



# SHAPE MEMORY ALLOY (SMA) VALVE FOR TELECOMMUNICATION APPLICATIONS

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Dr. Farid Infed

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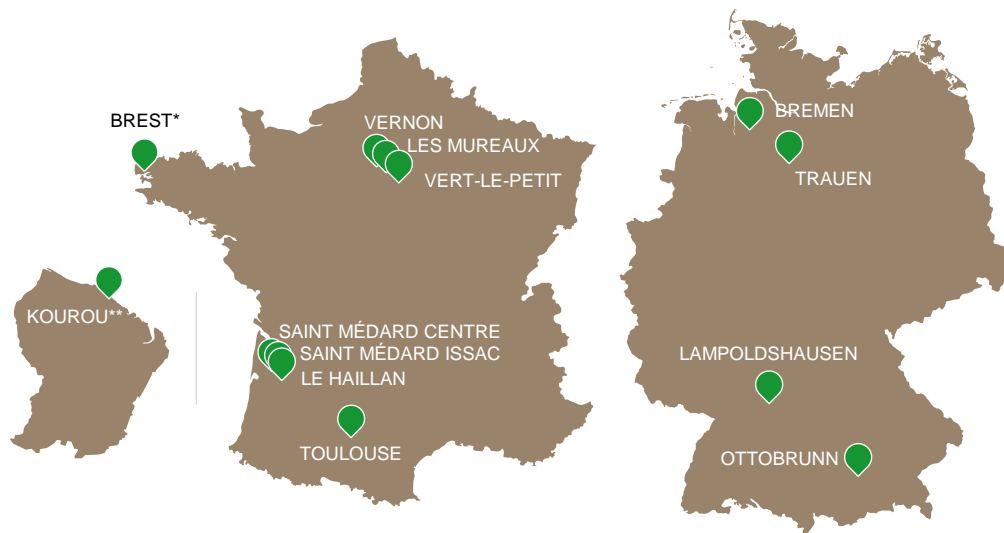
# 01

# COMPANY BACKGROUND

# LOCATIONS

## FRANCE

## GERMANY



\* Secondment to the French Navy site on Île Longue

\*\* Locations on the Guiana Space Centre (CSG)

## SUBSIDIARIES

### APP

Klundert (Netherlands)

### Arianespace

Kourou (France), Evry (France), Washington DC (United States), Singapore, Tokyo (Japan)

### Cilas

Orléans, Mont Audouze, Le Barp, Aubagne (France)

### Eurockot

Bremen (Germany)

### Nuclétudes

Les Ulis (France)

### Pyroalliance

Les Mureaux, Toulon (France)

### Sodern

Limeil-Brévannes (France)

## AFFILIATES

### Europropulsion

Suresnes, Kourou (France)

### Euro Cryospace

Les Mureaux (France)

### Regulus

Kourou (France)

### Starsem

Evry (France)

# EQUIPMENT AND SERVICES FOR SATELLITES AND SPACECRAFT

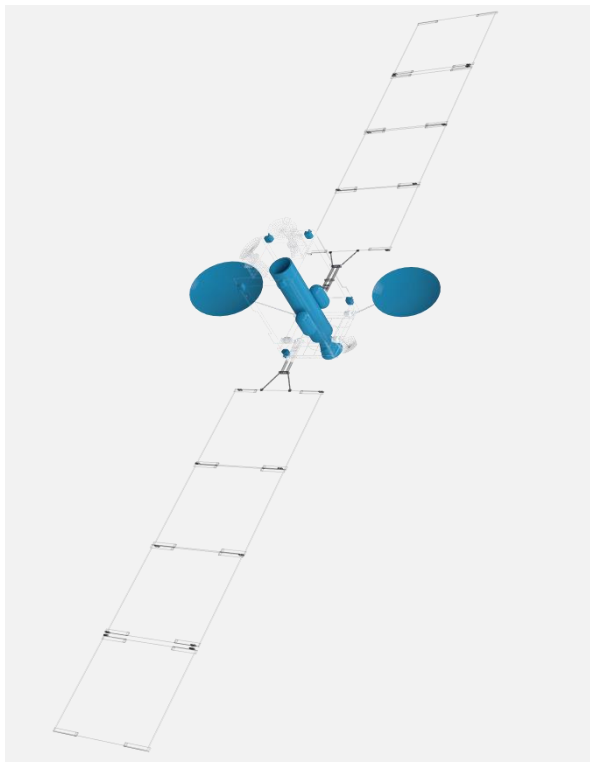
## ORBITAL PROPULSION

### Subsystems & associated services

- Chemical propulsion (mono & bipropellant)
- Electrical propulsion
- Hybrid propulsion
- Orbital and attitude control systems
- Launch support services
- Liquid propellant

