



MINISTÈRE DE LA DÉFENSE
ET DES ANCIENS COMBATTANTS

New French IM GP Bombs

Development update

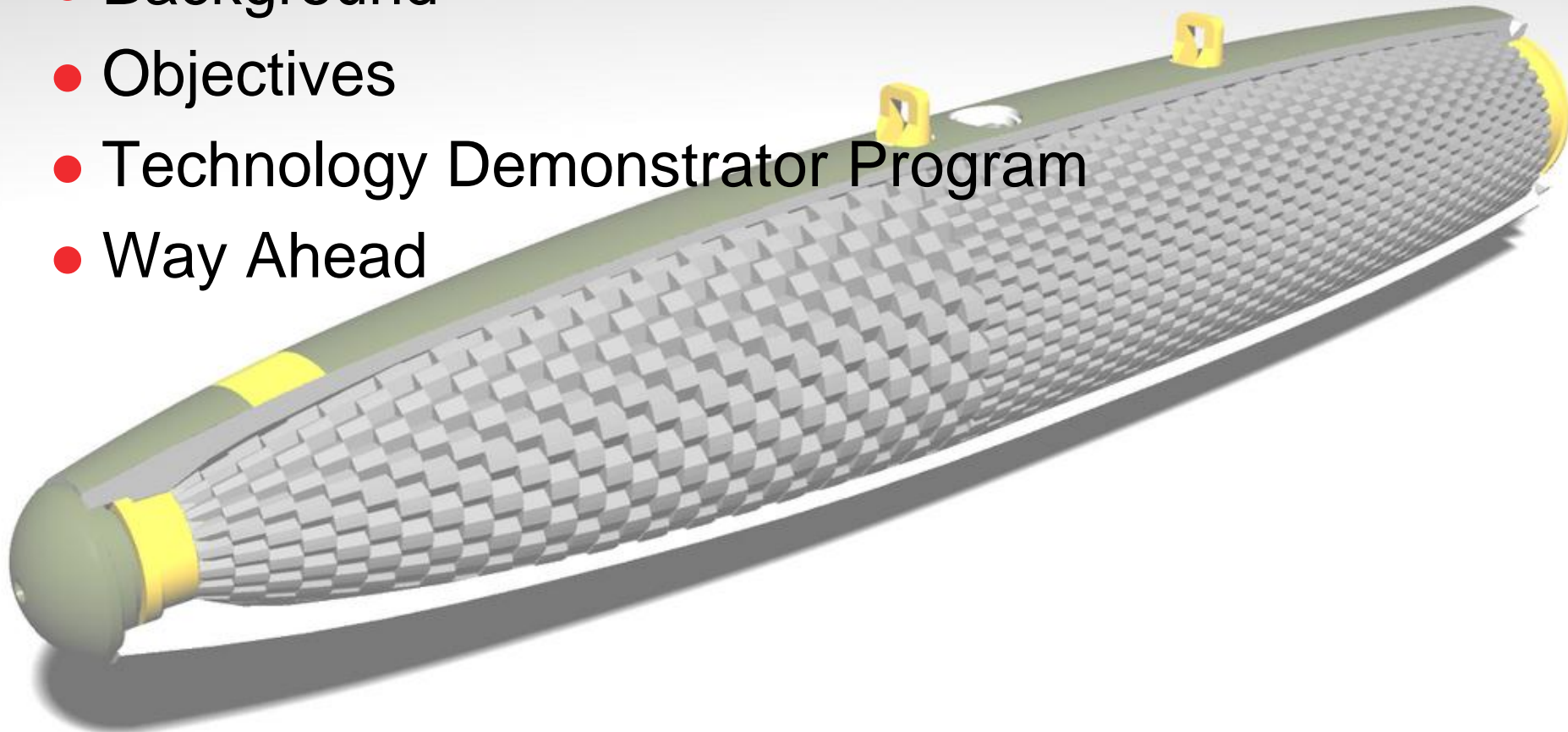
Laurent Delrieu (DGA), Sébastien Régnaut (SAMP),
Bruno Nouguez (Eurenco)



