



# AERONAUTICS EXPERTISE

OUR EB SOLUTIONS MEET ALL YOUR CHALLENGES

**ELECTRON BEAM WELDING**

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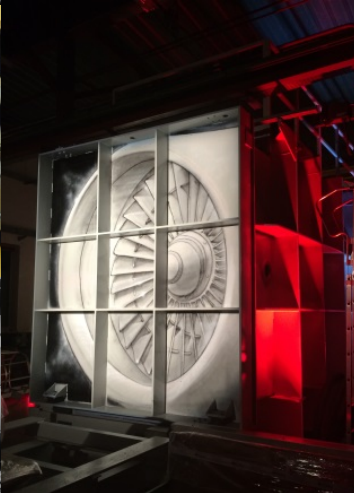
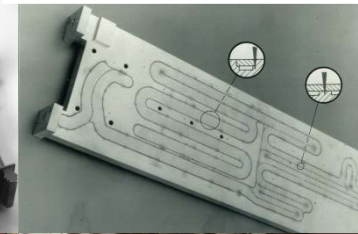
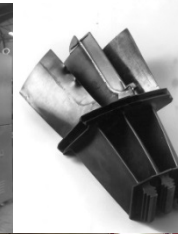
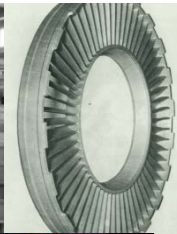
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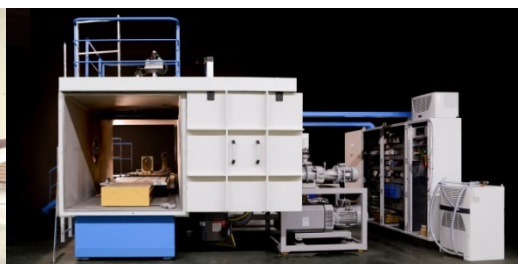
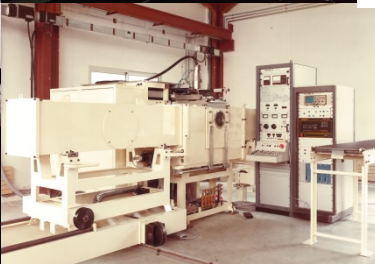
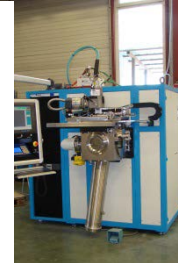
SPECIFIC  
MACHINES

# AERONAUTICS EXPERTISE

**TECHMETA**  
GROUPE **Bodycote**



SINCE 1980 →  
**35 YEARS**  
**OF EXPERTISE**



AERONAUTICS  
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# WE HAVE THEIR TRUST...

## SEVERAL AERONAUTICS CLIENTS

**TECHMETA**  
GROUPE **bodycote**

TIER-1 SUPPLIER  
FOR MOST OF  
OUR CLIENTS



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# THE PARTNER OF YOUR PROJECTS

OUR WILLING IS TO GO FURTHER BY YOUR SIDE

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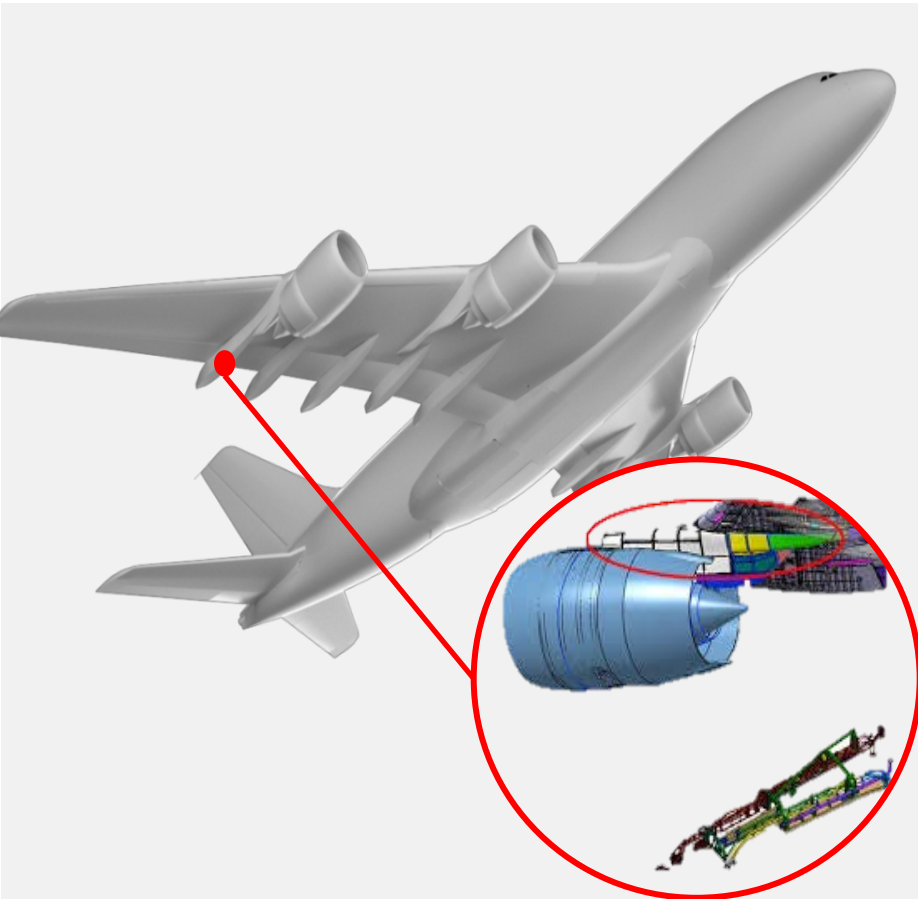
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# PARTS WELDED BY TECHMETA

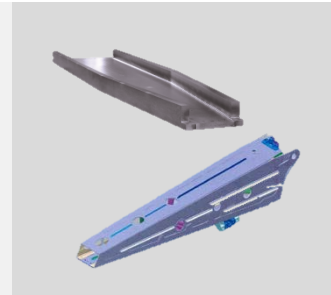
## ON PLANES – A350/A380 PYLON STRUCTURE