### Components

- Monopropellant chemical engine of 1N to 400N
- Bipropellant chemical engine of 4N to 200N
- Bipropellant apogee engine of 400N
- RIT ion thruster of 50 $\mu$ N to 200+ mN
- Fuel tanks
- High-pressure composite tanks



## EQUIPMENT

- Star trackers
- Parachute deployment services
- Antenna reflectors
- Optical coatings
- Scientific instrumentation

# ArianeGroup Lampoldshausen

## Products – Electric Propulsion Portfolio

ArianeGroup offers for EP subsystems the modular Radiofrequency Ion Thruster (RIT) solution



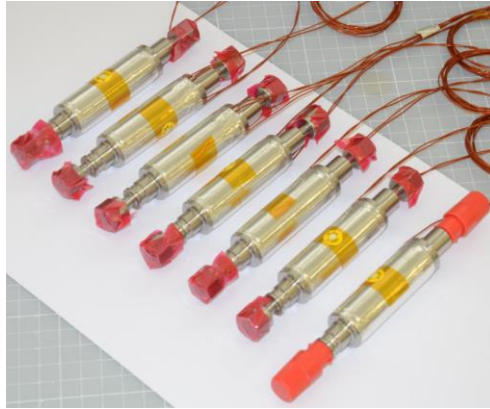
	Thruster				
	RIT $\mu$ X	RIT 10/EVO	RIT 15	RIT 22	RIT 2X
nominal thrust	50 – 500 $\mu$ N	15 mN	50 mN	150 mN	80-165-190 mN
extended / on request	3 – 3000 $\mu$ N	5 – 25 mN <sup>1)</sup>	10 – 70 mN	50 – 200 mN	50 – 240 mN
Isp	300 – 3000 s	> 3300 s	> 3300 s	> 3300 s 4260 s <sup>2)</sup> 4669 s <sup>3)</sup>	80mN: 3460s 165mN: 3500s 190mN: 2550s
max. demonstrated	> 3500 s	> 3500 s	> 4000 s	> 6000 s	> 4000s
nom. power	< 50 W	470 W	1500 W	4580 W <sup>2)</sup> 4740 W <sup>3)</sup>	2,2-4,3-4,3 kW 1.2-5.7kW
mass	440 g	1.8 kg	2.8 kg	7.7 kg	< 12 kg
	Application				
NSSK					
Primary propulsion <sup>4)</sup>					
Electrical orbit raising <sup>5)</sup>					
Ultra fine thrust control					



# 02

# PRODUCT AND TECHNOLOGY OVERVIEW

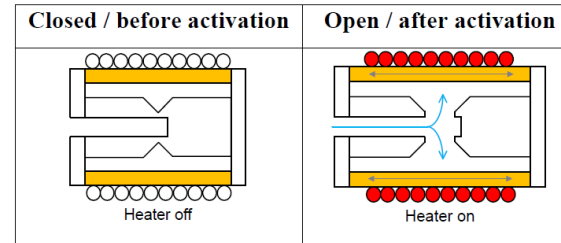
# PRODUCT OVERVIEW: OPERATIONAL PRINCIPLE AND MOTIVATION (2)



1st lot of flight like EM valves (2015)

## Operational principle

- One-time expansion of a shape memory alloy actuator
- Activation triggered by temperature (electrical heating)
- Rupture of internal hermetic seal element
- Zero leakage prior to activation