DIRECTION GÉNÉRALE DE L'ARMEMENT

New French IM GP Bombs

- Background
- Objectives
- Technology Demonstrator Program
- Way Ahead

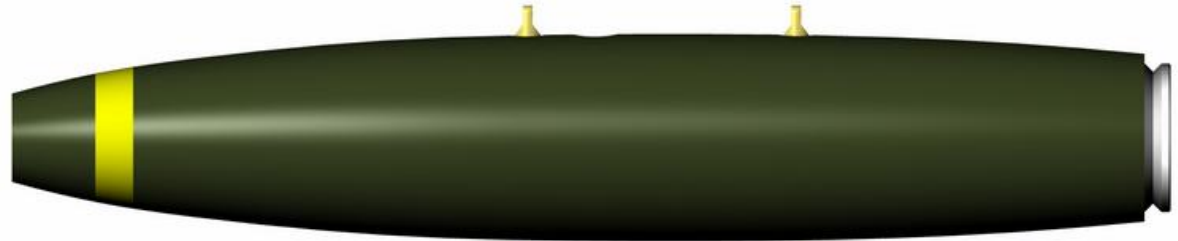




Background

- 500 lb bombs in French Forces

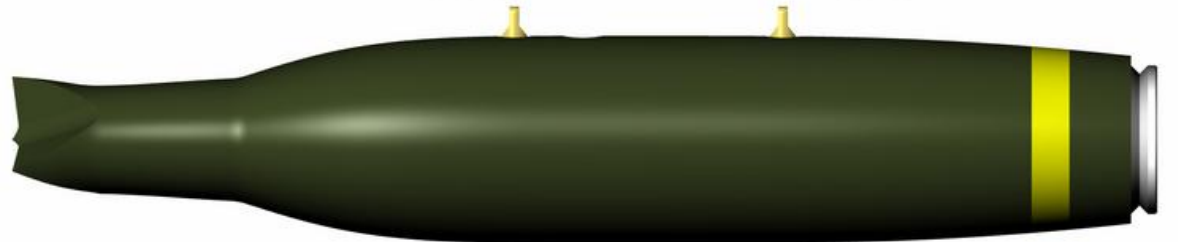
- Mk 82



- BLU 111



- CBEMS 250



Background : Mk 82



- Use
 - General Purpose Bomb
 - Armée de l'air
- Description
 - Similar to US BLU-111/B
 - PBXN-109 iRDX
- Manufacturer
 - SAMP
 - Eurenco
- IM Signature (MSIAC)

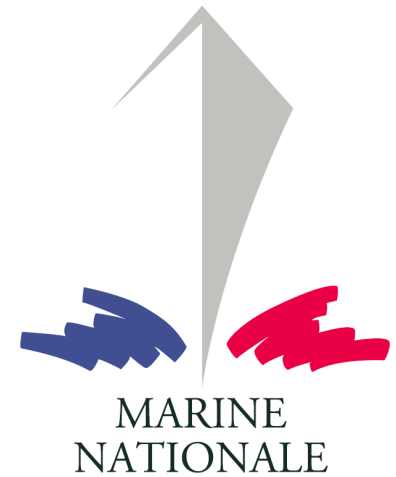


FCO	SCO	BI	FI	SR
IV/V	IV/V	V	V	I





Background : BLU 111



- Use
 - General Purpose Bomb
 - Marine Nationale
- Description
 - Similar to US BLU-111A/B
 - Thick Thermal Coating (FM26)
 - PBXN-109 iRDX
- Manufacturer
 - SAMP
 - Eurenco
- IM Signature (MSIAC)