**TECHMETA**  
GROUPE Bodycote



### GENERAL INFORMATION

- Projects since 2008
- 8 months for development
- Material : titanium



### MAIN FEATURES

- Vacuum level  $10^{-4}$  mbar
- Adaptable machine
- Manufactured in 1989
- Upgradation 2015



### WELDS

- Welding thickness: from 19 to 50 mm
- Titanium
- Part dimensions :
  - 2m diameter
  - 5m length



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# PARTS WELDED BY TECHMETA

## LIST OF THE PARTS

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GROUPE **bodycote**



OVER 30 PARTS WELDED FOR THE  
SECTOR

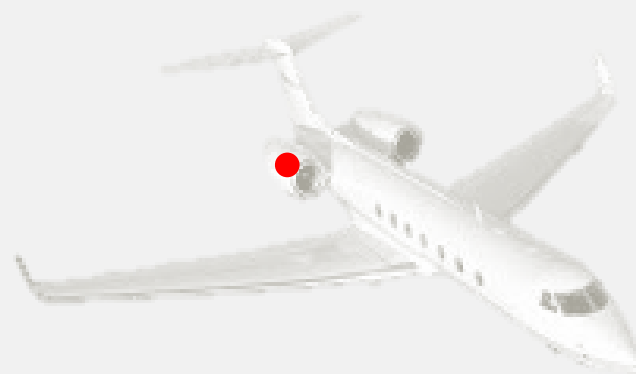
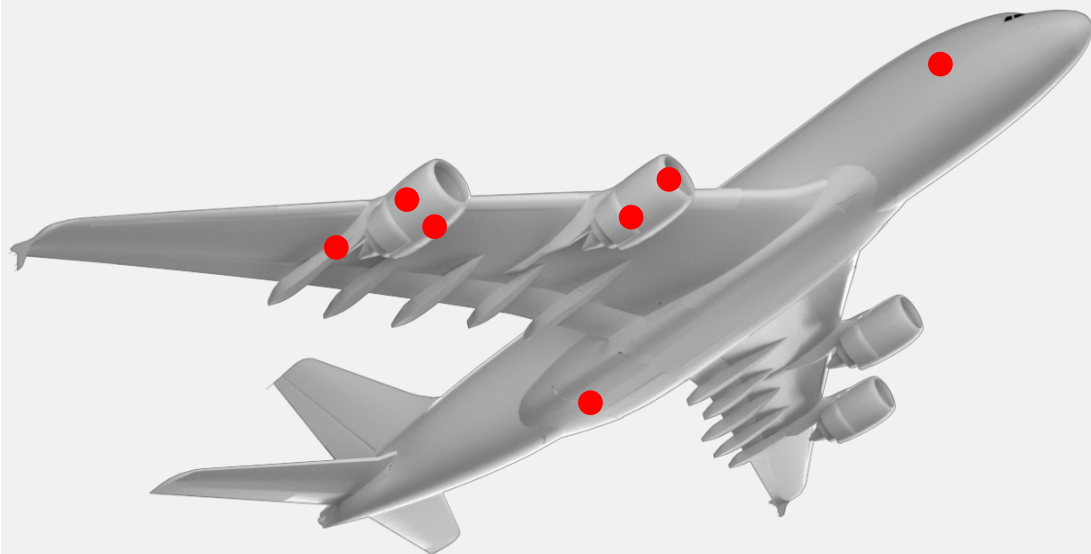
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# PARTS WELDED BY TECHMETA ON PLANES

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## OVER 10 PARTS WELDED FOR PLANES

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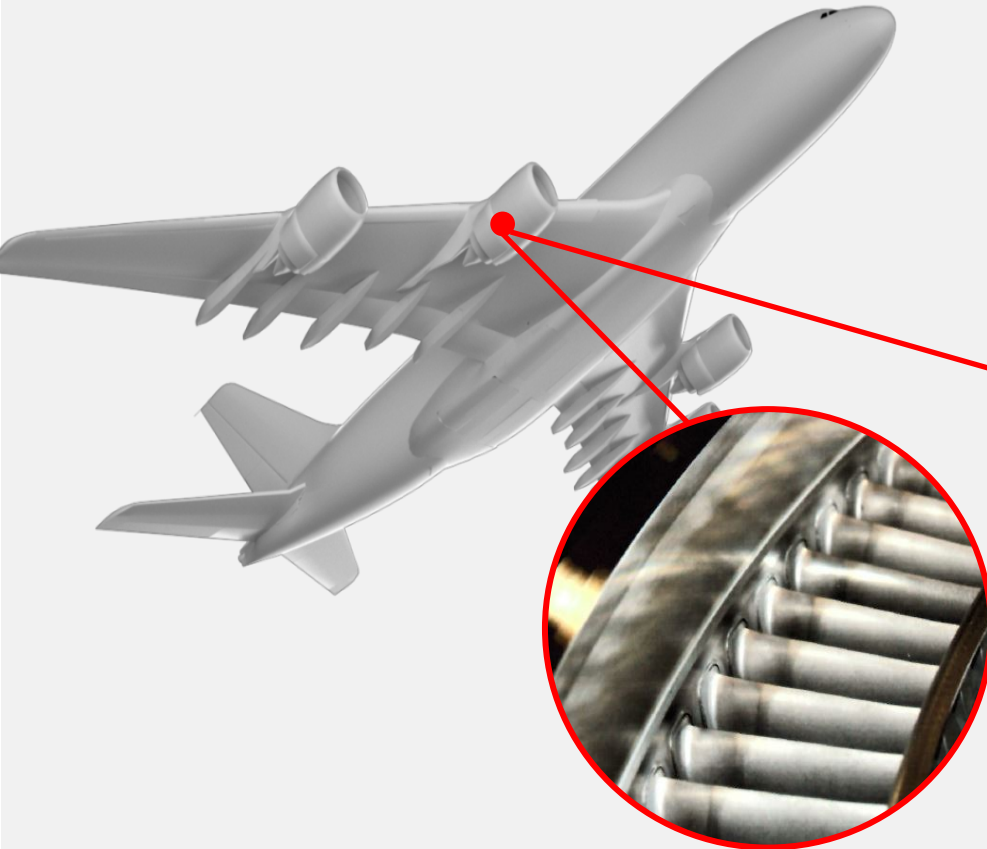
# PARTS WELDED BY TECHMETA