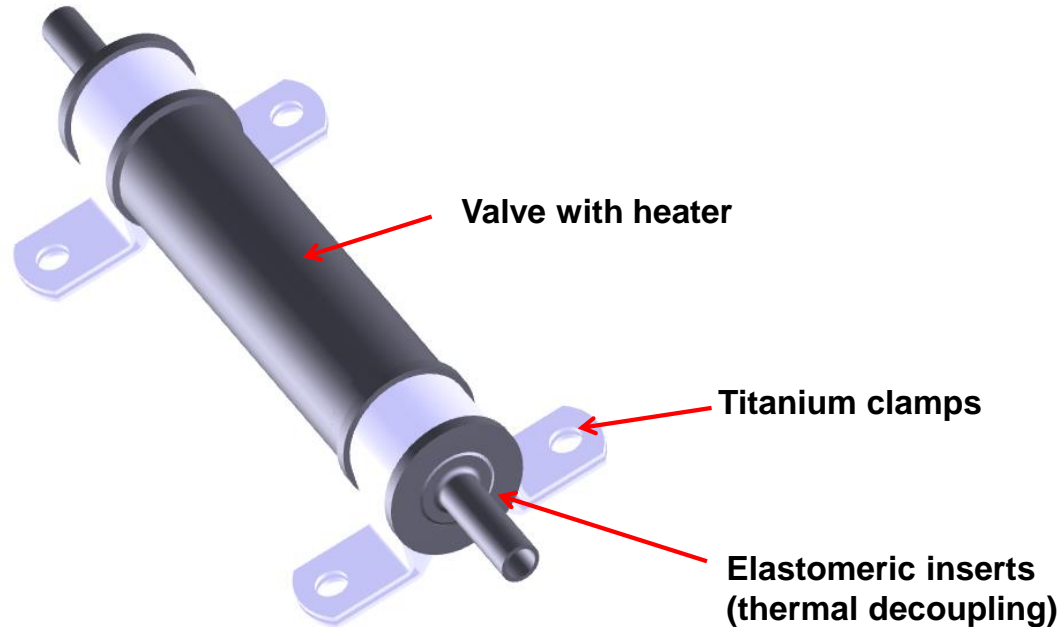


## Motivation & : Advantages vs. pyrotechnical valves

- Lifetime extension (>25 years) & cost reduction
- Reduction of pyrotechnical shock loads
- Elimination of pyrotechnics (no transport&handling constraints)
- Simplified electrical activation
- Insensitive towards ESD effects
- No hot combustion gases inside the valve that could leak into flow path



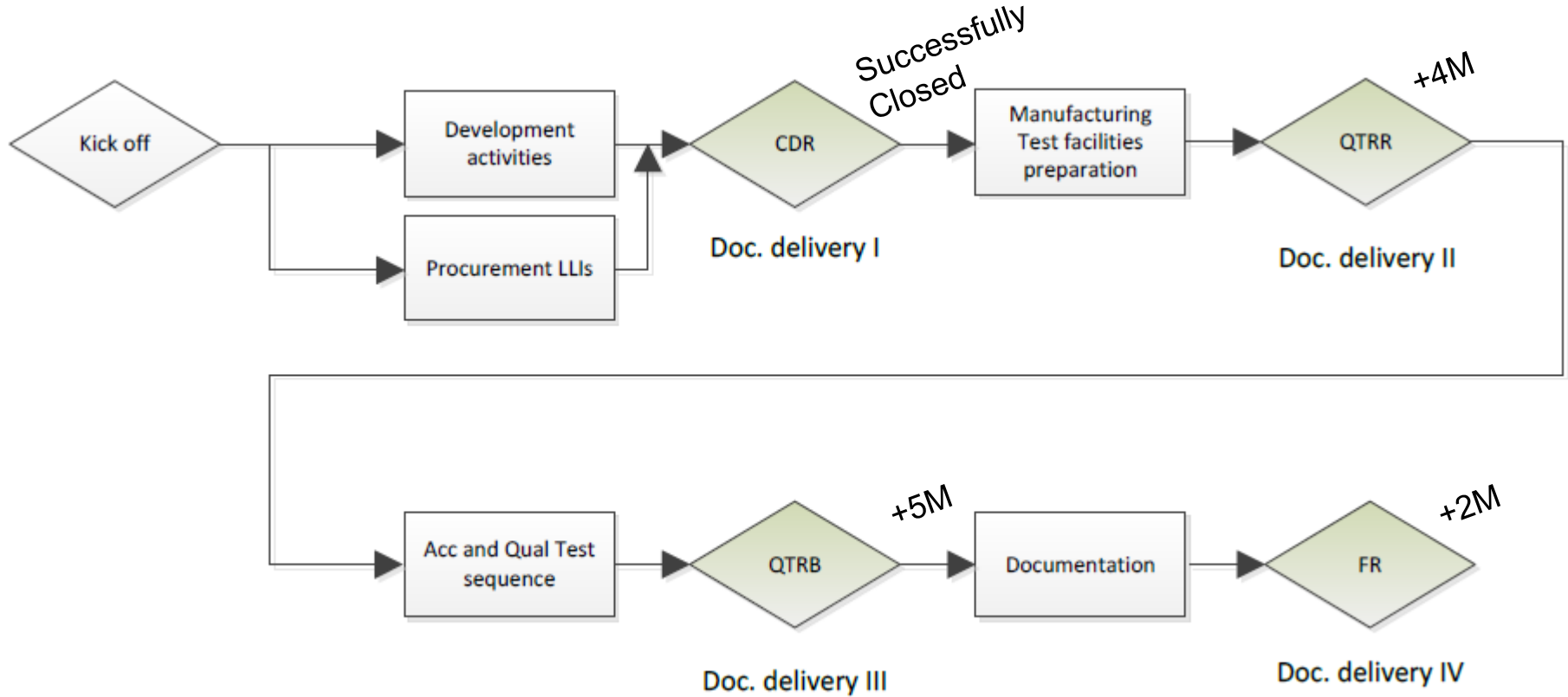
# PRODUCT OVERVIEW: VALVE IN DELIVERY CONFIGURATION



# 03

## STATUS & PROGRESS ON DEVELOPMENT

# PRODUCT OVERVIEW: STATUS AND PROGRESS



# #spaceenablers