FCO	SCO	BI	FI	SR
IV/V	IV/V	V	V	I





Background : CBEMS 250



● Use

- General purpose but with high penetration capabilities
- Marine Nationale

● Description

- B2214B (EIDS)
- Intumescent coating
- Venting systems
- Logistic palette

● Manufacturer

- MBDA
- Eurenco

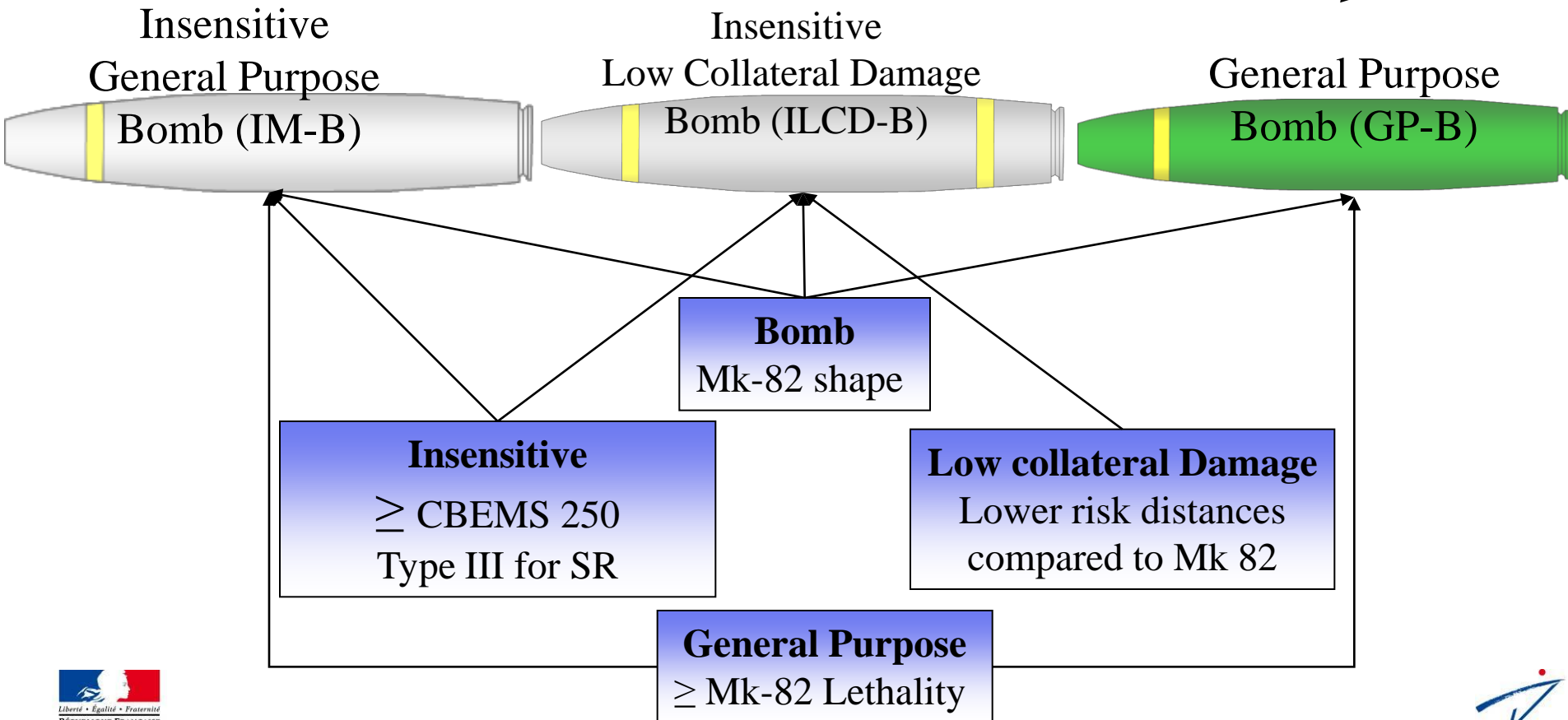
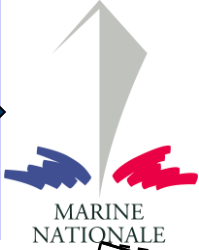
● IM Signature