## ON PLANES – CFM – REDRESSEURS

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### MAIN FEATURES

- Year volume : 1700 parts
- Difficulties :
  - Welding position precision
  - Full penetration



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# PARTS WELDED BY TECHMETA

## ON PLANES – BLADE TURBINE

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### MAIN FEATURES

- Welding thickness: on surface, bead 0,9 mm right side up and 0,5 mm upside down
- Material : nickel based
- Difficulties: material hardly weldable by other processes

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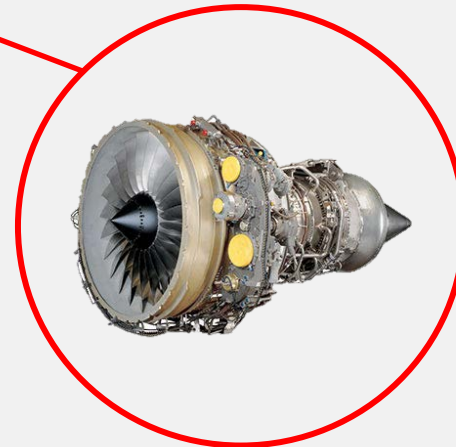
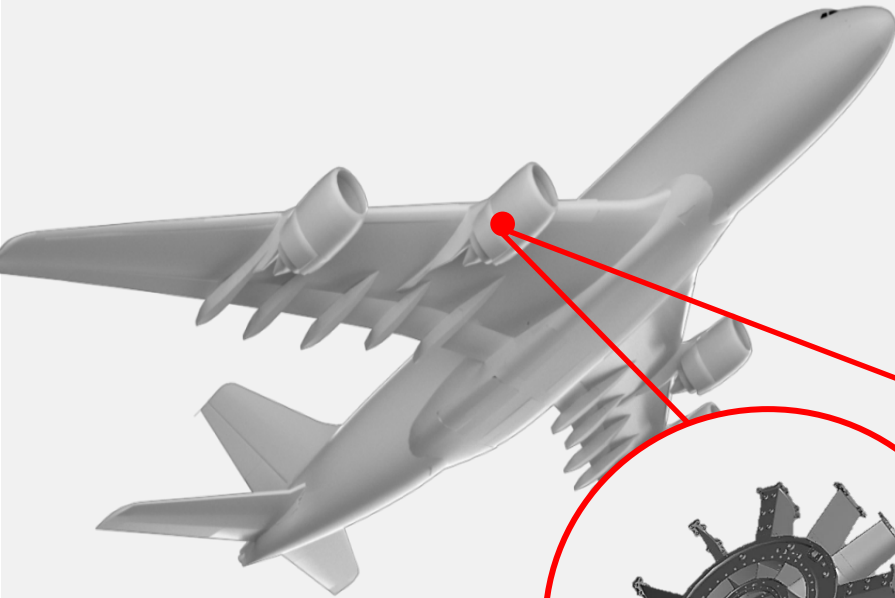
# PARTS WELDED BY TECHMETA

## ON PLANES – FAN FRAME CF34-10

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### MAIN FEATURES

- Welding double face with a 120 mm space between the two faces
- Variable thickness from 3 to 38 mm and variable gradient



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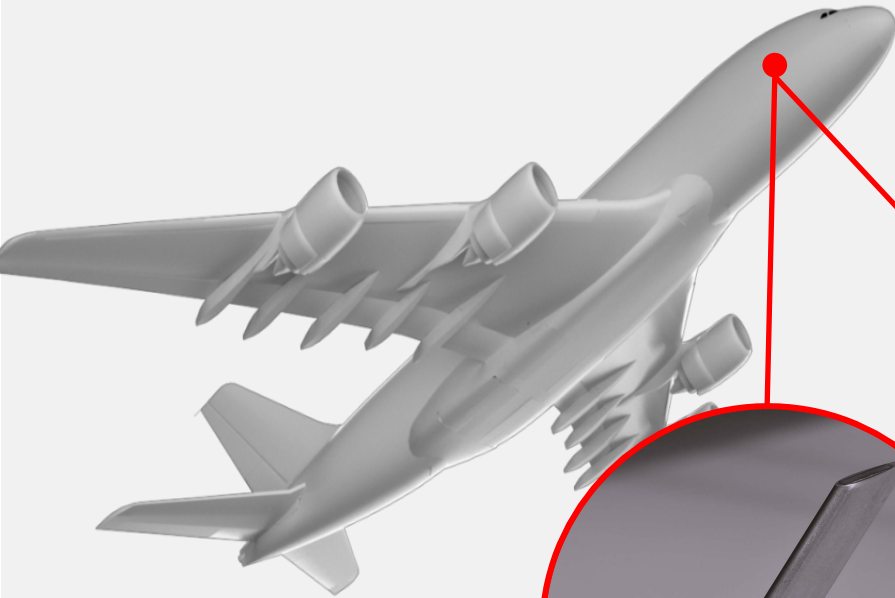
# PARTS WELDED BY TECHMETA

## ON PLANES – WIND SENSOR

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### MAIN FEATURES

- Welding penetration : variation of 5/10ème at 3 mm
- Permanent evolution of the welding profile
- Thick geometrical tolerance to obtain after welding



