Heavy tubes	Hot rolled / hollow forged
Sheet thickness < 12 mm	Cold rolled
Sheet thickness > 12 mm	Hot rolled
Bars < Ø 130 mm	Rolled / forged
Bars Ø 130 to 200 mm	Forging machine
Bars > Ø 200 mm	Forged
Forged parts	Open-die or closed-die

1	Warhead casing	819B (36NiCrMo16)
2	Hangers	MARVAL X12
3	Wings and Structural parts	17.4Ph, 15.5Ph
4	Booster Motor cases	ALUMINUM, APX4 (X4CrNiMo16-5-1)
5	Tails	MARAGING 250, 15.5Ph
6	Cruise and propulsion motor case tubes and cups	MARVAL X12H (X1CrNiMoAlTi12-10-2), MARAGING 250 & 300, APX4

A long history of proven systems

Antiship Missiles, Air to Air, Cruise Missiles, Ground to Air , Air to Ground, Tactical Missiles, Antitank Missiles (EXOCET® FAMILY - MICA® - STORMSHADOW® - ASTER® - AMRAAM® - SPIKE® - METEOR® - IRIS-T®).

Aubert & Duval fulfills the most stringent requirements in terms of grade composition, micro-structural material integrity, dimensional tolerances and quality control.

All our products comply with ASTM standards.

Developments

- **New stainless steel grades:**

  NYB66 superaustenitic and MLX17 precipitation hardened stainless steel.

- **Powder Metallurgy:**

  Aubert & Duval also offers small and medium-size near-net-shape products to answer requirements for difficult-to-machine parts.

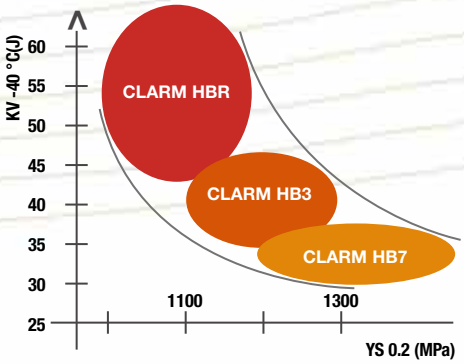
Castings

Our castings are made of custom-designed grades to meet stringent requirements for demanding duties (up to 20 tons).

- We supply muzzle brakes - lashing hooks - hull parts, etc...
- For sight systems parts low expansion alloys are also available.

The fine art of making gun barrels

3 main steel grades designed for heavy gun barrels



corresponding data sheets are available on request.

The right steel for every application

- Field towed guns 105 - 122 -155 mm
- Tank guns 60 - 90 - 100 -105 - 120 - 125 -140 mm
- Self-propelled howitzers 105 - 120 - 155 mm
- Naval guns 40 - 57 - 76 - 127 - 155 mm
- Mortars 60 - 81 - 120 -160 mm
- Breech rings, breech blocks and muzzle brakes

Medium caliber barrels

- For medium caliber cannons 20 - 25 - 30 - 35 and 40 mm, we propose the following steel grades:

	GKH		GK4W	CLARM HB7
Rm (N/mm²)	950	1000	1300	1320
RpO.2% (N/mm²)	790	840	1080	1200
A5d (%)	17	16	14	13
KV -40 °C (J)	150	60	40	60

Transportation and equipment

Closed-die forgings

Cover

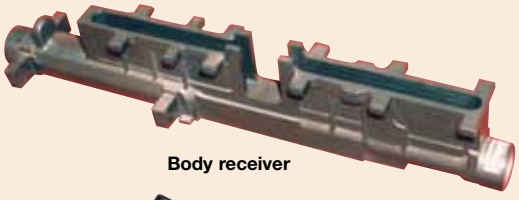
Gun shield

Aluminum alloys series:
2000
5000
7000

Hook support

Titanium alloys:
T40
TI64

Hatch



Body receiver

Superalloys Ni base

Special steels

Suspension arm

Riser

Loading arm

Rim

Support gun

1/2 Wheel for track

Rolled products

Application	Commercial steel grades	EN grades
Pinions and gears for transmissions	FAD/FADH	16NiCrMo13
	FDMA	30NiCrMo16
	V300	45SiCrMo6
	LXM5	X1CrNiMoAlTi12.10.2
	GKH/GK3	32CrMoV12 / 30CrMo12
	819B	36NiCrMo16
Torsion Bars	V300	45SiCrMo6
	LXM5	X1CrNiMoAlTi12.10.2
Energy recovery systems	F66S	25CrMo4
	F65	34CrMo4
	GK3	30CrMo12
	NC25M	28NiCrMo11