FCO	SCO	BI	FI	SR
V	V	V	V	III



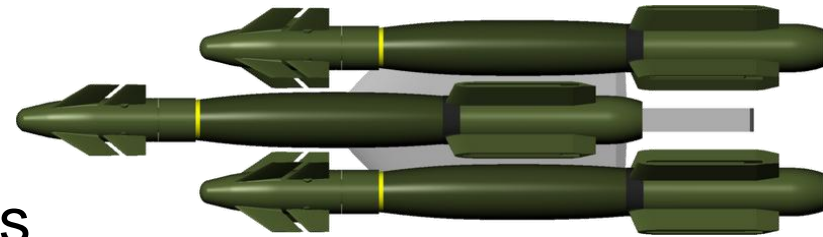
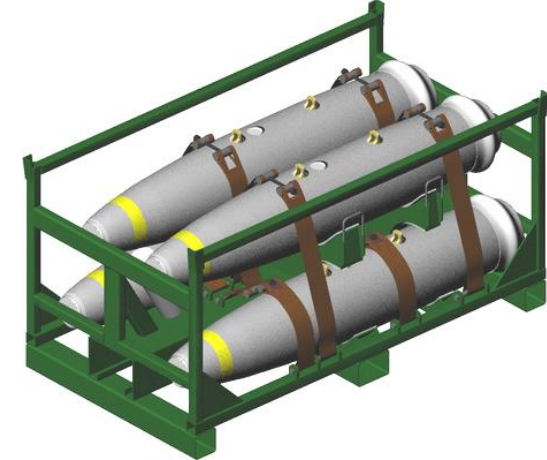
Objectives for new GP bombs TDP





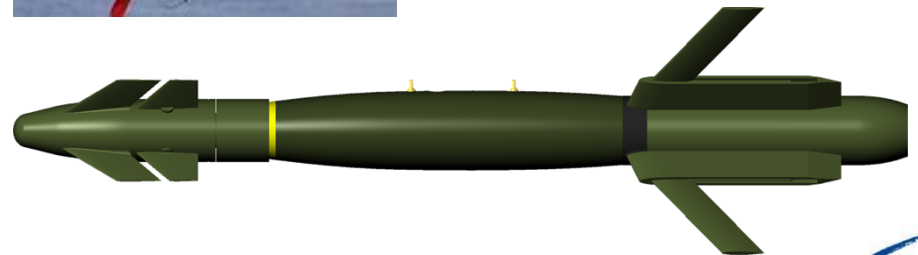
Objectives : Insensitive

- Sympathetic Reaction
 - No propagation of detonation
 - Reaction \geq Type III
- Fast Cook Off
 - No reaction for several minutes
 - Reaction limited to combustion
- Heavy Fragment Impact
 - No explosion when subjected to an impact of an Heavy Fragment



▶ Objectives : Bomb

- Compatibility with different interfaces
 - Mk-82 outline : no thick thermal protection
 - Fuzes : FBM21, FMU-139, FMU-143
 - Ejectors : TG480, ...
 - Kits : AASM, Paveway