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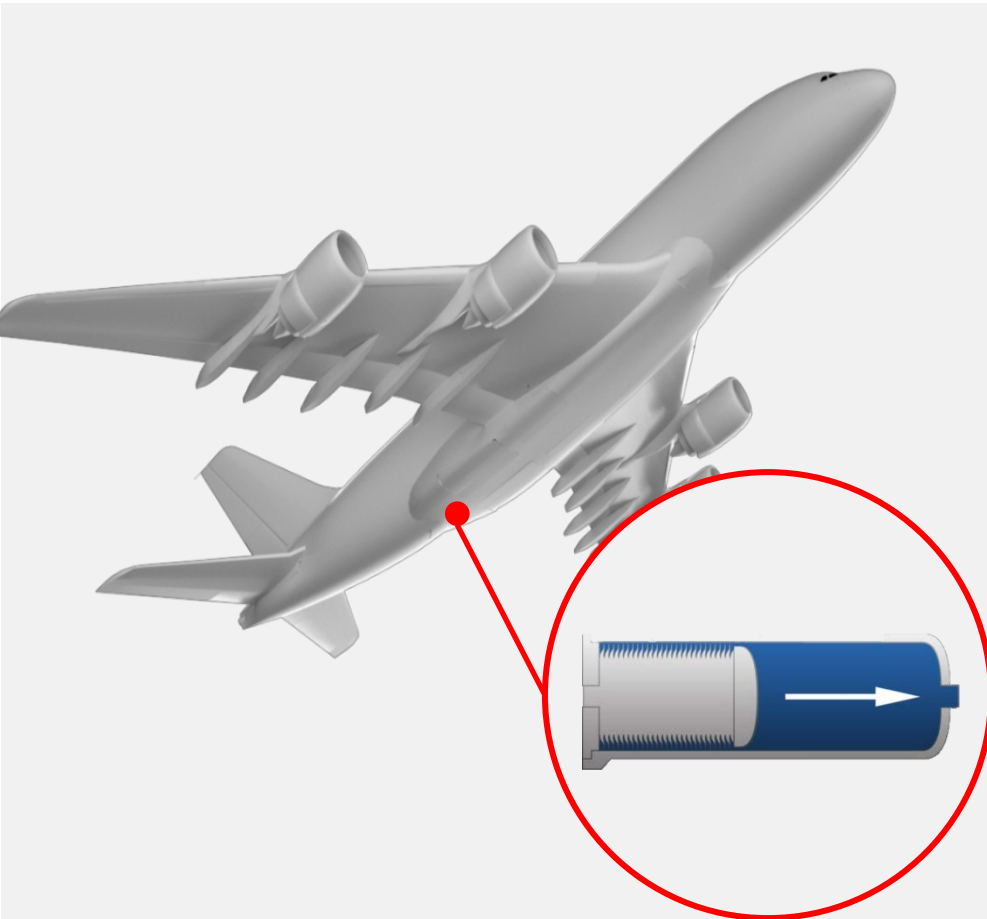
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# PARTS WELDED BY TECHMETA

## ON PLANES – HIGH PRESSURE FLUID RESERVOIR

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### MAIN FEATURES

- Material : precipitation hardened stainless steel
- Penetration around 30 mm
- Complex axial welding

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# PARTS WELDED BY TECHMETA

## ON PLANES – SAM 146 – RODS

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### MAIN FEATURES

- Material : inconel 718
- Thick geometrical tolerance after welding

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# PARTS WELDED BY TECHMETA

ON PLANES

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OVER 5 PARTS WELDED FOR MILITARY PLANES

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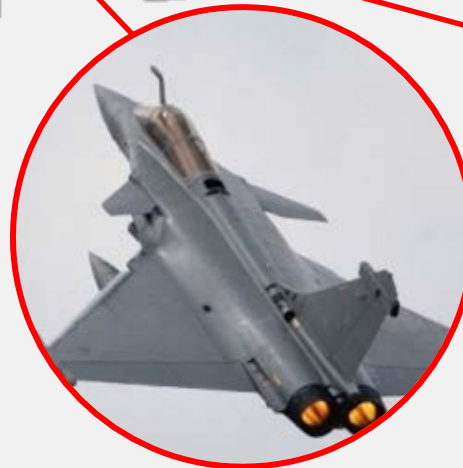
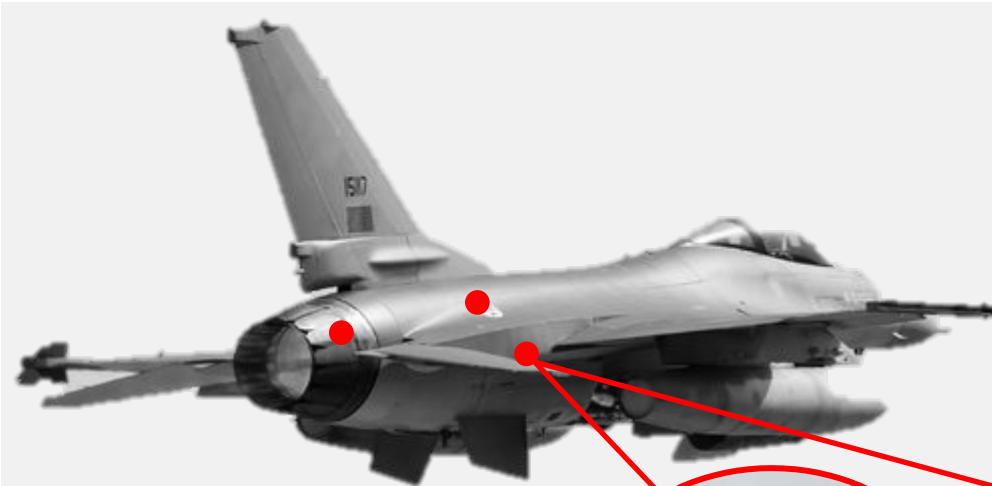
# PARTS WELDED BY TECHMETA