Assault weapons, pistols and accessories

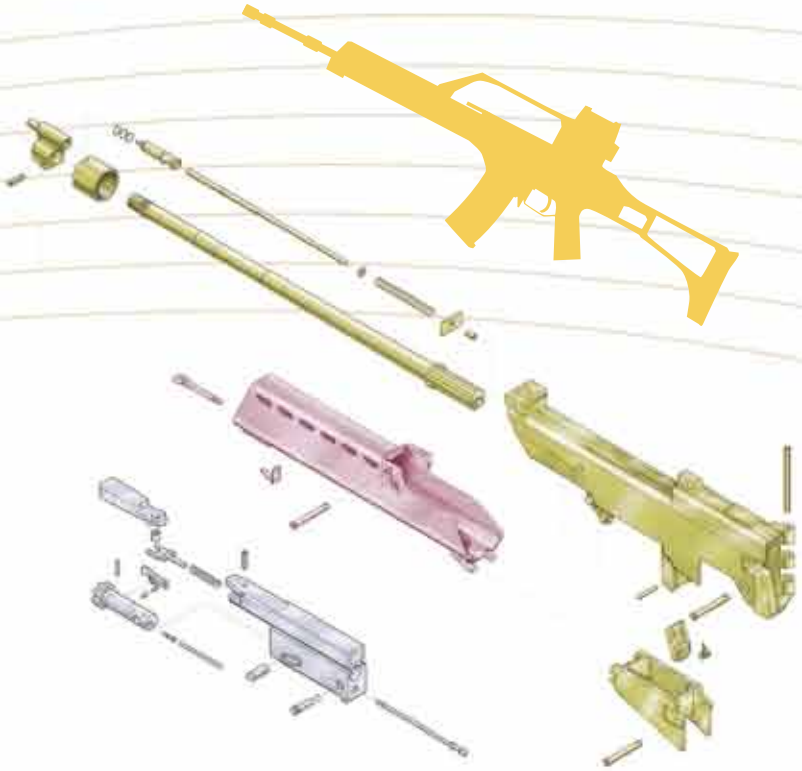
Products / Applications:

Our GKH is manufactured by a special process which confers particular suitability for cold swaging of small caliber barrels.

The process has been perfected over the years to produce a steel which possesses excellent transverse properties, especially low temperature impact properties. Our tight control of the heat treatment process guarantees strong consistency in the mechanical properties, as well as very good dimensional stability during machining and while in service.

For the stainless versions, we would advise use of our MLX12 and MLX12H steels.

X15TN is a stainless steel exhibiting excellent corrosion resistance, high hardness and superb cutting properties. Because of this, it is particularly suitable for the production of knives and bayonets.



Application	Commercial steel grades	EN grades
Firing pins	NCAV	12NiCr12
	FDMA	30NiCrMo16
	819B	36NiCrMo16
	MY18	X2NiCoMo18.8.5
Extractors	FDMA	30NiCrMo16
	FADH	16NiCrMo13
Ejectors	819AW	E35NiCrMo16-H
	GKH	32CrMoV12.10
	FND	15NiMoCr10
Barrels	F65	34CrMo4
	GKH	32CrMoV12.10
	GH4W	40CrMoV12
	MLX12*	X1CrNiMoAlTi12.9.2
	MLX12H*	X1CrNiMoAlTi12.10.2
Knives & Bayonets	X15TN	X40CrMoVN16.2

*stainless

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Contact us:

www.aubertduval.com

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