TDP : Team

- Contracting French MoD

- DGA UM RAF
- DGA Technical direction
- CEA Gramat Expertise



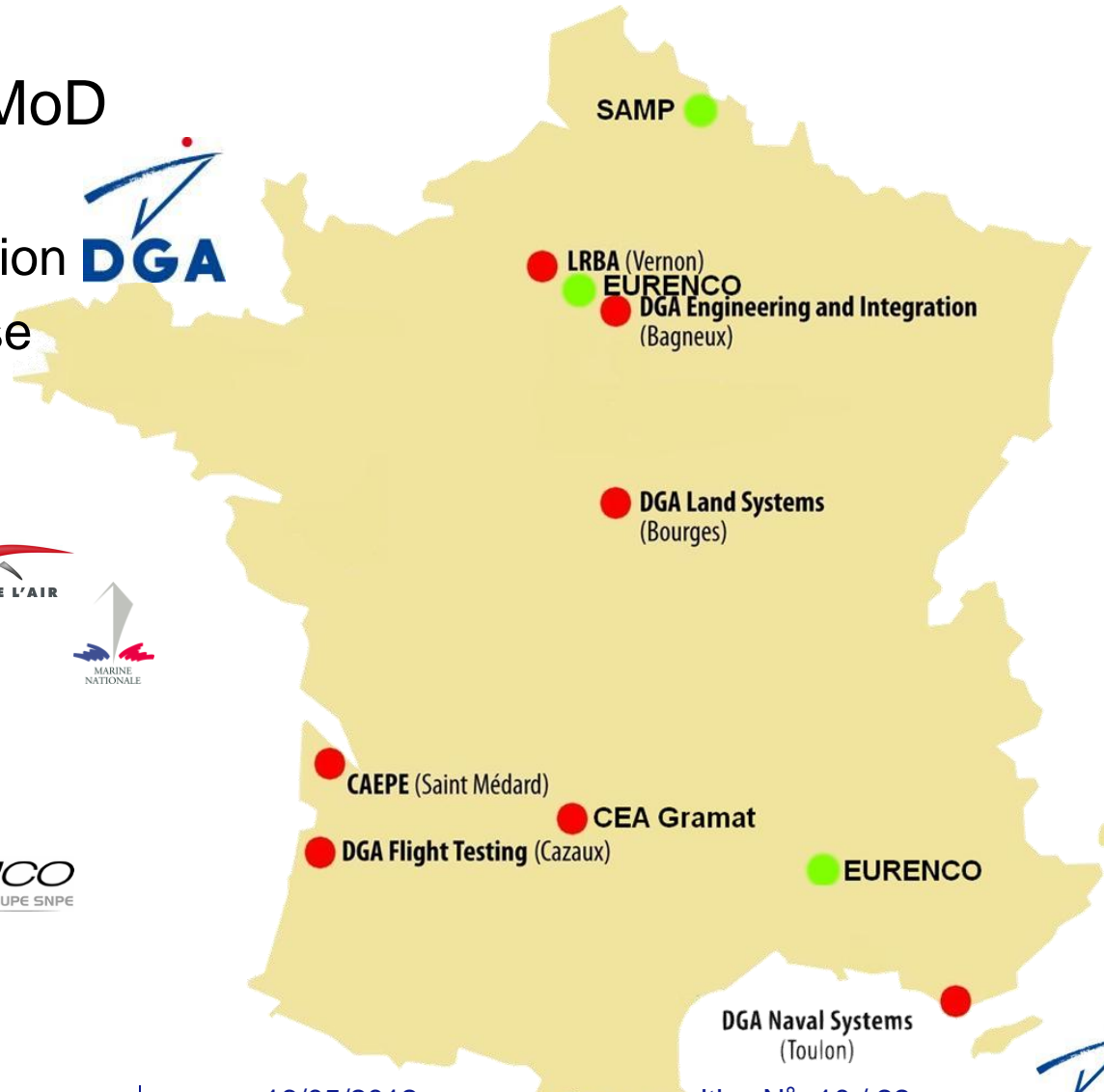
- Forces

- EMA : CNC
- Armée de l'air
- Marine Nationale