## ON PLANES – M43 AND M88 COMPONENTS

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### MAIN FEATURES

- Material : Titanium alloy



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# PARTS WELDED BY TECHMETA

## ON PLANES – TAILHOOK

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### MAIN FEATURES

- Material : martensitic ageing alloys
- Complex welding process



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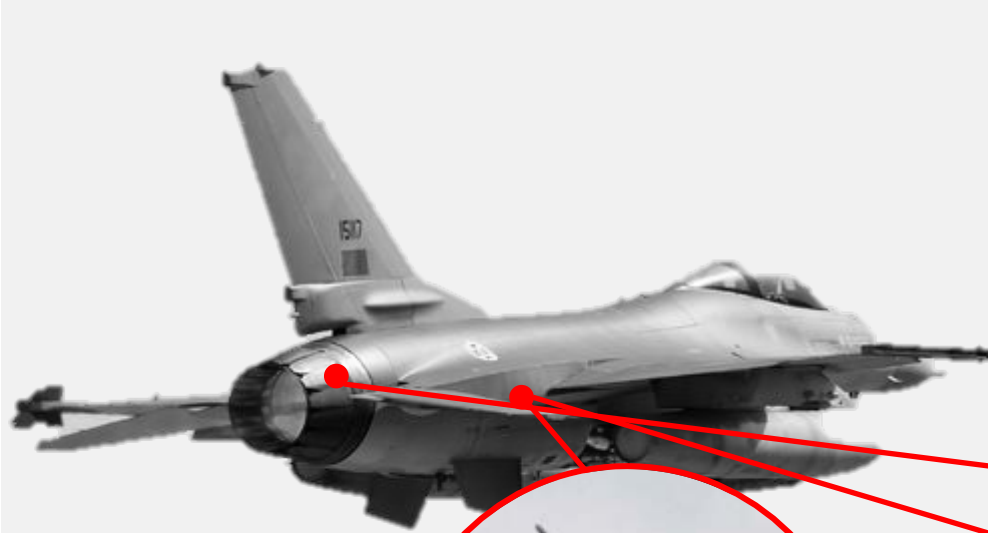
# PARTS WELDED BY TECHMETA

ON PLANES – VORTEX AIR DISTRIBUTORS AND VOLUTES CASING TURBOS

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GROUP **bodycote**

## MAIN FEATURES

- Material : Titanium alloy
- Highly precise geometry of the parts



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# PARTS WELDED BY TECHMETA ON HELICOPTERS

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GRUPE **bodycote**



## 5 PARTS WELDED FOR HELICOPTERS

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# PARTS WELDED BY TECHMETA

## ON HELICOPTERS – BLADES' ORIENTATION MECHANISM

**TECHMETA**  
GROUPE **bodycote**



### MAIN FEATURES

- Axial immobilisation welding of the components
- Welding with high cosmetic value

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# PARTS WELDED BY TECHMETA

## ON HELICOPTERS – BLADES' POSITION SENSOR

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GROUPE Bodycote

### MAIN FEATURES

- Welding thickness: between 0,2 mm and 1,5 mm
- Material: maraging steel



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# PARTS WELDED BY TECHMETA

## ON HELICOPTERS – POWER SHAFT

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GROUPE **bodycote**



### MAIN FEATURES

- Highly thick welding, minimal deformation required
- Material : precipitation hardened stainless steel

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# PARTS WELDED BY TECHMETA

## ON HELICOPTERS – ENGINE PARTS

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### MAIN FEATURES

- Heterogeneous welding (2 different materials)
- Difficulty :
  - Welding with high mechanical resistance submitted to cycled obligation



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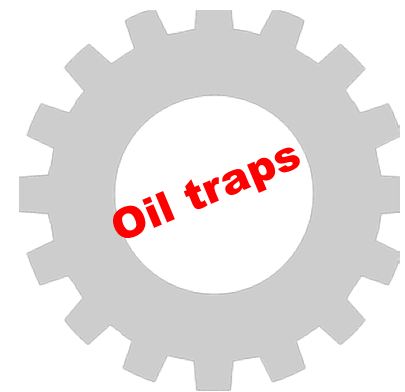
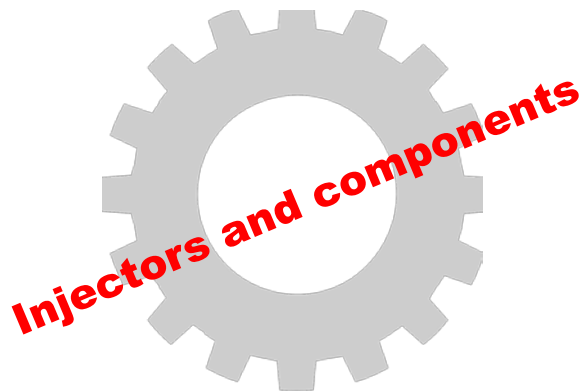
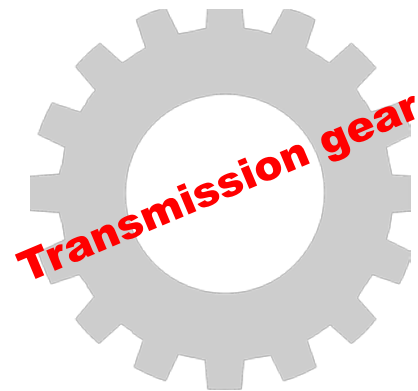
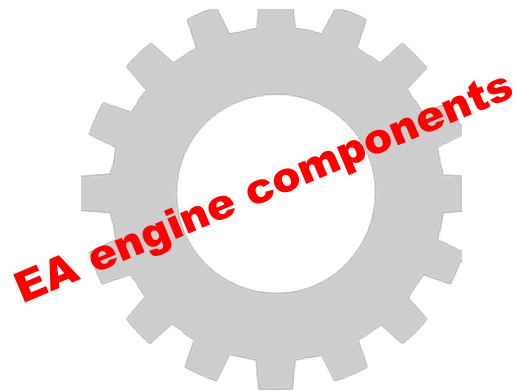
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# PARTS WELDED BY TECHMETA

## OTHER PROJECTS

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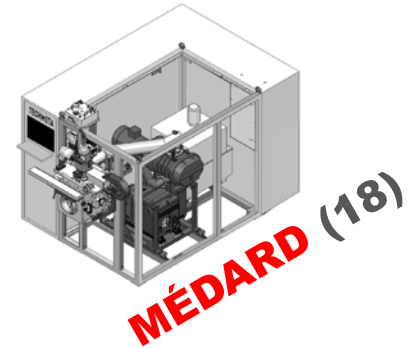
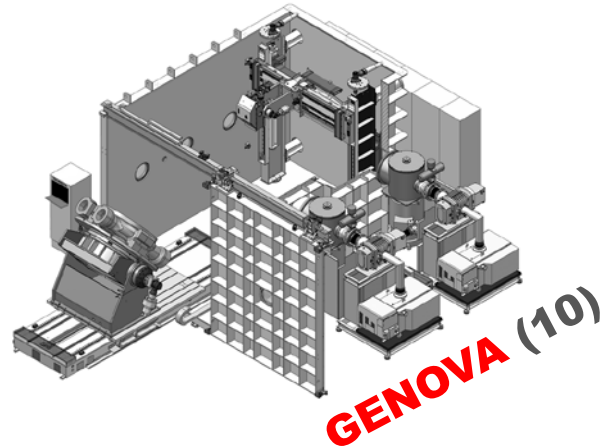
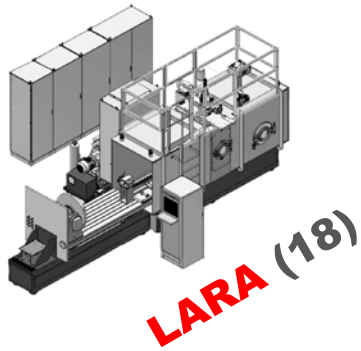
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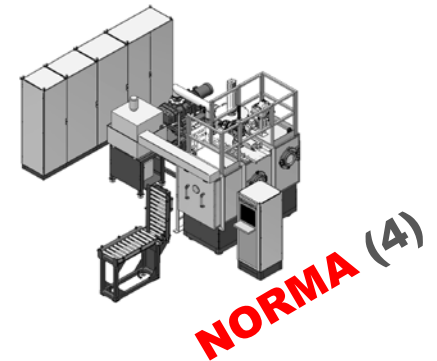
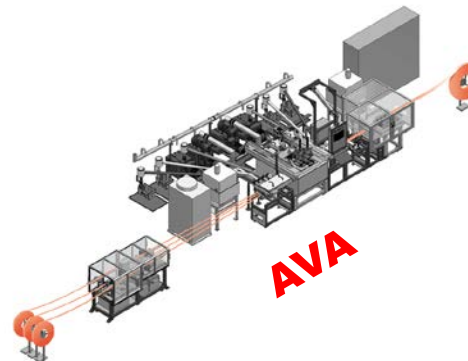
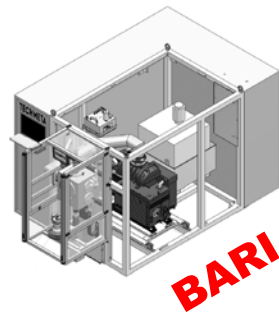
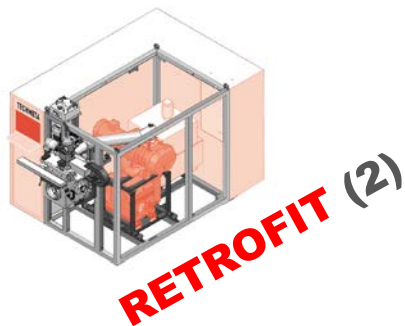
# MACHINES

WE DESIGN AND MANUFACTURE THE MACHINE  
THAT BEST FITS WITH YOUR WELDING NEEDS

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OVER 50 MACHINES AROUND THE WORLD



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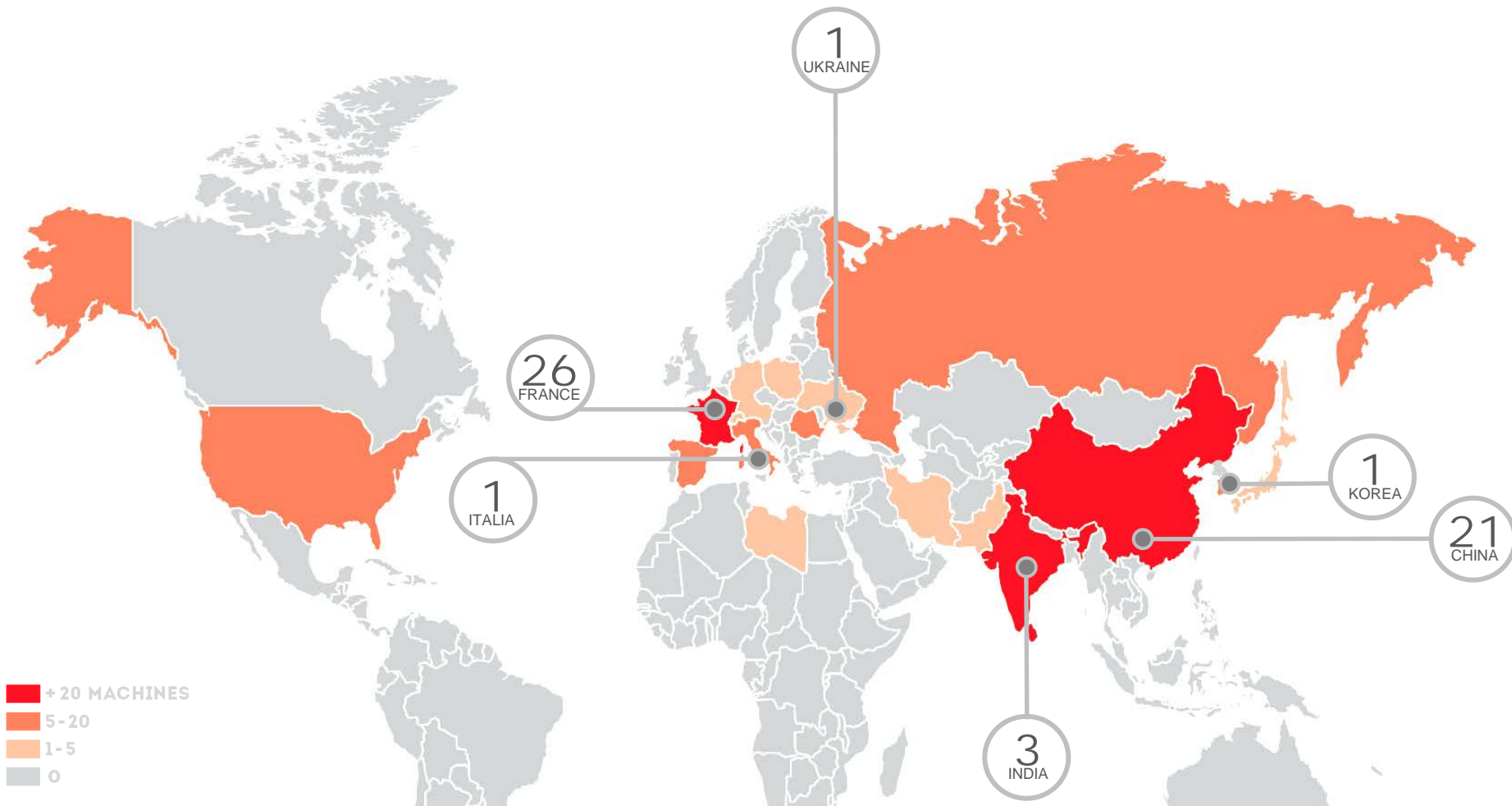
OUTSOURCING  
DEVELOPMENTS