- Industry

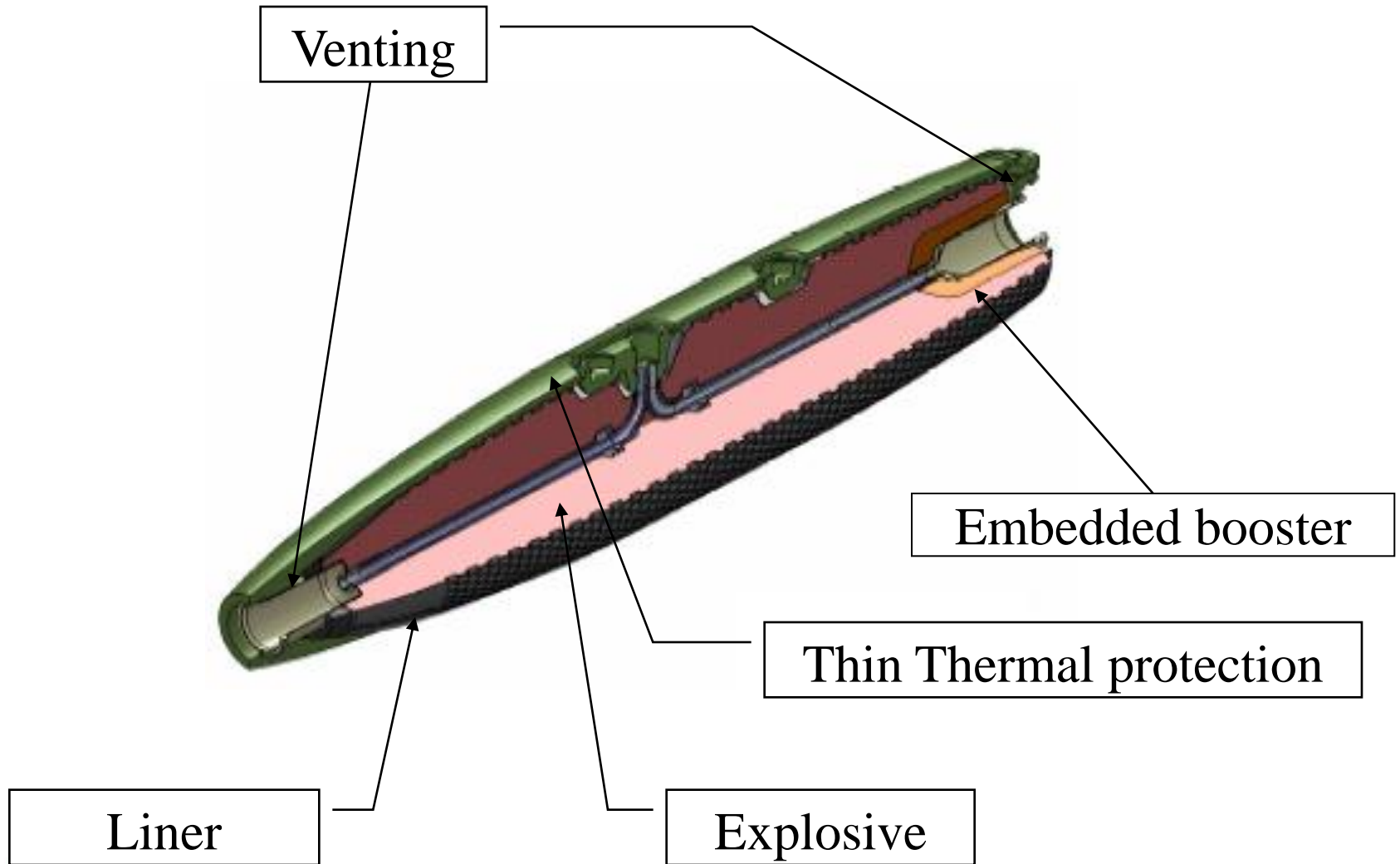
- SAMP
- Eurenco
- CEA



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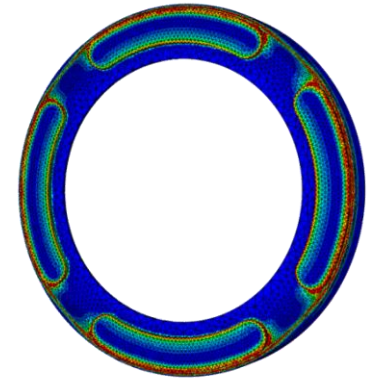
TDP : Major Parts





TDP : Venting

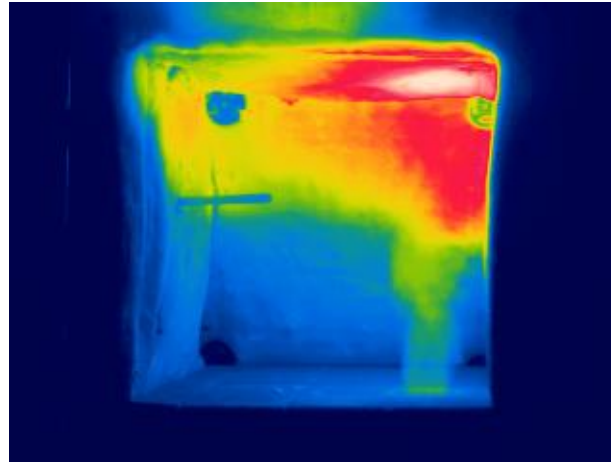
- Prevent violent reaction for
 - Sympathetic Reaction
 - Slow Cook Off
 - Light / Heavy Fragment Impact
- No reduction of reaction time for
 - Fast Cook Off
- Principle
 - Safety cut-out
 - Pressure breaking
 - Withstand environment



TDP : Thermal Protection

- Test on intumescent coating with ENSCL (France)
 - Evaluation of thermal coating, common and “home-made” intumescent coating
 - Coated steel sample
 - FAST COOK OFF (GAS OVEN)
 - TEMPERATURE INCREASE AND FLUX
 - COMPLIANT WITH STANAG 4240

INDIRECT FIRE (RADIATOR)





TDP : Thermal Protection



- Common intumescent coating (layer < 1 mm)

- Less efficient than FM26 (15% less)
- Thin layer
- No burning
- European supply



- “Home-made” intumescent coating (layer < 1 mm)

- As efficient as FM26
- Thin layer
- No burning
- European supply





TDP : Explosives



	GP-B	IM-B	ILCD-B
Main Filling	B2258B	B2268A	B2274A
Main Ingredients	RDX/AP/AI/HTPB	RDX/NTO/AI/HTPB	RDX/AI/HTPB
Embedded Booster	/	B2273A	B2273A
Main Ingredients	/	HMX/HTPB	HMX/HTPB



TDP : Liner and Booster



Boostering reliability



Fragment shapes and velocities identification



Overall view

- Velocity screen plates
- Water bottle « frag catcher »



LDTU

Large Diameter

Testing Unit

Post test view

Overpressure measurement



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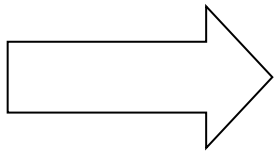
TDP : Liner and Booster

- Liners on production line



TDP : Sympathetic Reaction

- Trials of IM-B
 - 4 live IM-Bombs



REACTION TYPE III



Before test



After test (and reconstruction)

▶ TDP : Arena tests

IM-B (04/2012)
&
ILCD-B (05/2012)





TDP : Delivery of demonstrators to DGA



ILCD-B

IM-B before loading



Way Ahead

- IM test on IM-B
 - Fast Cook Off
 - Slow Cook Off
 - Heavy Fragment Impact
- Arena test for ILCD-B





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DGA institutional site: www.defense.gouv.fr/dga
Industry portal: www.ixarm.com



DIRECTION GÉNÉRALE DE L'ARMEMENT

7, rue des Mathurins - 92221 Bagneux Cedex - France
Tél. : +33 (0)1 46 19 50 00 - Fax : +33 (0)1 46 19 50 01