SPECIFIC  
MACHINES

# MACHINES

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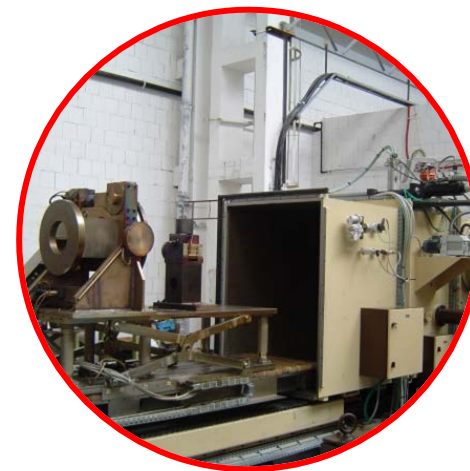
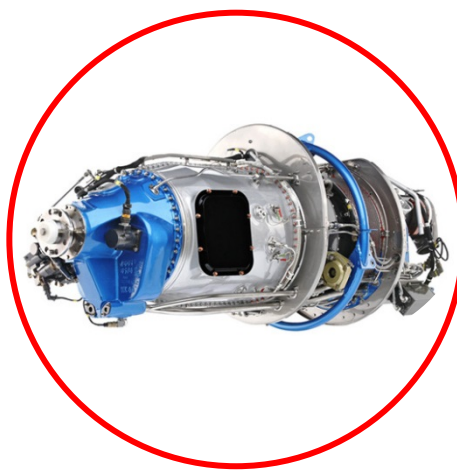
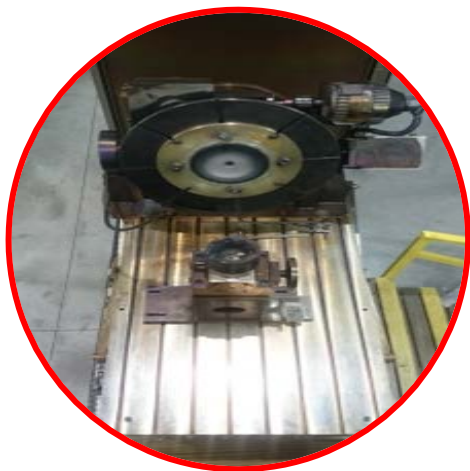
SPECIFIC  
MACHINES



# MANUFACTURED MACHINES

## LARA MACHINE – PROPELLERS ENGINE TURBOCHARGER

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GROUPE **bodycote**



### MAIN FEATURES

- Chamber volume : 6 m<sup>3</sup>
- 0-90° tilting of the rotary manipulator
- Bore diameter 205 mm – plate diameter 665 mm
- Table fitted with an extra vertical axis
- Welding in secondary vacuum – 5 10<sup>-4</sup> in 14 minutes

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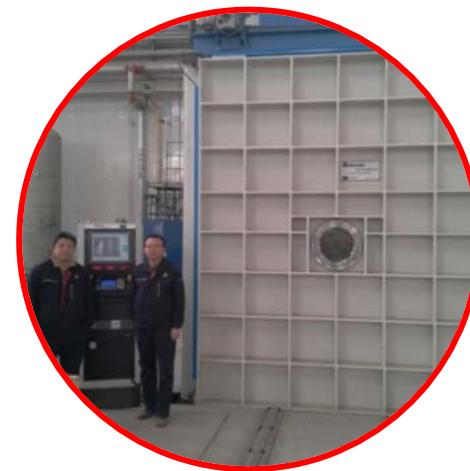
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# MANUFACTURED MACHINES

## GENOVA MACHINE – JET PLANE ENGINES

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GROUPE **bodycote**



### MAIN FEATURES

- Material : Al-alloy, Ti-alloy, high strength steel, stainless steel...
- Penetration for stainless steel : 3-80mm
- Ratio depth/width : 20/1
- CCD video system
- 4 mechanical movements: X, Y, Z, B
- Chamber size: 5000 mm x 2400 mm x 3000 mm

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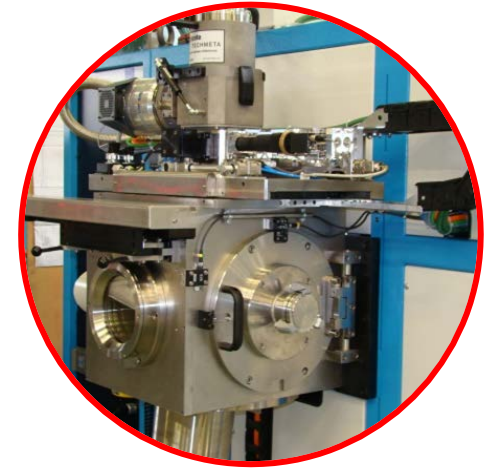
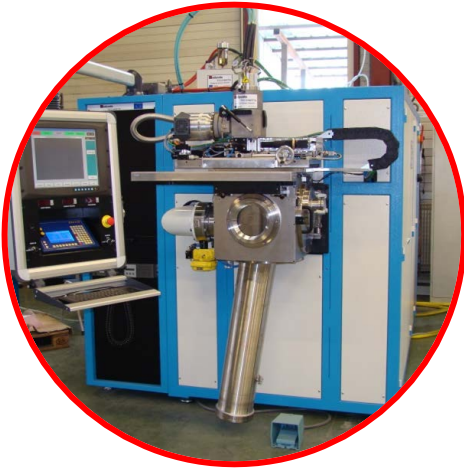
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# MANUFACTURED MACHINES

## MEDARD MACHINE – AERONAUTICS SENSORS

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### MAIN FEATURES

- 2 mechanical movements,
- Primary vacuum :  $2 \cdot 10^{-2}$  mbar in 15 seconds,
- Welding depth : 5 mm.

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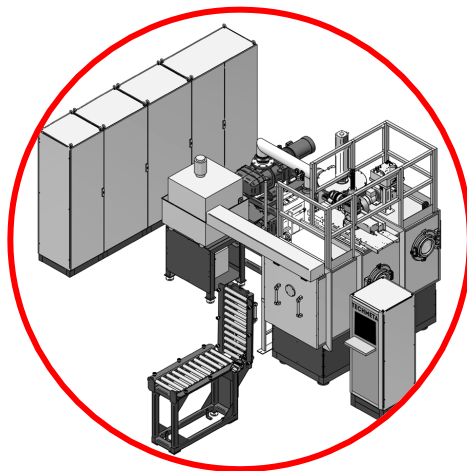
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# MANUFACTURED MACHINES

## NORMA MACHINE – FRAME RIB

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GROUPE Bodycote



### MAIN FEATURES

- 4 frame rib welds
- Diameter : 150 mm
- 3 mechanical movements
- NC for welding programs + MMI with PC
- Vacuum level  $5 \cdot 10^{-4}$  mbar
- Working distance up to 400 mm

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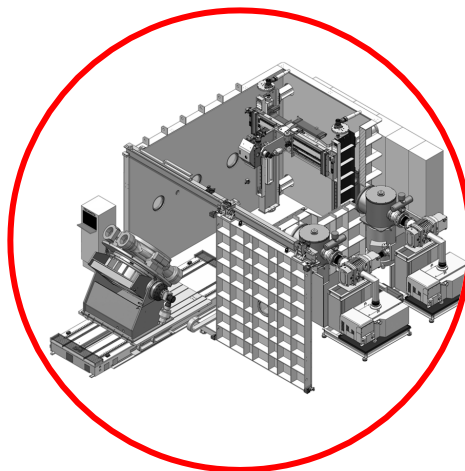
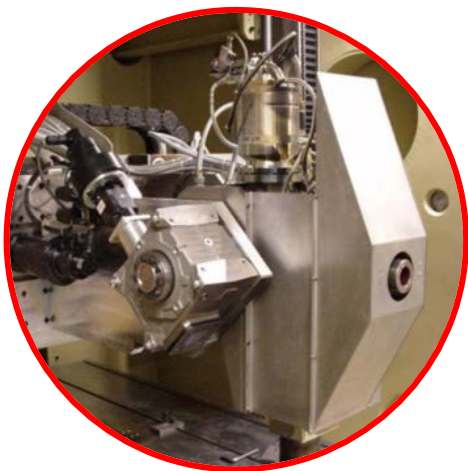
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# MANUFACTURED MACHINES

## GENOVA MACHINE – FIGHTER AIRCRAFT TURBINES AND ENGINES

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### MAIN FEATURES

- Welding chamber : 3500 mm x 3800 mm x 3000 mm
- Working table with loading/unloading platform
- Manipulator system for inner gun, CNC controlled
- Maximum dimension of the parts : 2500 mm x 2000 mm x 1000 mm
- Maximum loading weight : 700 kg

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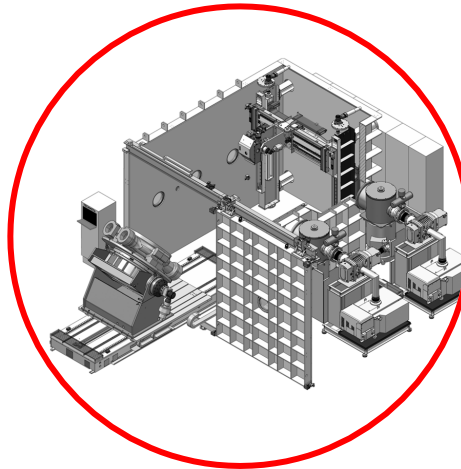
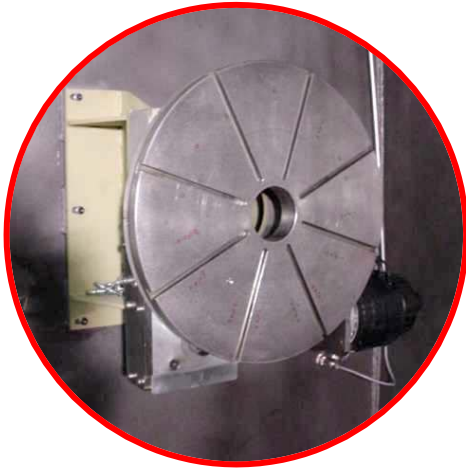
SPECIFIC  
MACHINES



# MANUFACTURED MACHINES

## GENOVA MACHINE – AIRCRAFT ENGINES' REPAIR FOR FRENCH NAVY

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GROUPE Bodycote



### MAIN FEATURES

- Chamber volume in  $m^3$  : 11,17
- Upgradation of a Sciaky machine,
- 6 mechanical axis : X, Y, Z, C, W + manual axis to move the gun

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# OUR EB SOLUTIONS MEET ALL YOUR CHALLENGES WHAT WILL BE YOURS?

35

35 YEARS OF  
EXPERTISE

30

ABILITY TO  
WELD OVER 30  
PARTS FOR THE  
SECTOR

50

OVER 50  
MACHINES  
AROUND THE  
WORLD



THANK YOU FOR  
YOUR ATTENTION

ANY QUESTIONS?

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